

Revision history

| Product version | Operating Instructions | Changes | Comments |
|-----------------|------------------------|-----------------|----------|
| 1.00.XX | BA01930S/04/EN/01.18 | Initial version | - |

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1 About this document

1.1 Document function













These instructions provide all the information required to use the system: from the product description, installation and use to system integration, operation, diagnostics and troubleshooting to software updates and disposal.

1.2 Symbols used






1.2.1 Safety symbols

| Symbol | Meaning |
|---|--|
|  | DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury. |
|  | WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. |
|  | CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury. |
|  | NOTE! This symbol contains information on procedures and other facts which do not result in personal injury. |








1.2.2 Symbols for certain types of information

| Symbol | Meaning |
|---|--|
|  | Permitted Procedures, processes or actions that are permitted. |
|  | Preferred Procedures, processes or actions that are preferred. |
|  | Forbidden Procedures, processes or actions that are forbidden. |
|  | Tip Indicates additional information. |
|  | Reference to documentation. |
|  | Reference to page. |
|  | Reference to graphic. |
|  | Notice or individual step to be observed. |
|  | Series of steps. |
|  | Result of a step. |
|  | Help in the event of a problem. |
|  | Visual inspection. |

1.2.3 Electrical symbols

| Symbol | Meaning |
|---|--|
|  | Direct current |
|  | Alternating current |
|  | Direct current and alternating current |
|  | Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system. |
|  | Protective Earth (PE) A terminal which must be connected to ground prior to establishing any other connections. The ground terminals are situated inside and outside the device: <ul style="list-style-type: none"> ▪ Inner ground terminal: Connects the protective earth to the mains supply. ▪ Outer ground terminal: Connects the device to the plant grounding system. |

1.2.4 Symbols to indicate device statuses (NAMUR NE107)

| Symbol | Meaning |
|---|--|
|  | Symbol as per NAMUR NE107 Failed High severity level: The output signal is invalid. A device error has occurred. |
|  | Symbol as per NAMUR NE107 Out of Specification Medium severity level: Either the permitted ambient conditions or the permitted process conditions have been exceeded, or the measured errors are too large. |
|  | Symbol as per NAMUR NE107 Maintenance Required Low severity level: The output signal is still valid. The expected operating life is nearly exhausted, or functionality will soon be restricted. With a pH measuring device, for example, "Maintenance Required" is displayed when the pH electrode needs to be replaced. |
|  | Symbol as per NAMUR NE107 Check Function The signal is temporarily invalid or held at the last valid value. Work is currently being carried out on the device. |
|  | Unknown: A connection could not be established to the device. |
|  | OK: The device is OK. |
|  | Not monitored: The device is not monitored. |

1.3 Text emphasis

| Emphasis | Meaning | Example |
|----------------|---|--|
| Bold | Keys, buttons, program icons, tabs, menus, commands | Start → Programs → Endress+Hauser In the File menu, select the Print option. |
| Angle brackets | Variables | <DVD drive> |

1.4 Acronyms used


| Acronyms | Meaning |
|--|--|
| AC | Alternating Current |
| CAS40D | Endress+Hauser ammonium and nitrate sensor |
| CM444 | Endress+Hauser transmitter |
| COS51D (only SSP200 for salt water applications) | Endress+Hauser oxygen sensor |
| COS61D (only SSP200 for freshwater applications) | Endress+Hauser oxygen sensor |
| CYA112 | Endress+Hauser immersion assembly |
| CYK10 | Endress+Hauser measuring cable |
| CPU | Central Processing Unit |
| DC | Direct Current |
| SSP | Smart System Package |
| Rest JSON API | Specification for REST-compliant API (Application Programmable Interface) (REST = Representational State Transfer) |

1.5 Documentation

The Operating Instructions for the Smart System are included in the delivery.

Supplementary documentation for SSP Smart Systems and system components

| System or system components | Designation | Documentation |
|--|-----------------|--|
| Smart System for Surface Water | SSP100 | <ul style="list-style-type: none"> ■ Technical Information TI01420S/04/EN ■ Operating Instructions BA01929S/04/EN |
| Smart System for Aquacultures | SSP200 | <ul style="list-style-type: none"> ■ Technical Information TI01421S/04/EN ■ Operating Instructions BA01930S/04/EN |
| Modbus Edge Device | SGC400 | Technical Information TI01422S/04/EN |
| Transmitter | Liquiline CM444 | <ul style="list-style-type: none"> ■ Technical Information TI00444C/07/EN ■ Brief Operating Instructions KA01159C/07/EN ■ Operating Instructions BA00444C/07/EN ■ Installation Instructions EA00009C/07/A2 |
| Ammonium and nitrate sensor | ISEmax CAS40D | <ul style="list-style-type: none"> ■ Technical Information TI00491C/07/EN ■ Operating Instructions BA00491C/07/EN |
| Oxygen sensor (for SSP200 for salt water applications) | Oxymax COS51D | <ul style="list-style-type: none"> ■ Technical Information TI00413C/07/EN ■ Brief Operating Instructions KA00413C/07/EN ■ Operating Instructions BA00413C/07/EN |
| Oxygen sensor (for SSP200 for freshwater applications) | Oxymax COS61D | <ul style="list-style-type: none"> ■ Technical Information TI00387C/07/EN ■ Brief Operating Instructions KA01133C/07/EN ■ Operating Instructions BA00460C/07/EN |
| Immersion assembly | Flexdip CYA112 | <ul style="list-style-type: none"> ■ Technical Information TI00118C/07/EN ■ Operating Instructions BA00118C/07/A2 |
| Measuring cable | CYK10 | <ul style="list-style-type: none"> ■ Technical Information TI00432C/07/EN ■ Operating Instructions BA00432C/07/EN |

 For additional documentation, please refer to the Endress+Hauser Operations App or go to www.endress.com/device-viewer.

1.6 Registered trademarks

Modbus is the registered trademark of Modicon, Incorporated.

RUT240 is a product of Teltonika Ltd., 08105 Vilnius/Lithuania.

RevPi Core 3 is a product of Kunbus GmbH, 73770 Denkendorf/Germany.

UNO PS is a product of Phoenix CONTACT GmbH & Co. KG, 32825 Blomberg/Germany.

All other brand and product names are trademarks or registered trademarks of the companies and organizations in question.

2 Basic safety instructions

2.1 Requirements for personnel

The personnel for installation, commissioning, diagnostics and maintenance must meet the following requirements:

- ▶ Trained, qualified specialists: must have a relevant qualification for this specific role and task and have been trained by Endress+Hauser. Experts at the Endress+Hauser service organization.
- ▶ Personnel must be authorized by the plant owner/operator.
- ▶ Personnel must be familiar with regional and national regulations.
- ▶ Before starting work: personnel must read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Personnel must follow instructions and comply with general policies.

Operating personnel must meet the following requirements:

- ▶ Personnel are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- ▶ Personnel follow the instructions in this manual.

2.2 Designated use

The Smart System SSP200 for freshwater applications is designed to monitor freshwater. The Smart System SSP200 for salt water applications is designed to monitor salt water.

The Liquiline CM444 transmitter is a multichannel controller and is used to connect the digital sensors supplied.

Any other use is considered to be non-designated use. Designated use entails compliance with the operating and maintenance requirements specified by the manufacturer. The Smart System must be mounted in an environment intended for this purpose.

The Smart System is not suitable for use in explosive atmospheres.

Dangers

It is the responsibility of the owner/operator to assess any dangers for the systems. These dangers must be assessed by the owner/operator and the measures resulting from the assessment must be implemented. While the Smart System can form part of such a measure, responsibility for the process always rests with the owner/operator, particularly the taking of suitable measures if the Smart System signals an alarm.

Incorrect use

Non-designated use can compromise safety. The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Occupational safety

Personnel must meet the following conditions when working on and with the system:

- ▶ Wear the required personal protective equipment according to regional/national regulations.
- ▶ When welding, do not ground the welding unit via the system.
- ▶ If hands are wet, wear gloves on account of the higher risk of electric shock.

2.4 Operational safety

Operate the system only if it is in proper technical condition, free from errors and faults.

The operator is responsible for the trouble-free operation of the system.

2.4.1 Modifications to the system

Unauthorized modifications to the system are not permitted and can lead to unforeseeable dangers:

- ▶ If, despite this, modifications are required, consult with Endress+Hauser.

2.4.2 Repair

To ensure continued operational safety and reliability:

- ▶ Repairs must be performed only by certified Endress+Hauser specialists.
- ▶ Observe federal/national regulations pertaining to the repair of an electrical device.
- ▶ Use original spare parts and accessories from Endress+Hauser only.

2.5 Product safety

The components used for the Smart System meet the general safety standards and legal requirements. Furthermore, the components comply with the EC/EU Directives that are listed in the EU Declarations of Conformity for the components.

2.6 IT security

We only provide a warranty if the system is installed and used as described in the Operating Instructions. The system is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the system and system data transfer must be implemented by the operators themselves.

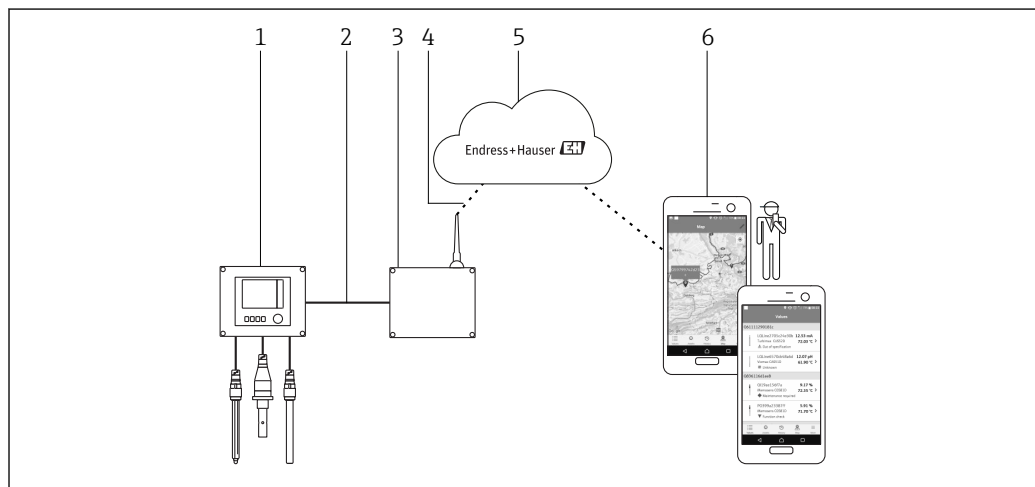
3 Product description

3.1 Function

The Smart System for Aquacultures SSP200 monitors aquaculture systems.

The package includes all the necessary sensors and a transmitter for measured data processing and the Modbus Edge Device SGC400. The package also contains immersion assemblies, mounting plates and the connecting cable for Modbus TCP connection. The Modbus Edge Device SGC400 transmits the device ID data, measured values and status information to the Endress+Hauser Cloud. The data sent to the cloud can be either queried directly via a REST JSON API or used in a smartphone application.

3.2 System design



1 Network architecture

- 1 Field device e.g. Liquiline CM444
- 2 Modbus TCP connection
- 3 Modbus Edge Device SGC400
- 4 LTE connection
- 5 Endress+Hauser Cloud
- 6 User application on smartphone

3.3 Communication and data processing

| | |
|-----------------------|---|
| Modbus TCP (Ethernet) | 2x LAN port, 10/100 Mbps, comply with IEEE 802.3, IEEE 802.3u standards |
| Wireless LAN | IEEE 802.11b/g/n, Access Point (AP), Station (STA) |
| Mobile | 4G (LTE) CAT4 up to 150 Mbps 3G up to 42 Mbps |

4 Incoming acceptance and product identification

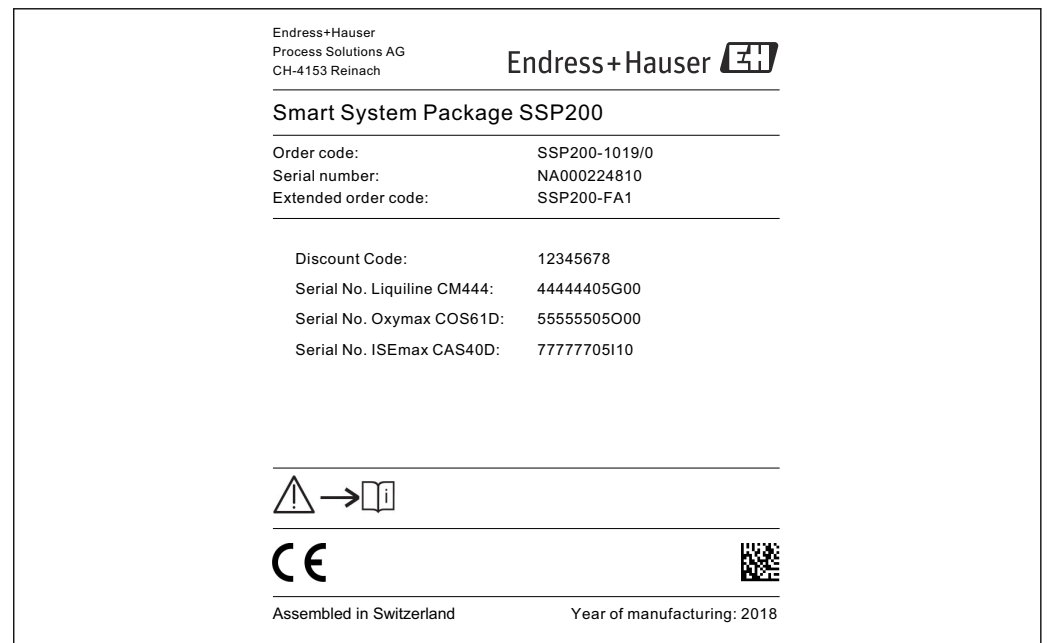
4.1 Incoming acceptance


- Check the packaging for visible damage arising from transportation.
- To avoid damage, remove the packaging with care.
- Keep all the accompanying documents.

The system may not be put into operation if the contents are found to be damaged beforehand. Contact your Endress+Hauser Sales Center if this happens. Return the system to Endress+Hauser in the original packaging where possible.

4.2 Product identification

The package contains a datasheet with the nameplate of the Smart System. The nameplate contains the serial number of the Smart System, the serial number of the Liquiline CM444 transmitter and the serial numbers of the sensors.



 2 Example of a nameplate for SSP200

A0037838

You can identify the system in the following ways:

- Enter the serial number indicated on the nameplate in W@M Device Viewer (www.endress.com → About us → W@M Life Cycle Management → Operations → The right device information always at hand (find spare part) → Access device-specific information → Enter serial number): all the information relating to the system/device is then displayed.
- Enter the serial number indicated on the nameplate in the Endress+Hauser Operations App: all the information relating to the system is then displayed.

4.3 Storage and transport



- The components are packed in such a way that they are fully protected against shock when in storage and during transportation.
- The permitted storage temperature is 0 to 40 °C (32 to 104 °F).
- Store the components in the original packaging in a dry place.
- Where possible, only transport the components in the original packaging.

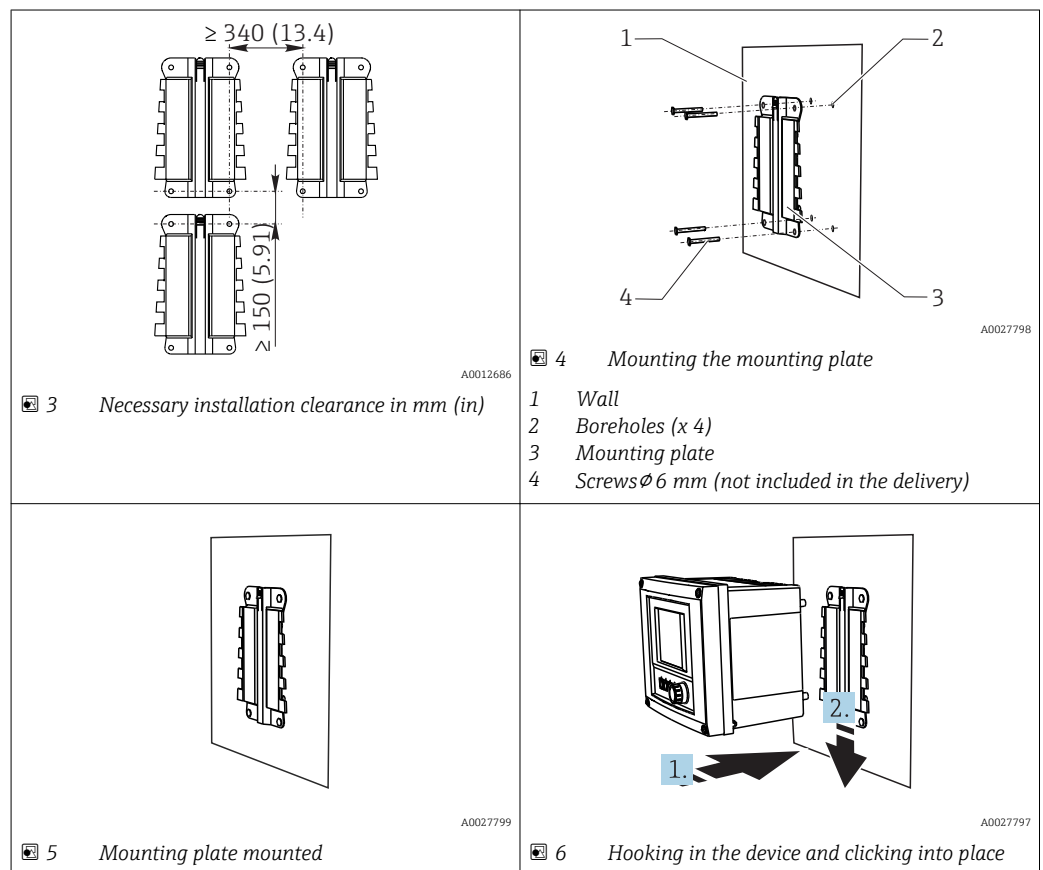
5 Installation

5.1 Liquiline CM444 and Modbus Edge Device

5.1.1 Mounting the Liquiline CM444 and the Modbus Edge Device

Mount both the Liquiline CM444 transmitter and the Modbus Edge Device on the wall using a mounting plate.

 For detailed information on the dimensions, see the Technical Information for "Liquiline CM444" and the Technical Information for "Modbus Edge Device" →  6.



1. Mount the mounting plates. Observe the installation clearances indicated. The diameter of the boreholes depends on the wall plugs used. Wall plugs and screws are not included in the delivery.
2. Hook the device into the holder.
3. Push the device down into the holder until the device clicks into place.

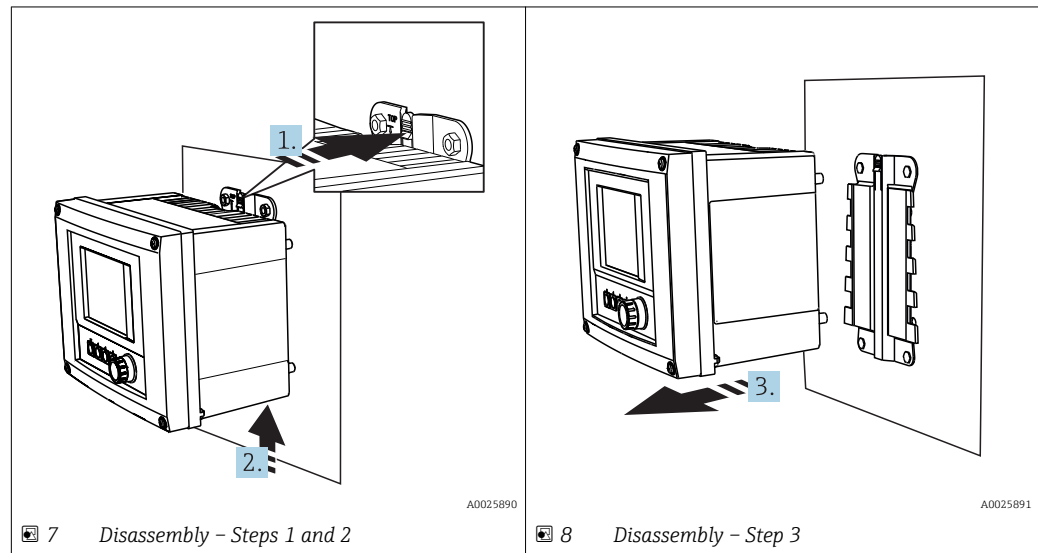
5.1.2 Disassembling the Liquiline CM444 and Modbus Edge Device

Disassemble the Liquiline CM444 transmitter and the Modbus Edge Device in the same way.

NOTICE**Device is dropped**

Damage to the device

- ▶ When pushing the device out of the holder, secure the device to ensure that you do not drop it.
- ▶ Ideally, have two people disassemble the device.



1. Push back the catch.
2. Push up the device to remove it from the holder.
3. Remove the device towards the front.

5.2 Assembling immersion assemblies CYA112

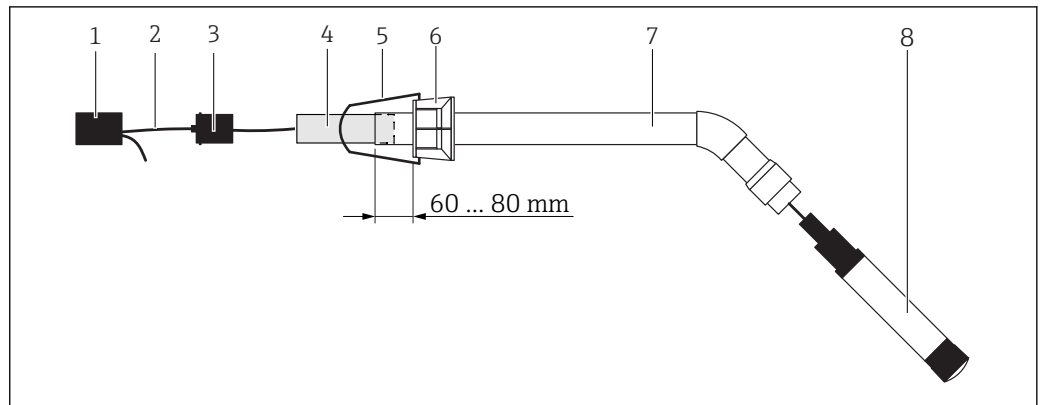
i Note that the immersion assemblies are fitted with different sensor adapters.

The following sensors are mounted with the immersion assembly CYA112:

- SSP200 for salt water applications: oxygen sensor COS51D with NPT3/4 sensor adapter
- SSP200 for freshwater applications: oxygen sensor COS61D with G1 sensor adapter

The ammonium and nitrate sensor CAS40D is mounted without an immersion assembly.

Assembling the immersion assembly



9 Immersion assembly CYA112 with mounted sensor

- 1 Splash protection cap
- 2 Sensor cable or measuring cable, depending on sensor
- 3 Rubber plug
- 4 Weight
- 5 Retaining bracket
- 6 Multifunctional clamp ring
- 7 Immersion assembly consisting of immersion tube, connecting bracket and sensor adapter
- 8 Sensor

1. Push the weight into the immersion tube.
2. Mount the retaining bracket on the multifunctional clamp ring.
3. Mount the multifunctional clamp ring on the immersion tube. Make sure to keep a distance of 60 to 80 mm from the upper edge of the immersion tube as illustrated in the graphic above.
4. If the sensor is not fitted with a permanently attached sensor cable, connect the measuring cable supplied to the sensor.
5. Guide the cable through the immersion assembly.
6. Guide the cable through the rubber plug. Observe the required length in relation to the Liquiline CM444 transmitter.
7. Seal the immersion tube with the rubber plug.
8. Screw the splash protection cap onto the immersion tube.

i The optional Flexdip CYH112 holder system offers different ways to mount the immersion assembly.

5.3 Post-installation check

| | |
|--|--------------------------|
| Are the mounted components undamaged (visual inspection)? | <input type="checkbox"/> |
| Do all the components meet the required specifications? For example: <ul style="list-style-type: none"> ▪ Ambient temperature range ▪ Humidity | <input type="checkbox"/> |
| Are all the securing screws tightened securely? | <input type="checkbox"/> |

6 Electrical connection

6.1 Safety

⚠ WARNING

Transmitter and Modbus Edge Device are live

Incorrect connection may result in injury or death!

- ▶ Only certified electricians may perform the electrical connection.
- ▶ The certified electrician must read and understand these Operating Instructions and must follow all the instructions.
- ▶ Prior to commencing connection work, ensure that no voltage is present on any cable.

6.2 Opening and closing the housing

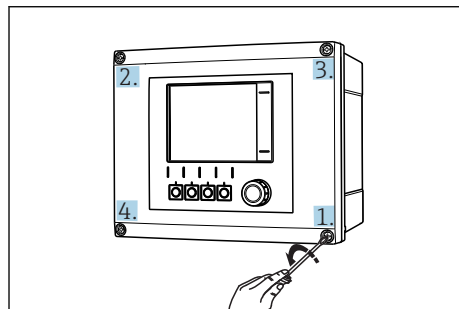
The housing of the transmitter and the housing of the Modbus Edge Device are opened and closed in the same way.

NOTICE

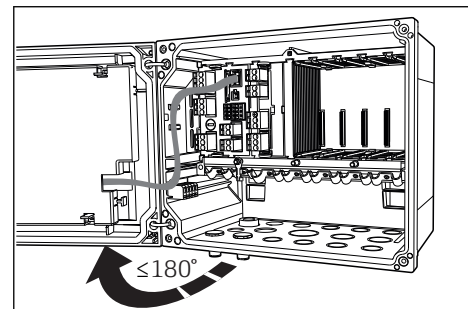
Pointed and sharp tools

If unsuitable tools are used, they can scratch the housing or damage the seal, and thus negatively affect the leak-tightness of the housing!

- ▶ Do not use any sharp or pointed objects, such as a knife, to open the housing.
- ▶ Only use a suitable Phillips-head screwdriver to open and close the housing.



10 Releasing housing screws in a diagonally opposite sequence with Phillips screwdriver



11 Opening housing cover, max. opening angle 180° (depends on installation position)

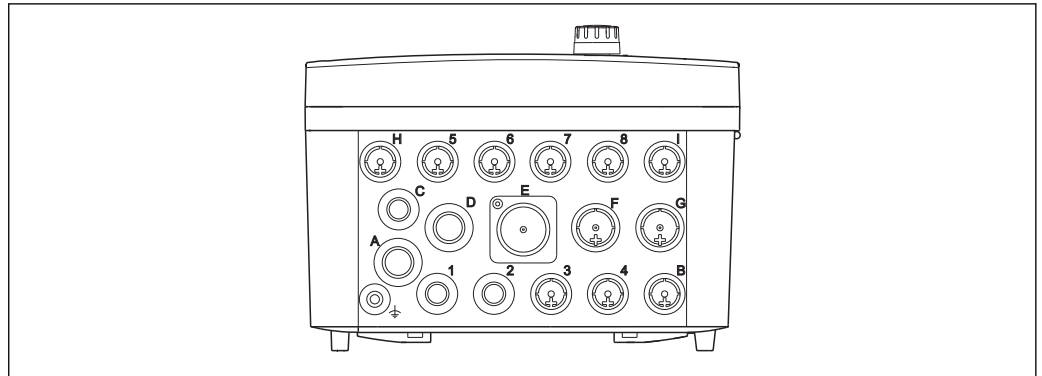
Opening the housing

1. Release the housing screws on a step-by-step basis. Start with any housing screw of your choice.
2. Release the housing screw that is diagonally opposite to this screw.
3. Release the third and fourth housing screw.

Closing the housing

- ▶ Tighten the housing screws on a step-by-step basis in a diagonally opposite sequence.

6.3 Cable entries and terminals



A0018025

12 Underside of housing with labeled cable entries and terminals

| Labeling on underside of housing | Description for Liquiline CM444 | Description for Modbus Device Edge |
|----------------------------------|---|------------------------------------|
| 1 to 8 | Sensors 1 to 8 | Do not use |
| A | Supply voltage | LTE antenna |
| B | RS485 In or M12 DP/RS485 (not used in factory configuration) | Do not use |
| C | Freely usable | Do not use |
| D | Current outputs and inputs, relays (not used in factory configuration) | Do not use |
| E | Do not use | Do not use |
| F | Current outputs and inputs, relays (not used in factory configuration) | Ethernet |
| G | Current outputs and inputs, relays (not used in factory configuration) | Supply voltage |
| H | Can be used freely | Do not use |
| I | RS485 Out and M12 Ethernet (M12 Ethernet used in factory configuration) | Do not use |

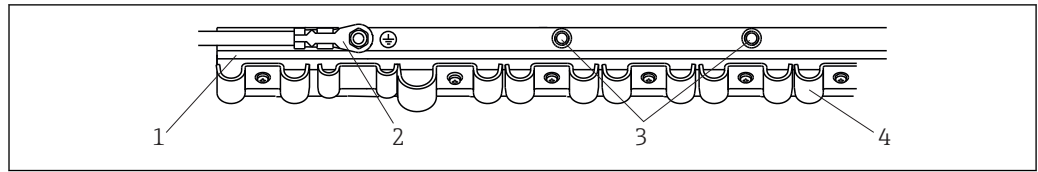
6.4 Electrical connection Liquiline CM444

NOTICE

The transmitter does not have a power switch!

- ▶ Provide a protected circuit breaker in the vicinity of the transmitter at the place of installation.
- ▶ The circuit breaker must be a switch or power switch, and must be labeled as the circuit breaker for the device.

6.4.1 Cable mounting rail

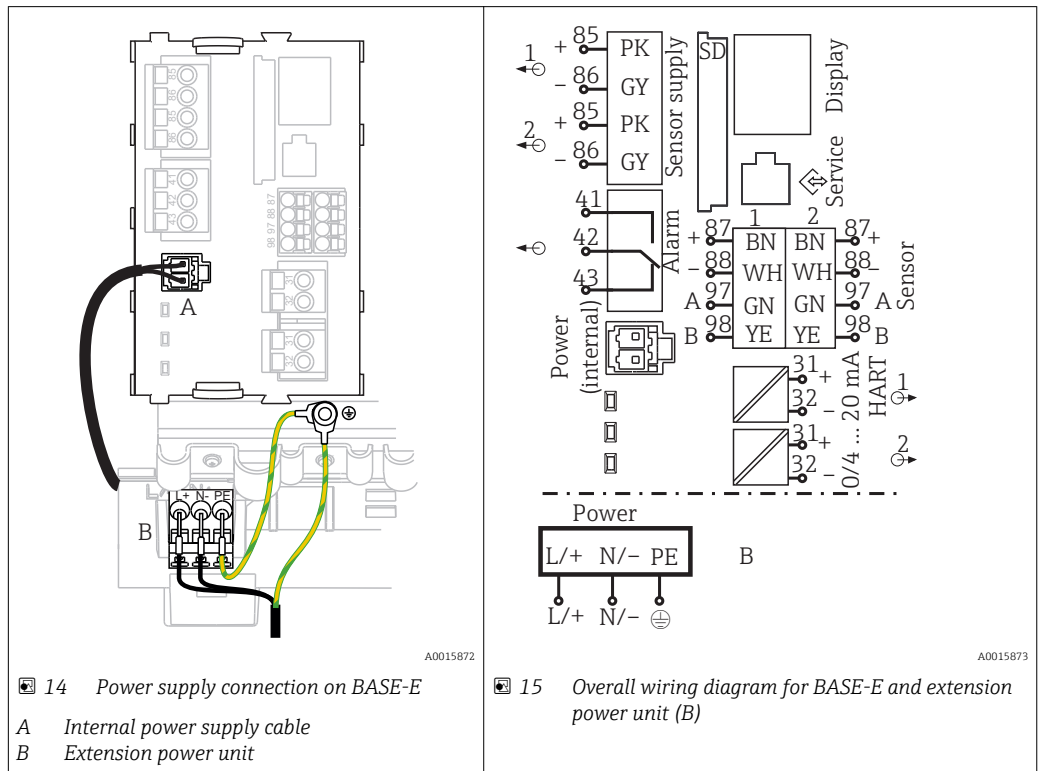


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13 Cable mounting rail and associated function

- 1 Cable mounting rail
- 2 Threaded bolt as protective ground connection, central grounding point
- 3 Additional threaded bolts for ground connections
- 4 Cable clamps for fixing and grounding the sensor cables

6.4.2 Connecting the Liquiline CM444 supply voltage



A0015872

A0015873

14 Power supply connection on BASE-E

- A Internal power supply cable
- B Extension power unit

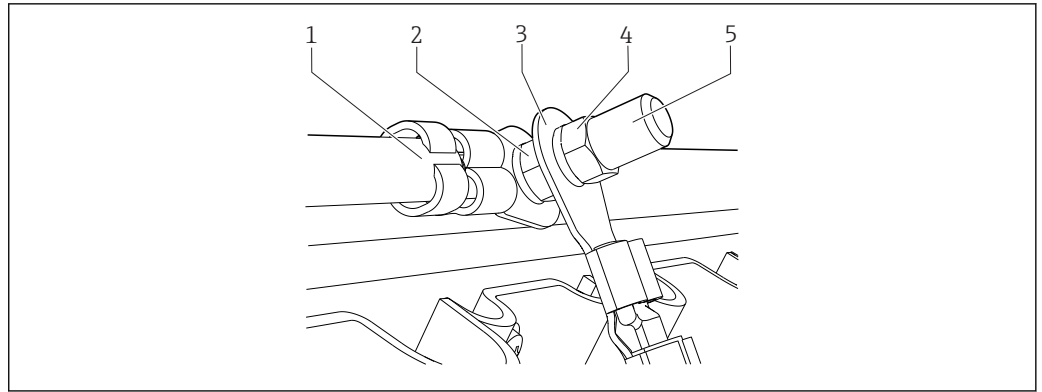
15 Overall wiring diagram for BASE-E and extension power unit (B)

Connecting the supply voltage – power unit 100 to 230 V AC

1. Route the power supply cable through the appropriate cable entry and into the housing.
2. Connect the protective ground of the power unit to the threaded bolt specially provided on the cable mounting rail.
3. We recommend you connect the protective ground or ground cable provided onsite to the mounting bolt. For this purpose, pull the protective ground or the ground cable through the cable entry and connect it to the threaded bolt on the cable mounting rail.
4. Connect cable cores L and N to the plug-in terminals of the power unit as shown in the wiring diagram.

Requirements for protective ground / ground cable

- Onsite fuse 10 A: wire cross-section min. 0.75 mm² (18 AWG)
- Onsite fuse 16 A: wire cross-section min. 1.5 mm² (14 AWG)



A0025812

16 Protective ground or grounding connection

NOTICE

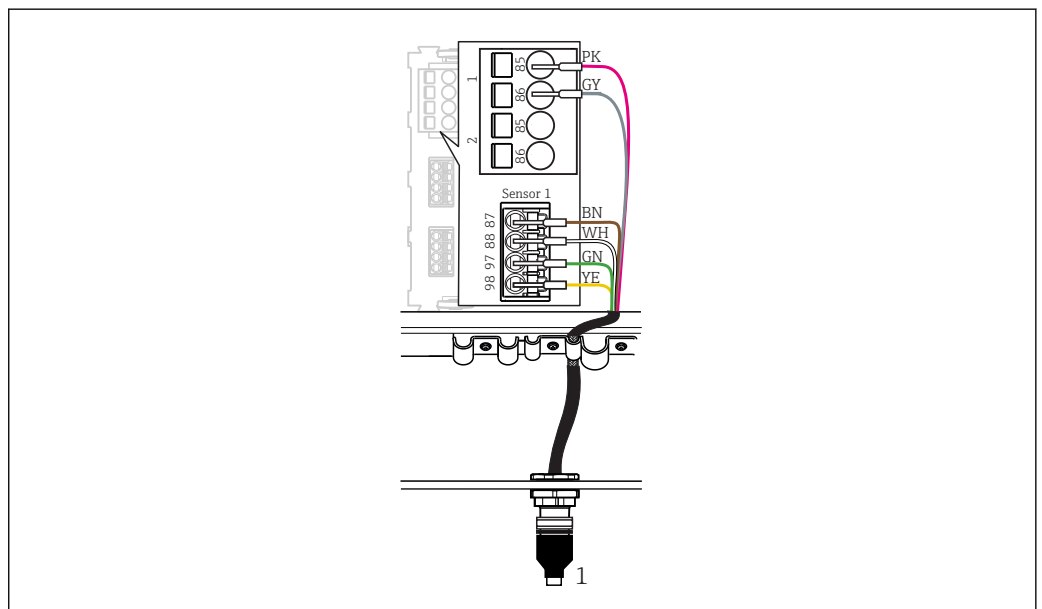
Protective ground or ground cable with wire ferrule or open cable lug

The cable can become loose. Loss of the protective function!

- ▶ To connect the protective ground or ground cable to the threaded bolt, only use a cable with a closed cable lug as per DIN 46211, 46225, form A.
- ▶ Never connect the protective ground or ground cable to the threaded bolt with a wire ferrule or an open cable lug.

6.4.3 Connecting the sensors

All sensors are supplied either with a sensor cable with an M12 connector or with a measuring cable CYA10 with an M12 connector. Connect the cable with the M12 connector to the M12 sensor socket provided on the underside of the device. The transmitter is already wired at the factory.



A0018019

17 M12 connection

1 Sensor cable with M12 connector or measuring cable CYA10 with M12 connector, depending on the sensor

i Name of connection ports: → 17

SSP200 for freshwater applications: connecting the sensors

1. Connect the sensor cable of oxygen sensor COS61D to **connection port 1**.

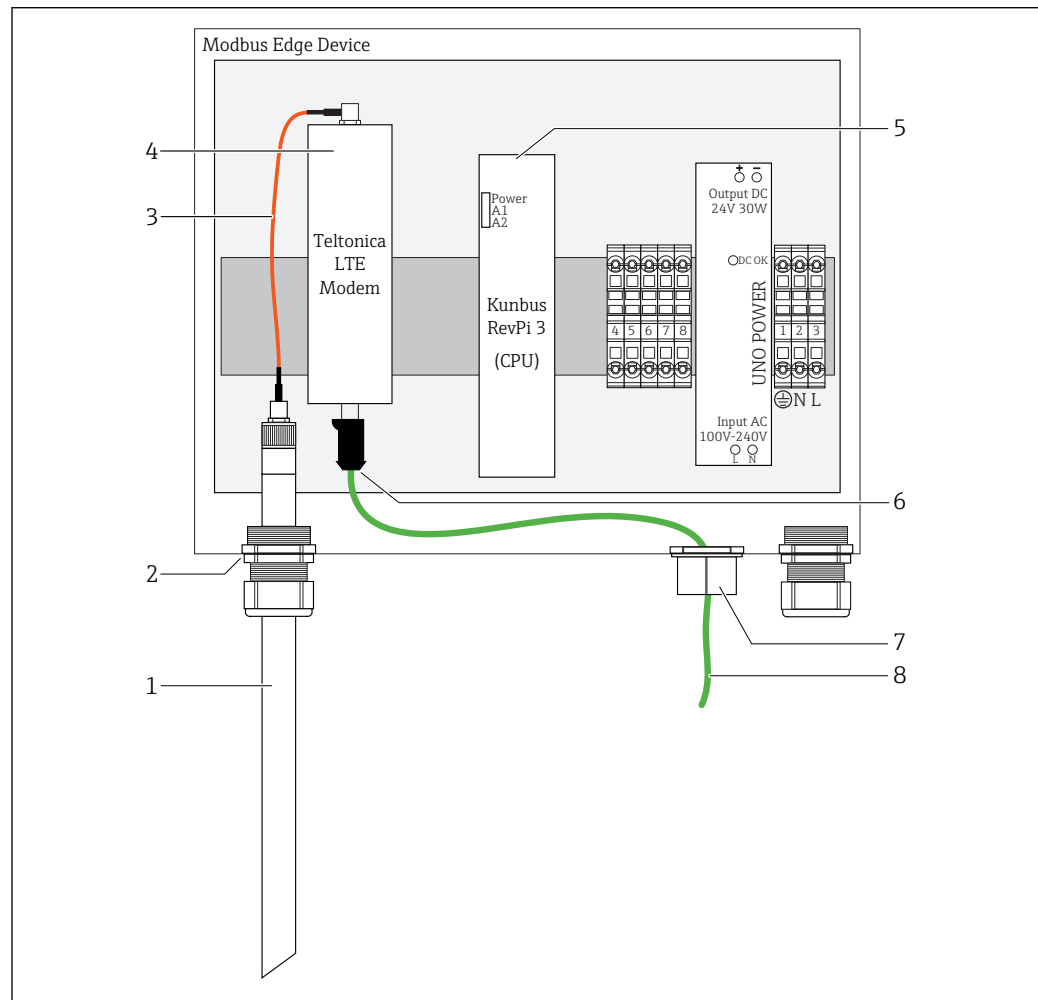
2. Connect the sensor cable of ammonium and nitrate sensor CAS40D to **connection port 2**.

SSP200 for salt water applications: connecting the sensors

1. Connect the measuring cable of oxygen sensor COS51D to **connection port 1**.
2. Connect the sensor cable of ammonium and nitrate sensor CAS40D to **connection port 2**.

6.5 Electrical connection of Modbus Edge Device

6.5.1 Preparing the Modbus Edge Device



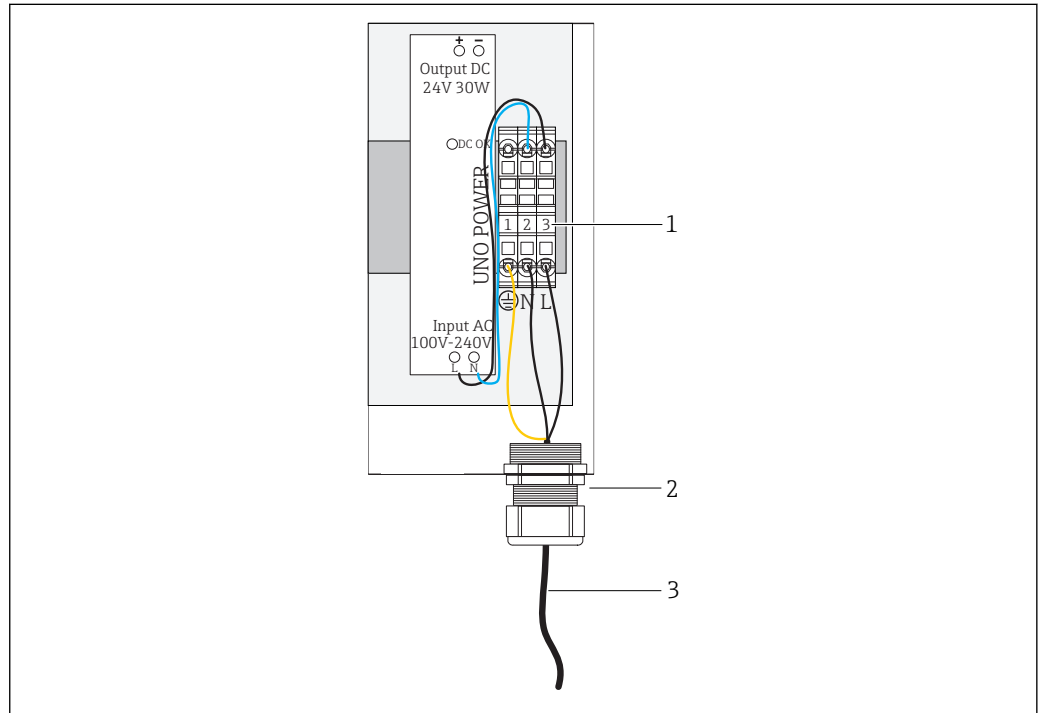
18 Modbus Device Edge preparation

- 1 LTE antenna
- 2 Cable gland at connection port A
- 3 Antenna - LTE modem connection cable
- 4 Teltonica LTE modem
- 5 CPU (Kunbus RevPi 3)
- 6 Free connection of Teltonica LTE modem
- 7 Split cable gland
- 8 Ethernet cable (Modbus TCP connection)

1. Open the housing of the Modbus Edge Device → 16.
2. Connect the antenna connection cable to the LTE antenna.

3. Guide the LTE antenna through the cable gland at **connection port A** until the LTE antenna is firmly seated in the cable gland.
4. Tighten the cable gland.
5. Secure the split cable gland on the Ethernet cable.
6. Mount the split cable gland with the Ethernet cable on **connection port F**.
7. Connect the Ethernet cable to the free connection of the Teltonica LTE modem.

6.5.2 Connecting the supply voltage for Modbus Edge Device



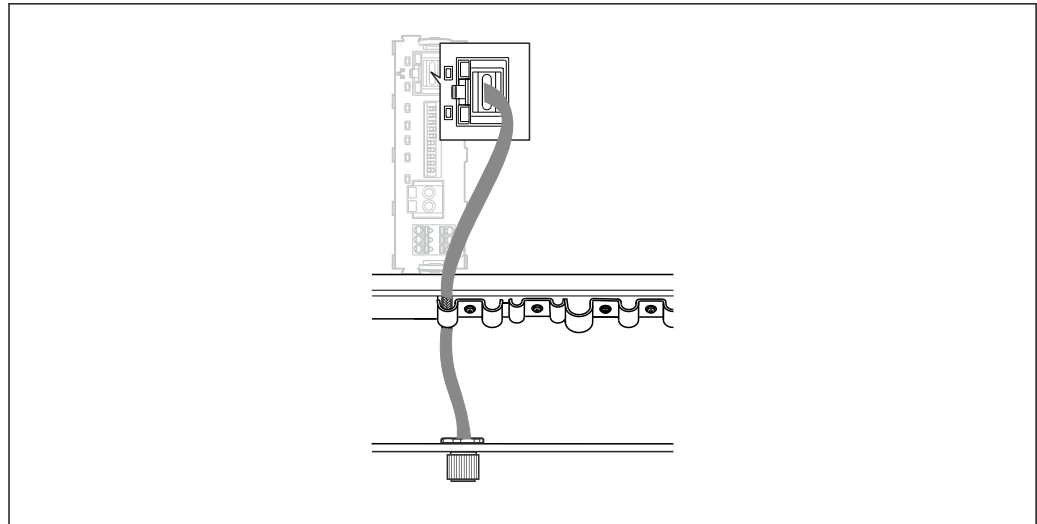
19 Connecting supply voltage 100 to 240 V AC

- 1 Terminal blocks
- 2 Cable entry
- 3 Power supply cable

1. Route the power supply cable into the housing through the cable gland at **connection port G**.
2. Connect the protective ground to the green/yellow terminal strip "1". The terminal strip is marked with a symbol for the protective ground connection.
3. Connect the neutral conductor N to the blue terminal strip "2". The terminal strip is marked "N".
4. Connect phase L1 to the gray terminal strip "3". The terminal strip is marked "L".
5. Close the housing → 16.

6.6 Connecting Liquiline CM444 and Modbus Device Edge

Signal transmission between the Liquiline CM444 transmitter and the Modbus Device Edge is via the Ethernet cable supplied. The Ethernet connection in the transmitter is already established on delivery from the factory.



A0025985

 20 Connecting the Ethernet cable to the transmitter

- ▶ Connect the Ethernet cable to the M12 socket of **connection port I** on the transmitter.

6.7 Post-connection check

| | |
|--|--------------------------|
| Are the system, devices and cables undamaged (visual check)? | <input type="checkbox"/> |
| Do the cables comply with the requirements? | <input type="checkbox"/> |
| Do the installed cables have adequate strain relief? | <input type="checkbox"/> |
| Does the supply voltage of the components match the specifications on the nameplate? | <input type="checkbox"/> |
| Is the terminal assignment correct? | <input type="checkbox"/> |
| Are all the housing covers closed? | <input type="checkbox"/> |
| Are all the housing screws securely fastened? | <input type="checkbox"/> |
| Are dummy plugs inserted in every unused cable entry? | <input type="checkbox"/> |
| Are all the cable glands tightened securely? | <input type="checkbox"/> |

7 Commissioning

7.1 Commissioning the Liquiline CM444

7.1.1 Function check



WARNING

Incorrect connection and/or incorrect supply voltage

Safety risks for staff and device malfunctions!

- ▶ Check that all connections have been established correctly in accordance with the wiring diagram.
- ▶ Ensure that the supply voltage matches the voltage indicated on the nameplate.


Via the local display, you can take screenshots at any time and save them to an SD card.

1. Open the housing →  16.
2. Insert an SD card into the SD card slot in the base module.
3. Press the navigator button for at least 3 seconds.
4. In the context menu select the **Screenshot** item.
 - ↳ The current screen is saved as a bitmap file to the SD card in the "Screenshots" folder.
5. Close the housing →  16.

7.1.2 Setting the operating language

1. Switch on the supply voltage.
2. Wait for the initialization to finish.
3. Press the **MENU** soft key. Set your language in the top menu item.
 - ↳ The device can now be operated in your chosen language.

7.1.3 Configuring the Liquiline CM444

 The Liquiline CM444 transmitter is preconfigured on delivery from Endress+Hauser. Take the following steps if you want other settings or want to connect an additional sensor.

Customizing specific parameters for the Liquiline CM444 transmitter

1. Select the **Basic setup** menu. Menu path: Menu > Setup > Basic setup
2. Set the **Device tag**, **Set date** and **Set time** parameters.
 - ↳ The specific parameters for the transmitter are customized.

Customizing the tag name for the sensors

You have to customize the tag name for each connected sensor individually.

1. Select the **Check name** menu. Menu path: Menu > Setup > Inputs > Channel: Sensor type > Advanced setup > Check name
2. Customize the **Tag name** parameter.
 - ↳ The tag name is customized for the selected sensor.

Modifying the Modbus assignment

Each sensor is assigned one analog output for the primary value and one analog output for the secondary value. The sensors are assigned to the analog outputs according to the connection on the transmitter.

1. Select the **Modbus** menu. Menu path: Menu > Setup > Outputs > Modbus
2. Select the first analog output pertaining to the sensor. Menu path: Modbus > AI 1 to AI 16, e.g. AI 7.
3. Assign the channel or measured value to the analog output.
4. Select the second analog output pertaining to the sensor. Menu path: Modbus > AI 1 to AI 16, e.g. AI 8.
5. Assign the channel or measured value to the analog output.
 - ↳ The Modbus register has been modified.

| Connection at the transmitter | Analog input | Measured value | Factory configuration |
|-------------------------------|--------------|--------------------------|---|
| A | AI 1 | Sensor 1 primary value | Oxygen content (oxygen sensor COS51D for salt water applications, oxygen sensor COS61D for freshwater applications) |
| | AI 2 | Sensor 1 secondary value | Temperature (oxygen sensor COS51D for salt water applications, oxygen sensor COS61D for freshwater applications) |
| B | AI 3 | Sensor 2 primary value | Ammonium (ammonium and nitrate sensor CAS40D) |
| | AI 4 | Sensor 2 secondary value | Nitrate (ammonium and nitrate sensor CAS40D) |
| C | AI 5 | Sensor 3 primary value | – |
| | AI 6 | Sensor 3 secondary value | – |
| D | AI 7 | Sensor 4 primary value | – |
| | AI 8 | Sensor 4 secondary value | – |
| E | AI 9 | Sensor 5 primary value | – |
| | AI 10 | Sensor 5 secondary value | – |
| F | AI 11 | Sensor 6 primary value | – |
| | AI 12 | Sensor 6 secondary value | – |
| G | AI 13 | Sensor 7 primary value | – |
| | AI 14 | Sensor 7 secondary value | – |
| H | AI 15 | Sensor 8 primary value | – |
| | AI 16 | Sensor 8 secondary value | – |

Modifying the settings for Ethernet





1. Select the **Ethernet** menu. Menu path: Menu > Setup > General settings > Advanced setup > Ethernet
2. Select the **Off** option for the **DHCP** parameter.
3. Save the setting. Press the **SAVE** soft key to do so.
4. For the **IP address** parameter, configure the value **192.168.1.99**.
5. For the **Subnet mask** parameter, configure the value **255.255.255.0**.
6. For the **Gateway** parameter, configure the value **192.168.1.1**.

7. Save the settings. Press the **SAVE** soft key to do so.
8. Exit the **Ethernet** menu.
9. Check the settings in the **System information** menu. Menu path: DIAG > System information
 - ↳ The Liquiline CM444 transmitter can be found by the Modbus Edge Device and read out data.

7.2 Commissioning the Modbus Edge Device

No settings need to be made on the Modbus Edge Device. Once the Liquiline CM444 transmitter has been configured successfully, the Modbus Edge Device connects to the transmitter.

Checking the connection if necessary

1. Open the housing of the Modbus Edge Device →  16.
2. Check whether LED A2 on the CPU (Kunbus RevPi3) is flashing at an interval of 1 Hz (→  18,  20).
3. Close the housing of the Modbus Edge Device →  16.

7.3 Adding devices to the Web application

All devices connected to the Modbus Edge Device are automatically created in the Cloud. All the user needs to do is to add the Smart System to his assets.

1. Call up the log-in page in the Web browser
<https://iiot.endress.com/app/smartsystems>.
 - ↳ The "ID login" page is displayed.
2. Log in or register.
 - ↳ Once the user has logged in successfully, the **Assets** page is displayed.
3. Select the **Add** function.
4. Enter the serial number of the Liquiline CM444 transmitter.
5. Enter the serial number of a connected sensor.
6. Click the **Add** button.
7. Select a subscription. The subscriptions vary due to the different data transmission intervals.
 - ↳ The **Order details** page is displayed.
8. Enter the discount code. A discount code is included in the packaging of the Smart System.
9. Enter the payment and invoicing data.
10. Click the **Buy** button.
 - ↳ Once the payment has been made successfully, the newly added devices are displayed in the overview.

7.4 Installing a smartphone application

Prerequisite

The user owns the Smart System (→  25).

1. Download the Smart Systems App from the Apple AppStore or Google Play Store.
2. Install the Smart System App.

3. Log in.
 - ↳ The devices are displayed in the overview.

8 Operation

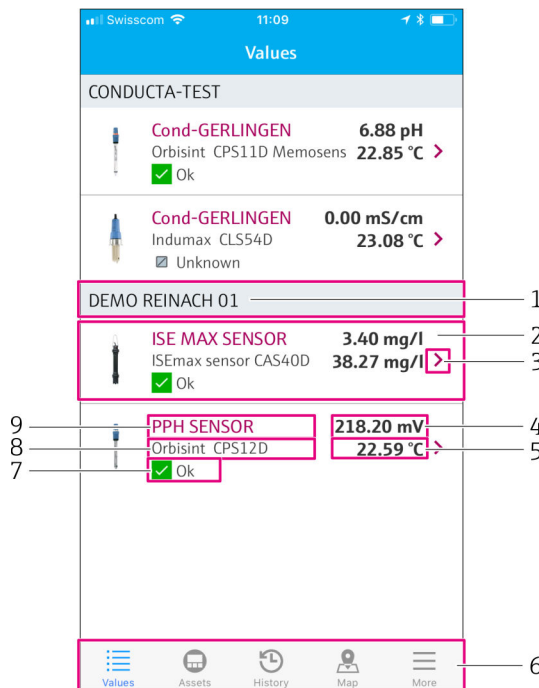
8.1 Values

8.1.1 Measured value overview

The "Measured value overview" view shows all the measured values and the current status of the sensors pertaining to the system.

Calling up the measured value overview

- ▶ Tap the **Values** symbol in the navigation bar.



21 "Measured value overview" view

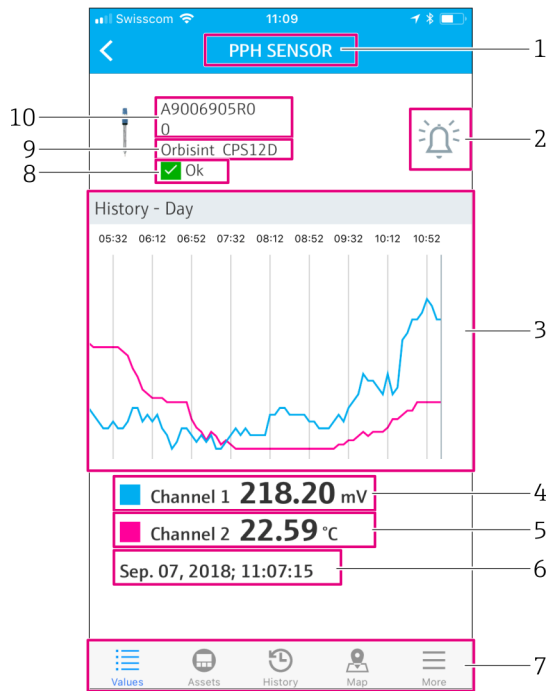
- 1 Transmitter tag name
- 2 Information about the sensor including picture of product
- 3 Navigation to "Sensor details" view → 27
- 4 Primary measured value
- 5 Secondary measured value
- 6 Navigation bar
- 7 NAMUR NE107 sensor status → 5
- 8 Sensor product name
- 9 Sensor tag name

8.1.2 Sensor details

The "Sensor details" view displays all the information for the selected sensor.

Calling the sensor details for a sensor

- ▶ In the "Measured value overview" view for the desired sensor, tap the **arrow symbol**.
→ 27



22 "Sensor details" view

- 1 Sensor tag name
- 2 Navigation to "Alarm setting" view
- 3 Display area for history graphs
- 4 Primary measured value at selected point in graph
- 5 Secondary measured value at selected point in graph
- 6 Date and time of displayed measured values
- 7 Navigation bar
- 8 NAMUR NE107 sensor status → 5
- 9 Sensor product name
- 10 Sensor serial number

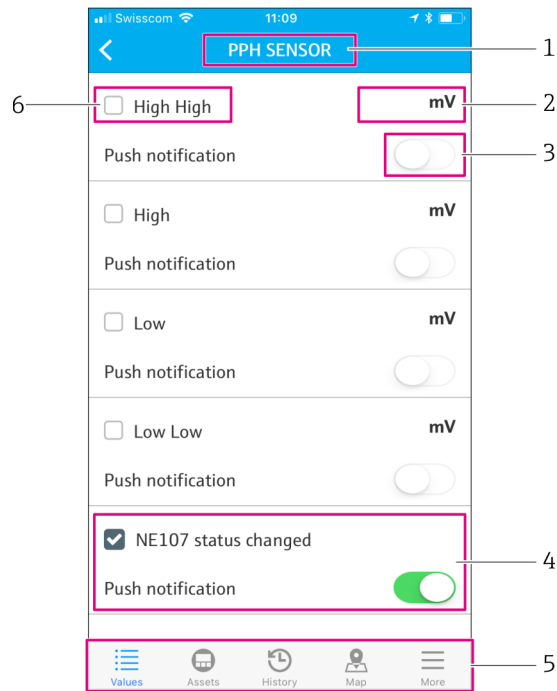
8.1.3 Alarm settings

You can make the following settings for the selected sensor via the "Alarm settings" view:

- Define the limit values.
- Activate notifications for limit value violation (value above/below limits).
- Activate notification as soon as a status change as per NAMUR NE107 occurs.

Calling the alarm settings for a sensor

1. In the "Measured value overview" view, tap the desired sensor.
 - ↳ The "Sensor details" view is displayed.
2. In the "Sensor details" view, tap the **alarm symbol** on the top right. → 27



23 "Alarm settings" view

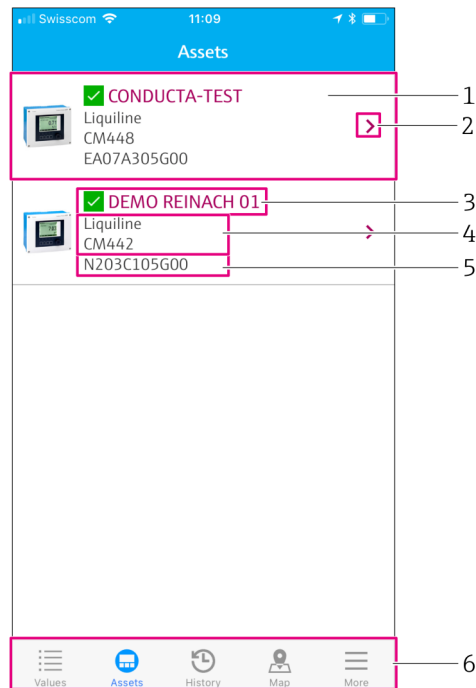
- 1 Sensor tag name
- 2 Enter the limit value for the primary measured value
- 3 Enable or disable push notification in event of limit value overshoot
- 4 Enable or disable push notification in event of NAMUR NE107 status change → 5
- 5 Navigation bar
- 6 Enable limit value

8.2 Assets

The "Assets" view displays all the Liquiline CM444 transmitters that you own.

Calling an asset

- ▶ Tap the **Assets** symbol in the navigation bar.



24 "Assets" view

- 1 Overview of transmitters including product picture
- 2 Navigation to "Transmitter details" view → 30
- 3 Current NAMUR NE107 status of transmitter and transmitter tag name → 5
- 4 Transmitter product name
- 5 Transmitter serial number
- 6 Navigation bar

8.2.1 Transmitter details

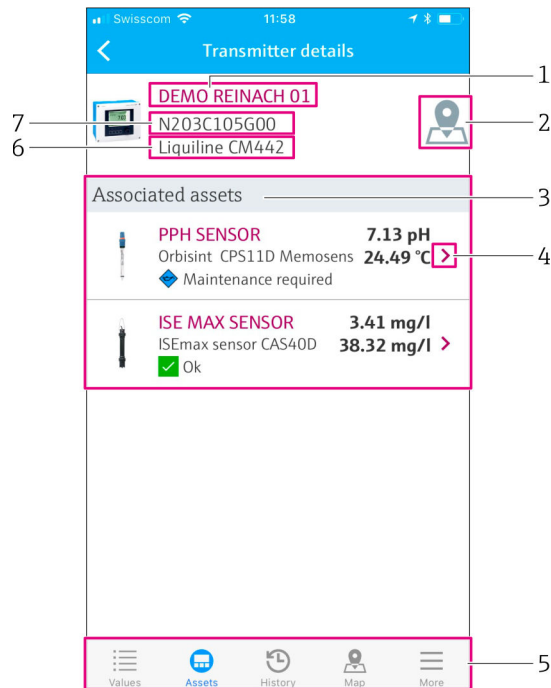
The "Transmitter details" view shows the selected transmitter and the sensors that are connected to the transmitter.


Calling transmitter details – Version 1


1. Tap the **Assets** symbol in the navigation bar.
2. In the "Assets" view for the desired transmitter, tap the **arrow symbol**. → 29

Calling transmitter details – Version 2

1. Tap the **Map** symbol in the navigation bar.
2. In the "Map" view, tap the tag name of the desired transmitter. → 32



 25 "Transmitter details" view

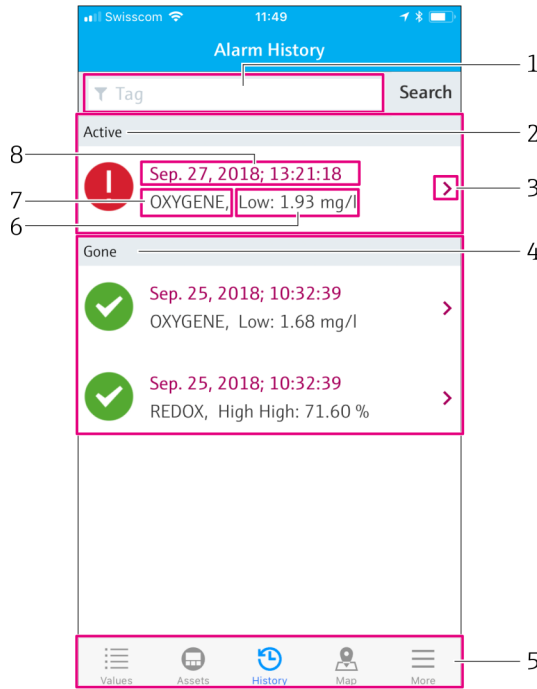
- 1 Transmitter tag name
- 2 Navigation to transmitter on the overview map
- 3 List of sensors connected to the transmitter
- 4 Navigation to "Sensor details" view →  27
- 5 Navigation bar
- 6 Transmitter product name
- 7 Transmitter serial number

8.3 History (Alarm history)

The "History" view displays all the alarms that occurred in the past. The view is divided into two sections: the "Active" section and the "Gone" section.

Calling the "Alarm history" view

- ▶ Tap the **History** symbol in the navigation bar.



26 "Alarm history" view

- 1 Search field to search for alarms for a tag
- 2 "Active" section for all pending and unacknowledged alarms
- 3 Navigation to "Sensor details" view → 27
- 4 "Gone" section for all acknowledged alarms that are no longer present
- 5 Navigation bar
- 6 NAMUR NE107 diagnostic or limit value that has been exceeded or undershot
- 7 Tag name
- 8 Date and time when the alarm occurred

| Section | Identification | Description |
|---------|----------------------|--|
| Active | Red exclamation mark | The alarm has not yet been acknowledged. |
| Active | Blue tick | The alarm is still present but has been acknowledged. |
| Gone | Green tick | The alarm has been acknowledged and is no longer present. The NAMUR NE107 status is OK. The measured value is within the limits. |

Acknowledging alarms

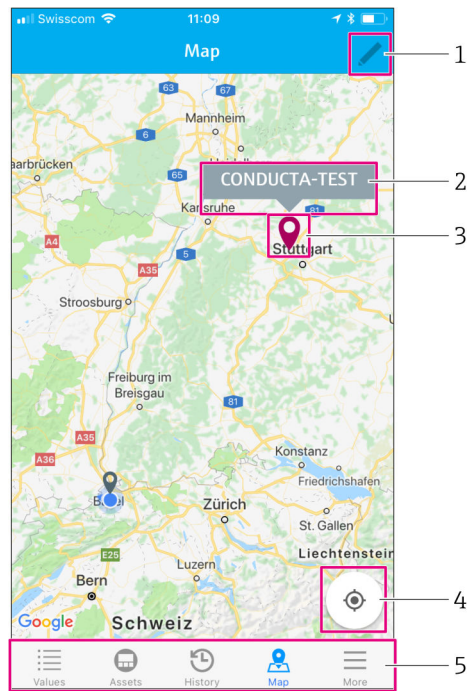
- ▶ Swipe right to left over the alarm that you wish to acknowledge.

8.4 Map

You can pinpoint the locations of your transmitters in the "Map" view.

Calling the map

- ▶ Tap the **Map** symbol in the navigation bar.



27 "Map" view

- 1 Activate the edit mode
- 2 Transmitter tag name and navigation to "Transmitter details" view → 30
- 3 Pin to mark the location of the transmitter
- 4 Navigation to the operator's current location
- 5 Navigation bar


Setting the pin to mark the transmitter location

The pin is set to the operator's location at the start.



1. Activate the edit mode.
2. Tap the pin.
3. Tap and hold the pin and move it to the desired location.

9 Diagnostics and troubleshooting

9.1 Smart System SSP

For an overview of the alarms currently pending, see the "History" view in the Smart System App. →  31.

9.2 Liquiline CM444

 For detailed information on transmitter diagnostics and troubleshooting, see the Operating Instructions for Liquiline CM444 →  6.

10 Maintenance

We recommend you perform regular visual inspections of the components. Endress+Hauser also offers its customers Maintenance Agreements or Service Level Agreements for this. For more information, see the next section.

10.1 Endress+Hauser services



Endress+Hauser offers a wide variety of services for maintenance such as recalibration, maintenance service, system tests or device tests. Your Endress+Hauser Sales Center can provide detailed information on the services.

10.2 Smart System SSP

10.2.1 Updates

Updates for the Smart System App are available from either the Apple AppStore or the Google Play Store. Updates for the Modbus Edge Device are automatically installed by Endress+Hauser. Where necessary, updates for the transmitter will be provided by your Endress+Hauser Sales Center.

10.3 Liquiline CM444


 For detailed information on the maintenance of the transmitter, see the Operating Instructions for Liquiline CM444 →  6

11 Repair

11.1 General information

Please note the following:

- Repairs may only be performed by Endress+Hauser staff or by individuals authorized and trained by Endress+Hauser.
- Observe local and national laws and regulations.
- Standard components can be replaced with identical components.
- Document all repairs and enter them in the W@M Lifecycle Management database.
- Check the function after repair.

 We recommend you conclude a Service Level Agreement. For more information, please contact your Endress+Hauser Sales Center.



11.2 Spare parts

Please contact your Endress+Hauser Sales Center at: www.addresses.endress.com

11.3 Endress+Hauser services

Endress+Hauser offers a wide variety of services for maintenance such as recalibration, maintenance service, system tests or device tests. Your Endress+Hauser Sales Center can provide detailed information on the services.

11.4 Liquiline CM444

 For detailed information on repairing the transmitter, see the Operating Instructions for Liquiline CM444 →  6

11.5 Disposal

NOTICE


Risk of environmental damage from improper disposal

The improper disposal of the system components may damage the environment.

- ▶ Do not dispose of system components as domestic waste.
- ▶ Dispose of system components in accordance with applicable national regulations.
- ▶ Ensure proper separation and reuse of the system components.

12 Technical data



For detailed information on the technical data, see the Technical Information for the particular product →  6

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www.addresses.endress.com
