WTW
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Installation, Operation, and Maintenance manual
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MultiLab® Pro IDS 20
MultiLab® Pro IDS 40

Digital meter for IDS sensors

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1 Introduction and safety

1.1 Introduction

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Purpose of the manual

The purpose of this manual is to provide necessary information for installation, operation, and maintenance of the unit.

Read and keep the manual

Save this manual for future reference, and keep it readily available at the location of the unit.



CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.

The equipment, and its functioning, may be impaired if used in a manner not specified by the manufacturer.

Intended use



WARNING:

Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment and the surroundings. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.

1.2 Safety terminology and symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:

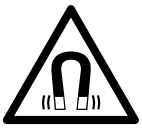
- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

Hazard levels

Hazard level	Indication
 **DANGER:**	A hazardous situation which, if not avoided, will result in death or serious injury
 **WARNING:**	A hazardous situation which, if not avoided, could result in death or serious injury
 **CAUTION:**	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury.

Special symbols

Some hazard categories have specific symbols, as shown in the following table.

Electrical hazard		Magnetic fields hazard	
	**Electrical Hazard:**		**CAUTION:**

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1.3 User safety

Introduction

All government regulations, local health and safety directives must be observed.

Prevent danger due to electricity

All danger due to electricity must be avoided. Electrical connections must always be carried out in compliance with the following:

- The standard connections shown in the product documentation that is delivered together with the product
- All international, national, state, and local regulations. (For details, consult the regulations of your local electricity supplier.)

For more information about requirements, see sections dealing specifically with electrical connections.

1.4 Authorized use

The usage of the device must satisfy the following conditions:

- Always measure the pH, oxidation-reduction potential (ORP), conductivity, dissolved oxygen (DO), and turbidity only in a laboratory environment.
- The device operation must adhere to the instructions and technical specifications that are given in this manual.
- Always obey the safety instructions of the sensors. For more information, see *https://www.xylemanalytics.com*.

1.5 Unauthorized use

Dot not operate the device in the following cases:

- A visible damage is present on the device or the power adapter.
- The device was stored under unspecified conditions for an extended period.

Table 1: Storage temperature

Storage temperature	Value
Temperature range	-25 °C to +65 °C (-13 °F to +149 °F)

1.6 Data security

To protect the digital information against an unauthorized access, damage, or theft, obey the following points.

- The device must operate in a segmented network environment that is isolated from external internet access.
- The access must be strictly limited to authorized personnel or approved teams that are enforced through network controls and authentication systems.

Restrictions:

- No inbound or outbound internet connectivity is allowed.
- The device must not be exposed to any publicly routable IP address.
- All inter-system communications must be tightly controlled, auditable, and limited to predefined ports and protocols.

1.7 Protecting the environment

Emissions and waste disposal

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Observe the local regulations and codes regarding:

- Reporting of emissions to the appropriate authorities
- Sorting, recycling and disposal of solid or liquid waste
- Clean-up of spills

Exceptional sites

CAUTION: Radiation Hazard

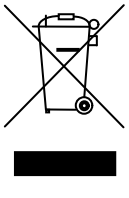
Do NOT send the product to Xylem if it has been exposed to nuclear radiation, unless Xylem has been informed and appropriate actions have been agreed upon.

1.8 End-of-life product disposal

Handle and dispose of all waste in compliance with local laws and regulations.

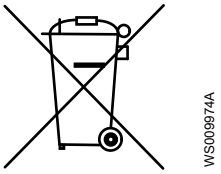
EU and UK only: Correct disposal of this product — waste electrical and electronic equipment

- EU: Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)
- UK: SI 2013 No. 3113



This marking on the product, accessories, or literature shows that the product should not be disposed of with other waste at the end of its working life.

EU and UK only: Correct disposal of batteries in this product



This marking on the battery, manual, or packaging shows that the batteries in this product should not be disposed of with other waste at the end of its working life. Where marked, the chemical symbols Hg, Cd, or Pb indicate that the battery contains mercury, cadmium, or lead above the reference levels in 2006/66/EC or UK SI 2008 No. 2164. If batteries are not properly disposed of, these substances can cause harm to human health or the environment.

To protect natural resources and to promote material reuse, please separate batteries from other types of waste and recycle them through your local, free battery return system.

1.9 Spare parts

CAUTION:

Only use the manufacturer's original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the warranty.

1.10 Warranty

For information about warranty, see the sales contract.

1.11 Support

Xylem only supports products that have been tested and approved. Xylem does not support unapproved equipment.

2 Transportation and storage

2.1 Examine the delivery

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Examine the package

1. Examine the package for damaged or missing items upon delivery.
2. Record any damaged or missing items on the receipt and freight bill.
3. If anything is out of order, then file a claim with the shipping company.
   If the product has been picked up at a distributor, make a claim directly to the distributor.

Examine the unit

1. Remove packing materials from the product.
   Dispose of all packing materials in accordance with local regulations.
2. To determine whether any parts have been damaged or are missing, examine the product.
3. If there is any issue, then contact a sales partner.

2.2 Storage guidelines

Storage location

The product must be stored in a covered and dry location free from heat, dirt, and vibrations.

NOTICE:

Protect the product against humidity, heat sources, and mechanical damage.

NOTICE:

Do not place heavy weights on the packed product.

Storage temperature

Table 2: Storage temperature

Item	Value
Storage temperature range	-25 °C to +65 °C (-13 °F to +149 °F)

2.3 Transportation

This device is sent out in a protective transport packing.

1. Put the device in the protective transport packing that was used for delivery.
   The original packing protects the meter against damage during transport.
2. Follow the storage guidelines also for transportation.
   For more information, see *Storage guidelines* on page 8.

3 Product description

3.1 Introduction

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MultiLab Pro IDS assists the measurement of several parameters of aqueous solutions.

Sensors

The device variants support multiple intelligent digital sensors (IDS) for simultaneous measurements.

Table 3: MultiLab Pro IDS variants

Model	Number of sensors	Connection	Sensor type
MultiLab Pro IDS 20	Up to 2	• Wired • Wireless	• pH • Oxidation-reduction potential (ORP) • Conductivity • Dissolved oxygen (DO) • Turbidity
MultiLab Pro IDS 40	Up to 4		

Functions

The device supports the following functions:

- Standard calibration procedures
- Automatic stability control
- Automatic sensor recognition
- Operation with IDS sensors
- Continuous measurement control (CMC)
- Quality sensor control (QSC)
- User management
- Audit trail
- Data history and export

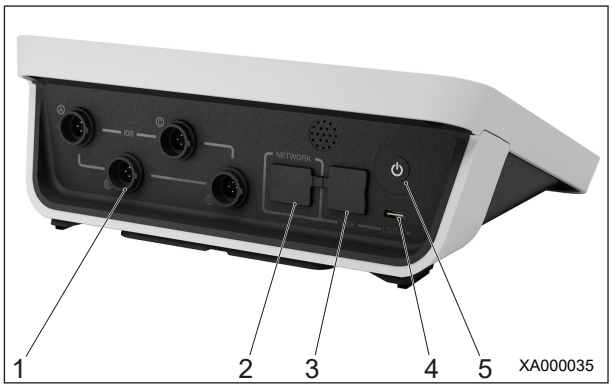
3.2 Device layout

Figure 1: MultiLab Pro IDS 40 touchscreen



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Figure 2: MultiLab Pro IDS 40 socket field



1. IDS sensor ports, A–D
2. Network port
3. USB–A port, 2x
   USB-A low power ports, max. 4V, 100 mA
4. Power port USB–C
5. Power switch

3.3 Intelligent digital sensor

The intelligent digital sensor (IDS) sensors have different functional and physical capabilities:

- Processing digital signal transmission.
- Even for a long wired connection, the measurements are precise and interference-free.
- For easy connection to the device, the IDS sensors are equipped with a quick-lock coupling.
- For easy identification, the IDS sensors are equipped with a colored coupling.

The IDS sensors store the following data:

- Sensor identification data
  - Sensor name
  - Sensor serial number
- Calibration data
- Measurement settings

When the IDS sensors are connected to the device, the device collects the stored data.

4 Installation

4.1 Precautions

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Before starting the work, make sure that the safety instructions have been read and understood.

For more information, see *Introduction and safety* on page 4.

4.2 Mechanical installation

Mechanical installation options

- As a bench-top device.
- Mounted on a VESA 75 stand.

  The VESA 75 mount is not part of the delivery scope.

  For more information, see *Attach the device to a VESA mount* on page 11.
- With sensors installed on the provided sensor stand

  The sensor stand is included in the scope of delivery.

  For more information, see the installation instructions of the sensor stand.

Put the device on a work table

1. Put the device on a clean surface.
2. If a protection sheet covers the screen, then remove it.

The device is ready for electrical installation.

For more information, see *Electrical installation* on page 11.

Attach the device to a VESA mount

1. Follow the instructions that are given in the documentation of the mounting stand to install it.
2. Align the device with the mounting stand holder.
3. Insert four M3 screws with washers.
4. Tighten the four screws.

   The device is installed on the mounting stand.
5. If a protection sheet covers the screen, then remove it.

The device is ready for electrical installation.

For more information, see *Electrical installation* on page 11.

4.3 Electrical installation

Table 4: Power supply options

Options	Description
Power adapter	• Make sure to use only the original power adapter included in the package. For more information, see *Technical specification* on page 64. • Check that the power adapter is in good condition.
Power bank	• Minimum output power of 15 W (5 V, 3 A) • USB-C cable

The power bank is not included in the scope of delivery.

1. Connect the correct primary plug to the power adapter.

   There are four primary plugs that are supplied in the package.
2. Connect the power adapter cable to the power port USB-C on the device.
3. Connect the power adapter to the power outlet.

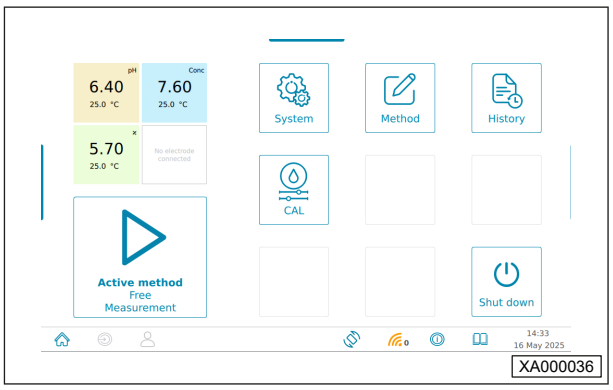
5 Commissioning, startup, operation, and shutdown

5.1 Turn on the device

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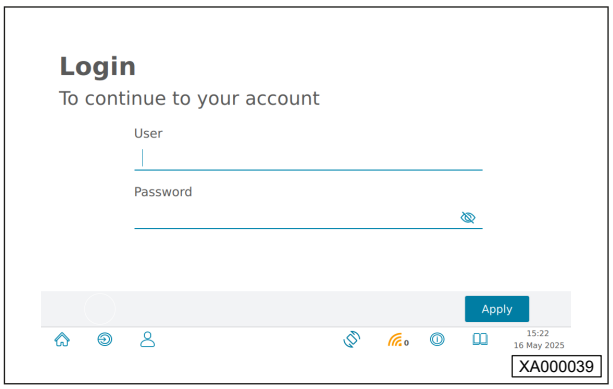
1. Press the power switch.
   – If the user management is not active, then the home screen is shown.

   Figure 3: Home screen

   – If the user management is active, then the login screen is shown.

   Figure 4: Login screen

2. If the user management is active, then follow the next steps:
   a) Fill in the user credentials.
   b) If needed, then tap to show the password.
   c) Tap **OK** to log in.

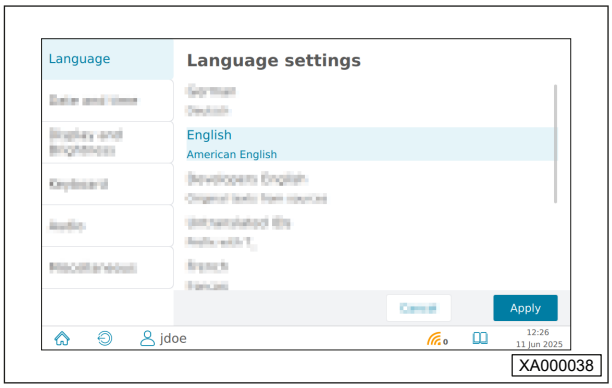
      Based on the configured settings, a user is temporarily or permanently blocked after multiple incorrect password attempts. The number of remaining login attempts is displayed.

The home screen is shown.

5.2 Set language, date, and time

1. Go to > **System** or swipe down from the top of the screen.
   The system screen is shown.
2. Go to **Device settings** > **Language**.

Figure 5: Device settings



3. Select a language.
4. Tap **OK**.

   The selected language is activated.

   The system screen is shown.
5. Go to **Device settings** > **Date / Time**.
6. Select the **Select time format…**.
7. Select the **Select date format…**.
8. If the local time zone has daylight savings, then set the toggle switch **Automatic daylight saving adjustment** to **on**.
9. If there is no network connection, then set the toggle switch **Set time / date manually** to **on**.
   a) Select the local **Select time zone…**.
   b) Set the **Time**.
   c) Set the **Date**.

   The date and time are set.
10. If there is a network connection, then set the toggle switch **Set time / date manually** to **off**.
    a) Type the address of a **NTP Server** for the local time.

    The date and time are set.
11. Tap **Back**.

    Language, date, and time are set.

    The system screen is shown.
12. Tap ⌂.

    The home screen is shown.

More device settings are available. For more information, see *Device settings* on page 25.

5.3 Turn off the device

Make sure that all ongoing processes are completed.

1. Go to ⌂ > **Shut down**.

   A pop-up window is shown.
2. Tap **OK** to shut down the device.

   If the device does not respond, then press and hold the power switch for three seconds. Unsaved changes are lost.

The device is turned off.

6 Operation

6.1 Principles of operation

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- All Xylem blue elements are active elements, for example the edit icon .
  The user can execute the function or edit the setting.
- If the device is operated with an active user administration, then some elements are not accessible based on the permissions for the user.
- Active elements in the user interface can be menus, buttons, and icons.
  - Icons are shown as images, for example, ▷.
  - Texts in the user interface, for example buttons or menu names, are displayed as **bold text** in the manual.

Here is an example of how the navigation is presented in this manual:

Short navigation:

Go to ⌂ > **System** > **Device settings** > **Language**.

Long navigation:

1. Tap the icon ⌂ in the status bar.
2. Tap the **System** button on the home screen.
3. Tap the **Device settings** button on the system screen.
4. Tap the **Language** button in the menu bar.

6.1.1 Touch gestures and actions

Table 5: Touch gestures and actions

Gesture	Description
Tap	The tap gesture selects an item or option on the display.
Swipe	The swipe gesture from the top, the left or the right opens the mostly used screens or menu options.

6.1.2 Elements on the home screen

Figure 6: Elements on the home screen

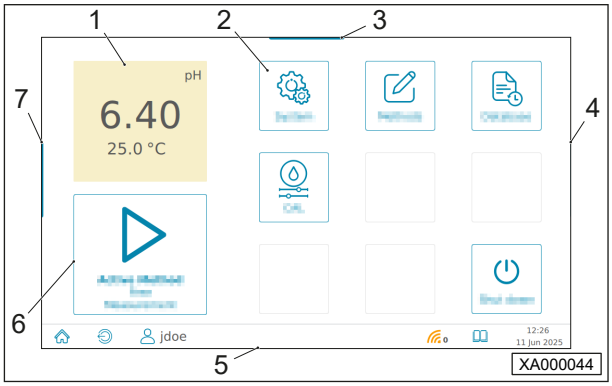


Table 6: Elements on the home screen

Position	Element	Description
1	Measurement preview	The preview of the measured values from all connected sensors is shown.
2	Button	The home screen has predefined buttons.
3	Top swipe indicator	The swipe indicator shows that a swipe gesture from the top edge is supported. If the swipe gesture is executed, then the settings screen is shown.

Position	Element	Description
4	Right swipe indicator	The swipe indicator shows that a swipe gesture from the right edge is supported. If the swipe gesture is executed, then the database screen is shown.
5	Status bar	For more information, see *Elements in the status bar* on page 15.
6	▷	This button opens the measurement screen. The selected measurement method is active.
7	Left swipe indicator	The swipe indicator shows that a swipe gesture from the left edge is supported. If the swipe gesture is executed, then the **Calibration methods** menu is shown.

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6.1.3 Elements in the status bar

The status bar displays icons for frequently used functions and status information for a quick overview. Functions are displayed in Xylem blue and orange.

Figure 7: Elements in the status bar

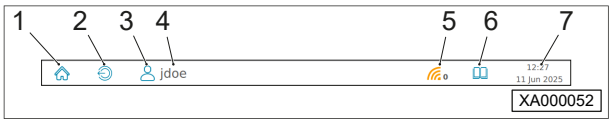
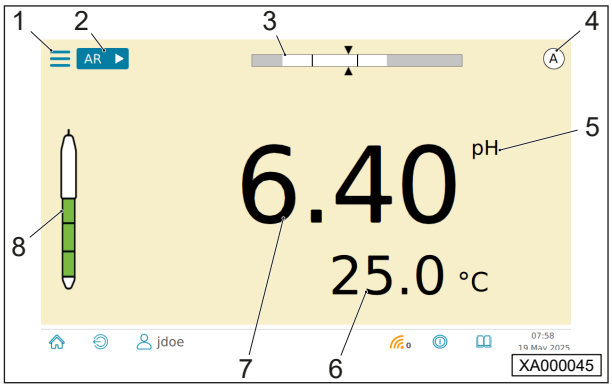


Table 7: Elements in the status bar

Position	Element	Description
1		The icon opens the home screen.
2		The icon logs out the user without confirmation. The icon is gray when the function **User Management** is not active.
3		The icon opens the user settings to change the password and see the permissions. The icon is gray, when user management is not active.
4	**Username**	The username of the logged-in user is shown.
5		The icon opens the menu for the management of wireless sensors. For more information, see *Connect a wireless sensor* on page 17. If wireless sensors are connected, then the number of sensors is shown next to the icon.
6		The icon opens the installation, operation, and maintenance manual.
7	Date and time	The current date and time is shown.

6.1.4 Elements on the measurement screen

Figure 8: Elements on the measurement screen



If more than one sensor is connected, then all sensors are shown in an overview.

If no measured value is available, then a notification is shown in the measurement screen.

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Table 8: Elements on the measurement screen

Position	Elements	Description
1	Menu icon	The menu icon opens the sensor settings. For more information, see the sensor settings chapter of the selected sensor.
2	AutoRead button	The AutoRead button starts or stops the measurement with the AutoRead method.
3	CMC scale	The continuous measurement control (CMC) scale is available only for pH sensors. For more information, see *Measure the pH value* on page 34.
4	Sensor connection indicator	• A letter inside a circle shows the IDS port to which a wired sensor is connected. The letter is also shown next to the port on the device. • The icon shows that the sensor is connected wireless.
5	Measured parameter	The measured parameter is shown on the measurement screen.
6	Measured temperature value	The temperature of the measured solution is shown on the measurement screen. If the sensor does not support temperature measurement, then a blue (m) is shown next to the temperature value.
7	Measured value	The value of the measured solution is shown on the measurement screen.
8	Sensor quality symbol	• Calibration evaluation • The sensor icon can be replaced by quality sensor control (QSC) scale for IDS pH sensors. For more information, see *Quality sensor control (QSC) function* on page 37.

6.2 Sensors

The following sensors can be operated with the device:

- Wired IDS sensor
- Wireless IDS sensor

  For more information on wireless IDS sensors, see the operating manual of the IDS WLM system.

6.2.1 Connect a sensor

To connect a sensor, follow these instructions:

- *Connect a wired sensor* on page 16
- *Connect a wireless sensor* on page 17

Connect a wired sensor

1. Connect the IDS sensor to an IDS port on the device.

   The measurement preview shows the measurement screen of the sensor.

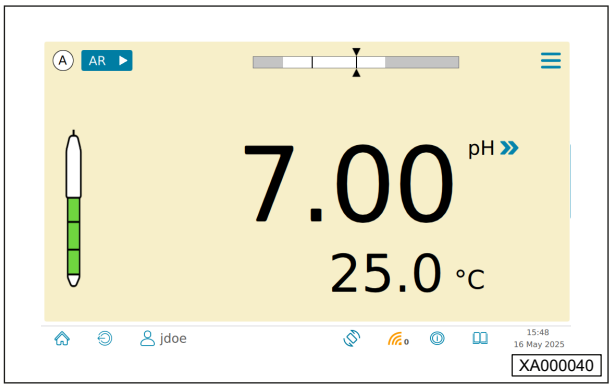
   Prerequisites:

   – The sensor must have a valid calibration.
   – The number of sensors must not exceed the allowed maximum..

2. Tap the ▷ button on the home screen.

   The measurement screen is shown.

Figure 9: Measurement screen for a pH sensor



Connect a wireless sensor

For more information on the IDS WLM system, see the IDS WLM system operating manual.

1. Connect the WLM-M adapter to an IDS port of the device.
2. Connect the WLM-S adapter to the sensor.
3. Tap in the status bar of the device.

   The **Available wireless sensors** screen is shown.
4. Tap **Search**.

   The search for available wireless sensors is started. The stop icon is shown on the **Search** button. When a wireless sensor is found, the sensor is shown in the list. Wireless sensors that are already connected show a check mark in the checkbox. If all available wireless IDS sensors are shown, or the search takes too long, then go to the next step.
5. Tap **Search**.

   The search for available wireless sensors is stopped. The start icon is shown on the **Search** button.
6. Tap the checkboxes for all sensors to be connected to the device.
7. Tap **Connect**.

   The selected sensors are connected. The number of sensors is limited by the device type and the number of sensors that are connected by wire. Three wireless sensors can be connected to one WLM-M adapter. To connect a fourth wireless sensor, a second WLM-M adapter is required.
8. Tap **Back**.

   The previous screen is shown.
9. Tap .

   The measurement preview shows the measurement screen of the sensor.

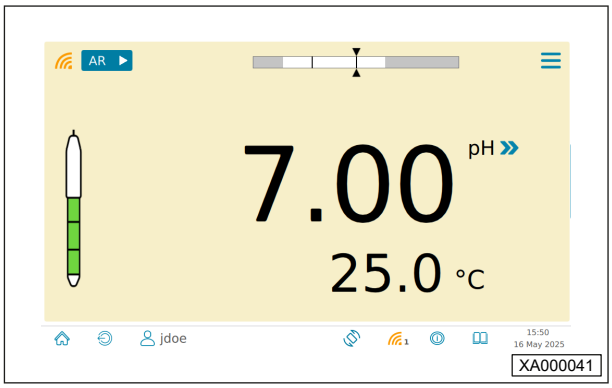
   Prerequisites:

   – The sensor must have a valid calibration.
   – The number of sensors must not exceed the allowed maximum.
10. Tap the ▷ button on the home screen.

    The measurement screen is shown.

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Figure 10: Measurement screen for a pH sensor



6.2.2 Connect multiple sensors

A sensor is already connected. For more information, see *Connect a sensor* on page 16.

1. Connect an additional sensor.
   The additional connected sensor is shown on the measurement screen.

Figure 11: Example of MultiLab Pro IDS 20 with two sensors

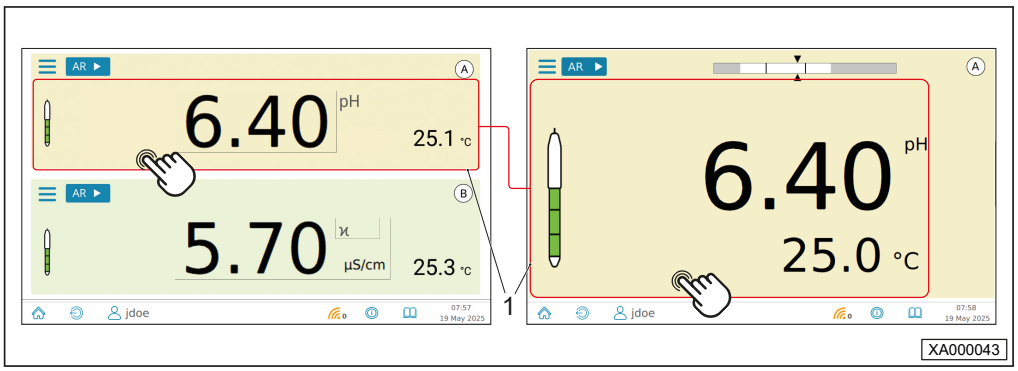


Figure 12: Example of MultiLab Pro IDS 40 with three sensors

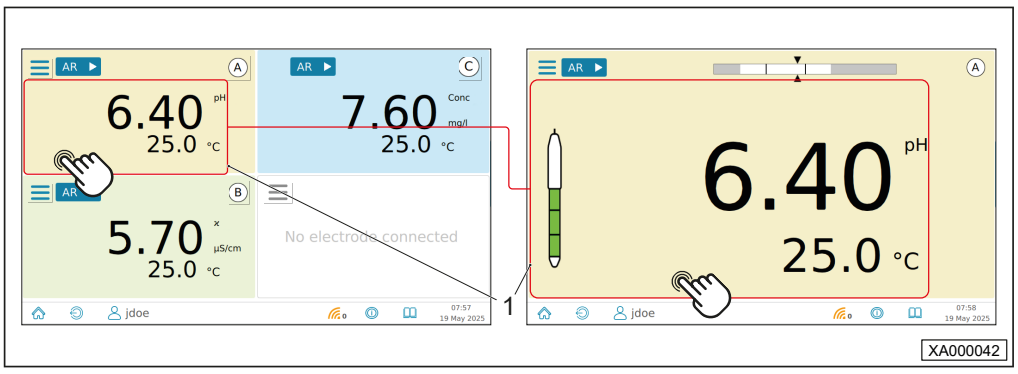


Table 9: Measurement screen

Position	Element	Description
1	Measured value area	A tap on the measured value area switches between the single-sensor screen and the multi-sensor screen

2. Tap the measured value area (1) of the related sensor.
   The single-sensor screen is shown.
3. Tap the measured value area (1) in the single-sensor screen.
   The multi-sensor screen is shown.

6.3 Methods

6.3.1 Introduction

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Methods are workflows with several consecutive steps that only give a result if all steps are executed successfully.

The method name is stored in the database together with the measured value. The method name is also used to filter the data in the database.

The following types of methods are available:

- Calibration methods

  The calibration methods are workflows to evaluate the sensor quality.
- Measurement methods

  The measurement methods are workflows that give a measured value.
  - For measurement with other connected devices, specific types of methods are available or can be created.
  - For measurement with sensors, the following types of methods are predefined:
    - **Free Measurement**

      Stability control function

      For more information, see *Stability control* on page 19.
    - **FDO Check**

      For more information, see *FDO check* on page 45.

6.3.2 Stability control

If the measurement method **Free Measurement** is active, then the stability control function AutoRead(**AR**) is available on the measurement screen. The AutoRead function checks the stability of the measured value. The stability has a significant effect on the repeatability of the measured value.

If the measured value stays stable during the time interval of the stability control function, then it is considered valid.

The criteria for a stable measured value are different for the sensor types.

Table 10: Stability criteria for the AutoRead function

Sensor type	Stability criteria
pH	For more information, see *Criteria for a stable measured value* on page 35.
DO	For more information, see *Criteria for a stable measured value* on page 46.
Conductivity	For more information, see *Criteria for a stable measured value* on page 53.
Turbidity	For more information, see *Criteria for a stable measured value* on page 58.

6.4 Measurement

6.4.1 Prepare for measurement

A sensor is connected to the device. For more information, see *Connect a sensor* on page 16.

1. Check the sensor settings.

   For more information, see *Check the sensor data and sensor settings* on page 20.
2. Check the calibration evaluation.

   For more information, see *Calibration evaluation* on page 23.

   If the sensor has no valid calibration or the calibration evaluation is not sufficient, then do the following:

   a) Clean the sensor.

      For more information, see the manual of the sensor.

   b) Start a calibration.

For more information, see the following chapter for the connected sensor type.
- pH sensor: *Quality assurance* on page 34
- Oxidation-reduction potential (ORP) sensor: *Quality assurance* on page 42
- Dissolved oxygen (DO) sensor: *Quality assurance* on page 45
- Conductivity sensor: *Quality assurance* on page 52
- Turbidity sensor: *Quality assurance* on page 58

c) Replace the sensor.

3. Select a method for the measurement.
   For more information, see *Select a measurement method* on page 20.

6.4.2 Select a measurement method

1. Go to ⌂ > **Measurement**.
   The **Measurement methods** menu is shown. The following list contains examples of default measurement methods.

   Table 11: List of measurement methods

Measurement method	Description
Free Measurement	For each method, the following icons show the available actions. – ⊳+: Selects the method as the active method – ⓘ: Shows the settings of the method
FDO Check	

2. Scroll through the list until the name of the measurement method to be used is shown.
3. Tap ⊳+ that is next to the name of measurement method to be used.
   The selected method is active. The home screen is shown. The name of the selected measurement method is visible on the ▷ button on the home screen.

6.4.3 Check the sensor data and sensor settings

1. Go to ⌂ > ▷ > **Measurement screen of the sensor** > ☰.
   The **Sensor Data / Settings** menu is shown.
2. Check or edit the sensor settings.
   For more information, see the following chapter for the connected sensor type.
   - pH sensor: *Quality assurance* on page 34
   - Oxidation-reduction potential (ORP) sensor: *Quality assurance* on page 42
   - Dissolved oxygen (DO) sensor: *Quality assurance* on page 45
   - Conductivity sensor: *Quality assurance* on page 52
   - Turbidity sensor: *Quality assurance* on page 58

6.4.4 Measure

Prepare for measurement. For more information, see *Prepare for measurement* on page 19.

The sensor connection and the USB interfaces are galvanically insulated. The measurement is interference-free also in the following cases:
- Measurement in grounded test samples
- Measurement with several sensors that are connected to one MultiLab Pro IDS in one test sample

1. Immerse the sensor in the sample.
2. Go to ⌂ > ▷.
   The measured value is shown. If the measured value is not shown, then an error message is shown on the measurement screen.
3. Tap **AR** on the measurement screen.

The rotating arrow next to the **AR** button shows that the method is active. The measured value is not yet valid according to the rules of the AutoRead function.

It is possible to stop the **AR** function with a tap on the **AR** button. This stops the measurement without save the result.

It is possible to start the **AR** function for other sensors while the method is active.

4. Wait until the rotating arrow icon has stopped.

   As long as HOLD is shown next to the **AR** button, the measured value is stable and does not change.

   The measured value is valid according to the rules of the selected method. A pop-up menu bar with further actions is shown.

Table 12: Pop-up menu bar that is shown at the end of a measurement

Icon	Description
	The icon repeats the measurement with the **AR** measurement method.
	The icon opens an input field for a comment and an ID.
	The icon opens a menu to store the calibration data to another storage location.
	The icon shows the measurement data.
	The icon terminates the measurement and returns to the measurement screen. The measurement is stored in the database.

6.4.5 Measure the temperature

For repeatable measurements, it is essential to measure the temperature of the test sample.

The displayed temperature shows which type of temperature measuring is active.

Table 13: Temperature measurement

Integrated temperature sensor	Resolution of the temperature display	Temperature measurement
Yes	0.1 °C	automatic
No	1 °C	manual

Measure or calibrate with an integrated temperature sensor

IDS sensors measure the temperature automatically with an integrated temperature sensor.

Measure or calibrate without an integrated temperature sensor

If a sensor without an integrated temperature sensor is used, then the following methods can be used to measure the temperature of the test sample.

- Measurement of the temperature with the temperature sensor of another connected sensor
- Manual measurement of the temperature and input of the temperature value

Set the manually measured temperature value:

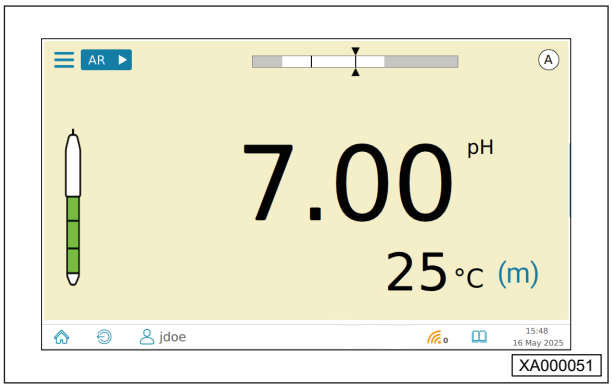
1. Measure the current temperature of the test sample.
2. Go to > .

   The measurement screen is shown. The displayed temperature value is the set value for all sensors without an integrated temperature sensor. For more information, see *Miscellaneous settings* on page 26.

   The temperature value has no decimal positions and an **(m)** is shown next to the temperature value. The temperature must be set manually.

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Figure 13: Measurement screen pH



3. Tap the **(m)** beside the temperature value.
   An input window is shown.
4. Type in the manually measured temperature value.
5. Tap **OK**.
   The manually measured temperature value is shown on the measurement screen and is used to calculate the main measure value.

6.5 Calibration

6.5.1 Prepare for calibration

1. Check the settings for the calibration method.
   For more information, see *Select a calibration method and start the calibration* on page 22.
2. Make sure that all the necessary calibration standards are available for the selected calibration method.
   For a DO calibration, prepare the check and storage vessel FDO check or the standard for the selected calibration method.
3. Start the calibration procedure.
   For more information, see the calibration chapter for the selected sensor.
4. Follow the instructions on the display until the calibration is finished.

6.5.2 Select a calibration method and start the calibration

1. Go to > **CAL**.
   The **Calibration methods** menu is shown. The following list contains examples of default calibration methods.

   Table 14: Calibration methods

Calibration method	Description
Default pH	For each method, icons show the available actions. – : Edit the settings of the method. – : Shows the settings of the method. – : Start the method.
Default DO	
Default pH QSC	

2. Tap the icon next to the name of the calibration method to be used.
   The **Calibration settings** menu of the selected sensor is shown.
3. Check the settings for the calibration method.
   For more information, see the following chapter for the connected sensor type.
   – pH sensor: *Quality assurance* on page 34
   – Oxidation-reduction potential (ORP) sensor: *Quality assurance* on page 42
   – Dissolved oxygen (DO) sensor: *Quality assurance* on page 45

- Conductivity sensor: *Quality assurance* on page 52
- Turbidity sensor: *Quality assurance* on page 58

4. Tap the ▷ icon next to the name of the calibration method to be used.
   - If there is only one sensor connected that can be calibrated with that method, then the summary of the calibration method is shown.
   - If there are more sensors connected that can be calibrated with that method, then the list of these sensors is shown. Select the name of the sensor to be calibrated.

   A summary of the calibration method is shown.
5. Tap **Start**.

   The procedure of the selected calibration method starts. Instructions are shown on the screen.
6. Follow the instructions on the screen until the calibration result is shown.

   A pop-up menu bar is shown:

   Table 15: Pop-up menu bar that is shown at the end of a calibration

Icon	Description
	The icon opens an input field for a comment and an ID.
	The icon opens a menu to store the calibration data to another storage location.
	The icon shows the calibration data and the calibration evaluation
✓	The icon terminates the calibration and returns to the home screen. The calibration is stored in the database.

7. Tap ✓.

The calibration method is finished.

6.5.3 Calibration evaluation

The calibration evaluation of a connected sensor is displayed on the measurement screen.

Table 16: Calibration evaluation

Calibration evaluation	Description
The measured value is not shown in the measurement screen. Examples for error messages: • **Calibration expired** • **Invalid calibration**	A new calibration is required. For more information, see *Prepare for calibration* on page 22.
The measured value is shown in the measurement screen. The sensor quality symbol is shown.	The best calibration evaluation is the sensor quality symbol that contains three green levels. For more information, see the calibration evaluation chapter for the sensor type. For more information, see the following chapter for the connected sensor type. • *Calibration evaluation for pH sensors* on page 36 • *Calibration evaluation for DO sensors* on page 48 • *Calibration evaluation for conductivity sensors* on page 54 • *Calibration evaluation for turbidity sensors* on page 59
 The measured value is shown in the measurement screen. The quality sensor control (QSC) scale is shown.	The QSC scale is shown for pH sensors that are calibrated with the **Default pH QSC** method. Finely graded graphical representation from 0 to 100 For more information, see *Quality sensor control (QSC) function* on page 37.

6.6 Database

6.6.1 Introduction

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The MultiLab Pro IDS stores all measurements and calibrations in a database. The database is accessible over > **Database**.

The database stores two types of datasets.

- Measurement
- Calibration

Measurements that use the AutoRead function and all calibrations are automatically stored in the database.

6.6.2 Calibration and measurement datasets

Figure 14: Calibration dataset

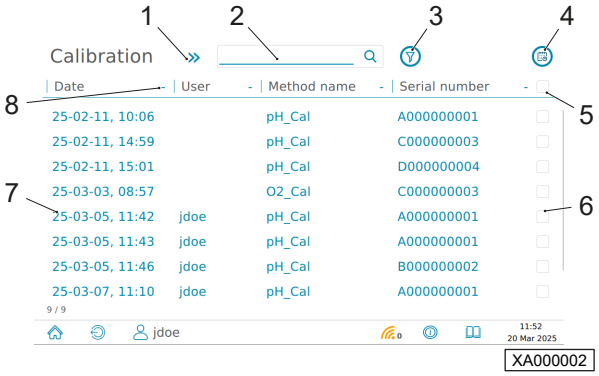


Table 17: Calibration and measurement datasets

Position	Element	Description
1	Dropdown	The dropdown is used to change between the calibration dataset and the measurement dataset.
2	Full-text search	The full-text search is used to filter the following data: • User • Method name • Serial number in the calibration dataset • Sample ID in the measurement dataset The full-text search is case-sensitive but does not have to match the full text. It also finds results that contain the text search entry.
3	Reset filter icon	The reset filter icon deletes all selected filters.
4	Interval filter icon	The interval filter icon can be used to filter the data between two specific days.
5	Select all checkbox	The select all checkbox selects all datasets, without an effect on the active filters.
6	Select dataset checkbox	The select dataset checkbox selects the actual dataset. Multiple datasets can be selected. When one or more datasets are selected, a pop-up menu bar is shown, see *Table 18* on page 25.
7	Dataset	The dataset stores all the data from the measurement. The dataset can be clicked to see the details of the measurement.
8	Sort function	The sort function is used to sort the dataset in ascending or descending order by the following data: • Date • User • Method name • Serial number in the calibration dataset • Sample ID in the measurement dataset

Table 18: Pop-up menu bar dataset

Icon	Description
	Adds or edits an ID or comment to the measurement data Adds or edits a comment to the calibration data
	Opens a menu to store the dataset to another storage location
	Deselects the dataset

EN

6.7 Device settings

6.7.1 Introduction

The menu contains general settings that are related to the device and external hardware.

- **Language**
- **Date / Time**
- **Display / Brightness**
- **Keyboard**
- **Acoustic signals**
- **Miscellaneous**

6.7.2 Display

Go to > **System** > **Device settings** > **Display / Brightness**.

The following table contains information on selected menu items:

Table 19: Display settings

Setting	Description
Brightness	Slide the slider to change the brightness.
Dim screen after:	• Drop-down list of available dim steps • Default value: two minutes
Turn off screen after:	Not available during an active measurement • Drop-down list of possible values • Default value: 20 minutes

6.7.3 Date and time settings

Go to > **System** > **Device settings** > **Date / Time**.

The following table contains information on selected menu items:

Table 20: Date and time settings

Settings	Description
Set time / date manually	Set the date and time manually or automatically
Select time zone...	List of available time zones Available when the setting **Set time / date manually** is **on**.
Automatic daylight saving adjustment	Activate daylight saving time
Time	Change the actual time Available when the setting **Set time / date manually** is **on**.
Select time format...	List of available time formats
Date	Change the actual date Available when the setting **Set time / date manually** is **on**.
Select date format...	List of available date formats
NTP Server	Change the IP address of the NTP server The device requires an Ethernet connection to an NTP server. Available when the setting **Set time / date manually** is **off**.

6.7.4 Miscellaneous settings

Go to ⌂ > **System** > **Device settings** > **Miscellaneous**.

The following table contains information on selected menu items:

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Table 21: Miscellaneous settings

Settings	Description
Temperature uniti	List of temperature units • **°C** • **°F**
Default manual temperature in used unit	List of default temperature values to be shown for sensors without integrated temperature sensor • **25** • **20**
External calibration	List of options for how the device handles sensors that have been calibrated with another device. • **Accepted** • **Warning** • **Not accepted**

6.8 User management

6.8.1 Introduction

During the first activation of the **User Management** function, an administrator account has to be created.

If the **User Management** function is active, then the usage of the device is only possible after login with a user account. The username is documented with measurements and calibrations.

Only an administrator can turn off the function **User Management**.

6.8.2 Turn on the user management

1. Go to ⌂ > **System** > **User Management**.
2. Set the **User Management** toggle switch to **on**.
   A pop-up window is shown.
3. Tap **OK**.
   The setting is active.
4. Create a new user account. For more information, see *Create a user account* on page 26.

The **User Management** function is active. Every user has to log in now.

6.8.3 Create and edit a user account

Create a user account

The first admin account data must be kept safely. If the data is lost, then a reset is not possible. The device must be returned to the manufacturer to reset it.

1. Go to ⌂ > **System** > **User Management** > **User**.
2. Tap ⊕.
   A new user account is created. Once a user account is created, the username cannot be edited.
3. Insert the following data:
   - **Username ***
   - **Full name ***
   - **User role**

- **One-time password ***
- **Email**

  The email setting is optional.

  The settings with an asterisk * are mandatory.

4. Tap **OK**.

   The new user account is created and saved.

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Edit a user account

1. Go to > **System** > **User Management** > **User**.
2. Tap next to the name of the user account to be edited.

   All settings can be edited, except for the username.
3. Edit the settings:
   - **Full name ***
   - **User role**
   - **One-time password ***
   - **Email**

     The email setting is optional.

     The settings with an asterisk * are mandatory.
4. Tap **OK**.

   The changes are stored.
5. Tap next to the name of the user account to be blocked.

   The blocked user cannot log in to the device anymore.

6.8.4 Create and edit a user role

Create a user role

1. Go to > **System** > **User Management** > **User roles**.
2. Tap .

   A new user role is opened.
3. Enter a role name.
4. Tap **OK**.

   The new user role is created without any permissions.
5. Edit the user role to set the permissions.

Edit a user role

The default user roles cannot be edited.

1. Go to > **System** > **User Management** > **User roles**.
2. Tap .

   The permissions of the default user roles are shown.
3. Tap next to the user role to be edited.

   The permissions for the role are shown. For more information, see *Permissions* on page 27.
4. Select all permissions for the user role.
5. Tap **OK**.

   The settings for the user role are updated.
6. If a user role is to be deleted, then tap .

6.8.5 Permissions

The permissions follow the menu structure of the device. The first-level checkboxes enable or disable all second-level permissions. The second-level checkboxes turn individual permissions on or off.

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Table 22: Permissions

Permission	Description
Methods	Sets the following permissions: • Create and edit methods • Create and edit calibration settings • Create and edit buffer and buffersets
System	Sets the following permissions: • Change device settings • Create, edit, and delete users • Create, edit, and delete communication settings • Export and import data • Manage external devices • Reset and update the device • Access audit trail
Database	Sets the following permissions: • Use the history
Home screen	Sets the following permissions: • Change the layout of the home screen • Create and use shortcuts • Start the active method

6.8.6 Policies

Go to ⌂ > **System** > **User Management** > **Policies**.

Table 23: Policies

Policies	Settings	Description
Registration rules	**Auto logout after**	The following settings can be edited: Sets the time that a user will be logged off after inactivity. An active measurement does not count the time.
	Failed login attempts	Sets the number of times a password can be entered incorrectly before a user is blocked.
	Block after max. login attempts	Sets the time that a user is blocked when the maximum number of failed tries is reached.
Password rules	**Password properties**	Sets the properties of a password. Multiple choice is possible.
	Minimum length	Sets the minimum length of a password.
	Validity of the password	Defines the time after which a password must be changed.
	Repetitions	Sets the number of times a password has to be changed before a previous password can be used again.

6.8.7 Turn off the user management

When the user management is turned off, all user accounts are locked and all passwords are reset. After the user management is turned on again, new passwords must be assigned for all user accounts.

1. Go to ⌂ > **System** > **User Management**.
2. Turn off the toggle switch.
   A pop-up window is shown.
3. Tap **OK**.

The user management is turned off. Login is no longer required to use the device.

6.9 Audit trail

6.9.1 Introduction

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The audit trail saves a full record of all actions and changes in the system. It tracks and checks data entries such as measurements, calibrations, and changes to system settings.

The audit trail keeps a detailed record of user actions. This record helps meet legal rules and improves data management. It saves the key information such as username, time of action, and type of change. This supports clear and responsible work in the laboratory.

The user management is necessary for the audit trail.

6.9.2 Turn on the audit trail demo

The demo mode will be deactivated after the device has been turned off. Every data is stored in a demo dataset and will be deleted after the device has been turned off.

1. Go to ⌂ > **System** > **Audit Trail**.

   A pop-up window is shown.
2. Tap **Demo**.

   The audit trail demo is active.

- The audit trail demo is active. Every event is now logged and stored in the audit trail demo dataset, see *Audit trail datasets* on page 29.
- Three user accounts are created automatically.
  - Admin
  - Lab manager
  - Lab technician

6.9.3 Turn on the audit trail

The activation of the audit trail cannot be undone. The device must be returned to the manufacturer to reset it. The audit trail has a demo mode. For more information, see *Turn on the audit trail demo* on page 29.

1. Go to ⌂ > **System** > **Audit Trail**.

   A pop-up window is shown.
2. Tap **OK**.
3. Enter the code 0000.
4. Tap **OK**.

- The audit trail is active. Every event is now logged and stored in the audit trail dataset, see *Audit trail datasets* on page 29.
- Three user accounts are created automatically.
  - Admin
  - Lab manager
  - Lab technician

6.9.4 Audit trail datasets

Go to ⌂ > **System** > **Audit Trail**.

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Figure 15: Audit trail datasets

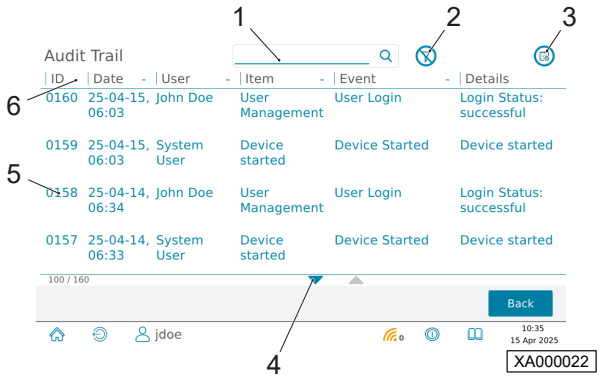


Table 24: Audit trail datasets

Position	Element	Description
1	Full-text search	The full-text search can be used to filter by the following data: • **User** • **Item** • **Event** • **Details** • **Comment** The full-text search is case-sensitive but does not have to match the full text. It also finds results that contain the text search entry.
2	Reset filter icon	The reset filter icon deletes all selected filters.
3	Interval filter icon	The interval filter icon can be used to filter the data between two specific days.
4	Page change	The page change can be used to navigate between pages when there are more than 100 rows.
5	Dataset	The dataset stores all the data from the measurement. The dataset can be clicked to see the details of the measurement.
6	Sort function	The sort function can be used to sort the datasets in ascending or descending order by the following data: • **ID** • **Date** • **User** • **Item** • **Event** • **Details** • **Comment**

6.10 Data import and export

The **Import / Export** menu gives settings for the following import and export of data:

- **System**
- **Import/Export buffersets**

Go to ⌂ > **System** > **Import / Export**.

The following table contains information on selected menu items:

Table 25: Data import and export settings

Settings	Description
Import	• **Source** Drop-down list of available storage paths. Storage paths are managed in ⌂ > **System** > **Communication** > **Network address**. For more information, see *Communication* on page 31.

Settings	Description
Export	• **Interval** for system backup The interval for regular, automatic system backups. • **Buffer sets** Drop-down list of available buffer sets which can be exported. • **Target** Drop-down list of available storage paths.

EN

6.11 Communication

The **Communication** menu gives information and settings for all external devices that can exchange data with the device. Examples of external devices:

- Network drive
- USB drive
- Sensors

Go to ⌂ > **System** > **Communication**.

The following table contains information on selected menu items:

Table 26: Communication menu

Settings	Description
Ethernet	**Available networks** List of network paths that were created. Network paths can be created edited or deleted. Network settings: • **DHCP** • **IP address** • **Subnet mask** • **Default gateway**
Network address	List of storage paths that were created. Storage paths can be created edited or deleted. Storage path settings: • **Connection name** • **Server address** • **Path** • **User** • **Password**
Sensors	List of sensors that are connected to the device or were connected in the past. Detailed information on the sensors can be shown.

6.12 Service

The **Service** menu shows the following information and functions:

- information about the device
- service information
- service functions

Go to ⌂ > **System** > **Service**.

The following table contains information on selected menu items:

Table 27: Service menu

Settings	Description
Device information	Examples for device information: • **Software Version** • **IP address** • **Serial number**

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Settings	Description
Reset	Start a reset of the device.
Software Update	If a software update is available on a connected USB storage, then it is listed here. For more information, see *Software update* on page 32.
Documentation	QR code to access the manual online.
Technical support	Contact information for technical support.

6.13 Software update

A software update can be done with the help of a USB storage.

The following chapters describe the software update with a USB storage.

- Software update for the device
  For more information, see *Software update for the device* on page 32.
- Software update for IDS sensors
  For more information, see *Software update for IDS sensors* on page 32.

6.13.1 Software update for the device

Software updates for the device are available on the internet.

1. Download the software update file from the website and store it on a USB storage in the root directory.
2. Connect the USB storage to the device.
3. Go to ⌂ > **System** > **Service** > **Software Update**.
   If a software update file is found on the connected USB storage in the root directory, then it is listed here.
4. Select the software update.
5. Tap **OK**.
   The software update is started.
6. Follow the instructions on the display until the software update is finished.

6.13.2 Software update for IDS sensors

The IDS sensor to be updated must be connected to an IDS port of the device through a wire. Sensor variants with IDS plug, P variants, must be connected to the device through a wire that is available as an accessory. Remove all other sensors from the device.

Software updates for the IDS sensors are available on the internet.

1. Download the software update files for IDS sensors from the website and store it on a USB storage.
2. Connect the USB storage to the device.
3. Go to ⌂ > **System** > **Service** > **Software Update**.
   If a software update file is found on the connected USB storage in the root directory, then it is listed here.
4. Select the software update.
5. Tap **OK**.
   The software update is started.
6. Follow the instructions on the display until the software update is finished.

6.13.3 Software update for IDS WLM-M adapters

The IDS WLM-M adapter must be connected to an IDS port on the device. Remove other IDS WLM-M adapters from the devce.

Software updates for the IDS WLM-M adapter are available on the internet.

1. Download the software update file for the IDS WLM-M adapter from the website and store it on a USB storage.
2. Connect the USB storage to the device.
3. Go to ⌂ > **System** > **Service** > **Software Update**.

   If a software update file is found on the connected USB storage in the root directory, then it is listed here.
4. Select the software update.
5. Tap **OK**.

   The software update is started.
6. Follow the instructions on the display until the software update is finished.

7 Operation with pH sensors

7.1 Measurement

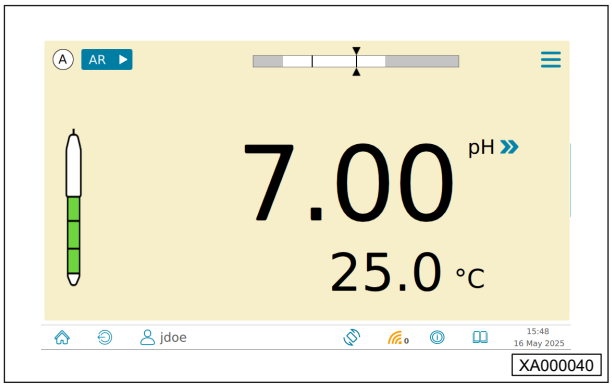
EN

Measure the pH value

Prepare for measurement. For more information, see *Prepare for measurement* on page 19.

1. Immerse the sensor in the sample.
2. Go to ⌂ > ▷.
   The measurement screen is shown. If the measured value is not shown, then an information is shown on the measurement screen.

   Figure 16: Measurement screen for pH sensors



3. Tap **AR** to measure with the selected measurement method.
   When the measurement is finished, a pop-up menu bar is shown.

   Table 28: Pop-up menu bar that is shown at the end of a measurement with AutoRead

Icon	Description
↻	Repeats the measurement.
↻	Adds an ID or comment to the measurement data.
⇧	Opens a menu to store the calibration data to another storage location.
☑	Shows the measurement dataset.
✓	Stores the data in the database and return to the measurement screen.

4. Tap ✓ to close the pop-up menu bar.

Temperature measurement

The temperature of the sample influences the measured value. Temperature is an important secondary measured value. IDS sensors are equipped with an integrated temperature sensor. The temperature of the sample is automatically shown in the measurement screen. For measurement without an integrated temperature sensor, the temperature has to be measured manually and set in the measurement screen. For more information, see *Measure or calibrate without an integrated temperature sensor* on page 21.

7.2 Quality assurance

7.2.1 Introduction

Purpose

The characteristics of a sensor and the measured values change over time because of age or contamination of the sensor. To maintain the quality of the measured value, the sensor must be checked.

A calibration checks the following characteristics of the sensor:

Table 29: Sensor characteristics checked by a calibration

Calibration procedure	Characteristics
Default pH	• Asymmetry potential • Slope
Default pH QSC	

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Calibration interval

- At regular intervals
- When the accuracy requirements are especially high
- Routinely as part of the company quality assurance

Calibration procedures

- Calibration with a buffer set that is listed in the settings of the **Default pH** calibration method

  For more information, see *Start a pH calibration* on page 35.
- Calibration with a buffer set that is listed in the settings of the **Default pH QSC** calibration method

  For more information on QSC calibration, see *Start a QSC calibration* on page 38.

The buffer solutions that are listed in the selected buffer set and used for calibration are identified automatically during the calibration procedure. The relevant nominal values are used automatically.

Calibration points

A calibration must be performed with at least two buffers that are listed in the selected buffer set.

The maximum number of calibration points is limited by the number of buffers in the buffer set. The absolute maximum of calibration points is five.

Calibration record

Calibration results are stored in a database. For more information, see *Database* on page 24.

Criteria for a stable measured value

The stability control function checks whether the measured values are stable in the monitored time interval. The minimum duration until a measured value is evaluated as stable is given in the following table. The actual duration is mostly longer.

Table 30: Stability criteria pH

Measured parameter	Time interval	Stability in the time interval
pH value	15 seconds	Δ less than 0.01 pH
Temperature	15 seconds	Δ less than 0.5 °C

7.2.2 Calibration

Start a pH calibration

Prepare for calibration. For more information, see *Prepare for calibration* on page 22.

1. Go to ⌂ > **CAL**.

   The **Calibration methods** menu is shown. Examples of pH calibration methods:

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Table 31: Default calibration methods for pH calibration

Method	Description
Default pH	For each method, icons show the available actions. – ✎: Edit the settings of the method. For more information, see *Settings of the calibration method Default pH* on page 40. – ⓘ: Shows the settings of the method. For more information, see *Settings of the calibration method Default pH* on page 40. – ▷: Start the method.
Default pH QSC	

2. Tap the ✎ icon next to the name of the calibration method to be used.
   The **Calibration settings** menu of the selected sensor is shown.
3. Check the settings for the calibration method.
   For more information, see *Quality assurance* on page 34.
4. Tap the ▷ icon next to the name of the calibration method to be used.
   – If there is only one sensor connected that can be calibrated with that method, then the summary of the calibration method is shown.
   – If there are more sensors connected that can be calibrated with that method, then the list of these sensors is shown. Select the name of the sensor to be calibrated.

   A summary of the calibration method is shown.
5. Tap **Start**.
   The procedure of the selected calibration method starts.
6. Follow the instructions on the screen until the calibration result is shown.
   A pop-up menu bar is shown:

Table 32: Pop-up menu bar that is shown at the end of a calibration

Icon	Description
	The icon opens an input field to enter an ID or a comment.
	The icon opens a menu to store the calibration data to another storage location.
	The icon shows the calibration data and the calibration evaluation.
✓	The icon finishes the calibration and shows the home screen.

7. Tap ✓.
   The calibration is finished. The home screen is shown.

Calibration evaluation for pH sensors

Table 33: Calibration evaluation for pH sensors

Sensor quality symbol	Calibration record	Zero point [mV]	Slope [mV/pH]
	+++	-15 to +15	-60.5 to -58.0
	++	-20 to <-15 or >+15 to +20	>-58.0 to -57.0
	+	-25 to <-20 or >+20 to +25	-61.0 to <-60.5 or >-57.0 to -56.0
	-	-30 to <-25 or >+25 to +30	-62.0 to <-61.0 or >-56.0 to -50.0

Sensor quality symbol	Calibration record	Zero point [mV]	Slope [mV/pH]
	Error	<-30 or >+30	<-62.0 or >-50,0

EN

For pH IDS sensors a more finely graded calibration evaluation (QSC) is available. For more information, see *Quality sensor control (QSC) function* on page 37.

Create the dataset for a pH buffer

For a pH calibration, a buffer set must be selected. Default buffer sets are available in the list of buffer sets. The datasets of buffers that are not listed can be created.

To add a buffer to the list of buffers, continue as follows:

1. Go to ⌂ > **CAL** > **Default pH** > ✎ > **Buffers** > ⊕.
   The input field for the name of the new buffer is shown. All available names of buffer values are shown.
2. Enter the name of the new buffer.
3. Enter the nominal buffer values for at least three temperatures.
4. Tap the **OK** button.
   The dataset of the new buffer is checked for validity. If all rules for the buffer data are met, then the new buffer is added to the list of buffers.

Create the dataset of a pH buffer set

For a pH calibration, a buffer set must be selected. Default buffer sets are available in the list of buffer sets. Buffer sets that are not listed can be created.

To add a buffer set to the list of buffer sets, continue as follows:

1. Go to ⌂ > **CAL** > **Default pH** > ✎ > **Buffer sets** > ⊕.
   The input field for the name of the new buffer set is shown. All available buffer values are shown in a list.
2. Enter the name of the new buffer set.
3. Tap the checkboxes for all buffers to be included in the new buffer set.
   The buffers are added to the new buffer set.
   Criteria for a valid buffer set:
   - 2 to 5 buffer values must be included in the buffer set
   - The values of any two buffers in the buffer set must differ by at least two pH units

   If the required buffer value is not in the list, then create the dataset for a buffer. For more information, see *Create the dataset for a pH buffer* on page 37.
4. Tap the **Save** button.
   The dataset of the new buffer set is checked for validity. If all rules for the buffer set are met, then the new buffer set is added to the list buffer sets.

7.2.3 Quality sensor control (QSC) function

Quality sensor control (QSC) function

The QSC function is a sensor evaluation for IDS sensors. It evaluates the condition of an IDS pH sensor individually and with a fine grading.

The QSC scale shows the current sensor evaluation with an indicator on the display.

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Figure 17: Measurement screen pH with QSC scale

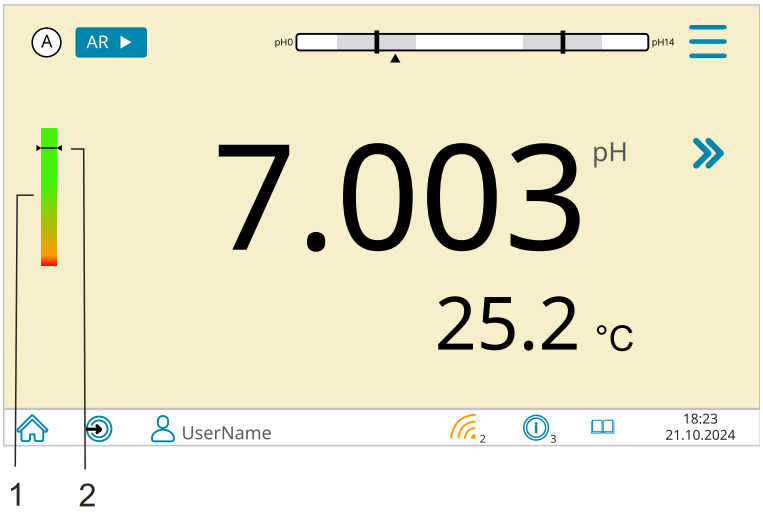


Table 34: Measurement screen pH with QSC scale

Position	Element	Description
1	QSC scale	Sensor quality scale
2	Pointer	Indicator of the current calibration evaluation on the QSC scale

To display the QSC scale in the pH measured value display, start the calibration method **Default pH QSC**. For more information, see *Start a QSC calibration* on page 38.

Once a calibration with the QSC buffer set is successfully finished, the QSC scale replaces the sensor symbol for calibration evaluation permanently.

Table 35: Default sensor evaluation compared to evaluation with QSC calibration

Evaluation with QSC calibration	Default evaluation
Fine grading of the sensor evaluation into 100 grades	Rough grading of the sensor evaluation into 4 grades
The reference value is set individually for each sensor during the QSC initial calibration	A theoretical reference value is used for all sensors
Low tolerances for zero point and slope with QSC buffer solutions	Greater tolerances for zero point and slope with commercial buffer sets
Calibration with the method **Default pH QSC** required	No extra calibration required

For more information on the QSC calibration, see *Quality sensor control (QSC) function* on page 37.

Start a QSC calibration

A valid calibration is stored. For more information, see *Start a pH calibration* on page 35.

The **QSC** calibration method is active when an extra three-point calibration with special QSC buffer solutions is successful. It covers the measuring range of the sensor from pH 2 to pH 11. The **QSC** initial calibration stores the actual condition of the sensor as a reference in the sensor. To meet the high requirements of a QSC initial calibration, perform the initial **QSC** calibration with the initial commissioning of the sensor.

1. Tap ⌂ > **CAL** > **Default pH QSC** > ⓘ .
   The **Calibration settings** menu is shown.
2. Tap **Back**.
   The **Calibration methods** menu is shown.
3. Tap **Default pH QSC** > ▷.
   The **QSC** calibration is started. Follow the instructions on the screen. For more information, see *Start a pH calibration* on page 35.

The QSC initial calibration is complete. The measurement screen always shows the QSC scale. For more information, see *Quality sensor control (QSC) function* on page 37.

After a successful QSC calibration, all other calibration methods are allowed. The QSC calibration values are always used to check the normal calibration. All QSC calibrations, except the initial QSC calibration, are QSC control calibrations.

If the sensor evaluation changes a lot after normal calibrations, then it's time for a QSC control calibration. The calibration interval is longer for QSC calibrations than for normal calibrations.

All other QSC calibrations are QSC control calibrations.

EN

7.3 Settings

Settings and sensor data pH

All the settings are stored in the sensor.

Table 36: Settings and sensor data pH

Settings	Description
Sensor type	Type of the sensor
Serial number	Serial number of the sensor
Sensor name	Name of the sensor
Measurement mode	Measured parameter • **U** • **pH**
Resolution	• **0.1** • **0.01** • **0.001**
Last calibration	Date and time of the last calibration.
Executed by	Name of the user who performed the last calibration.
Calibrated with	• **Internal** • **External** **Sensor name** and the **Serial number** of the device that was used for the last calibration are shown.
Quality	Sensor quality evaluation of the last calibration. If the sensor is not calibrated, then there is no entry. For more details, see *Calibration evaluation for pH sensors* on page 36.
Calibration result	Information on the calibration standard used during the last calibration
Calibration history	The last five calibrations are shown. For more details, see *Calibration and measurement datasets* on page 24.
Calibration check	The toggle switch turns the input field **Calibration interval in days on** or **off**.
Calibration interval in days	Calibration interval The unit is days. If the calibration interval has expired, then a message is shown.
QSC	• **on** • **off** For more information, see *Quality sensor control (QSC) function* on page 37.
Slope [%]	Value of the sensor slope of the last calibration in %
Slope [mV/pH]	Value of the sensor slope of the last calibration in mV/pH
Zero point [mV]	Zero point of the last calibration in mV
Zero point [pH]	Zero point of the last calibration in pH
Software Version	Software version of the sensor

EN

Settings of the calibration method Default pH

Table 37: Settings of the calibration method Default pH

Settings	Description
QSC	QSC is a quick check with the QSC calibration buffer set. For more information, see *Quality sensor control (QSC) function* on page 37.
Automatic calibration	**Automatic calibration** is a function that enables an easy calibration procedure. If **Automatic calibration** is active, then the following comfort functions are active: • The buffers are automatically recognized. • The order of the buffers during calibration is not important. If **Automatic calibration** is not active, then all buffers must be used in the correct order. The toggle switch turns the input field **Calibration interval in days on** or **off**.
Buffer set... • AutoCal TEC • AutoCal SI • AutoCal DIN/NIST • QSC-Kit	If the buffer set to be used is not in the list, then an individual buffer set can be created. For more information, see *Create the dataset of a pH buffer set* on page 37.
Type of calibration...	2- to 5-point calibration For more information, see *Calibration points* on page 35.

7.4 Troubleshooting pH sensors

Measurement failed

Table 38: Measurement failed

Cause	Remedy
Measured value outside the measuring range	Select a sensor that matches the measuring range
Air bubble in front of the diaphragm	Remove the air bubble, for example, sway or stir the solution
Air in the diaphragm	Extract the air or moisten the diaphragm
Cable broken	Replace the sensor
Gel electrolyte dried out	

Calibration failed

Table 39: Calibration failed

Cause	Remedy
The values that are determined for zero point and slope of the IDS pH sensor are outside the allowed limits	Perform a calibration
Diaphragm contaminated	Clean the diaphragm
Sensor broken	Replace the sensor
The used buffer solutions do not match with the selected buffer set	Select another buffer set
Buffer solutions too old	Use only fresh buffer solutions
Buffer solutions used up	Change buffer solutions

No stable measured value

Table 40: No stable measured value

Cause	Remedy
Junction of the pH sensor is contaminated	Clean the junction
The membrane of the pH sensor is contaminated	Clean the membrane

Cause	Remedy
The pH value of the test sample is not stable	Measure with air excluded if necessary
The temperature of the test sample is not stable	Adjust temperature if necessary
Temperature too high	Use a sensor that matches the temperature range
Organic liquids	Use a sensor that matches the sample

Incorrect measured values

More information and instructions on cleaning and exchange of sensors are given in the documentation of the sensor.

Table 41: Obviously incorrect measured values

Cause	Remedy
Sensor not suitable	Use a suitable sensor
Temperature difference between buffer and test sample too great	Adjust the temperature of buffer or sample solutions
Measurement procedure not suitable	Follow special procedure

8 Operation with ORP sensors

8.1 Measurement

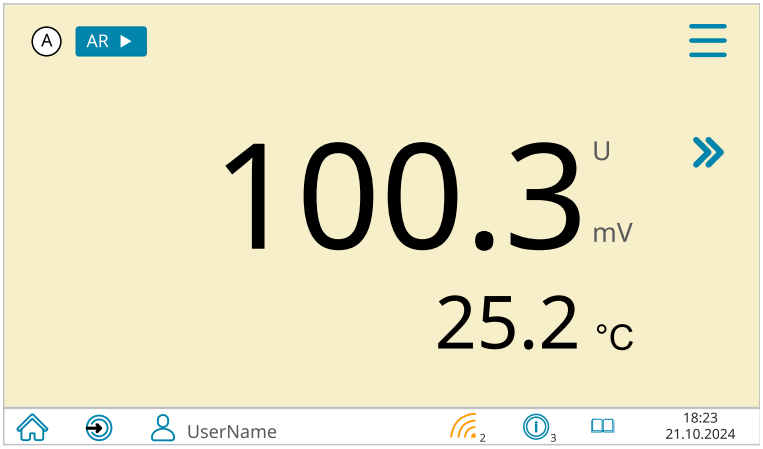
EN

Measure the ORP

Prepare for measurement. For more information, see *Prepare for measurement* on page 19.

1. Immerse the sensor in the sample.
2. Go to ⌂ > ▷.
   The measurement screen is shown. If the measured value is not shown, then an information is shown on the measurement screen.

   Figure 18: Measurement screen for ORP sensors



3. Tap on **AR** to measure with the selected measurement method.
   When the measurement is finished, a pop-up menu bar is shown.

   Table 42: Pop-up menu bar that is shown at the end of a measurement with AutoRead

Icon	Description
↻	Repeats the measurement
↻+	Adds an ID or comment to the measurement data
↑	Opens a menu to store the calibration data to another storage location
☑	Shows the measurement dataset
✓	Stores the data in the database and return to the measurement screen

4. Tap ✓ to close the pop-up menu bar.

Temperature measurement

The temperature of the sample influences the measured value. Temperature is an important secondary measured value. IDS sensors are equipped with an integrated temperature sensor. The temperature of the sample is automatically shown in the measurement screen. For measurement without an integrated temperature sensor, the temperature has to be measured manually and set in the measurement screen. For more information, see *Measure or calibrate without an integrated temperature sensor* on page 21.

8.2 Quality assurance

Purpose

The characteristics of a sensor and the measured values change over time because of age or contamination of the sensor. To maintain the quality of the measured value, the sensor must be checked.

Calibration procedures

ORP sensors are not calibrated. But a check of ORP sensors is possible. For more information, see *Check the ORP electrode* on page 43.

Criteria for a stable measured value

Table 43: Stability criteria oxidation-reduction potential (ORP)

Measured parameter	Time interval	Stability in the time interval
ORP	15 seconds	Δ less than 0.3 mV
Temperature	15 seconds	Δ less than 0.5 °C

Check the ORP electrode

1. Measure the ORP of a test solution.
2. Compare the value with the nominal value.

8.3 Settings

Settings and sensor data ORP

All the settings are stored in the sensor.

Table 44: Settings and sensor data ORP

Settings	Description
Sensor type	Type of the sensor
Serial number	Serial number of the sensor
Sensor name	Name of the sensor
Measurement mode	Measured parameter • **U**
Software Version	Software version of the sensor

9 Operation with dissolved oxygen (DO) sensors

9.1 Measurement

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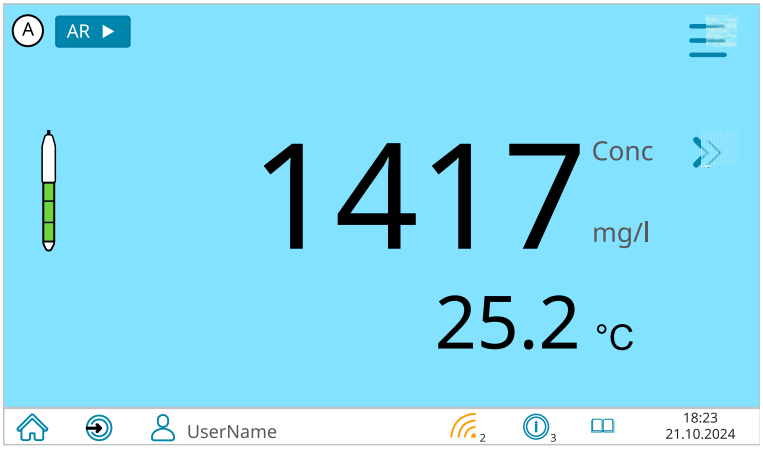
Measure the DO value

Prepare for measurement. For more information, see *Prepare for measurement* on page 19.

1. Immerse the sensor in the test sample.
2. Go to ⌂ > ▷.

   The measurement screen is shown. If the measured value is not shown, then an information is shown on the measurement screen.

   Figure 19: Measurement screen for dissolved oxygen sensors



3. Tap on **AR** to measure with the selected measurement method.

   When the measurement is finished, a pop-up menu bar is shown.

   Table 45: Pop-up menu bar that is shown at the end of a measurement with AutoRead

Icon	Description
↻	Repeats the measurement.
↻	Adds an ID or comment to the measurement data.
↑	Opens a menu to store the calibration data to another storage location.
☑	Shows the measurement dataset.
✓	Stores the data in the database and return to the measurement screen.

4. Tap ✓ to close the pop-up menu bar.

Temperature measurement

The temperature of the sample influences the measured value. Temperature is an important secondary measured value. IDS sensors are equipped with an integrated temperature sensor. The temperature of the sample is automatically shown in the measurement screen. For measurement without an integrated temperature sensor, the temperature has to be measured manually and set in the measurement screen. For more information, see *Measure or calibrate without an integrated temperature sensor* on page 21.

9.2 Quality assurance

9.2.1 FDO check

Purpose

The fluorescent dissolved oxygen (FDO) check is a method to find out in a simple manner whether the sensor should be cleaned or calibrated. The FDO check does not do any changes to the sensor as the calibration does.

FDO check interval

The sensor has no fixed FDO check interval. The sensor should be checked if the following conditions are met:

- When the check interval has expired, the check status indicator is shown.
- When the measured values seem to be incorrect.
- When the sensor cap is contaminated or at the end of its lifetime.
- After the sensor cap is replaced.
- Routinely as part of the company quality assurance.

Start an FDO check

Prepare for calibration. For more information, see *Prepare for calibration* on page 22.

1. Go to > **Methods** > **Measurement methods**.
2. Tap that is next to the method FDO check item.
   The FDO check is selected as the active method. The home screen is shown.
3. Tap **Active method**.
   Moisten the sponge. Leave the sensor in the calibration vessel to adjust to the ambient temperature. Minimum time is 15 minutes.
   - If there is only one sensor connected that can be calibrated with that method, then the summary of the calibration method is shown.
   - If there are more sensors connected that can be calibrated with that method, then the list of these sensors is shown. Select the name of the sensor to be calibrated.

   The FDO check method is started.
4. Position the sensor in the check and storage vessel for the FDO check.
5. Tap **Next** to start the FDO check.
   The AutoRead function checks the measured value for stability. If the measured value is stable for 20 seconds, then the FDO check is finished. The result of the FDO check is shown.
6. Check the result. For more information, see *Evaluation* on page 45.
7. If the result is in the tolerance, then tap **OK** to return to the home screen.
   The FDO check is finished.
8. If the result is outside the tolerance, then tap **OK** to return to the home screen and go on with the following steps:
   a) Clean the shaft and the membrane of the sensor.
   b) Repeat the FDO check.
   c) If the result is still outside the tolerance, then perform a calibration, see *Start a calibration in water vapor-saturated air* on page 47.

Evaluation

The evaluation is based on the accuracy that is required by the user. Together with the nominal value (100%), this results in a validity scope for the check.

If the measured value is in the validity scope, then no cleaning or user calibration is required.

If the measured value is outside the validity scope, clean the sensor shaft and membrane, then repeat the check. For more information, see *Start an FDO check* on page 45.

EN

Evaluation example outside of the validity scope

- Required accuracy: ± 2%
- In water vapor-saturated air or in air-saturated water, the nominal value is 100% considering the local air pressure
- Therefore, the validity scope is 98% to 102%
- The check resulted in a measured value of 96.7%

The measurement error is outside the specified validity scope. Cleaning or calibration is required.

Evaluation example in the validity scope

- Required accuracy: ± 2%
- In water vapor-saturated air or in air-saturated water, the nominal value is 100% considering the local air pressure
- Therefore, the validity scope is 98% to 102%
- The check resulted in a measured value of 99.3%

The measurement error is in the specified validity scope. Cleaning or calibration is not required.

9.2.2 Calibration

Purpose

The characteristics of a sensor and the measured values change over time because of age or contamination of the sensor. To keep the quality of the measured value, the sensor must be calibrated. Calibration identifies the current slope of the sensor and stores this value in the sensor.

The dissolved oxygen (DO) sensor FDO 925 (-P) ages so slowly that it does not require a periodic calibration. To detect decreasing accuracy at an early stage, perform an FDO check. For more information, see *Start an FDO check* on page 45.

Calibration interval

The sensor has no fixed calibration interval. The sensor should be calibrated if the following conditions are met:

- When the evaluation of the FDO check suggests calibration
- When the accuracy requirements are especially high
- Routinely as part of the company quality assurance

Calibration procedures

- Calibration in water vapor-saturated air

  For more information, see *Start a calibration in water vapor-saturated air* on page 47.
- Calibration via a comparative measurement (for example Winkler titration according to DIN EN 25813 or ISO 5813). Here, the relative slope is adapted to the comparative measurement by a correction factor. The correction factor is stored and can be shown in the sensor settings.

  For more information, see *Start a calibration via a comparison measurement* on page 47.

Calibration record

Calibration results are stored in a database. For more information, see *Database* on page 24.

Criteria for a stable measured value

The stability control function checks whether the measured values are stable in the monitored time interval. The minimum duration until a measured value is evaluated as stable is given in the following table. The actual duration is mostly longer.

Table 46: Stability criteria dissolved oxygen (DO)

Measured parameter	Time interval	Stability in the time interval
DO concentration	20 seconds	Δ less than 0.03 mg/l

Measured parameter	Time interval	Stability in the time interval
DO saturation	20 seconds	Δ less than 0.4%
DO partial pressure	20 seconds	Δ less than 0.8 mbar
Temperature	15 seconds	Δ less than 0.5 °C

EN

Start a calibration in water vapor-saturated air

Prepare for calibration. For more information, see *Prepare for calibration* on page 22.

1. Go to > **CAL**.
2. Tap the icon next to the name of the calibration method to be used.
   The **Calibration settings** menu of the selected sensor is shown.
3. Tap .
   The list of available calibration procedures is shown.
4. Select **Water Vapor Saturated Air**.
5. Tap **OK**.
   The calibration method is selected.
6. Tap the icon next to the name of the calibration method to be used.
   - If there is only one sensor connected that can be calibrated with that method, then the summary of the calibration method is shown.
   - If there are more sensors connected that can be calibrated with that method, then the list of these sensors is shown. Select the name of the sensor to be calibrated.

   A summary of the calibration method is shown.
7. **Moisten the sponge. Leave the sensor in the calibration vessel to adjust to the ambient temperature.** Minimum time is 15 minutes.
8. Place the sensor in the check and storage vessel for the FDO check.
9. Tap **Next**.
   The procedure of the selected calibration method starts. The AutoRead function checks the measured value for stability. If the measured value is stable, the calibration is finished. A pop-up menu bar is shown.

   Table 47: Pop-up menu bar that is shown at the end of a calibration

Icon	Description
	The icon opens an input field to enter an ID or a comment.
	The icon opens a menu to store the calibration data to another storage location.
	The icon shows the calibration data and the calibration evaluation.
	The icon finishes the calibration and shows the home screen.

10. Tap .
    The calibration is finished. The home screen is shown.

Start a calibration via a comparison measurement

Prepare for calibration. For more information, see *Prepare for calibration* on page 22.

The comparison calibration is only available if a FDO 925 (-P) sensor is used.

With the calibration procedure comparison measurement, the measured value of the sensor is adjusted to the nominal value of a comparison solution via a correction factor. The current correction factor is documented in the sensor settings and in the calibration record. For more information, see *Settings* on page 39.

1. Go to > **CAL**.
2. Tap the icon next to the name of the calibration method to be used.
   The **Calibration settings** menu of the selected sensor is shown.
3. Tap .

The list of available calibration procedures is shown.

4. Select **Comparison measurement (DO Adjust)**.
5. Type in the correct reference value of the comparison solution in mg/l.
6. Tap **OK**.

   The calibration method is selected.
7. Tap the ▷ icon next to the name of the calibration method to be used.
   - If there is only one sensor connected that can be calibrated with that method, then the summary of the calibration method is shown.
   - If there are more sensors connected that can be calibrated with that method, then the list of these sensors is shown. Select the name of the sensor to be calibrated.

   A summary of the calibration method is shown.
8. Place the sensor in the comparison solution.
9. Tap **Next**.

   The procedure of the selected calibration method starts. The AutoRead function checks the measured value for stability. If the measured value is stable, the calibration is finished. A pop-up menu bar is shown.

Table 48: Pop-up menu bar that is shown at the end of a calibration

Icon	Description
	The icon opens an input field to enter an ID or a comment.
	The icon opens a menu to store the calibration data to another storage location.
	The icon shows the calibration data and the calibration evaluation.
✓	The icon finishes the calibration and shows the home screen.

10. Tap ✓.

    The calibration is finished. The home screen is shown.

Calibration evaluation for DO sensors

After calibration, the meter automatically evaluates the current status of the calibration. The evaluation appears on the display and in the calibration record.

For evaluation, the characteristic curve of the sensor that was determined is compared to the characteristic curve of an ideal sensor at similar environmental conditions (relative slope S):

$S = S_{sensor} / S_{ideal\ sensor}$

An ideal sensor has a relative slope of 1.

Table 49: Calibration evaluation for DO sensors

Sensor quality symbol	Calibration record	Relative slope
	+++	S = 0.94 to 1.06
	++	S = 0.92 to 0.94 or S = 1.06 to 1.08
	+	S = 0.90 to 0.92 or S = 1.08 to 1.10
	Error	S < 0.90 or S > 1.10

9.3 Settings

9.3.1 Settings and sensor data DO

All the settings are stored in the sensor.

Table 50: Settings and sensor data DO

Setting	Description
Sensor type	Type of the sensor
Serial number	Serial number of the sensor
Sensor name	Name of the sensor
Measurement mode	Measured parameter • **Partial pressure (P)** • **Concentration (Conc)** • **Saturation (Sat)**
Last calibration	Date and time of the last calibration.
Executed by	Name of the user who performed the last calibration
Calibrated with	• **Internal** • **External** **Sensor name** and the **Serial number** of the device that was used for the last calibration are shown.
Quality	Sensor quality evaluation of the last calibration. Empty, if the sensor is not calibrated. For more details, see *Calibration evaluation for DO sensors* on page 48.
Calibration result	Information on the calibration standards that were used during the last calibration.
Calibration history	The last five calibrations are shown. For more details, see *Calibration and measurement datasets* on page 24.
Calibration check	The toggle switch turns the input field **Calibration interval in days on** or **off**.
Calibration interval in days	Calibration interval The unit is days. If the calibration interval has expired, then a message is shown.
t_90 (seconds)	The response time of the signal filter The unit is seconds. The response time is the time after which 90% of a signal change is shown. The signal filter reduces the fluctuation range of the measured value. The setting response time **t_90 (seconds)** defines the signal filter. • **30** • **60** • ...
Salinity correction	• **off** • **manual** • **automatic** If **manual** is selected, then the item **Salinity** is shown. If **automatic** is selected, then the item **Linked sensor** is shown.
Salinity	Salinity equivalent for the salt content correction This menu item is only available if the salinity correction is set to manual.
Linked sensor	This menu item is only available if the salinity correction is set to automatic.
Serial number cap	The serial number of the sensor cap
Software Version	Software version of the sensor

9.3.2 Settings of the DO calibration method Default DO

Table 51: Settings of Default DO calibration method

EN

Setting	Description
Calibration method	• **Water Vapor Saturated Air** Calibration procedure for calibration of the sensor with a moistened sponge in a check and storage container • **Comparison measurement (DO Adjust)** Calibration procedure for calibration of the sensor with a comparison solution and a correction factor

9.4 Troubleshooting DO sensors

More information and instructions on cleaning and exchange of sensors are given in the documentation of the sensor.

Measurement failed

Table 52: Measurement failed

Cause	Remedy
Measured value outside the measuring range	Select a suitable measuring medium.

Calibration failed

Table 53: Calibration failed

Cause	Remedy
Sensor contaminated	Clean the sensor.
Measured temperature value outside the operating conditions	Use under specified conditions
Defective sensor	Calibration Exchange the sensor cap Replace the sensor.
Loose cap	Tightly screw the cap.
Missing cap	Put on a new cap. For more information, see the manual of the sensor FDO 925 (-P).

10 Operation with conductivity sensors

10.1 Measurement

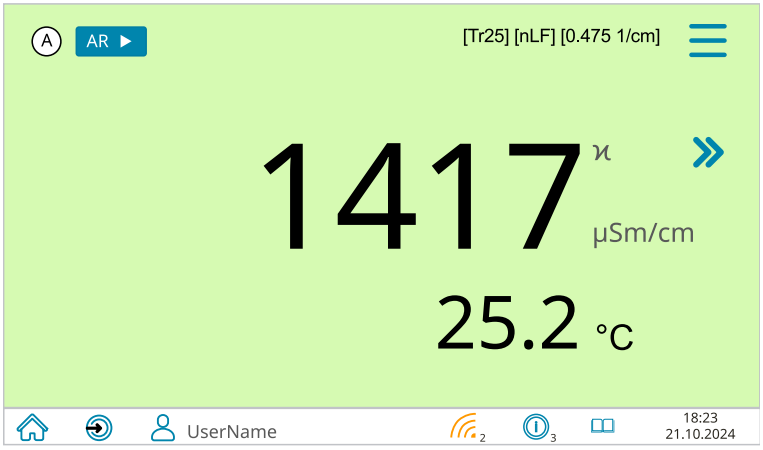
EN

Measure the conductivity

Prepare for measurement. For more information, see *Prepare for measurement* on page 19.

1. Immerse the sensor in the sample.
2. Go to ⌂ > ▷.
   The measurement screen is shown. If the measured value is not shown, then an information is shown on the measurement screen.

   Figure 20: Measurement screen for conductivity sensors



3. Tap on **AR** to measure with the selected measurement method.
   When the measurement is finished, a pop-up menu bar is shown.

   Table 54: Pop-up menu bar that is shown at the end of a measurement with AutoRead

Icon	Description
↻	Repeats the measurement
↻	Adds an ID or comment to the measurement data
↑	Opens a menu to store the calibration data to another storage location
☑	Shows the measurement dataset
✓	Stores the data in the database and return to the measurement screen

4. Tap ✓ to close the pop-up menu bar.

Temperature measurement

The temperature of the sample influences the measured value. Temperature is an important secondary measured value. IDS sensors are equipped with an integrated temperature sensor. The temperature of the sample is automatically shown in the measurement screen. For measurement without an integrated temperature sensor, the temperature has to be measured manually and set in the measurement screen. For more information, see *Measure or calibrate without an integrated temperature sensor* on page 21.

Temperature compensation

The temperature compensation is calculated based on the preset reference temperature of either 20 °C or 25 °C. It is shown on the measurement screen as Tr20 or Tr25.

The following settings for temperature compensation methods can be selected:

- **Nonlinear (nLF)**:

Nonlinear temperature compensation (nLF) according to ISO 7888

- **Linear (Lin)**:

  Linear temperature compensation with adjustable coefficient

- **off**

  The temperature compensation is turned off.

EN

The reference temperature and temperature compensation are set in the sensor settings. For more information, see *Settings and sensor data conductivity* on page 54.

Application tips

Select one of the following temperature compensations that are given in the table according to the respective test sample:

Table 55: Application tips

Test sample	Temperature compensation	Display
Natural water, for example, groundwater, surface water, potable water	nLF According to ISO 7888	nLF
Ultrapure water	nLF According to ISO 7888	nLF
Other aqueous solutions	Lin Set a linear temperature coefficient. 0.000 %/K to 10.000 %/K	Lin
Salinity (seawater)	Automatic nLF according to international oceanographic tables (IOT)	Sal, nLF

10.2 Quality assurance

10.2.1 Introduction

Purpose

Aging slightly changes the cell constant, for example, because of coatings. Thus, an inexact measured value is displayed. If coatings are the reason for the change of the cell constant, then clean the cell to restore the original characteristics of the cell. Calibration calculates the current value of the cell constant and sets the value as the nominal value. The correction is stored in the sensor.

Calibration interval

- At recommended intervals
- For more information, see standard recommendations, for example DIN EN 27888 or ISO 7888.
- When the accuracy requirements are especially high
- Routinely as part of the company quality assurance
- When the calibration interval has expired

Calibration procedures

To calculate the actual cell constant of a conductivity sensor, calibrate it with a control standard that is applicable for the cell constant. For more information on conductivity calibration standards, see the accessories on the website.

Example for the IDS conductivity sensor TetraCon 925 (/C)(-P).

The conductivity sensor TetraCon 925 (/C)(-P), has a cell constant with the nominal value 0.475 cm^{-1}. The cell constant is calculated after a calibration in the control standard E-SET Trace that is available as an accessory for conductivity calibration. In the default condition, the calibrated cell constant of the sensor is set to 0.475 cm^{-1}.

Calibration record

Calibration results are stored in a database. For more information, see *Database* on page 24.

Criteria for a stable measured value

The stability control function checks whether the measured values are stable in the monitored time interval. The minimum duration until a measured value is evaluated as stable is given in the following table. The actual duration is mostly longer.

EN

Table 56: Stability criteria conductivity

Measured parameter	Time interval	Stability in the time interval
Conductivity χ	10 seconds	$\Delta \chi$ less than 1.0% of measured value
Temperature	15 seconds	Δ less than 0.5 °C

10.2.2 Calibration

Start a conductivity calibration

Prepare for calibration. For more information, see *Prepare for calibration* on page 22.

1. Go to ⌂ > **CAL**.
   The **Calibration methods** menu is shown. Examples of conductivity calibration methods:

   Table 57: Default calibration methods for conductivity calibration

Method	Description
Default conductivity	For each method, icons show the available actions. – ✎: Edit the settings of the method. For more information, see *Settings of the calibration method Default conductivity* on page 55. – ⓘ: Shows the settings of the method. For more information, see *Settings of the calibration method Default conductivity* on page 55. – ▷: Start the method.

2. Tap the ✎ icon next to the name of the calibration method to be used.
   The **Calibration settings** menu of the selected sensor is shown.
3. Check the settings for the calibration method.
   For more information, see *Quality assurance* on page 52.
4. Tap the ▷ icon next to the name of the calibration method to be used.
   – If there is only one sensor connected that can be calibrated with that method, then the summary of the calibration method is shown.
   – If there are more sensors connected that can be calibrated with that method, then the list of these sensors is shown. Select the name of the sensor to be calibrated.

   A summary of the calibration method is shown.
5. Tap **Start**.
   The procedure of the selected calibration method starts.
6. Follow the instructions on the screen until the calibration result is shown.
   A pop-up menu bar is shown:

   Table 58: Pop-up menu bar that is shown at the end of a calibration

Icon	Description
💬	The icon opens an input field to enter an ID or a comment.
⇪	The icon opens a menu to store the calibration data to another storage location.
📋	The icon shows the calibration data and the calibration evaluation.
✓	The icon finishes the calibration and shows the home screen.

7. Tap ✓.
   The calibration is finished. The home screen is shown.

Calibration evaluation for conductivity sensors

Table 59: Calibration evaluation for conductivity sensors

Sensor quality symbol	Calibration record	Cell constant [cm^{-1}]
	+++	Within the range 0.450 cm^{-1} to 0.500 cm^{-1}
	Error	Outside the range 0.450 cm^{-1} to 0.500 cm^{-1}

10.3 Settings

Settings and sensor data conductivity

All the settings are stored in the sensor.

Table 60: Settings and sensor data conductivity

Settings	Description
Sensor type	Type of the sensor
Serial number	Serial number of the sensor
Sensor name	Name of the sensor
Measurement mode	Measured parameter • **χ** • **Ω** • **SAL** • **TDS**
Last calibration	Date and time of the last calibration.
Executed by	Name of the user who performed the last calibration.
Calibrated with	• **Internal** • **External** **Sensor name** and the **Serial number** of the device that was used for the last calibration are shown.
Quality	Sensor quality evaluation of the last calibration. If the sensor is not calibrated, then there is no entry. For more details, see *Calibration evaluation for conductivity sensors* on page 54.
Calibration result	Information on the calibration standards that were used during the last calibration.
Calibration history	The last five calibrations are shown. For more details, see *Calibration and measurement datasets* on page 24.
Calibration check	The toggle switch turns the input field **Calibration interval in days** on or **off**.
Calibration interval in days	Calibration interval The unit is days. If the calibration interval has expired, then a message is shown.
Reference temperature	Reference temperature If the setting **Measurement mode** is **χ** or **Ω**, then the item **Reference temperature** is shown. • **20 °C** • **25 °C**
Use manually set cell constant	• **true** • **false**

Settings	Description
Cell constant	• Possible values according to the connected sensor: – TetraCon 925 (/C)(-P) Cell constant: 0.475 cm^{-1} – LR 925/01 (-P) Cell constant: 0.090 cm^{-1} to 0.110 cm^{-1} The default value is stored in the IDS sensor.
Temperature compensation	• **Linear (Lin)**: Linear temperature compensation with adjustable coefficient • **Nonlinear (nLF)**: Nonlinear temperature compensation (nLF) according to ISO 7888 • **None (off)** The temperature compensation is turned off.
Linear temperature coefficient in %/K	**0.000 %/K to 10.000 %/K** If the setting **Measurement mode** is set to **TDS**, then the setting **Linear temperature coefficient in %/K** is shown.
TDS multiplier	**0.40 to 1.00** If the setting **Temperature compensation** is set to **Nonlinear (nLF)** or **Linear (Lin)**, then the setting **TDS multiplier** is shown.
Software Version	Software version of the sensor

Settings of the calibration method Default conductivity

Table 61: Settings of the calibration method Default conductivity

Settings	Description
Calibration method	• **automatic** • **manual**
Standard	• TetraCon 925 (/C)(-P) **1413 µS/cm (25°C)** The TetraCon 925 (/C)(-P) IDS sensor can only be calibrated with this standard. • LR 925/01 (-P) The LR 925/01 (-P) IDS sensor can be calibrated with the standards of the E-SET Tracekit. – **100 µS/cm 25 °C** – **5 µS/cm 25 °C** – **1.3 µS/cm 25 °C**

10.4 Troubleshooting conductivity sensors

More information and instructions on cleaning and exchange of sensors are given in the documentation of the sensor.

Measurement failed

Table 62: Measurement failed

Cause	Remedy
The measured value is outside the measuring range.	Select a sensor that matches the measuring range.

Calibration failed

Table 63: Calibration failed

Cause	Remedy
The sensor is contaminated.	Clean the sensor.

Cause	Remedy
• The calibration solution is to old or contaminated • The calibration solution does not correspond to the selected standard in the calibration settings	Replace the calibration solution.

11 Operation with turbidity sensors

Check the latest software update for availability of the function.

EN

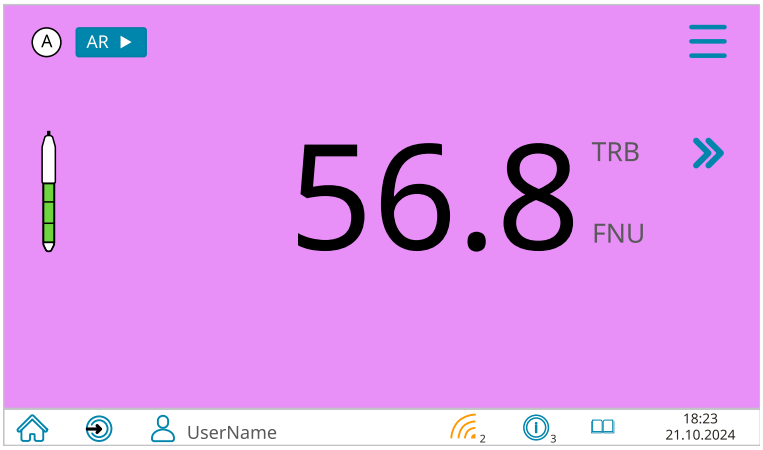
11.1 Measurement

Measure the turbidity

Prepare for measurement. For more information, see *Prepare for measurement* on page 19.

1. Immerse the sensor in the sample.
2. Go to ⌂ > ▷.
   The measurement screen is shown. If the measured value is not shown, then an information is shown on the measurement screen.

   Figure 21: Measurement screen for turbidity sensors



3. Tap on **AR** to measure with the selected measurement method.
   When the measurement is finished, a pop-up menu bar is shown.

   Table 64: Pop-up menu bar that is shown at the end of a measurement with AutoRead

Icon	Description
↻	Repeats the measurement
💬	Adds an ID or comment to the measurement data
⇪	Opens a menu to store the calibration data to another storage location
📋	Shows the measurement dataset
✓	Stores the data in the data base and return to the measurement screen

4. Tap ✓ to close the pop-up menu bar.

Temperature measurement

The temperature of the sample influences the measured value. Temperature is an important secondary measured value. IDS sensors are equipped with an integrated temperature sensor. The temperature of the sample is automatically shown in the measurement screen. For measurement without an integrated temperature sensor, the temperature has to be measured manually and set in the measurement screen. For more information, see *Measure or calibrate without an integrated temperature sensor* on page 21.

11.2 Quality assurance

11.2.1 Introduction

EN

Purpose

The calibration line of the sensor is calculated and stored through calibration.

Calibration interval

- At regular intervals
- When the cleaning interval has expired
- Routinely as part of the company quality assurance

Calibration procedures

A turbidity calibration is carried out with 2 to 3 turbidity standards that are listed in the selected turbidity calibration set.

For more information, see *Start a turbidity calibration* on page 58.

Calibration standards

Table 65: Calibration standards for turbidity

Standard solution value (FNU/NTU)	Range (FNU/NTU)	Description
0	0.0 to 1.0	Clean tap water or filtered, deionized water can be used. The preparation of the standard with the turbidity value 0.0 FNU/NTU has to be done freshly before the calibration. Bottles that can be used for the preparation of the standard are available as accessories. For measurement and calibration a special vessel must be used. For more information, see the operating manual of the turbidity sensor VisoTurb 900-P.
124	5.0 to 200.0	These standards are available as accessories. For more information, see the operating manual of the turbidity sensor VisoTurb 900-P. The calibration can be performed in the bottles the standards are delivered in.
1010	200.0 to 4000.0	

The standards can be used several times in the shelf life.

The standard solutions must be replaced in the following cases:

- After the expiration date
- There are any other doubts about the quality

Calibration record

Calibration results are stored in a database. For more information, see *Database* on page 24.

Criteria for a stable measured value

The stability control function checks whether the measured values are stable in the monitored time interval. The minimum duration until a measured value is evaluated as stable is given in the following table. The actual duration is mostly longer.

Table 66: Stability criteria turbidity

Measured parameter	Time interval	Stability in the time interval
Turbidity	15 seconds	Δ less than 1.0% of measured value

11.2.2 Calibration

Start a turbidity calibration

The expected turbidity value of the measurement defines the number and selection of standards. The calibration has to be carried out for the range with the highest turbidity

to be expected and for all lower ranges. The standard solutions have to be used in ascending order, starting with standard 1.

The standard solutions to be used for the calibration must cover the complete value range that is expected for the turbidity measurement. For example, if the expected turbidity value is in the range from 200 to 4000 FNU/NTU, then the **3-Point Calibration** is required.

EN

Prepare for calibration. For more information, see *Prepare for calibration* on page 22.

1. Go to ⌂ > **CAL**.
   The **Calibration methods** menu is shown. Examples of turbidity calibration methods:

   Table 67: Default calibration methods for turbidity

Method	Description
Default Turb Cal	For each method, icons show the available actions. – ✎: Edit the settings of the method. For more information, see *Settings of the calibration method Default turbidity-Cal* on page 60. – ⓘ: Shows the settings of the method. For more information, see *Settings of the calibration method Default turbidity-Cal* on page 60. – ▷: Start the method.

2. Tap the ✎ icon next to the name of the calibration method to be used.
   The **Calibration settings** menu of the selected sensor is shown.
3. Check the settings for the calibration method.
   For more information, see *Quality assurance* on page 58.
4. Tap the ▷ icon next to the name of the calibration method to be used.
   – If there is only one sensor connected that can be calibrated with that method, then the summary of the calibration method is shown.
   – If there are more sensors connected that can be calibrated with that method, then the list of these sensors is shown. Select the name of the sensor to be calibrated.

   A summary of the calibration method is shown.
5. Tap **Start**.
   The procedure of the selected calibration method starts.
6. Follow the instructions on the screen until the calibration result is shown.
   A pop-up menu bar is shown:

   Table 68: A pop menu bar that is shown at the end of a calibration

Icon	Description
	The icon opens an input field to enter an ID or a comment.
	The icon opens a menu to store the calibration data to another storage location.
	The icon shows the calibration data and the calibration evaluation.
✓	The icon finishes the calibration and shows the home screen.

7. Tap ✓.
   The calibration is finished. The home screen is shown.

Calibration evaluation for turbidity sensors

Table 69: Calibration evaluation for turbidity sensors

Sensor quality symbol	Calibration record	
	+++	Optimum calibration
		Good calibration

11.3 Settings

Settings and sensor data turbidity

EN

All the settings are stored in the sensor.

Table 70: Settings and sensor data turbidity

Settings	Description
Sensor type	Type of the sensor
Serial number	Serial number of the sensor
Sensor name	Name of the sensor
Measurement mode	Measured parameter • Nephelometric turbidity units (NTU) • Formazin nephelometric units (FNU)
Last calibration	Date and time of the last calibration.
Executed by	Name of the user who performed the last calibration.
Calibrated with	• **Internal** • **External** **Sensor name** and the **Serial number** of the device that was used for the last calibration are shown.
Quality	Sensor quality evaluation of the last calibration. If the sensor is not calibrated, then the field is empty. For more details, see *Calibration evaluation for pH sensors* on page 36.
Calibration result	Information on the calibration standards used during the last calibration
Calibration history	The last five calibrations are shown. For more details, see *Calibration and measurement datasets* on page 24.
Calibration check	The toggle switch turns the input field **Calibration interval in days** on or **off**.
Calibration interval in days	Calibration interval The unit is days. If the calibration interval has expired, then a message is shown.
Software Version	Software version of the sensor

Settings of the calibration method Default turbidity-Cal

Table 71: Settings of the calibration method Default turbidity-Cal

Settings	Description
Calibration standard set	• **Turbidity standard solutions**
Type of calibration…	• **3-Point Calibration** Only the following standard can be used in the specified order.

11.4 Troubleshooting turbidity sensors

More information and instructions on cleaning and exchange of sensors are given in the documentation of the sensor.

Implausible turbidity values

Table 72: Incorrect measured values

Cause	Remedy
There are gas bubbles, for example, air bubbles, in front of the measurement window.	Remove the gas bubbles. For example, immerse the sensor at an angle.
Incorrect calibration, for example: • Unsuitable calibration standard solutions • Too old calibration solutions • Unsuitable calibration environment • Gas bubbles, reflection, light	Check the calibration.

Cause	Remedy
Minimum immersion depth not obeyed	Heed the minimum immersion depth of the sensor (2 cm).
Minimum distance of the sensor towards the walls and bottom of the measuring vessel not obeyed	Heep the minimum distance of the sensor towards the walls and bottom of the measuring vessel (6 cm).
The measurement window is dirty.	Clean the measurement window.
Incidence of light	Use a light-proof measuring vessel.

12 Maintenance

Precautions

EN

Before starting the work, make sure that the safety instructions have been read and understood.

For more information, see *Introduction and safety* on page 4.

Clean the device

NOTICE:

The socket field is made up of acrylonitrile butadiene styrene (ABS) synthetic material.

Keep the device away from acetone and other solvent-based detergents.

Regularly clean the device.

1. Wipe the device surface with a wet, lint-free cloth.
2. For disinfection of the device surface use a lint-free cloth that is soaked in isopropanol.

Battery replacement

The device has a built-in CR 2032 battery. The battery has a lifespan of 7 to 10 years and is rated at 3 V and 230 mA.

The device must be returned to the manufacturer to replace the battery.

13 Troubleshooting

The device does not react to touch gestures

Table 73: The device does not react to touch gestures

Cause	Remedy
The device software has crashed.	Shut down the device. Press and hold the power switch for three seconds. Unsaved changes will be lost.
The touchscreen did not recognize the touch gesture. • The fingers are too dry. • The fingers are too wet. • The user uses wrong gloves.	• Moisten the finger. • Dry the finger. • Press more firmly. • Use gloves made from another material.

Log in to the administrator account is not possible

Table 74: Login data for admin account is lost

Cause	Remedy
Login data for the admin account is lost.	Contact the technical support.

Troubleshooting for sensor types

Table 75: Troubleshooting for sensor types

Sensor	Troubleshooting
pH sensors	See *Troubleshooting pH sensors* on page 40
DO sensors	See *Troubleshooting DO sensors* on page 50
Conductivity sensors	See *Troubleshooting conductivity sensors* on page 55
Turbidity sensors	see *Troubleshooting turbidity sensors* on page 60

14 Technical specification

General data

EN

Table 76: General data

Data	Value
Dimensions	161 mm x 97 mm x 70 mm (6.3 in x 3.8 in x 2.8 in)
Weight	0.6 kg (1.32 lb)
DC input device	• 5 V • 3 A • 15 W
AC input power adapter	• Voltage: 100 V to 240 V, ± 10% • Frequency: 50 Hz to 60 Hz • Current: 0.8 A at 115 V 0.4 A at 230 V
Output voltage	• IDS port – 9 VDC, 100 mA maximum – 5 VDC, 130 mA maximum • USB-A low power ports: 4 V, 100 mA
Battery	Lithium battery, type CR 2032, 3 V
Environmental condition	Intended for indoor use only
Storage temperature	-25 °C to +65 °C (-13 °F to +149 °F)
Operating temperature	0 °C to +40 °C (32 °F to +104 °F)
Operating humidity	Yearly average ≤ 80%
Operating site altitude	Maximum 4000 m above sea level
Pollution degree	2
Electrical safety	Class III
Overvoltage category	II
Supplier of the power adapter	Getronic EA1019GVRS
USB-A, low power port	2
USB–C, power port	1
Network port, 1 gigabit	1
EMC standards	• EC directive 2014/30/EC • EN 61326-1 • EN 61000-3-2 • EN 61000-3-3 • FCC class A
Device approval	CE
Meter safety standards	• EC directive 2014/35/EC • EN 61010-1
Ingress protection (IP) class	IP 43 according to EN 60529

Internall sensor

The internal pressure sensor is used only for DO measurement and calibration. The air pressure is automatically used for the air pressure correction during DO calibration and for the display of the oxygen saturation parameter.

Table 77: Internal sensor

Measured parameter	Measuring range	Accuracy
Air pressure, absolute	330 mbar to 1100 mbar	±4 mbar

15 Glossary

General terms in measurement technology

Table 78: General terms in measurement technology

Term	Description
Adjustment	A process of a professional modification in order to achieve a desired result. This usually involves setting a measuring device or its display.
AutoRange	Name of the automatic selection of the measuring range.
Calibration	Calibration is the comparison of values from a measurement system to the correct value or a value that is considered as correct. Frequently, this expression is also used when the measuring system is adjusted at the same time.
Measured parameter	The measured parameter is the physical dimension that is determined by the measurement, for example, pH, conductivity or DO concentration.
Molality	Molality is the amount (in moles) of a solute in 1000 g solvent.
Reset	Restore the original condition of all settings of a measuring system.
Resolution	The smallest difference between two measured values that a meter can display.
Stability control / AutoRead	The function stability control continually checks the stability of the measured value. The function stability control is referred to in the measurement screen as AR, the acronym for AutoRead. Measured values that do not meet the stability criteria cannot be saved or further processed. The criteria for stable measured values are listed in the quality assurance chapter for the sensor type.
Standard solution	The standard solution is a solution where the measured value is known by definition. It is used to calibrate a measuring system.
Temperature function	The name of a mathematical function which expresses the temperature behavior of a test sample, a sensor, or part of a sensor.
Test sample	Designation of the test sample ready to be measured. Usually, a test sample is obtained from the original sample through preparation. If the test sample was not processed, then the test sample and the original sample are identical.

pH / oxidation-reduction potential (ORP) / ion-selective electrode (ISE)

Table 79: pH / oxidation-reduction potential (ORP) / ion-selective electrode (ISE)

Term	Description
Electromotive force of an electrode	The electromotive force U of the electrode is the measurable voltage of an electrode in a solution. It is equal to the sum of all galvanic voltages of the electrode. Its dependency on the pH results in the electrode function, which is characterized by the parameters slope and zero point.
Junction	The junction is a porous body in the housing wall of reference electrodes or electrolyte bridges. It arranges the electrical contact between two solutions and makes the electrolyte exchange more difficult. The expression, junction, is also used for ground or junction-less transitions.
Oxidation-reduction potential (ORP)	Oxidizing or reducing substances that are dissolved in water cause the ORP. These substances become effective when they interact with an electrode surface, such as gold or platinum.
pH value	The pH value is a measure of the acidic or basic effect of an aqueous solution. It corresponds to the negative decadic logarithm of the molar hydrogen ions activity divided by the unit of the molality. The practical pH value is the value of a pH measurement.
Potentiometry	Name of a measurement technique. The signal that depends on the measured parameter of the electrode is the electrical potential. The electrical current stays constant.
Slope	Describes the slope of a linear calibration function.

Term	Description
Zero point / Asymmetry	The zero point of a combination electrode is the pH value at which the electromotive force of the combination electrode at a specified temperature is zero. Usually, this temperature is at 25 °C (77 °F).

Conductivity

Table 80: Conductivity

Term	Description
Cell constant	Characteristic of a conductivity measuring cell which is based on the geometry.
Conductivity	Conductivity is used as short form of the expression, specific electrical conductivity χ. It corresponds to the reciprocal value of the specific resistivity. It is a measured value of the ability of a substance to conduct an electric current. In the analysis of water, the electrical conductivity is a dimension for the ionized substances in a solution.
Reference temperature	Fixed temperature value to compare temperature-dependent measured values. For conductivity measurements, the measured value is adjusted to a standard temperature of either 20 °C (68 °F) or 25 °C (77 °F).
Resistivity	Resistivity is the short name for the specific electrolytic resistance ρ. It corresponds to the reciprocal value of the electrical conductivity.
Salinity	The absolute salinity S_A of seawater corresponds to the relationship of the mass of dissolved salts to the mass of the solution in g/kg. In practice, this dimension cannot be measured directly. Therefore, the practical salinity according to international oceanographic tables (IOT) is used for oceanographic monitoring. It is the result of the measurement of electrical conductivity.
Salt content	General designation for the quantity of salt dissolved in water.
Temperature coefficient	The value of the slope α of a linear temperature function.
Temperature compensation	Name of a function that considers the temperature influence on the measurement and converts it accordingly. Temperature compensation works in different ways which are based on the measured parameter. For conductimetric measurements, the measured value is converted to a defined reference temperature. For potentiometric measurements, the slope value is adjusted to the temperature of the test sample but the measured value is not converted.

Dissolved oxygen (DO)

Table 81: Dissolved oxygen (DO)

Term	Description
DO partial pressure	Pressure that is generated by the oxygen in a gas mixture or a liquid.
DO saturation	Short name for the relative DO saturation.
OxiCal®	Name for a procedure to calibrate DO measuring systems in a water vapor saturated air.
Relative slope	The designation expresses the relation of the slope value to the value of a theoretical reference sensor of the same construction type.

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