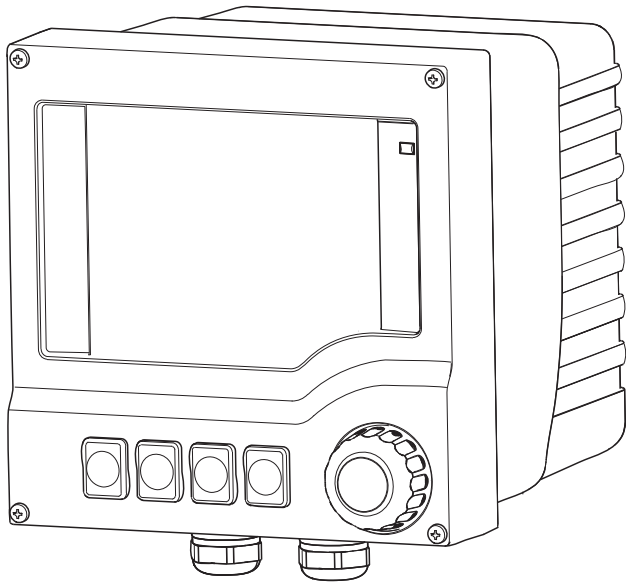# Operating Instructions
Liquiline M CM42

Two-wire transmitter for pH/ORP measurement
with Memosens glass sensors

Part 1

HART
COMMUNICATION PROTOCOL

Endress+Hauser
People for Process Automation

Table of contents

1   Document information

1.1   Warnings

The structure, signal words and color coding of the warnings follow the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Structure of the safety symbol	Meaning
🛆 DANGER **Causes (/consequences)** Possible consequences if ignored ▸ Preventive measures	This symbol alerts you to a dangerous situation. Failure to avoid this situation **will** result in serious or fatal injury.
🛆 WARNING **Causes (/consequences)** Possible consequences if ignored ▸ Preventive measures	This symbol alerts you to a dangerous situation. Failure to avoid this situation **can** result in serious or fatal injury.
🛆 CAUTION **Causes (/consequences)** Possible consequences if ignored ▸ Preventive measures	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in medium or minor injury.
NOTICE **Cause/situation** Possible consequences if ignored ▸ Action/note	This symbol alerts you to situations that can cause damage to equipment or property.

1.2   Symbols used

🛈	Additional information, tips
☑	Permitted or recommended
☒	Forbidden or not recommended
📖	Reference to device documentation
📄	Reference to page

⊡●   Reference to graphic

⌐►   Result of an action

1.3   Documentation

1.3.1   Operating Instructions

The Operating Instructions are split into two parts:
- **Part 1 (BA00381C)**
  - Basic safety instructions
  - Device description
  - Installation, connection and commissioning
  - Configuration via local operation
- **Part 2 (BA00382C)**
  - Configuration via fieldbus
  - Sensor calibration and adjustment
  - Diagnostics and troubleshooting
  - Maintenance, repair and accessories
  - Technical data

1.3.2   In addition

- 1 manufacturer's certificate
- Adhesive labels:
  - Interior nameplate
  - Wiring adhesive label

Attach the adhesive labels that concern your device to the inside of the cover.

2   Basic safety instructions

2.1   Requirements for personnel

▸ Installation, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
▸ The technical personnel must be authorized to perform the tasks by the owner-operator.
▸ The electrical connection may only be established by an electrical technician.
▸ The technical personnel must have read and understood these Operating Instructions and must follow the instructions they contain.
▸ Faults at the measuring point may only be rectified by authorized and properly trained personnel.

🛈 Repairs not described in the enclosed Operating Instructions may only be carried out directly at the manufacturer's or by the Service Organization.

2.2   Designated use

2.2.1   Applications

Liquiline M CM42 is a two-wire transmitter for liquid analysis in all areas of process engineering.

The primary applications comprise:
• Chemical processes
• Pharmaceutical industry
• Food technology

🛈 The use of the transmitter depends strongly on the sensor deployed. For this reason, please pay attention to the information on "designated use" provided in the sensor manual.

The transmitter is suitable for pollution degree 3 as per IEC/EN 61010-1.

2.2.2   Non-designated use

If the device is used for any purpose other than that described, this poses a threat to the safety of people and the entire measuring system and is thus not permitted.
The manufacturer does not accept liability for damage caused by improper or non-designated use.

2.3   Occupational safety

As the user, you are responsible for observing the following safety regulations:
• Installation guidelines
• Local standards and regulations

2.4   Operational safety

▸ Prior to commissioning the entire measuring point, check that all connections are correct. Make sure that electric cables and hose connections are not damaged.

▸ Do not commission damaged products. Protect them against unintentional startup. Label and identify the damaged product as defective.

▸ If the faults cannot be eliminated, take the products out of service and protect them against unintentional startup.

2.5   Product safety

The product is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate.
The applicable regulations and European standards have been taken into account.

3   Device description

3.1   Housing closed

1   *Wall securing plate*
2   *Alarm LED*
3   *Display*
4   *Navigator*
5-8 *Soft keys,*
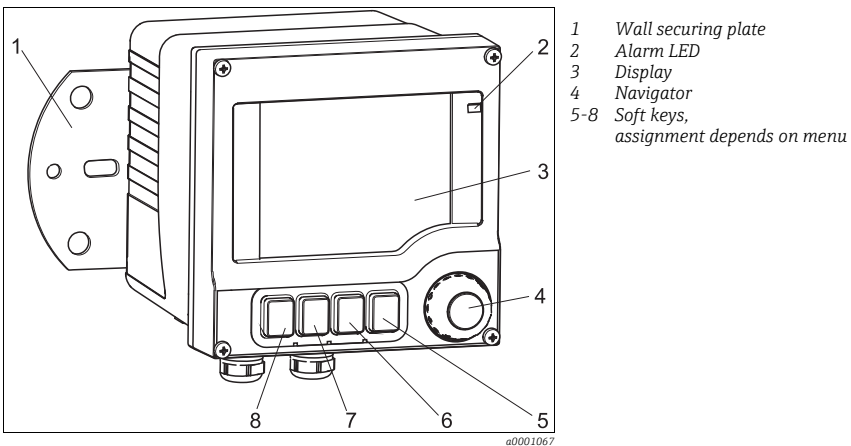   *assignment depends on menu*

a0001067

Fig. 1: Liquiline with closed display cover

3.2   Housing open
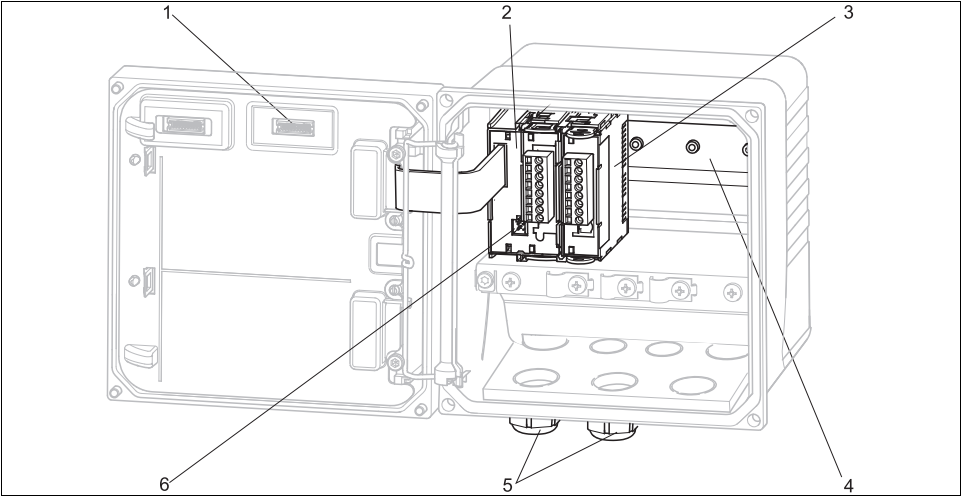
a0010274

Fig. 2: With open display cover (without wiring)

1	*Slot for DAT module*	*4*	*DIN rail*
2	*CPU module*	*5*	*Threaded joints*
3	*Sensor module*	*6*	*CDI socket (service interface)*

4   Incoming acceptance and product identification

4.1   Incoming acceptance

1. Make sure the packaging is not damaged.
    ↳ Inform your supplier of any damage to the packaging.
    Please keep the damaged packaging until any issues have been resolved.

2. Make sure the contents are not damaged.
    ↳ Inform your supplier of any damage to the contents.
    Please keep the damaged goods until any issues have been resolved.

3. Make sure that the delivery is complete and nothing is missing.
    ↳ Compare it against the shipping documents and your order.

4. For storage and transportation: pack the product in such a way as to protect it reliably against impact and moisture.
    ↳ Optimum protection is provided by the original packaging materials.
    The permitted ambient conditions must be observed (see Technical data).

If you have any queries, contact your supplier or local sales center.

4.2   Product identification

4.2.1   Nameplate

Nameplates can be found:
- On the outside of the housing (lasered)
- On the packaging (adhesive label, portrait format)
- On the adhesive label sheet provided (landscape format, for your own use)

Compare the data on the nameplate with your order.

The nameplate provides you with certain information about your device, including:
- Manufacturer name, address and logo
- Device type / order code
- Serial number, coded date of manufacture
- Firmware version
- Measuring range(s)
- Input, output values
- Approvals (depending on the version ordered)
- Ambient temperature range
- Approval symbols
- Safety notices, warnings

4.2.2 Serial number and order code

The order code and serial number of your device can be found in the following locations:
- On the nameplate
- On the front page of the Operating Instructions supplied
- In the delivery papers

ℹ️ The documentation only contains information that was valid at the time of delivery. If you have any queries, contact your local sales center.

4.2.3 Interpreting the order code

You can create a valid and complete order code on the Internet using the Configurator tool.

Enter the following address in the browser to launch the product page:
www.endress.com/cm42

The "Configuration" button is located to the right of the product image on the product page.

1. Click this button.

     ↳ The Configurator opens in a new window.

2. By selecting the number and letter codes, recreate the order code on the nameplate of your device.

     ↳ For each feature in the order code, a description of the feature in provided in plain text.

3. Export the order code and the product details as a PDF or Excel file. To do so, click the appropriate button at the top of the screen.

4.3 Scope of delivery

- 1 transmitter in the version ordered
- 1 mounting plate incl. 4 flat head screws
- 1 sheet of adhesive labels (nameplate, terminal connection diagrams)
- Operating Instructions Part 1 and 2, BA00381C and BA00382C in the language ordered
- 1 manufacturer's certificate

If you have any queries, contact your supplier or local sales center.

4.4 Finding documentation online

Search using the device serial number

1. Go to the product page on the Internet (www.endress.com/cm42).

2. At the bottom of the page, click the "Online tools" link and then select "Access device-specific information".

     ↳ An additional "Device viewer" window opens.

3. Use the default method "Device information and technical documentation" and enter the serial number from the nameplate into the search field.
   ↳ An overview of the device data appears on the screen. The links to the PDF files of your device documentation can be found under the "Documents" tab.

ℹ️ The order code of the device described, and its serial number, are printed on the front page of the original brochures. Furthermore, it is possible to specify a tag name.
The serial number and tag name are only generated in the factory print process and are **not** part of the PDF files which you can obtain online.

Search using a device order code
Documentation for devices whose function you have modified yourself by installing a module or for device versions which you want to learn more about.

www.endress.com/liquiline-documentation

1. Select the second option: "Click here to order the latest Operating Instructions for any Liquiline CM42 version".

2. Fill in all the mandatory fields in the Web form (name, e-mail, CM42 order code) and send your request.
   ↳ You will receive an e-mail with the desired Operating Instructions within a few minutes.

4.5 Certificates and approvals

With this declaration, the manufacturer guarantees that the product conforms to the regulations of European Directive 2014/30/EU and Low Voltage Directive 2014/35/EU. This is proven by observing the standards listed in the Declaration of Conformity.

5 Installation

5.1 Installation conditions

5.1.1 Measuring system

A complete measuring system consists of:
- Liquiline M CM42
- An assembly
- A digital sensor, e.g. Orbisint CPS11D
- A measuring cable CYK10
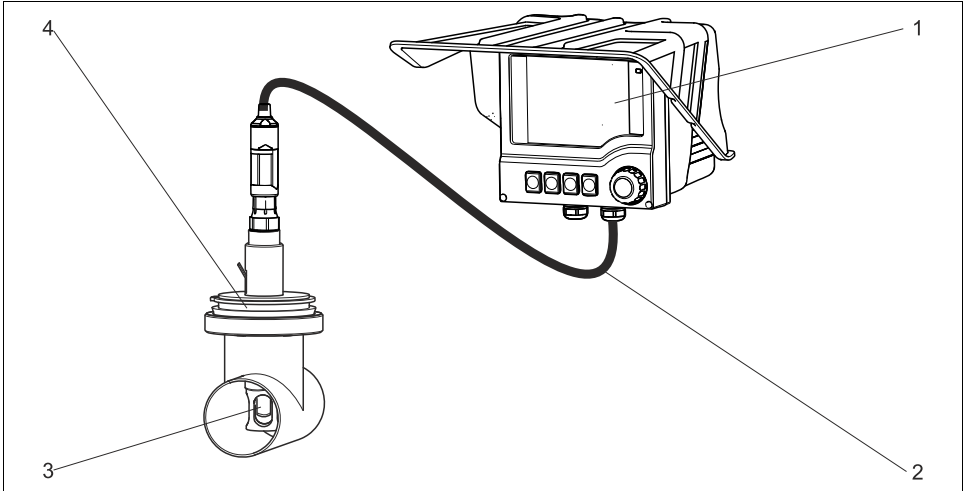
a0022854

Fig. 3: Example of a measuring system

1   *Liquiline M CM42*
2   *Measuring cable CYK10*
3   *Digital sensor*
4   *Fixed installation assembly CPA442*

5.1.2   Dimensions
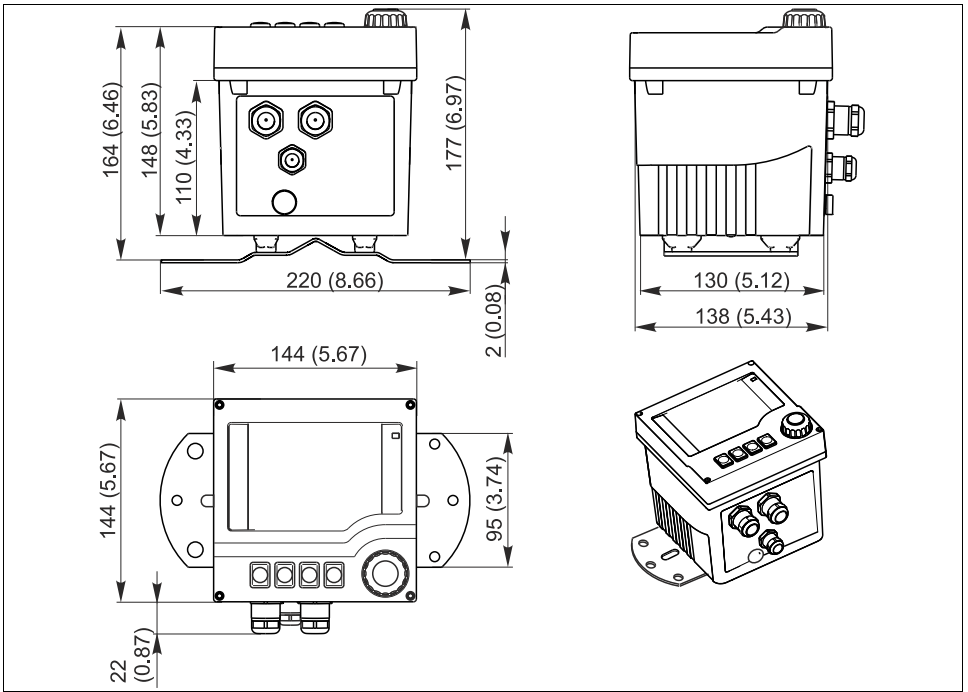
Fig. 4: Dimensions in mm (inch)

5.1.3   Mounting plate

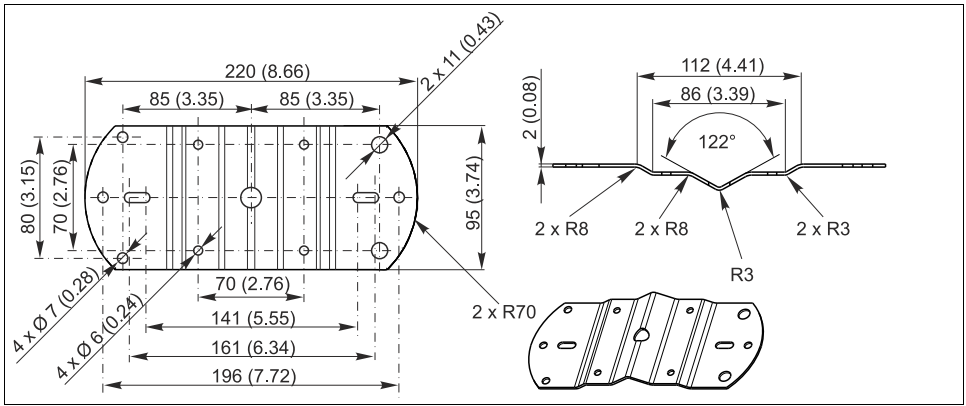*Fig. 5: Dimensions of the mounting plate in mm (inch)*

5.1.4   Weather protection cover

NOTICE

Effect of climatic conditions (rain, snow, direct sun etc.)

Impaired operation to complete transmitter failure

▶   When installing outside, always use the weather protection cover (accessory).
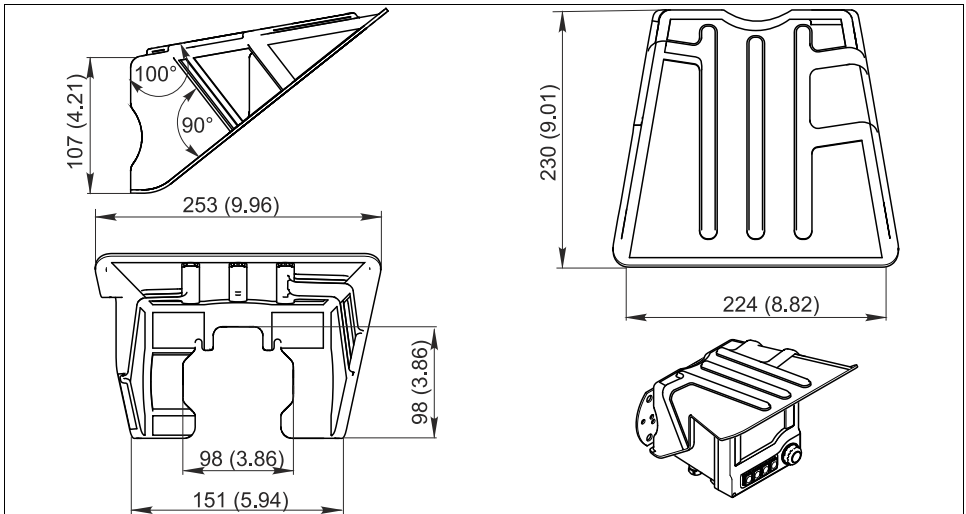
Fig. 6: Dimensions of the weather protection cover in mm (inch)

5.2   Mounting the measuring device

5.2.1   Wall or field mounting

There are many ways of mounting the device:
- Wall mounting
- Mounting on a vertical pipe or post (round or square)
- Mounting on railing or on a horizontal pipe (round or square)

ℹ️ Diameter of a pipe, post or railing suitable for mounting:
30 to 61 mm (1.18 to 2.40").
You require the post retainer when mounting. This is an accessory and is not included in the scope of delivery.
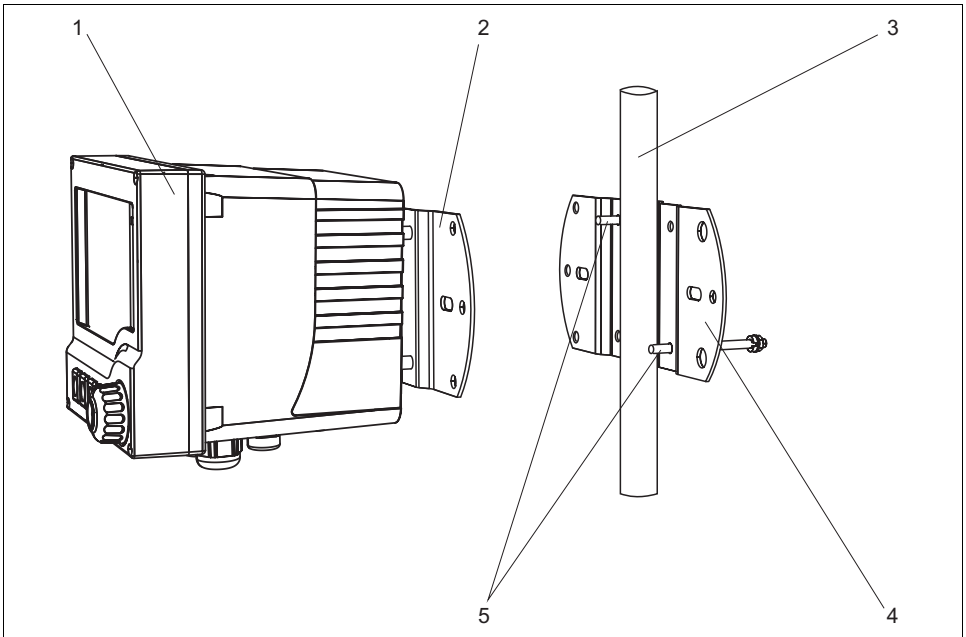
Fig. 7: Mounting on a vertical pipe/post

1   Liquiline
2   Mounting plate (part of scope of delivery for Liquiline)
3   Pipe or post (circular/square)
4   Mounting plate (post retainer, →? "Accessories")
5   Threaded rods with spring washer, washer and nut (part of scope of delivery for post retainer)
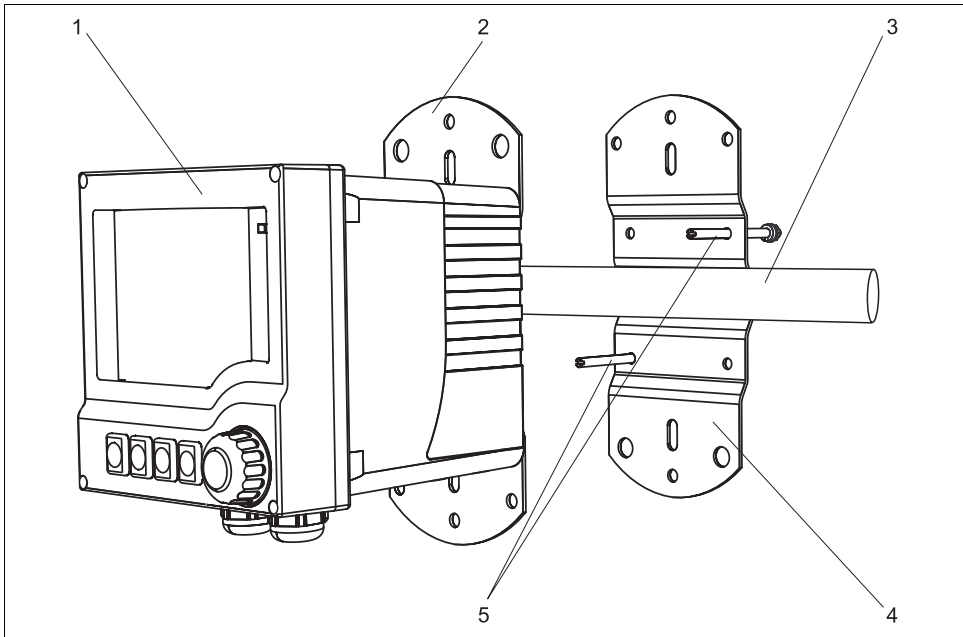
a0010371

Fig. 8: Mounting on a horizontal pipe/railing

1   *Liquiline*
2   *Mounting plate (part of scope of delivery for Liquiline)*
3   *Pipe or railing*
4   *Mounting plate (post retainer, → "Accessories")*
5   *Threaded rods with spring washer, washer and nut (part of scope of delivery for post retainer)*

a0010382

Fig. 9: Wall mounting

5.2.2   Panel mounting

- For panel mounting, you need the installation kit consisting of tensioning screws and a front seal. This is an accessory (see "Accessories") and is not included in the scope of delivery.
- If installing the units **above one another**, you must observe a minimum distance for the cable glands of the upper device.
- If installing the units **beside one another**, you must observe a minimum distance for opening the front of the housing.
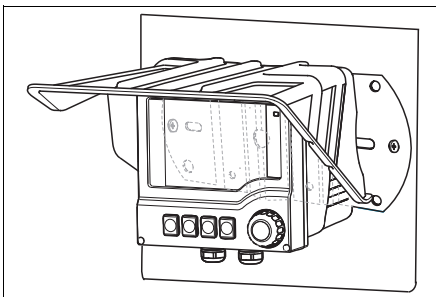- If arranging **in a square**, you must take into account the lengths of the mounting plates at the rear of the device or the cable glands for minimum spacing distance.
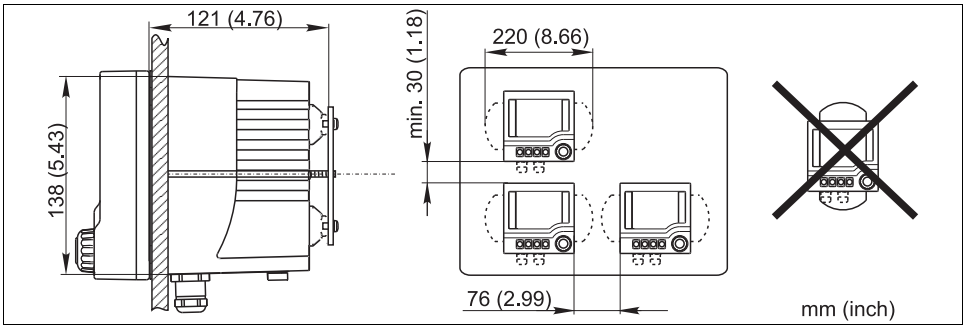
Fig. 10: Panel mounting: left side view, right front view

5.3   Post-installation check

▶ After installation, check the transmitter for damage.
▶ Check whether the transmitter is protected against precipitation and direct sunlight (e.g. by the weather protection cover).

6   Electrical connection

6.1   Connection conditions

6.1.1   Opening the housing

1. Loosen the four screws on the front with a Phillips screwdriver.
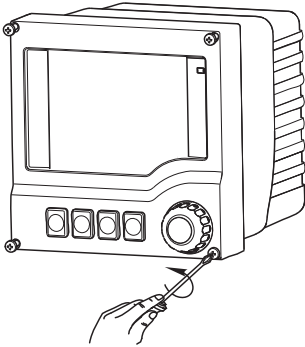
2. Open the housing.

NOTICE

Pointed or sharp tools

Damaged housing seal and scratched housing

▶   Do not use any sharp or pointed tools, such as screwdrivers or knives, to open the housing.

6.1.2   Housing grounding

⚠ WARNING

Electric voltage at ungrounded cable mounting rail

No shock protection

▶   Connect the cable mounting rail to the foundation ground with a separate ≥2.5 mm^2 (14 AWG) functional ground.
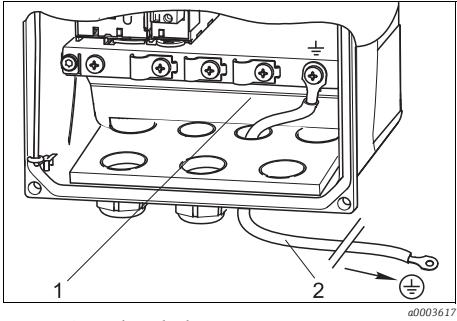
Fig. 11: Grounding the housing

a0003617

| 1 | Cable mounting rail |
| 2 | ≥2.5 mm² (14 AWG) functional ground |

6.1.3 Cable grounding in housing

If possible, only use terminated genuine cables.

▶ Ground all the cables in the housing of the transmitter as shown in the following diagrams (sample cable, does not necessarily correspond to the original cable).
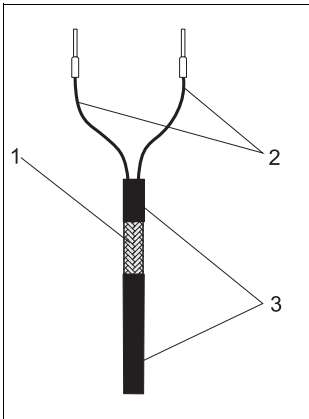
Fig. 12: Terminated cable (example)

a0002679

1   Outer shield (exposed)
2   Cable cores with ferrules
3   Cable sheath (insulation)
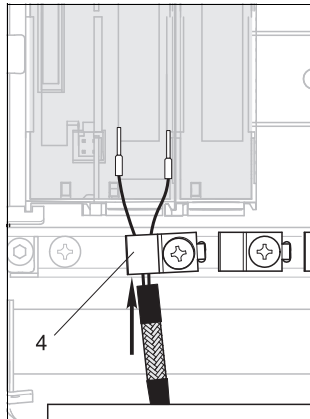
Fig. 13: Inserting the cable

a0002680
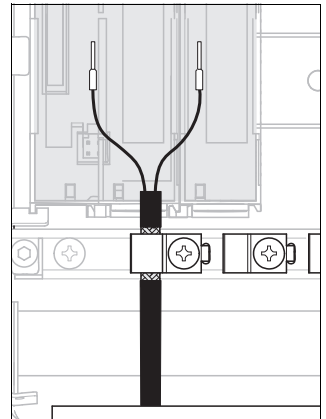
4   Grounding clip

Fig. 14: Tightening the screw, the cable shield is grounded by the grounding clip

a0002681

6.1.4 Cable terminals

Connecting the cable cores

ℹ️ Single-wire, multi-wire and fine-wire cables can be used for the connection, with and without ferrules. Only one wire is permitted per terminal.

1. Insert a suitable screwdriver into the opening of the terminal spring (square opening) until the stop.

   ↳ The spring is pressed down and the terminal opening is free:
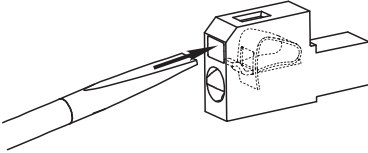
2. Insert the terminated wire end into the terminal opening (round opening):
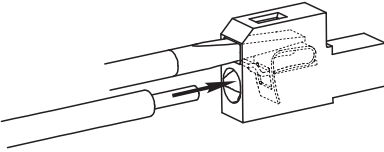
3. Remove the screwdriver.

   ↳ The spring is released and the wire is secured in place:
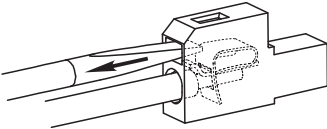
Make sure the cable is securely positioned in the terminal.

6.2   Connecting the measuring device

⚠ WARNING

The device is live!

Incorrect wiring can result in injury or fatality

▶ The electrical connection may only be established by an electrical technician.

▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions they contain.

▶ **Prior** to beginning any wiring work, make sure voltage is not applied to any of the cables.

NOTICE

Incorrect supply voltage can cause damage or a malfunction

▶ Comply with the specifications on the permitted and minimum supply voltage (see "Electrical connection" under Technical data).

6.2.1   Connection in transmitter

▶ Connect the transmitter with a shielded two-wire cable.

   ↳ How the shield is connected depends on the interference influence expected. To suppress electrical fields, it suffices to ground the shield at one end. If you also want to

suppress interference from a magnetic alternating field, you must ground the shield on both sides.
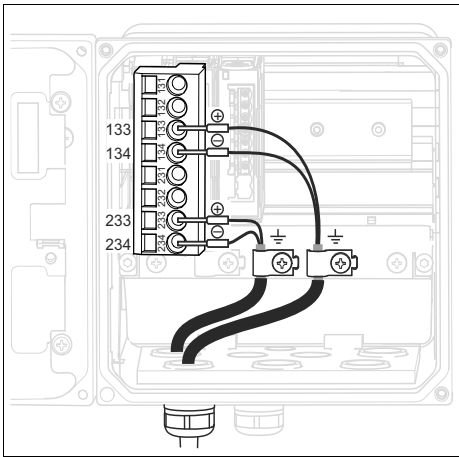
Fig. 15: View in device (CPU module)
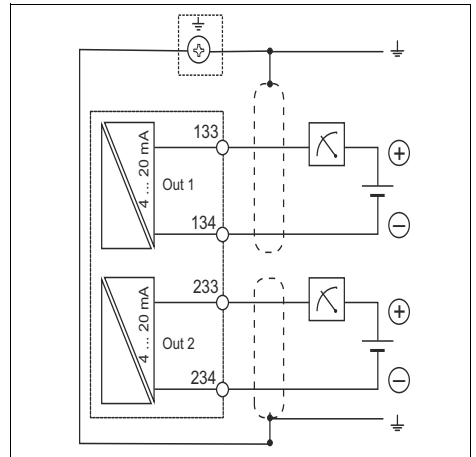
Fig. 16: Wiring diagram

Power is only supplied to the device via current output 1, not via current output 2.

6.2.2 Connection via HART interface

System integration → 📄 26

6.3 Connecting the sensor

pH sensors suitable for connection
- Glass electrodes: CPS11D, CPS41D, CPS71D, CPF81D, CPS91D
- Enamel electrodes: CPS341D

ORP sensors suitable for connection
- CPS12D, CPS42D, CPS72D, CPF82D, CPS92D

pH/ORP combined sensors suitable for connection
- CPS16D, CPS76D, CPS96D

The list of Endress+Hauser sensors provides examples only and does not claim to be exhaustive. For more information on the technical data and the suitability of particular sensors for your measuring task, please visit our online portal: www.endress.com/products/analytics

Explanation of abbreviations in the following diagrams:

Abbreviation	Meaning
U$_+$	Power supply of the digital sensor
U$_-$	
Com A	Communication signals of the digital sensor
Com B	

NOTICE

No shielding against electrical and magnetic interference

Interference can give erroneous measurement results

▶ You must connect shield connections or terminals to the functional ground ($\perp$) (there is no protective ground on the plastic housing ($\oplus$)).
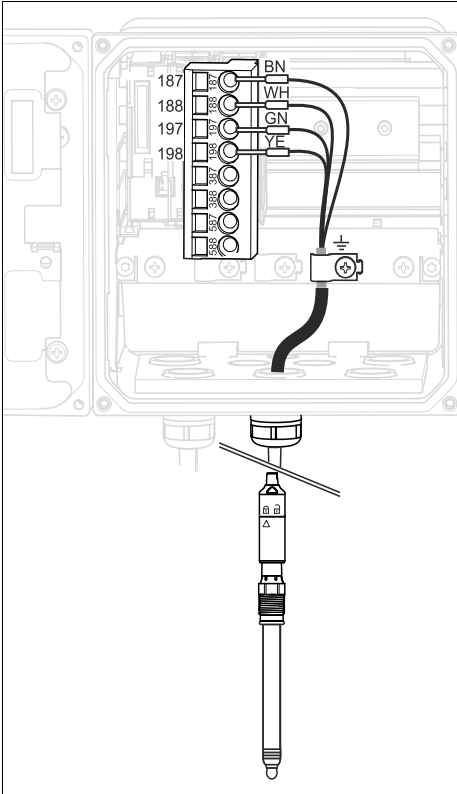
Fig. 17: View in device (sensor module)
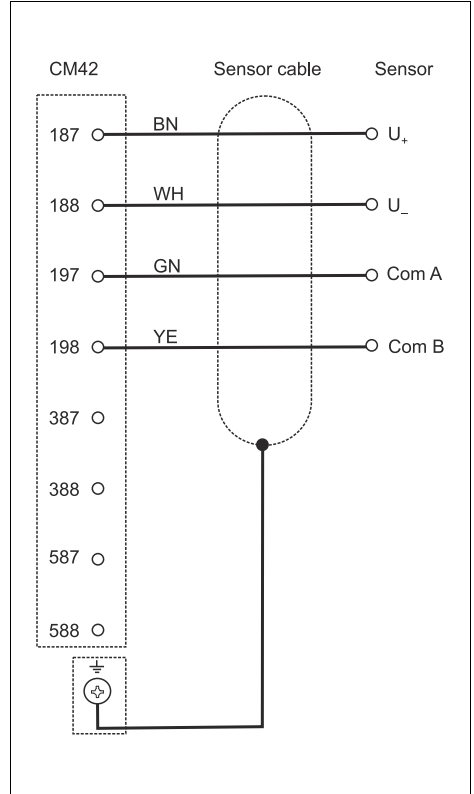
Fig. 18: Wiring diagram

6.4   Ensuring the degree of protection

Only the mechanical and electrical connections that are described in this manual, and are necessary for the required, designated application, may be established on the device supplied.

▶ Please play close attention when performing the work as degrees of protection individually confirmed for this product (ingress protection (IP), electrical safety, EMC interference immunity, explosion protection) can no longer be guaranteed as a result of things such as:
  – Leaving off covers
  – Not tightening cable glands sufficiently (must be tightened with 2 Nm for the confirmed level of IP protection)
  – Loose or insufficiently tightened cables/cable ends
  – Conductive cable strands left in the device

6.5   Post-connection check

⚠ WARNING

Wiring errors

Incorrect wiring puts the safety of people and the measuring point at risk. The manufacturer does not accept any responsibility for errors that result from failure to comply with the instructions in this manual.

▶   Only put the device into operation if you can answer **yes** to **all** of the following questions.

Electrical connection

• Are the mounted cables strain relieved?
• Are the cables run without loops and cross-overs?
• Are the signal lines correctly connected in accordance with the wiring diagram?
• Have you connected unused connection wires to the cable mounting rail?
• Are all plug-in terminals securely engaged?
• Are all the connection wires securely positioned in the cable terminals?

7   System integration

7.1   Device description files

7.1.1   Device identification

Manufacturer name:	Endress+Hauser
Model name:	Liquiline pHORP
Manufacturer ID code:	11_h
Device type code:	$11A0_h$
HART protocol revision:	7
Device revision:	1
Number of device variables:	7
Physical layers supported:	FSK
Physical device category:	Transmitter, non-DC-isolated bus device

7.1.2   Source for device description files

Downloading device drivers

1. On the Internet, go to the product page of your device.

The "Documents / Software" section can be found at the bottom of the page.

2. Click the sign on the right of the title to expand the section.
   ↳ Links to all the download topics for your device are displayed.

3. Select the "Device driver" topic.
   ↳ The complete list of all the drivers that are available for your device is displayed.

4. Select the suitable driver and click the link to the driver.
   ↳ A new window opens with the corresponding download link including a more in-depth description. You can now download the archive file containing all the necessary files.

7.2   Measured variables via HART protocol

Analog output 1: Main value
The main value corresponds to the HART primary variable.
HART communication is **only available at this output**.

Analog output 2
No HART communication is available via this output.

7.3 Integrating the measuring device into the system

7.3.1 Overview of system architecture

Connection to a HART modem
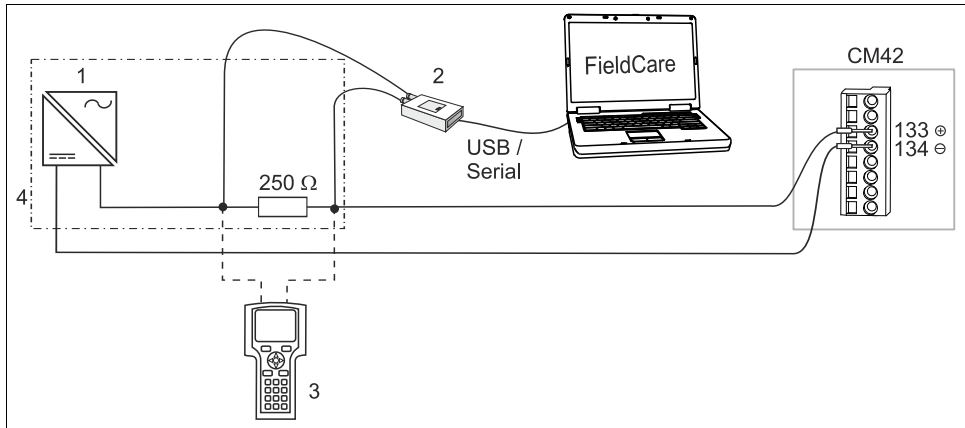
Fig. 19: HART system integration without PLC

a0023079

1   24 V power unit
2   HART modem for connecting to PC, e.g. Commubox FXA195 (switch setting "on" replaces the resistor)
3   HART handheld terminal
4   24 V power unit with integrated communication load (alternative to 1)

Recommendation for item 4:
- RN221 active barrier with transmission of HART communication,
  optionally with Ex approvals
- Supply unit RNS221 for up to 2 transmitters, non-Ex

Connection to a HART modem with Bluetooth
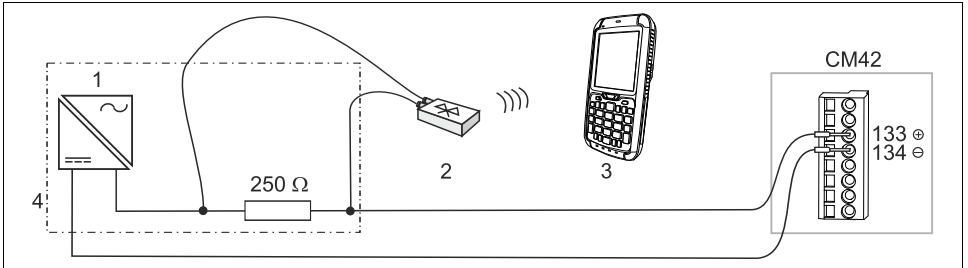
Fig. 20: HART system integration with Bluetooth modem

1   *Power unit*
2   *VIATOR HART Bluetooth modem*
3   *Field Xpert SFX350*
4   *Power unit with integrated communication load (alternative to 1)*

Connection via a programmable logic controller (PLC)
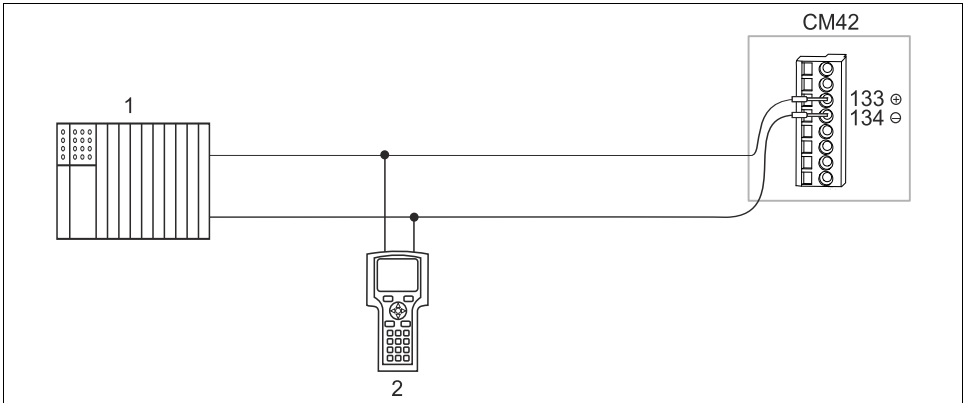
Fig. 21: HART system integration with PLC

1   *Programmable logic controller with integrated load (PLC)*
2   *HART handheld terminal*

Connection to the HART/Ethernet gateway
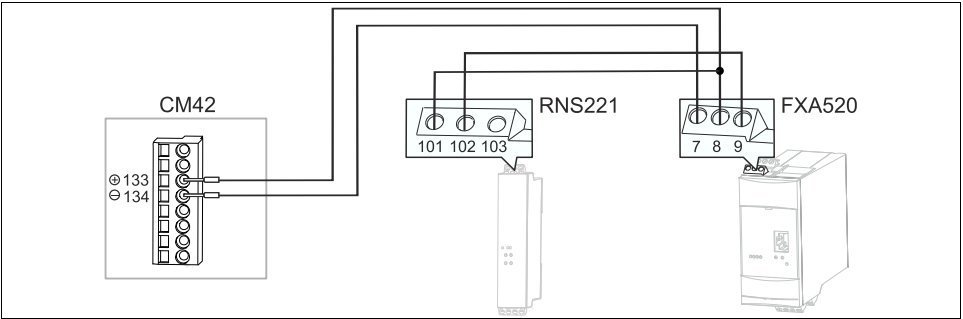
Fig. 22: Connecting a CM42 with an RNS221 active barrier to HART/Ethernet gateway FXA520

a0023093

Connection to current loop/Ethernet gateway FXA320
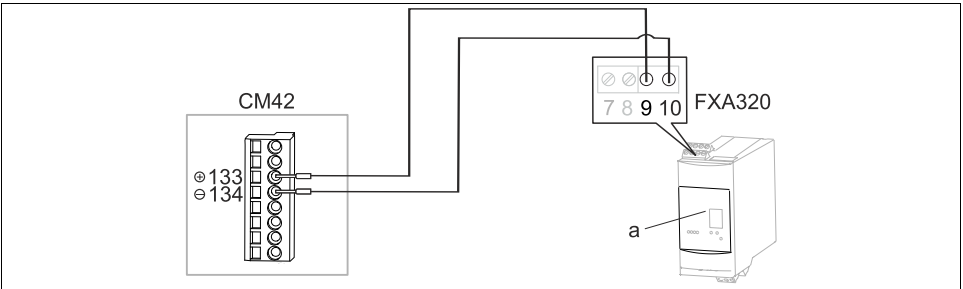
Fig. 23: Connecting CM42 to current loop/Ethernet gateway FXA320

a0023095

To connect a CM42 you must also put the switches under the front cover (a) of the FXA320 in the top position.

Connection to the WirelessHART Adapter SWA70
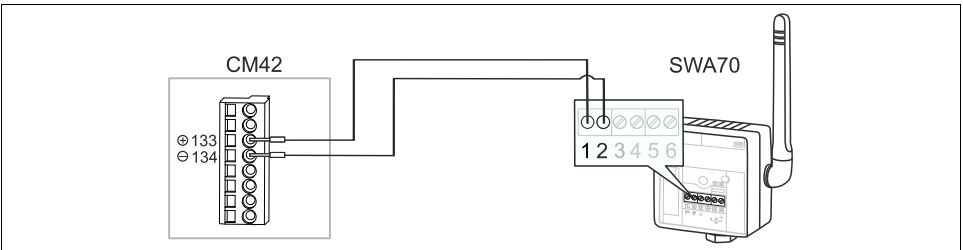
Fig. 24: Connecting CM42 to the WirelessHART Adapter SWA70

a0023094

7.3.2   Multidrop mode

In the Multidrop mode, several HART devices are integrated in a single current loop. In this case analog signal transmission is disabled and the current output of each connected device is permanently set to 4 mA.

Different types of devices and devices from different vendors can be integrated in a Multidrop network. However, do not mix devices with an active current output (e.g. four-wire devices) and a passive current output (e.g. two-wire devices).

The maximum possible number of devices in a Multidrop network depends on the device. If only **CM42** devices are connected, a **maximum of 2** may be in the Multidrop network.
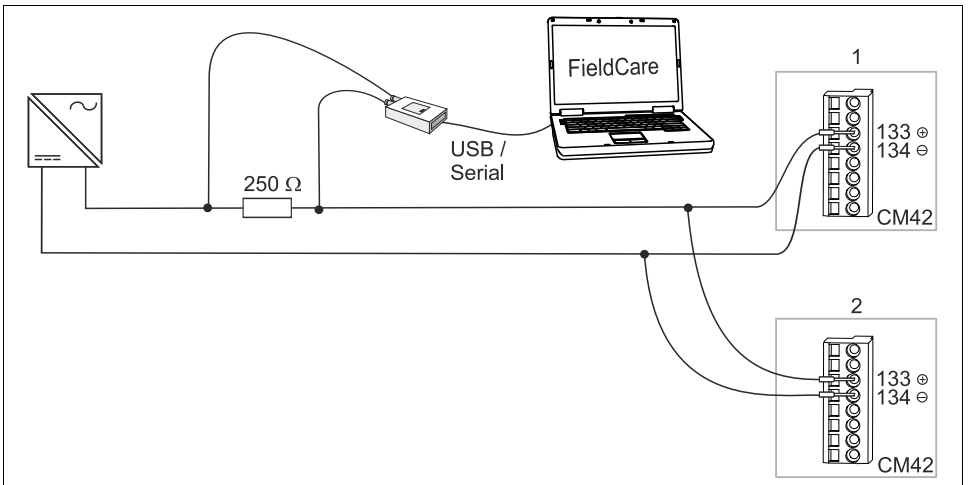
Abb. 25: Multidrop mode for a maximum of 2 devices

1, 2   Bus address

Each device in the Multidrop loop must have a bus address that is different from the bus address of the other devices. Preferably assign the addresses 1 to 15 (1 to 63 is possible). You can set the bus address either onsite via the device menu or using a HART operating terminal. Multidrop is not enabled if the bus address is 0.

7.3.3   Setting the bus address

Factory setting: 0.
You can change the device address to integrate several HART devices in a network (Multidrop mode).
You can change the device address with the HART terminal or via the Liquiline SETUP menu (→ Operating Instructions Part 2).

8   Operation options

8.1   Access to the operating menu via local operation

8.1.1   Display and soft key function
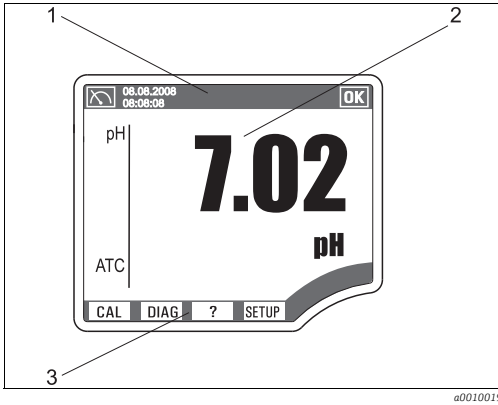
Fig. 26: Local display (measuring mode)

a0010019

1   Status line
2   Display and setting field
3   Assignment of the soft keys

8.1.2   Operation concept
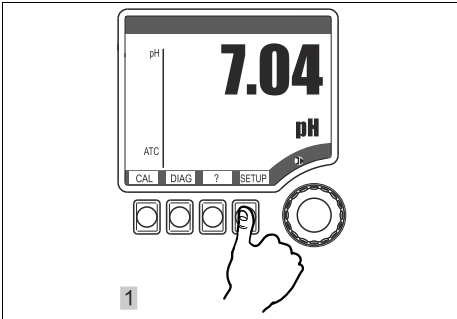
Fig. 27: Pressing the soft key: selecting the menu directly
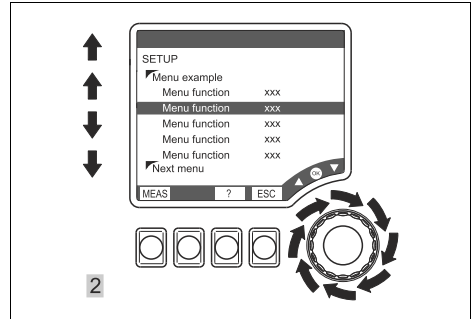
Fig. 28: Turning the navigator: moving the cursor in the menu
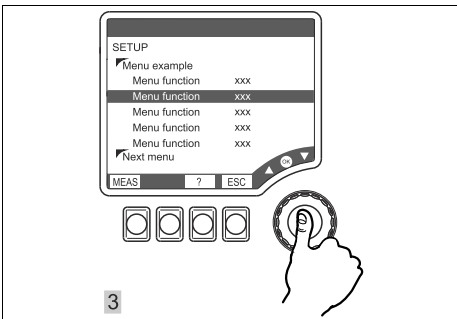
Fig. 29: Press navigator: select a function
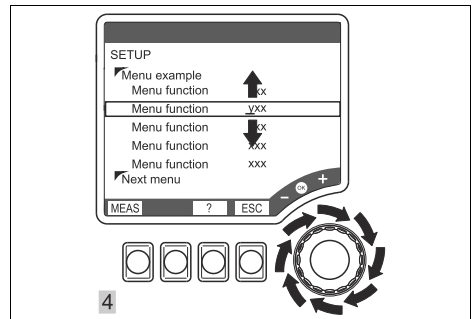
Fig. 30: Turn navigator: change value
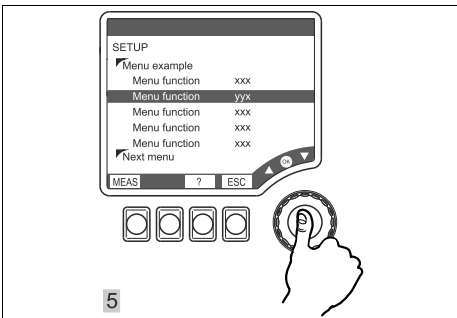
Fig. 31: Press navigator: accept new value

1. Select the main menu: press the appropriate soft key.

2. Move the cursor in the menu: turn the navigator.

3. Select a function: press the navigator.

4. Change the value: turn the navigator.

5. Accept a new value: press the navigator.

8.1.3 Types of setting

- Display fields
  - You can only read the values but cannot change them.
- Selection fields
  - You receive a list with options.
  - You select one of the options.
- Input fields
  - There are value ranges with upper and lower range limits that depend on the measured value configured and its units.
  - There are also menu functions where you can enter arbitrary text. The number of characters is then limited.
  - Set a value with the navigator:
    Turn to increase/reduce a value/letter/special character,
    Press to confirm or to enter the next character for arbitrary text.

8.1.4 Editing tables

You can set some software functions using a table:
- The number of columns depends on the menu function that is set via the table.
- You can add lines ("Insert") or delete lines ("Del").
- The maximum number of lines also depends on the menu function in question.
- You can press "Esc" at any time to exit the table and stop entering information.
- If the values entered result in a valid table, you receive the message "Table is valid" and the options:
  - Save table
  - Continue edit table
  - Discard table
- If the values entered are invalid, an error message is output with the options:
  - Continue edit table
  - Discard table

8.1.5 User administration

User administration modes

The device has a user administration function in order to avoid unscheduled changes to the measuring point.
You need to log on as an Expert to switch on the user administration function. The first time you log onto the device, you will therefore be asked to enter a password (the "Admin" user name is already entered).

The user administration function makes two different modes available in the Advanced version:

Roles
- There are 3 fixed user roles (Expert, Maintenance, Operator).
- "Experts" always have all the rights. "Operator" is the role with the least amount of rights.
- Each role has its own individual password. This password can be changed.
- No other user roles can be created.

User accounts
- You can create and manage a maximum of 15 user accounts.
- You need to be logged on as an "Expert" to be able to manage accounts.
- In each user account you specify the user name and the password and assign the new user one of 3 user roles (Operator, Maintenance and Expert).
- Multiple user accounts with the "Expert" role are possible.

Activating user administration

Go to the "SETUP/General settings/User administration" menu and switch on the function. You will then be asked to enter the password.
You must log on with the "Expert" user role. An "Admin" user is already configured at the factory. The default setting for the Admin password is 0000.
This password can then be changed. Make sure you make a note of your modified password and store it in a safe place. Contact your sales office if you lose your password.

Logging out
If you exit SETUP and user administration is activated, you will be asked whether you want to log out or remain logged on.

Assigning rights in the menus

If you have activated the user administration function and are logged on as Admin, you can assign each user role rights to each individual software function.
To do so, simply press and hold the navigator on a function for longer than 3 seconds. The "Rights" window appears. Change the default rights with the aid of the navigator.

8.1.6   Hold function

You can "freeze" the current output in the SETUP mode and during calibration. The current output then retains its current status or outputs a fixed, user-defined value. The message "Hold" appears on the display.

- Settings for the "Hold" function can be found in the function group "SETUP/General settings/Hold settings".
- An active hold has priority over all other automatic functions.
- Any alarm delay that has built up is reset to "0".

8.2   Access to the operating menu via the operating tool

8.2.1   HART Communicator

If a Liquiline DD (Device Description) is installed on your Communicator, you can make all
settings via the Communicator.
Only restricted configuration or operation is possible with a (pre-installed) universal DD.

ℹ️ For information about how to operate the handheld terminal, refer to the Operating
Instructions enclosed with the device.

Overview of Liquiline HART-DDs: → 📄 25

8.2.2   FieldCare

The fieldbus communication system only works correctly if it is configured correctly and
professionally. Users can avail of special configuration and operating programs from different
manufacturers for configuration purposes.
Both the fieldbus functions and all the device-specific parameters can be configured in this way.
The predefined function blocks allow uniform access to all the network and fieldbus device data.

"Fieldcare" is a universal service and communication software based on FDT/DTM technology[1].
The DTMs available for the device can also be used with software from other manufacturers that
supports FDT/DTM technology.

ℹ️ Further information can be found in the Installation Instructions supplied with the
software. At www.endress.com/fieldcare, you can find the download area where you can
download DTM files.

9   Commissioning

9.1   Function check

⚠️ **WARNING**

Incorrect connection, incorrect supply voltage
Safety risks for staff and incorrect operation of the device
▶ Check that all connections have been established correctly in accordance with the wiring
   diagram.
▶ Make sure that the supply voltage matches the voltage indicated on the nameplate.

9.2   First steps (Quick Setup via local operation)

1. Connect the supply voltage.

---

1)   FDT = Field Device Tool, DTM = Device Type Manager

2. Wait for the initialization to complete.

If you do not want to work with the language set at the factory:

3. Navigate to SETUP\Quick setup and select the desired language.

4. In "Quick setup" configure all the basic settings to adapt your device to the local conditions of the measuring point.

Path: SETUP / Quick setup

Function	Options	Info
Language	Options • Second language • English **Factory setting** Second language	You selected the "second language" in the CM42- order code. If the language is changed, the settings configured for the device remain intact. You can load another second language from the SystemDAT. → SETUP/DAT menu
Date format	Options • DDMMYYYY • MMDDYYYY **Factory setting** DDMMYYYY	Editing mode: DD (day): 1 to 31 MM (month): 1 to 12 YYYY (year): 2005 to 2100
Set date	Depends on the format DDMMYYYY	
Time format	Options • hhmmss (24h) • hhmmss (am/pm) **Factory setting** hhmmss (24h)	24-hour display or 12-hour display Editing mode: hh (hour): 0 to 23 / 0 am to 12 pm mm (minutes): 0 to 59 ss (seconds): 0 to 59
Set time	Depends on the format hh:mm:ss	
Measured value	Options *(depending on sensor type)* • pH • ORP mV • ORP % • Combined pH/ORP **Factory setting** pH or ORP mV	*Only ORP or combined sensor:* To obtain useful ORP % values, you must adapt the sensor to your process. This is achieved through two-point calibration. The two calibration points characterize the most important states your medium can assume in the process (→? calibration). You must connect a pH/ORP combined sensor, e.g. CPS16D, to determine the rH value. Some of the subsequent menu items and their options depend on the measured variable selected.
Temperature unit	Options • °C • °F **Factory setting** °C	Decide whether you want to use the ISO or the American temperature unit. All the values and settings are automatically converted to match the option selected.

10   Operation via local operation

10.1 Measured value display (MEAS)

10.1.1 Display mode

There are various display modes:
(Press the navigator button to change the mode)
1.   Main value
2.   Primary and secondary value
3.   All measured values

Sensor type	Main value	Main value / secondary value	All values
pH, glass	pH value	pH value, temperature	Main value, raw value, temperature, glass impedance, reference impedance Current outputs
pH and ORP combined sensor	pH value or ORP or rH value	pH value or ORP or rH value, temperature	Main values pH, ORP and rH (depending on measured value), raw value, temperature, glass impedance, reference impedance Current outputs
ORP	ORP	ORP, temperature	Main value, raw value, temperature Current outputs

ℹ   When you exit the measuring mode, the current measured value is displayed in the status bar in the top left-hand corner:

10.1.2 Status display

(gauge symbol)	Symbol for the measuring menu (MEAS)
OK	Device state is OK. No alarms or warnings are present.
F	Diagnostics message "Failure"
C	Diagnostics message "Check"
S	Diagnostics message "Out of specification"

M	Diagnostics message "Maintenance request"
17.03.2008 **16:59:01**	Date and time display in measuring menu
3.68 pH **25 °C**	Measured value display in the status line if a menu other than MEAS is launched. The main value and the secondary value are displayed.
HOLD	Hold is set to "ON", the measured value is "frozen". The status bit "Loop current fixed"=0x08 is set at the PLC. Displayed measured values are not frozen. They correspond to the current measurement. Depending on the configuration, the current value is a fixed, predefined value or the last valid value.
SIMU	Symbol for the simulation mode The status bit "Loop current fixed"=0x08 is set at the PLC. (Only for current output 1, simulation of current output 2 does not affect HART communication.)
⊡←→	Symbol is displayed while the device is actively communicating via the fieldbus.
👥	Symbol is displayed if user administration is switched on.
⌐o	Symbol is displayed if local operation has been disabled via the fieldbus.

10.2 Configuration (SETUP)

10.2.1 Sensor pH/ORP

Sensor-specific settings

Path: SETUP/Sensor pH/ORP

Function	Options	Info
Measured value	Options *(depending on sensor type)* ▪ pH ▪ ORP mV ▪ ORP % ▪ Combined pH/ORP **Factory setting** pH or ORP mV	*Only ORP or combined sensor:* To obtain useful ORP % values, you must adapt the sensor to your process. This is achieved through two-point calibration. The two calibration points characterize the most important states your medium can assume in the process (→ calibration). You must connect a pH/ORP combined sensor, e.g. CPS16D, to determine the rH value. Some of the subsequent menu items and their options depend on the measured variable selected.
Internal buffer *Only pH or combined sensor*	−2.0 to 16.0 pH **Factory setting** 7.0	Glass electrodes generally have an internal buffer with pH 7. Therefore only change the factory setting if you are using a special glass electrode with another internal buffer.

Path: SETUP/Sensor pH/ORP

Function	Options	Info
Damping	0 to 600 s **Factory setting** 0 s	The damping causes a floating average curve of the measured values over the time specified.

Temperature and medium compensation

ℹ️ The dissociation of water changes with increasing temperature. The balance shifts towards the protons; the pH value drops. You can balance out this effect with the "Medium compensation" function.

Path: SETUP/Sensor pH/ORP

Function	Options	Info
Temp. compensation *only pH*	Options • off • Auto comp.(ATC) • Man. comp. **Factory setting** Auto comp.(ATC)	Decide how you want to compensate the process temperature: • Not at all (off) • Automatically using the temperature sensor of your sensor (Auto comp.(ATC)) • Manually by entering the process temperature (Man. comp.)
Medium temp. *Temp. compensation =* *Man. comp.*	−50 to + 250 ℃ (−58 to + 482 ℉) **Factory setting** 25 ℃ (77 ℉)	Enter the process temperature.
Offset	−9.99 to + 9.99 pH **Factory setting** 0.00 pH1	

Path: SETUP/Sensor pH/ORP

Function	Options	Info
Medium compensation *only pH*		
Type of compensation	Options • off • 2 point • Table **Factory setting** off	Take a sample from the medium and determine its pH value at different temperatures in the lab. Decide whether you want to compensate using two points or several points in a table.
Reference temp. *Type of compensation = 2 point or Table*	-50 to 250 ℃ **Factory setting** 25 ℃	Temperature to which the compensated pH value refers.
Temperature 1 *Type of compensation = 2 point*	-50 to 250 ℃ **Factory setting** 25 ℃	Consecutively enter the value pairs for temperature and pH value determined at the laboratory.
pH 1 *Type of compensation = 2 point*	-2.00 to 16.00 **Factory setting** 7.00	
Temperature 2 *Type of compensation = 2 point*	-50 to 250 ℃ **Factory setting** 40 ℃	
pH 2 *Type of compensation = 2 point*	-2.00 to 16.00 **Factory setting** 7.50	
Edit table *Type of compensation = Table*	-50 to 250 ℃ **Factory setting** 25 ℃	Determine the number of points. Enter the value pairs for temperature and pH value measured at the laboratory.

pH calibration settings

pH/ORP combined sensors (CPS16D/CPS76D/CPS96D):
If the measured value="rH", you have two menus with calibration settings: one for the pH electrode and one for the ORP electrode.

Type of calibration

Path: SETUP/Sensor pH/ORP/Cal. settings/Type of calibration

Function	Options	Info
Numeric input	Options • off • on **Factory setting** on	You can switch every type of calibration on or off. If you switch off a type of calibration here, it is **not** displayed in the calibration menu!
2 point cal.		
1 point cal.		
Grab sample cal.		

Temperature compensation

ℹ️ The setting in this submenu only refers to compensation during calibration, not in measuring mode. You perform the compensation for the measuring mode at another point in the main menu.

Path: SETUP/Sensor pH/ORP/Cal. settings

Function	Options	Info
Temp. compensation	Options • off • Auto comp.(ATC) • Man. comp. **Factory setting** Auto comp.(ATC)	Decide how you want to compensate the buffer temperature: • Not at all (off) • Automatically using the temperature sensor of your sensor (Auto comp.(ATC)) • Manually by entering the buffer temperature (Man. comp.)
Medium temp. *Temp. compensation = Man. comp.*	−50 to + 250 ℃ (−58 to + 482 ℉) **Factory setting** 25 ℃ (77 ℉)	Specify the buffer temperature.

Buffer recognition

Automatic buffer recognition
To ensure a buffer is detected correctly, the measuring signal may deviate by a maximum of 30 mV from the value stored in the buffer table. This is approx. 0.5 pH at a temperature of 25 ˚C. If both buffers - 9.00 and 9.20 - were used, this would cause the signal intervals to overlap and buffer recognition would not work. For this reason, the device would recognize a buffer with a pH of 9.00 as a pH of 9.20.
→ Do not use the buffer with a pH of 9.00 for automatic buffer recognition.

Path: SETUP/Sensor pH/ORP/Cal. settings

Function	Options	Info
Buffer recognition	**Options** • automatic • fixed • manual **Factory setting** fixed	**automatic** The device recognizes the buffer automatically. The recognition depends on the setting for "Buffer manufacturer". **fixed** You choose values from a list. This list depends on the setting for "Buffer manufacturer". **manual** You enter any two buffer values. These must differ in terms of their pH value.

Buffer manufact.
 	
Buffer recognition = automatic or fixed
	Options
	• E+H (NIST)
	• Ingold/Mettler
	• DIN 19266
	• DIN 19267
	• Merck/Riedel
	• Hamilton[1]
	• Special buffer
	
	Factory setting
	E+H (NIST)
		Temperature tables are stored internally in the unit for the following pH values:
		• E+H (NIST):
		  2.00 / 4.00 / 7.00 / 9.00 / 9.20 / 10.00 / 12.00
		• Ingold/Mettler:
		  2.00 / 4.01 / 7.00 / 9.21
		• DIN 19266:
		  1.68 / 4.01 / 6.86 / 9.18
		• DIN 19267:
		  1.09 / 4.65 / 6.79 / 9.23 / 12.75
		• Merck/Riedel:
		  2.00 / 4.01 / 6.98 / 8.95 / 12.00
		• Hamilton:
		  1.09 / 1.68 / 2.00 / 3.06 / 4.01 / 5.00 / 6.00 / 7.00 / 8.00 / 9.21 / 10.01 / 11.00 / 12.00

Special buffer *Buffer manufact.=Special buffer*		With this option you have the possibility of defining four buffers of your own, two of which you can then select for the calibration.
Special buffer	**Options** • {Buffer 1} • {Buffer 2} • {Buffer 3} • {Buffer 4}	Select the buffer
Buffername	Enter any text (max. 10 characters)	Assign any name to the selected buffer. Once this information has been entered, the new name is added to the picklist for the special buffer.
Edit table	Enter temperature/pH value value pairs	You can save a table here for the temperature dependency of your special buffer. Specify the temperature and the related pH value of the special buffer for max. 20 points.

Path: SETUP/Sensor pH/ORP/Cal. settings

Function	Options	Info
Calib. buffer 1 *Buffer recognition = manual or fixed*	Choose from list or −2.0 to 16.0 pH **Factory setting** 7.00 pH [2]	**Buffer recognition = fixed:** Select a value from the list. **Buffer recognition = manual:** Configure the value of the buffer you use.
Calib. buffer 2 *Buffer recognition = manual or fixed*	Choose from list or −2.0 to 16.0 pH **Factory setting** 4.00 pH1	
Isotherm pnt.	−2.0 to 16.0 pH **Factory setting** 7.0 pH	Isotherm intersection The value is identical to that of the internal buffer. Do not change the value.

1)   Automatic identification is not possible with buffer solutions made by "Hamilton". While you can select the manufacturer here, the buffer recognition is set to "fixed" if this option is selected.

2)   The factory setting depends on the buffer recognition and buffer manufacturer selected. The factory settings for the buffer manufacturer Endress+Hauser, E+H (NIST) are indicated here.

ORP calibration settings

Type of calibration

Path: SETUP/Sensor pH/ORP/Cal. settings/Type of calibration

Function	Options	Info
Numeric input	Options • off • on	You can switch every type of calibration on or off. If you switch off a type of calibration here, it is **not** displayed in the calibration menu!
2 point cal. *(only ORP %)*		
1 point cal. *(only ORP mV)*	**Factory setting** on	

ORP buffer

ORP buffers contain ORP pairs with a high exchange current density. Such buffers have the advantage of higher accuracy levels, better reproducibility and faster measurement response times.
Temperature compensation does not take place when measuring the ORP since the thermal behavior of the medium is not known.

Path: SETUP/Sensor pH/ORP/Cal. settings

Function	Options	Info
Measured value = ORP mV		
Reference buffer	−1500 to +1500 mV **Factory setting** 0 mV	Specify the buffer on the manufacturer's certificate.
Measured value = ORP %		
2 point cal.		To obtain useful ORP % values, you must adapt the sensor to your process. This is achieved through two-point calibration. The two calibration points are characteristic of the most important states your medium can assume in the process. You require two different compositions of your medium that represent the characteristic limits of your process (e.g. 20% and 80% value). The absolute value in mV is not relevant for the ORP % measurement.
Buffer 1	0 to 30% **Factory setting** 20 %	
Buffer 2	70 to 100% **Factory setting** 80 %	

Sensor diagnosis

Adjusting diagnostic behavior

ℹ️ Diagnostic messages are classified and prioritized by their message status and message number according to Namur NE 107 (→ BA00382C, "Diagnostics and troubleshooting").

In this menu, you have the option of increasing or decreasing the priority of a pending error. You do this by editing the message in question in the diagnose list.
By giving an error currently displayed a lower priority, you can disable an error-related hold and set the device back to the measuring mode.

Example:
The diagnostics message "M501" is present. The screen alternates between displaying the measurement and displaying the diagnostic message (screen with black background). The maintenance symbol (M) is permanently visible in the status bar.

You want to lower the priority of message 501 so that a maintenance error is no longer displayed.

1. Go to the diagnostics list (SETUP\General settings\Device diagnostics\Diagnostics list) and select message M501.

   ↳ You can change the category of the message in the screen that follows.

2. Select "Function check (C)" for instance.

3. Switch back to the measuring mode.

   ↳ The maintenance symbol is no longer displayed and "C" is displayed instead.

> **NOTICE**
>
> **Diagnostic function switched off or important diagnostics messages downgraded**
> Critical device errors are ignored. This can result in incorrect measurement results and even the failure of the transmitter.
> ▶ Only switch off the diagnostic function or reduce the priority of a diagnostics message if you can be absolutely sure that a critical error is not present and your measurement results remain plausible.
> ▶ Always notify your Service Department.

Path: SETUP/Sensor pH/ORP/Cal. settings/Sensor diagnostics

Function	Options	Info
Diag. function	Options • off • on **Factory setting** on	Deactivate ("off") means: • No message shown on the display • Alarm LED is switched off • No error current at the current output
Diagnostics list	Priority adjustable	You can change the priority of the errors by moving them up or down in the list.

Diagnosis limits

Limit values for the sensor check system (SCS)

The factory settings in this function group can deviate significantly from the requirements of your measurement task. Trouble-free process management is then not possible with the factory settings.

▶ Check the settings and adapt them to your individual measurement task if necessary.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits

Function	Options	Info

Ref. impedance
 	
Measured value = pH or Combined pH/ORP
and
SCS reference = on
	Selection and entry
	• Upper alarm value
	  Factory setting
	  100 kΩ
	
	• Upper warning value
	  Factory setting
	  50 kΩ
	
	• Lower warning value
	  Factory setting
	  1 kΩ
	
	• Lower alarm value
	  Factory setting
	  0.0 kΩ
	
	General range of adjustment
	0.0 to 10000 MΩ
		The sensor check system (SCS) monitors the impedance of the reference electrode.
		
		An alarm is issued if a minimum impedance value is undershot or a maximum impedance is exceeded.
		Main reasons for increasing impedance:
		• Fouling
		• Blockage of the reference electrode

Glass impedance
 	
Measured value = pH or Combined pH/ORP
and
SCS glass low or SCS glass high = on
	Selection and entry
	• Upper alarm value
	  Factory setting
	  3000 MΩ
	
	• Upper warning value
	  Factory setting
	  2500 MΩ
	
	• Lower warning value
	  Factory setting
	  100 kΩ
	
	• Lower alarm value
	  Factory setting
	  0 kΩ
	
	General range of adjustment
	0.0 to 10000 MΩ
		The sensor check system (SCS) monitors the high impedance of the pH glass.
		An alarm is issued if a minimum impedance value is undershot or a maximum impedance is exceeded.
		• Glass breakage is the main reason for a drop in high impedance values.
		• The reasons for increasing impedance values include:
		  – Dry sensor
		  – Worn pH glass membrane

Slope and zero point

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits

Function	Options	Info
Slope *only pH*	Selection and entry • Maintenance value 5.00 to 99.99 mV/pH **Factory setting** 55.00 mV/pH • Alarm value 5.00 to 99.99 mV/pH **Factory setting** 53.00 mV/pH	Set values affect the range of the corresponding variable (maint. value > alarm value). The slope characterizes the sensor condition. The bigger the deviation from the ideal value (59 mV/pH) the poorer the condition of the sensor. You can also track this variable graphically in the "DIAG/Sensor state" menu.
Zero point *only pH*	Selection and entry • Upper alarm value **Factory setting** 9.00 pH • Upper warning value **Factory setting** 8.00 pH • Lower warning value **Factory setting** 6.00 pH • Upper warning value **Factory setting** 5.00 pH **General range of adjustment** −2 to 16.00 pH (glass)	Enter specific values for the alarm and warning limits for your process.
ORP mV *Measured value = ORP mV*	Selection and entry • Upper alarm value **Factory setting** 900 mV • Upper warning value **Factory setting** 700 mV • Lower warning value **Factory setting** -700 mV • Upper warning value **Factory setting** -900 mV **General range of adjustment** −2000 to 2000 mV	Enter specific values for the alarm and warning limits for your process.

Stability criteria

With the bandwidth, you define the permitted measured value fluctuation which must not be exceeded in a certain timeframe during calibration.
If the permitted difference is exceeded, the calibration is aborted with an error after maximum 60 seconds.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Stability criteria

Function	Options	Info
Bandwidth	1 to 10 mV **Factory setting** 1 mV	Permitted fluctuation in the measuring signal during calibration
Timeframe	5 to 60 s **Factory setting** 20 s	The permitted measured value fluctuation cannot be exceeded in this timeframe.

Calibration timer

You can specify the calibration interval for the sensor here.
Once the time configured elapses, the "Cal-Timer expired" diagnosis message appears on the display.

ℹ The timer is reset automatically if you recalibrate the sensor.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Calibration timer

Function	Options	Info
Function	Selection and entry ▪ on ▪ off **Factory setting** off	Switches the function on or off
Time	1 to 50000 h **Factory setting** 1000 h	Specify the time after which the timer should have timed out.

Sensor condition check (SCC)

Sensor condition check (SCC) monitors the electrode status and the degree of electrode aging.
The status is displayed with the messages "Electrode OK", "Low abrasion" or "Change electrode".
An error message is also output for the message "Change electrode".
The electrode status is updated after every calibration.

The main reasons for a deteriorating electrode status are:

- Glass membrane blocked or dry
- Diaphragm (reference) blocked

Remedial action

1. Clean or regenerate the sensor.

2. Replace the sensor if this does not have the desired effect.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits

Function	Options	Info
SCC *Only pH sensor*	Selection and entry • on • off **Factory setting** off	Switch the function on or off

Process check system (PCS)

The process check system (PCS) checks the measuring signal for stagnation. An alarm is triggered if the measuring signal does not change over a certain period (several measured values).
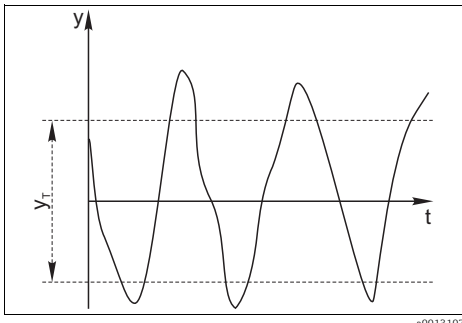
Fig. 32: *Normal measuring signal, no alarm*

y   *Measuring signal*
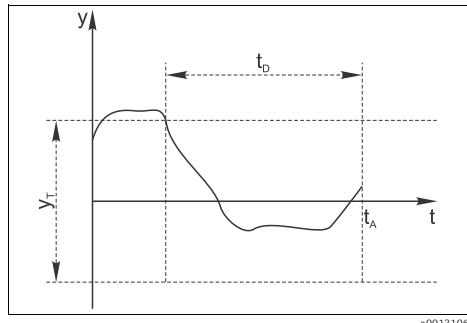y_T *Fixed value for minimum signal fluctuation*

Fig. 33: *Stagnating signal, alarm is triggered*

t_D *Set value for "Time"*
t_A *Time when the alarm is triggered*

The main causes of stagnating measured values are:

- Contaminated sensor, or sensor in air
- Sensor defective
- Process error (e.g. through control system)

Remedial action

1. Clean the sensor.

2. Check the measuring chain.

3. Switch off the transmitter and switch it back on again.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/PCS

Function	Options	Info
Function	Selection and entry ▪ on ▪ off **Factory setting** off	Switch the function on or off
Time	1 to 240 min **Factory setting** 60 min	Timeframe in which the measuring signal must have a certain minimum fluctuation so that it is not considered to be stagnant.

Operating hours

The total operating time of the sensor and its use under extreme conditions is monitored. If the operating time exceeds the defined threshold values, the device issues a corresponding diagnostics message.

ℹ️ Each sensor has a limited life expectancy which heavily depends on the operating conditions. If you specify warning limits for operating times under extreme conditions, you can guarantee the operation of your measuring point without any downtime by performing maintenance tasks in time.

The range of adjustment for the alarm and warning limits is generally 1 to 50000 h. Only the factory setting is highlighted in bold in the table.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Operating hours

Function	Options	Info
Function	Selection and entry ▪ on ▪ off **Factory setting** off	**on** The operation of the sensor under extreme conditions is monitored, recorded in the sensor and diagnostics messages are displayed on the controller. **off** No diagnostics messages. However, the time the sensor operates under extreme conditions is recorded in the sensor and can be read in the sensor information in the diagnostics menu.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Operating hours

Function	Options	Info
Operating time	• Warning level **10000h** • Alarm level **15000h**	Memosens sensors store their total operating time values. If you specify warning and alarm limits for the life expectancy of your sensor, you can guarantee the operation of your measuring point without any downtime by replacing the sensor in time.
Usage >80℃ Usage >100℃ Usage <-300mV Usage >300mV	• Warning level **10000h** • Alarm level **15000h**	Specify the warning and alarm limits here for the operating time of your sensor under extreme conditions. ℹ️ For ORP measurement, you can only specify the temperature-dependent warning/alarm limits.

Delta slope

The device determines the difference in slope between the last calibration and the penultimate calibration, and issues a warning or an alarm depending on the setting configured. The difference is an indicator for the condition of the sensor.
The greater the change, the greater the wear experienced by the pH-sensitive glass membrane as a result of chemical corrosion or abrasion.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Delta slope

Function	Options	Info
Function	Selection and entry • on • off **Factory setting** off	Decide whether you want to use the function (Function = on) or not (Function = off).
Warning level	0.10 to 9.98 mV/pH **Factory setting** 5 mV/pH	Values for alarm and warning limits mutually affect each other's possible ranges for adjustment. The following generally applies: warning limit < alarm limit
Alarm level	0.11 to 9.99 mV/pH **Factory setting** 6 mV/pH	

Delta zeropnt.

The device determines the difference between the last calibration and the penultimate calibration, and issues a warning or an alarm depending on the setting configured. The difference is an indicator for the condition of the sensor.
The following applies to pH glass electrodes: The greater the change, the greater the wear experienced by the reference as a result of contaminating ions or KCl dissolving away.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Delta zeropnt.

Function	Options	Info
Function	Selection and entry • on • off **Factory setting** off	Decide whether you want to use the function (Function = on) or not (Function = off).
Warning level	0.00 to 1.99 pH **Factory setting** 0.5	Values for alarm and warning limits mutually affect each other's possible ranges for adjustment. The following generally applies: warning limit < alarm limit
Alarm level	0.01 to 2.00 pH **Factory setting** 1.0	

Calibration validity

The function checks whether the calibration of a sensor is still valid.

Example:
You install a precalibrated sensor.
The device now checks how much time has elapsed since the sensor was last calibrated. A diagnostics message "Calibration expired" is displayed if the time since the last calibration is longer than the predefined warning and alarm limit.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Calibration expired

Function	Options	Info
Function	Selection and entry • on • off **Factory setting** off	Decide whether you want to use the function (Function = on) or not (Function = off).
Warning level	1 to 23 M **Factory setting** 23 M	Values for alarm and warning limits mutually affect each other's possible ranges for adjustment. The following generally applies: warning limit < alarm limit
Alarm level	2 to 24 M **Factory setting** 24 M	M = Months

Sterilization cnt.

The system counts the number of operating hours in which the sensor is exposed to a temperature that is typical for a sterilization. This temperature depends on the sensor.
If the limit values are exceeded, a "No. steril. warning" or "No. steril. alarm" diagnostic message is output.

Path: SETUP/Sensor pH/ORP/Sensor diagnostics/Diagnostic limits/Sterilization cnt.

Function	Options	Info
Function	Options • on • off **Factory setting** off	Decide whether you want to use the function (Function = on) or not (Function = off).
Warning level	1 to 98 **Factory setting** 30	Values for alarm and warning limits mutually affect each other's possible ranges for adjustment. The following generally applies: warning limit < alarm limit
Alarm level	2 to 99 **Factory setting** 50	

Switching on the sensor check system

The sensor check system (SCS) monitors the high impedance of the pH glass.
An alarm is issued if a minimum impedance value is undershot or a maximum impedance is exceeded.
• Glass breakage is the main reason for a drop in high impedance values.
• The reasons for increasing impedance values include:
  – Dry sensor
  – Worn pH glass membrane

Path: SETUP/Sensor pH/ORP/Sensor diagnostics

Function	Options	Info
SCS glass low *only with combined sensor*	Selection and entry • on • off **Factory setting** on	Decide whether you want to use the function (Function = on) or not (Function = off).
SCS glass high *Only pH or combined sensor*	Selection and entry • on • off **Factory setting** on	Decide whether you want to use the function (Function = on) or not (Function = off).

10.2.2 Current output

You assign one measured variable and a measuring range to the current output.

For the measuring range, you can decide whether a linear or non-linear function should be used to calculate the current output values:
- Linear characteristic
  - You define the measuring range by specifying the start and end value in the unit of your measured variable. These values are output at the current output with 4 mA (start of measuring range) and 20 mA (end of measuring range) respectively. All the current output values within this range are calculated with a linear function.
  - You can also map the measuring range with a negative slope. For this purpose, set the measuring range upper limit to 4 mA and the lower limit to 20 mA.
  - In accordance with Namur NE43 the current output is linearly extended to 20.5 mA or 3.8 mA if the measuring range is exceeded or undershot. A diagnostic message (404 or 405) appears on the display if this occurs.
  - The smaller the span you select between the 4 mA and 20 mA value, the more accurately you map the measuring range.
- Tabular characteristic
  - Using a tabular, non-linear characteristic, you can specifically control the accuracy over one or more measuring range subsections.
  - **Example:**
    Define a wide turndown (e.g. 4 to 19 mA) for the range where you would normally expect your measured values and where you thus require a high level of accuracy. In contrast, assign a narrow turndown (e.g. 19 to 20 mA) for the range where you could live with a lower level of accuracy.

Path: SETUP / Current output

Function	Options	Info
Current output 1		
Output value	Options • Main value • pH • % • mV (pH) • mV (ORP) • Temperature • Combined pH/ORP **Factory setting** Main value	Specify the measured variable that should be output at current output 1.
Characteristic	Options • linear • Table **Factory setting** linear	Use this function to select the characteristic curve for calculating the current output values

Path: SETUP / Current output

Function	Options	Info
Low value (4mA) *Characteristic = linear* Upper value (20mA) *Characteristic = linear*	Depends on the output variable selected **Factory setting** Depends on the output variable selected	The firmware permits all values. You can also set the same values for the start and end of the range. For this reason, use values that are plausible for your process. You will expect your measured values to fall within this range. **Recommended minimum span** between 4 mA and 20 mA value: • 1 pH2 • ORP mV: 5 mV • ORP %: 5 % • Main value: depending on the measured variable, see above. • 5 ℃ (9 ℉)
Edit table *Characteristic = Table*	Enter value pairs See Section "Edit table"	Enter the value pairs (measurement value, output current) here. A minimum of 2 value pairs have to be entered. The maximum is 10.
Current output 2		
Output value	Options • Main value • pH • % • mV (pH) • mV (ORP) • Temperature • Combined pH/ORP **Factory setting** Temperature	Specify the measured variable that should be output at current output 2.
Characteristic	Options • linear • Table **Factory setting** linear	Use this function to select the characteristic curve for calculating the current output values
Low value (4mA) *Characteristic = linear* Upper value (20mA) *Characteristic = linear*	Depends on the output variable selected **Factory setting** Depends on the output variable selected	see "Current output 1"
Edit table *Characteristic = Table*	Enter value pairs See Section "Edit table"	Enter the value pairs (measurement value, output current) here. A minimum of 2 value pairs have to be entered. The maximum is 10.

10.2.3 General settings

Tag name and sensor check

Path: SETUP / General settings

Function	Options	Info
TAG	Can be edited at random **Factory setting** EH_CM42_<Serial No.> Customer-specific	Give the device a device designation and assign it to a device group if necessary. Afterwards, you can specify which sensors are accepted on your device: ■ **off:** All sensors are accepted. ■ **TAG group** The device only accepts sensors from a group of similar sensors and brand-new sensors straight from the factory with the exact same order code as the previous sensor model. ■ **TAG:** The device only accepts sensors from a specific measuring point and brand-new sensors straight from the factory with the exact same order code as the previous sensor model. Connecting a sensor that is not accepted triggers an alarm.
TAG group *Sensor check = TAG group*	1 to 65535 **Factory setting** 1	
Sensor check	Selection and entry ■ off ■ TAG group ■ TAG **Factory setting** off	

Bus address

Path: SETUP / General settings

Function	Options	Info
Bus address	0 to 63 **Factory setting** 0	Each address may only be assigned once in a network. For addresses > 0, the current of current output 1 is permanently set to 4 mA, even in the event of an error.

Date and time

Path: SETUP/General settings/Date/Time

Function	Options	Info
Date format	Options ■ DDMMYYYY ■ MMDDYYYY **Factory setting** DDMMYYYY	Editing mode: DD (day): 1 to 31 MM (month): 1 to 12 YYYY (year): 2005 to 2100
Set date	Depends on the format DDMMYYYY	

Path: SETUP/General settings/Date/Time

Function	Options	Info
Time format	Options • hhmmss (24h) • hhmmss (am/pm) **Factory setting** hhmmss (24h)	24-hour display or 12-hour display Editing mode: hh (hour): 0 to 23 / 0 am to 12 pm mm (minutes): 0 to 59 ss (seconds): 0 to 59
Set time	Depends on the format hh:mm:ss	

Alarms

Path: SETUP/General settings/Alarms

Function	Options	Info
Alarm message	An alarm can be output at current output 1 (I1) or at both current outputs (I1+I2).	
Alarm active	Options • off • freeze (I1) • set value (I1) • set value (I1+I2) **Factory setting** set value (I1)	**freeze (I1)**: In the event of an alarm, the last measured value before the alarm occurred is displayed. **set value (I1) and set value (I1+I2)**: A fixed value is displayed in the event of an alarm.
Alarm value *Alarm active = set value (I1) or set value (I1+I2)*	3.60 to 21.50 mA **Factory setting** 21.50 mA	Enter the set value which you want to have displayed in the event of an alarm.
Maintenance message	A maintenance message can be output at current output 2 (I2) or at both current outputs (I1+I2).	
Maintenance active	Options • off • freeze (I2) • set value (I2) • set value (I1+I2) **Factory setting** off	**freeze (I2)**: The last measured value is displayed in the event of a maintenance message. **set value (I2) and set value (I1+I2)**: A set value is displayed in the event of a maintenance message.
Maintenance value *Maintenance active = set value (I2) or set value (I1+I2)*	3.60 to 21.50 mA **Factory setting** 21.50 mA	Enter the set value which you want to have displayed in the event of a maintenance message.

The settings only apply for the measuring mode.

Hold settings

Hold settings apply for the configuration, diagnosis and calibration. The measured value is displayed on the status bar.

A hold and diagnostics messages cannot be output simultaneously. Priority is given to whatever event occurs first. For example, if a hold is triggered no diagnostics messages are output until the hold is disabled. Conversely a hold cannot be triggered if a warning or alarm is present. You can start a simulation (via DIAG/Service) even if a hold is active. The hold remains active when you finish the simulation.

Path: SETUP/General settings/Hold settings

Function	Options	Info
Calibration active	Options • No hold • freeze • set value (I1+I2) **Factory setting** No hold	• **No hold**: The current measured value continues to be displayed. • **freeze**: The device keeps the last measured value. • **set value (I1+I2)**: You define a set display value.
Calibration value *Calibration active = freeze*	3.60 to 21.50 mA **Factory setting** 12.00 mA	Enter the value which you want to have displayed during calibration.
SETUP active	Options • No hold • freeze • set value (I1+I2) **Factory setting** No hold	• **No hold**: The current measured value continues to be displayed. • **freeze**: The device keeps the last measured value. • **set value (I1+I2)**: You define a set display value.
SETUP value *SETUP active = freeze*	3.60 to 21.50 mA **Factory setting** 12.00 mA	Enter the value which you want to have displayed during configuration.
DIAG active	Options • No hold • freeze • set value (I1+I2) **Factory setting** No hold	• **No hold**: The current measured value continues to be displayed. • **freeze**: The device keeps the last measured value. • **set value (I1+I2)**: You define a set display value.
DIAG value *DIAG active = freeze*	3.60 to 21.50 mA **Factory setting** 12.00 mA	Enter the value which you want to have displayed during diagnosis.
Hold delay	0 to 300 s **Factory setting** 15 s	After changing to the measuring mode, the specified hold is maintained for the hold delay period.

Device diagnosis

Explanations → 📄 43

Path: SETUP/General settings/Device diagnostics

Function	Options	Info
Diag. function	Options • on • off **Factory setting** off	Deactivate ("off") means: • No message shown on the display • Alarm LED is switched off • No error current at the current output
Housing monitoring	Options • on • off **Factory setting** off	If housing monitoring is switched on, the software detects if the housing is opened and outputs a corresponding diagnosis message.
Diagnostics list	Priority adjustable	You can change the priority of the errors by moving them up or down in the list.

Logbooks

ℹ️ The logbook memories are "ring memories". They are filled with data while storage space is available. As soon as the memory is full, each new entry overwrites the oldest entry in the memory.

A maintenance message is displayed when a logbook is almost full and another when the logbook is completely full. You can then empty the logbook ("Delete entries") so that the message is no longer displayed.

NOTICE
Delete entries
Recorded data are permanently deleted and cannot be retrieved
▶ Only delete entries if you are sure you no longer need these data.

Path: SETUP/General settings/Logbooks

Function	Options	Info
Recording	Options • on • off **Factory setting** on	Here, you can enable or disable the logging of all log books with the exception of the data logbook. The entries recorded can be found in the "DIAG/Logbooks" menu.

Path: SETUP/General settings/Logbooks

Function	Options	Info
Data logbook		
Recording	Options • on • off **Factory setting** off	Here, you can start or stop recording measured values in the data logbook.
Sample time	5 s to 17 h **Factory setting** 60 s	Specify how often a measured value should be recorded (after how many seconds, minutes or hours).
Meas. value	Options • Raw value • Temperature • Main value **Factory setting** Main value	Select the measured value which should be recorded in the data logbook. The entries can be found in the "DIAG/LogbooksData logbook" menu.
Delete entries	Options • All logbooks • Calibration logbook • Event logbook • Parameter logbook • User logbook • Data logbook	Select the logbooks which you want to empty and confirm your choice by choosing "Delete entries".

User administration

Switching on the unit

The user administration function is **not enabled** at the factory. All the menus and functions can be accessed and configured openly.
To view the following functions, you must first switch on the function.

Path: SETUP/General settings/User administration

Function	Options	Info
Function	Options • on • off **Factory setting** off	If the user administration function has already been activated, you can only switch it on and off subsequently in the "Expert" role. Depending on the operating mode selected, either log on in the role or as a user with an Expert role.

You must log on after power-up. Use the "Expert" role or a user with an Expert role (e.g. "Admin"). The operating mode last selected dictates whether you have to select a role or a user (under ...User administration/Settings).

Path: SETUP/General settings/User administration

Function	Options	Info
Login	Options *(Security level = Roles)* • Operator • Maintenance • Expert **Factory setting** Operator	Depending on the "Security level": **Roles** Select a user role and enter the password. **User accounts** Enter your user name and the password.

The first time you log on you will be asked to specify a new password (one other than 0000). If you have specified and confirmed your password using the navigator, you must press the **"OK" soft key** to continue.

After logging on you can change your password or continue to "Settings".

Path: SETUP/General settings/User administration

Function	Options	Info
Change password		You can change your password here. An error message is displayed if the password you enter is invalid or too short. If this occurs enter another password.

Settings

Path: SETUP/General settings/User administration/Settings

Function	Options	Info
Function		Switch the user administration function on/off. The default setting is "off" (disabled). Only an "Expert" can switch on the function. A password must be entered for this purpose.
Security level	Options • Roles • User accounts **Factory setting** Roles	**Roles** To log into the menu you must select one of the three set roles: Operator, Maintenance or Expert. **User accounts** To log into the menu you must enter your user name and the password.
Actions		
Diagnostics Calibrate	Options • None • Maintenance • Operator/Mainten.	When you are logged on as an "Expert" you can specify which users - apart from you - are authorized to use the "DIAG" and "CAL" menus here. "None" means that no-one other than an "Expert" has authorization. For the other two roles you can decide whether only the Maintenance role or both the Operator and Maintenance role should have authorization.

Path: SETUP/General settings/User administration/Settings

Function	Options	Info
User accounts *Security level =* *User accounts*	Functions • Create • Modify • Delete	"Experts" can manage the user accounts here. Select the desired function and then follow the instructions on the screen.
Auto logout time	Options • 5 minutes • 10 minutes • 15 minutes • 30 minutes **Factory setting** 15 minutes	If no action is executed for the selected period of time, you are logged out automatically. You must then log on again if you want to configure more settings.
Logbooks	Options • on • off **Factory setting** on	As an "Expert" you can switch off the logbook function here. The setting then changes the setting under General settings/Logbooks/ Recording.

10.2.4 Display

Path: SETUP / Display

Function	Options	Info
Language	Options • Second language • English **Factory setting** Second language	You selected the "second language" in the CM42- order code. If the language is changed, the settings configured for the device remain intact. You can load another second language from the SystemDAT. → SETUP/DAT menu
Main value format	Options • x.x • x.xx **Factory setting** x.xx	You select how many commas should appear after the decimal point in the measured value display.
Temperature unit	Options • °C • °F **Factory setting** °C	Decide whether you want to use the ISO or the American temperature unit. All the values and settings are automatically converted to match the option selected.
Temperature format	Options • xxx • xxx.x **Factory setting** xxx.x	You select how many commas should appear after the decimal point in the temperature display.

10.2.5 DAT menu

There are 3 different types of DAT module that can either be ordered as optional accessories or are already included in the delivery:
- **SystemDAT**
  Firmware updates (more recent firmware version) or change of language group
- **FunctionDAT**
  Extending the function scope ("Advanced" firmware or 2nd current output)
- **CopyDAT**
  Memory for own configuration settings

Check whether your device's functions can be extended

▶ Before you order a FunctionDAT, check whether it is at all possible to extend the function scope of your device.

Change of sensor type with a hardware change
If you also have to install another sensor module for the new sensor type:

1. Disconnect the device from the power supply.

2. Open the housing.

3. Replace the sensor module and connect the new sensor.

4. Reestablish the power supply.

5. Follow the steps that apply for changing the sensor type without a hardware change.

Change of sensor type without a hardware change
If you do not need another sensor module for the new sensor type:

1. Go to SETUP/DAT menu/SystemDAT/Sensor type.

2. Select the sensor type you wish to change to and confirm your choice.

   ↳ The new sensor type is now ready for measurement and you can configure it.

🛈 You can keep the device switched on if you are changing between pH/ORP, oxygen or conductive conductivity sensors with Memosens technology. You only change the sensor at the CYK10- cable or the M12 socket and follow the instructions.

DAT module for firmware updates or upgrades, change of language group or to save the configuration

The device does not need to be disconnected from the power supply.

1. Open the housing.

2. Insert a DAT module into the right-hand slot in the housing cover:
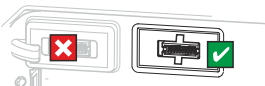
3. In the menu, select your type of DAT module: SystemDAT, FunctionDAT or CopyDAT.

     ↳ The transmitter reads in the DAT information. Data processing is interrupted for this purpose.

4. Select your preferred DAT action (see Table).

5. Follow the instructions.

     ↳ You can keep a CopyDAT plugged in for later use. You should remove all the others.

6. Close the housing again.

🛈 You can use SystemDATs and CopyDATs for as many devices as you like. FunctionDATs extend the device functions and can only be used for one device.

Path: SETUP / DAT menu

Function	Options	Info
SystemDAT	**Each of the options possible here causes the device to be restarted**	
Sensor type	Options Depends on the type of sensor currently used	Select through the available sensor types (configurations) The sensor types that you can switch to are displayed. The sensor type currently being used is not displayed.
Language	Options ■ English ■ German ■ French ■ Polish ■ Czech ■ Spanish ■ Dutch ■ Italian ■ Chinese ■ Japanese ■ Portuguese ■ Russian ■ Swedish ■ Korean	You can only change the second language of your device here. It is not possible to change English as the first language. The new second language replaces the second language previously used. It is not installed as an additional (third) language. If you want to return to the original second language, you will have to go through the DAT menu to do so.
Update	Options ■ PH 02.xx.xx-xxxx ■ COND 02.xx.xx-xxxx ■ DO 02.xx.xx-xxxx	Choice of software packages and versions available on the SystemDAT Only use this action to update the current software package. If you also want to change the sensor type, select the "Sensor type" option.
FunctionDAT	■ CY42-F2 Software extension	**Your device already has the complete scope of functions. Therefore, a FunctionDAT is not necessary.**
CopyDAT	Options ■ Read from DAT ■ Write to DAT	Displays information already saved You can now save the current configuration or download a saved configuration from the DAT.

If you change the type of sensor or the software package, you do not have appropriate operating instructions for the new software. You can download the appropriate operating instructions as a pdf file from:
www.endress.com/liquiline-documentation

10.2.6 Quick Setup

→ 🖹 34

Index

71329994

www.addresses.endress.com

Endress+Hauser
People for Process Automation