

# Technical Information

## Liquiline M CM42

Memosens: pH/ORP, oxygen, conductivity

Analog sensors: pH/ORP, conductivity, concentration, resistance



### Two-wire transmitter for Ex and non-Ex areas

#### Application

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

Depending on the version ordered, Liquiline has one or two analog current outputs. In addition, it can be connected to fieldbuses in accordance with the FOUNDATION Fieldbus, PROFIBUS PA and HART protocol.

The transmitter is suitable for pollution degree 3.

The highly robust plastic version and the hygienic stainless steel version are tailored to the following applications:

- Chemical processes
- Pharmaceuticals industry
- Foodstuff technology
- Applications in hazardous areas

#### Your benefits

- Cost-saving:
  - Simple commissioning with Quick Setup and Navigator
  - Memosens: Plug & play laboratory-calibrated sensors
  - Predictive maintenance system detects when a sensor needs to be cleaned, calibrated or replaced.
  - Less storage thanks to modular design
  - Effective asset management thanks to Fieldcare and W@M
- Safe:
  - Memosens: Active display of cable interruption
  - User-guided commissioning, graphic display and plain text guidance for maximum operating safety
  - Approvals: ATEX, FM, CSA, NEPSI, TIIS
  - User administration: Code-protected commissioning
  - pH glass with Memosens: SIL2 measuring point with TÜV approval

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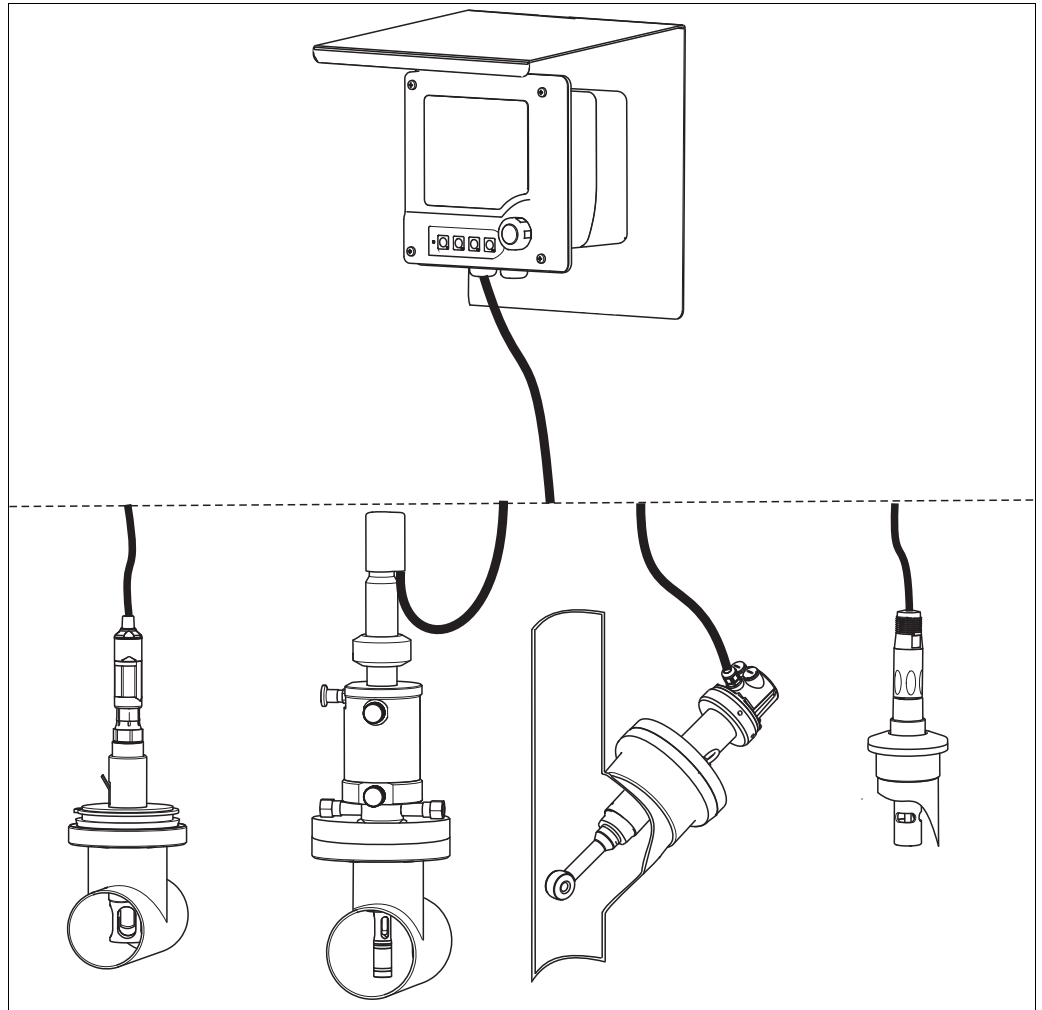
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## Function and system design

### Measuring system

A complete measuring system consists of:

- Liquiline M CM42 transmitter with mounting plate (e.g. for wall mounting)
- sensor and suitable sensor cable
- assembly suitable for the sensor (optional)
- post retainer (optional)
- weather protection cover (optional)



Examples of a measuring system

#### pH / ORP (analog)

- CM42-P...
- Measuring cable CPK9
- Cleanfit CPA471 assembly
- Orbisint CPS11 sensor

#### Conductivity, inductive measurement (analog)

- CM42-I...
- Dipfit CLA111 assembly
- Indumax CLS50 sensor

#### Conductivity, conductive measurement (analog)

- CM42-C...
- Measuring cable CPK9
- Condumax CLS16 sensor

#### Memosens (digital)

- CM42-K/L/M/N/O...
- Measuring cable CYK10
- (Unifit CPA442 assembly)
- Sensor <sup>1)</sup>

<sup>1)</sup> e.g. CPS11D (pH glass), CPS471D (pH ISFET), CPS341D (enamel pH), CPS16D (pH/ORP combined), CLS15D/CLS16D/CLS21D (LFC), CLS50D/CLS54D (LFI), COS22D/COS51D (DO)

You can combine your measuring point with a range of assemblies and sensors. For more information, see the "Accessories" section or the specified documentation.

#### NOTICE

##### Effect of climatic conditions: rain, snow, direct sun

Impaired operation to complete transmitter failure

- ▶ When installing outside, always use the weather protection cover (see accessories).

## Equipment architecture

### Software

You can choose from the following software packages:

- **Standard:**  
Standard application for the most common measuring points
- **Advanced:**  
Many additional functions that increase safety and quality

Package	Features					
	pH /ORP (glass/ISFET)	Conductivity	Oxygen			
<b>Standard</b>	<p><b>Analog sensors</b></p> <ul style="list-style-type: none"> <li>- Offset and two-point calibration</li> <li>- Sample calibration</li> <li>- Calibration with standard buffers</li> <li>- Manual buffer specification</li> <li>- Temperature compensation</li> <li>- Temperature adjustment</li> <li>- Isotherm intersection</li> <li>- Simulation of current output</li> <li>- Self-diagnosis</li> <li>- Calibration stability settings</li> <li>- Clock</li> </ul> <p><b>Memosens sensors</b> as for analog with the addition of:</p> <ul style="list-style-type: none"> <li>- Sensor information</li> <li>- Sensor check</li> </ul>	<p><b>Analog sensors</b></p> <ul style="list-style-type: none"> <li>- Sample calibration</li> <li>- Temperature calibration: one-point</li> <li>- Temperature compensation: linear, NaCl, ultrapure water (NaCl, HCl)</li> <li>- Simulation of current output</li> <li>- Self-diagnosis</li> <li>- Concentration measurement</li> <li>- Clock</li> </ul> <p><b>Memosens sensors</b> as for analog with the addition of:</p> <ul style="list-style-type: none"> <li>- Sensor information</li> <li>- Sensor check</li> </ul>	<p><b>Memosens sensors</b></p> <ul style="list-style-type: none"> <li>- Slope calibration               <ul style="list-style-type: none"> <li>- in air (100% rF)</li> <li>- in water (100% air-saturated)</li> </ul> </li> <li>- in air (with input of current absolute air pressure and relative humidity)</li> <li>- Zero point calibration</li> <li>- Sample calibration</li> <li>- Temperature adjustment</li> <li>- Medium compensation</li> <li>- Calibration stability settings</li> <li>- Simulation of current output</li> <li>- Self-diagnosis</li> <li>- Clock</li> <li>- Sensor information</li> <li>- Sensor check</li> </ul>			
<b>Advanced</b>	<p><b>"Standard" software package with the addition of:</b></p> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top; width: 33%;"> <p><b>Analog sensors</b></p> <ul style="list-style-type: none"> <li>- Medium compensation</li> <li>- Calibration timer</li> <li>- Sensor condition check (SCC)</li> <li>- Process check system (PCS)</li> </ul> <p><b>Memosens sensors</b> as for analog with the addition of</p> <ul style="list-style-type: none"> <li>- Operated hours counter</li> <li>- Sterilization cnt.</li> </ul> </td> <td style="vertical-align: top; width: 33%;"> <p><b>Analog sensors</b></p> <ul style="list-style-type: none"> <li>- Calibration with separate installation factor (inductive measurement only)</li> <li>- Polarization detection (conductive measurement only)</li> <li>- Temperature compensation via user table</li> <li>- Two-point temperature adjustment: offset and slope</li> <li>- USP alarm and prealarm</li> </ul> <p><b>Memosens sensors</b> as for analog with the addition of</p> <ul style="list-style-type: none"> <li>- Operated hours counter</li> <li>- Sterilization cnt.</li> </ul> </td> <td style="vertical-align: top; width: 33%;"> <p><b>Memosens sensors</b></p> <ul style="list-style-type: none"> <li>- Polarization voltage setting</li> <li>- Calibration timer</li> <li>- Sensor statistics</li> <li>- Operated hours counter</li> <li>- Sterilization cnt.</li> </ul> </td> </tr> </table> <p>All devices, regardless of measurement parameter</p> <ul style="list-style-type: none"> <li>- Logbooks</li> <li>- Data logbook</li> <li>- Free assignment of measured values to current outputs (optional)</li> <li>- Switching on and off of diagnostic function</li> <li>- Extended user administration</li> <li>- Current output tables</li> </ul>			<p><b>Analog sensors</b></p> <ul style="list-style-type: none"> <li>- Medium compensation</li> <li>- Calibration timer</li> <li>- Sensor condition check (SCC)</li> <li>- Process check system (PCS)</li> </ul> <p><b>Memosens sensors</b> as for analog with the addition of</p> <ul style="list-style-type: none"> <li>- Operated hours counter</li> <li>- Sterilization cnt.</li> </ul>	<p><b>Analog sensors</b></p> <ul style="list-style-type: none"> <li>- Calibration with separate installation factor (inductive measurement only)</li> <li>- Polarization detection (conductive measurement only)</li> <li>- Temperature compensation via user table</li> <li>- Two-point temperature adjustment: offset and slope</li> <li>- USP alarm and prealarm</li> </ul> <p><b>Memosens sensors</b> as for analog with the addition of</p> <ul style="list-style-type: none"> <li>- Operated hours counter</li> <li>- Sterilization cnt.</li> </ul>	<p><b>Memosens sensors</b></p> <ul style="list-style-type: none"> <li>- Polarization voltage setting</li> <li>- Calibration timer</li> <li>- Sensor statistics</li> <li>- Operated hours counter</li> <li>- Sterilization cnt.</li> </ul>
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## DAT memory modules

There are 3 different types of DAT module

### ■ SystemDAT

- For changing the sensor type, software updates (more recent software version) and changing the language package
- Part of the scope of delivery of the version ordered and available as an accessory
- Optional accessory

### ■ FunctionDAT

- For software upgrades (additional functionality)
- Extended functional range (2nd current output)
- Optional accessory

### ■ CopyDAT

- Memory for own configuration settings
- Optional accessory



A FunctionDAT is never available for a SIL device since the device already has all the possible functions and its functions can therefore not be extended.

A SystemDAT is also not available for the SIL device since it would not be possible to ensure the "functional safety" otherwise.

## Suitable sensors

### pH/ORP

- Analog and Memosens glass electrodes
- Analog and Memosens ISFET sensors
- Analog and Memosens ORP sensors
- Memosens pH/ORP combined sensors
- Analog and Memosens enamel pH electrodes
- Analog single electrodes (glass or antimony)

### Conductivity

- Analog and Memosens, conductive sensors
  - Two-electrode sensors
  - Four-electrode sensors
- Analog and Memosens, inductive sensors

### Oxygen

Amperometric sensors:

- with Memosens technology
- 12 and 40 mm design

## Dependability

### Reliability

#### Memosens



Memosens makes your measuring point safer:

- No-contact, digital signal transmission allows optimum galvanic isolation
- No contact corrosion
- Completely watertight
- Sensors can be calibrated in a lab, which increases the availability of measured values
- Predictive maintenance thanks to recording of sensor data, e.g.:
  - Total hours of operation
  - Hours of operation with very high or very low measured values
  - Operating hours at high temperatures
  - Number of steam sterilizations
  - Sensor status

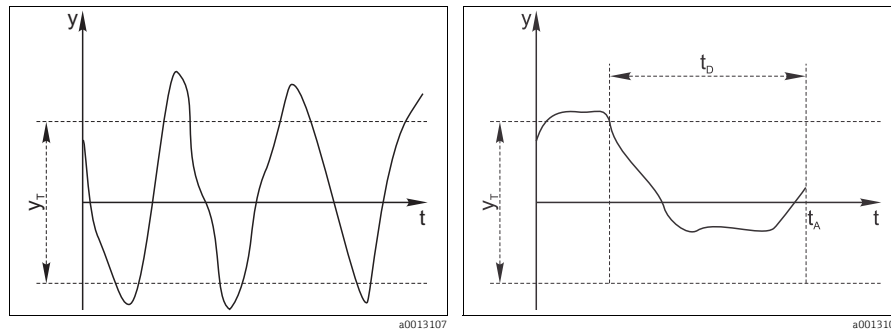
#### Quick Setup

##### To the first measured value within 1 minute

Once you have set up the few parameters in the Quick Setup menu, the measuring point is ready to measure. The first measured value is reliably displayed.

### Process Check System (PCS): Life check

This function is used to check the measuring signal for stagnation. An alarm is triggered if the measuring signal does not change over a certain period (several measured values). The reason for such behavior can be contamination, clogging or similar.



Normal measuring signal, no alarm

$y$  Measuring signal  
 $y_T$  Minimum signal fluctuation

Stagnating signal, alarm is triggered

$t_D$  Specified time interval  
 $t_A$  Time at which the alarm is triggered

### Sensor Condition Check (SCC, pH only)

This function monitors the electrode status and the degree of electrode aging. The status is displayed with the messages "SCC electrode condition bad" or "SCC electrode condition sufficient". The status of the electrode is updated after every calibration.

### Sensor Check System (SCS, pH only)

The Sensor Check System monitors the pH glass resistance or reference resistance (for analog sensors only), thus indicating possible incorrect measurements that may occur as a result of damage to or clogging of the pH electrode.

In addition, the SCS detects glass breakage in the case of classic glass electrodes as well as leaks in the case of ISFET sensors.

### Polarization monitoring (conductivity only, conductively measured)

Polarization effects in the boundary layer between the sensor and the measuring solution limit the measuring range of conductive conductivity sensors.

The transmitter can detect and report polarization effects using an intelligent signal evaluation process.

### United States Pharmacopeia (USP) and European Pharmacopeia (EP) (conductivity only)

The requirements for ultrapure water in the pharmaceutical industry are determined primarily by the American USP and European EP.

The transmitter complies with USP/EP requirements for conductivity measuring systems:

- Exact temperature measurement at the place of conductivity measurement
- Simultaneous display of uncompensated conductivity values and temperature is possible
- Display resolution 0.01  $\mu\text{S}/\text{cm}$
- Exact factory calibration of the transmitter with traceable precision resistance (optional)
- Exact adjustment of sensors in the factory as per ASTM D 1125-91 or ASTM D 5391-99 (optional)
- Temperature-dependent measured value monitoring as per USP and EP.

The limit functions for pharmaceutical water are implemented in the "Advanced" software package in accordance with USP and EP: For conductivity measurements, the limit functions for pharmaceutical water are implemented in the software in accordance with USP and EP:

- Water for Injection (WFI) as per USP <645> and EP
- Highly purified water (HPW) as per EP
- Purified water (PW) as per EP

The uncompensated conductivity value and the temperature are measured for the USP/EP limit functions. The measured values are compared with the tables set down in the standards. An alarm is triggered if the limit value is exceeded. In addition, a prealarm can be set that flags undesirable operating statuses before they occur.

**Application-optimized calibration models (oxygen only)**

In separate functions, the transmitter allows process-adjusted zero point sensor calibration or sensor calibration via the slope.

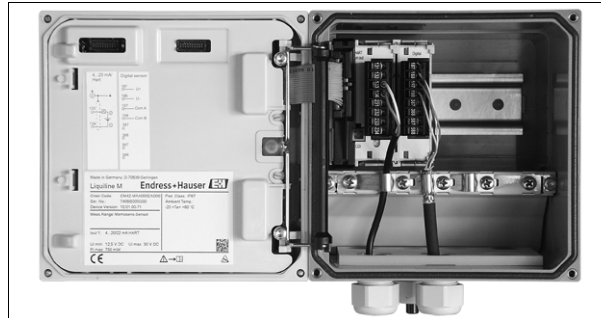
There are different calibration models for this, ranging from simple slope calibration in air that is saturated with water vapor to slope calibration with input of the absolute air pressure and relative humidity at the measuring location.

The latter model allows in-process calibration during operation as well as during sterilization and cleaning.

The number of calibrations and sterilizations are tracked separately for the sensor and membrane cap. The relevant counter can be reset if the membrane cap is replaced.

**Maintainability**

**Modular design**



a0010477

Liquiline inside (version with sensor module, without wiring)

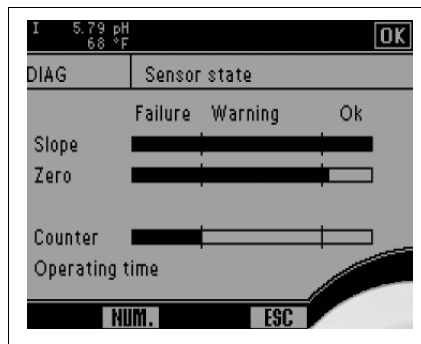


a0010476

CPU and sensor module

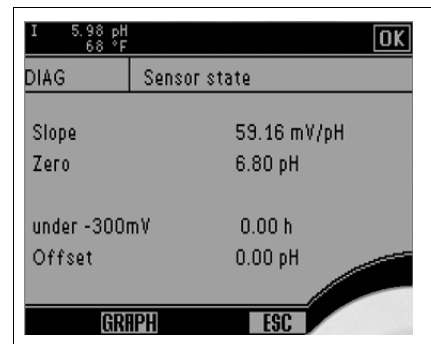
**Sensor monitor**

You will find the sensor monitor in the DIAG menu. Important sensor data incl. warning and alarm limits are displayed either graphically or numerically.



a0010475

Sensor monitor, graphical display (example)



a0015155

Sensor monitor, numerical display (example)

## Safety

### User administration

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.

### SIL

A TÜV-approved SIL2 version of the Liquiline M CM42 is also available (CM42-M\* only).

#### Safety functions

- Safe output of the digitized value at the current output
- Monitoring of the measured value for leaving a defined interval
- Safe calibration and adjustment

 Additional information and Safety Manuals can be found at:  
[www.endress.com/SIL](http://www.endress.com/SIL)

### Reordering validated software

You can order new devices with older, validated software so you do not have to constantly validate new software versions of new devices. This is possible as long as allowed by the hardware version.





## Input

**Measured variables** --> Documentation of the connected sensor

**Measuring ranges** --> Documentation of the connected sensor

**Binary input (Memosens):**  
pH/ORP, oxygen,  
conductivity



### Cable specification


CYK10 with Memosens

Max. cable length 100 m (330 ft)

Fixed cable with Memosens

Max. cable length 55 m (180 ft)

### Ex specification

	Intrinsically safe sensor circuit with protection type: Ex ia IIC <sup>1)</sup> , TIS Ex ib IIC	
	Intrinsically safe sensor circuit with protection type: Ex ic IIC <sup>2)</sup>	
Intrinsically safe sensor circuit with protection type: Ex ia Ga IIC <sup>3)</sup>		
Max. output voltage $U_o$ :	5.04 V	
Max. output current $I_o$ :	80 mA	
Max. output $P_o$ :	112 mW	
For connecting the measuring cable CYK10 <sup>4)</sup>		
For connecting fixed cable of sensor CLS50D <sup>5)</sup>		

- 1) CM42-\*G\*\*\*\*\*, CM42-\*X\*\*\*\*\*, CM42-\*Z\*\*\*\*\*
- 2) CM42-\*V\*\*\*\*\*
- 3) CM42?\*I\*\*\*\*\*
- 4) CM42-K\*\*\*\*\*, CM42-M\*\*\*\*\*, CM42-N\*\*\*\*\*
- 5) CM42-L\*\*\*\*\*


**Analog input: pH / ORP**
**Cable specification**

Without SCS	Max. cable length 50 m (160 ft)
With SCS	Max. cable length 20 m (65 ft)

**Applicable temperature sensors**

- Pt100
- Pt1000
- NTC 30K

**Ex specification**

 Intrinsicly safe sensor circuit with protection type: Ex ia IIC <sup>1)</sup> Intrinsicly safe sensor circuit with protection type: Ex ic IIC <sup>2)</sup> Intrinsicly safe sensor circuit with protection type: Ex ia Ga IIC <sup>3)</sup>		
Max. output voltage U <sub>o</sub>	<b>Glass</b> 10.08 V	<b>ISFET</b> 10.08 V
Max. output current I <sub>o</sub>	4.1 mA	50.7 mA
Max. output P <sub>o</sub>	10.2 mW	128 mW
Max. external inductance L <sub>o</sub>	1 mH	1 mH
Max. external capacitance C <sub>o</sub>	250 nF	250 nF
Connection class as per NE116 <sup>4)</sup>	SensISCO1X	-

1) CM42-\*G\*\*\*\*\* , CM42-\*X\*\*\*\*\* , CM42-\*Z\*\*\*\*\*

2) CM42-\*V\*\*\*\*\*

3) CM42-\*I\*\*\*\*\*

4) CM42-\*G\*\*\*\*\*

When pH/ORP glass electrodes are connected to terminals 317, 318, 320, 111, 112 and 113, the device corresponds to connection class 1 as per NAMUR Recommendation NE116 (SensISCO).

Terminals 315 and 316 may not be connected for this categorization.

The device is labeled SensISCO1X.

**Input impedance**

> 1\*10<sup>12</sup> Ω (under nominal operating conditions)

**Input leakage current**

< 1\*10<sup>-13</sup> A (under nominal operating conditions)

**Analog input: Conductivity****Cable specification**

Conductivity/specific resistance, conductively measured <sup>1)</sup> Two-electrode sensor 10 $\mu\text{S}\cdot\text{k}$ to 20 $\text{mS}\cdot\text{k}$ / 0.1 $\text{M}\Omega/\text{k}$ to 50 $\Omega/\text{k}$ 5 $\mu\text{S}\cdot\text{k}$ to 20 $\text{mS}\cdot\text{k}$ / 0.2 $\text{M}\Omega/\text{k}$ to 50 $\Omega/\text{k}$ 0.1 $\mu\text{S}\cdot\text{k}$ to 20 $\text{mS}\cdot\text{k}$ / 20 $\text{M}\Omega/\text{k}$ to 50 $\Omega/\text{k}$	Max. cable length 100 m (330 ft) Max. cable length 50 m (160 ft) Max. cable length 15 m (50 ft)
Conductivity, measured conductively Four-electrode sensor 10 $\mu\text{S}\cdot\text{k}$ to 1.5 $\text{S}\cdot\text{k}$ 0.1 $\mu\text{S}\cdot\text{k}$ to 20 $\text{mS}\cdot\text{k}$	Max. cable length 100 m (330 ft) Max. cable length 15 m (50 ft)
Conductivity, measured inductively <sup>2)</sup>	Max. cable length 55 m (180 ft)


1) with cable CYK71, CPK9 or fixed cable

2) with cable CLK5, CLK6 or fixed cable

**Applicable temperature sensors**

- Pt100
- Pt1000

**Ex specification, conductive sensors**


 Intrinsicly safe sensor circuit with protection type: Ex ia IIC <sup>1)</sup> Intrinsicly safe sensor circuit with protection type: Ex ic IIC <sup>2)</sup> Intrinsicly safe sensor circuit with protection type: Ex ia Ga IIC <sup>3)</sup>	
Max. output voltage $U_o$ Max. output current $I_o$ Max. output $P_o$ Max. external inductance $L_o$ Max. external capacitance $C_o$	10.08 V 23 mA 57 mW 300 $\mu\text{H}$ 50 nF

1) CM42-\*G\*\*\*\*\* , CM42-\*X\*\*\*\*\* , CM42-\*Z\*\*\*\*\*

2) CM42-\*V\*\*\*\*\*

3) CM42?\*I\*\*\*\*\*

**Ex specification, inductive sensors**

 Intrinsicly safe sensor circuit with protection type: Ex ia IIC <sup>1)</sup> Intrinsicly safe sensor circuit with protection type: Ex ic IIC <sup>2)</sup> Intrinsicly safe sensor circuit with protection type: Ex ia Ga IIC <sup>3)</sup>	
Max. output voltage $U_o$ Max. output current $I_o$ Max. output $P_o$	10.08 V 64 mA 128 mW
For connecting the inductive sensors CLS50, CLS54	


1) CM42-\*G\*\*\*\*\* , CM42-\*X\*\*\*\*\* , CM42-\*Z\*\*\*\*\*


2) CM42-\*V\*\*\*\*\*

3) CM42?\*I\*\*\*\*\*

## Output

<b>Output signal</b>	1x 4 to 20 mA, passive, potentially isolated against sensor circuit <sup>1)2)</sup> 2x 4 to 20 mA, passive, potentially isolated against sensor circuit and against each other <sup>1)2)3)</sup> PROFIBUS PA, potentially isolated against sensor circuit <sup>1)2)4)</sup> FOUNDATION Fieldbus, potentially isolated against sensor circuit <sup>1)2)5)</sup>
<b>Signal on alarm</b>	3.6 to 22.0 mA (3.6 mA fixed value when using HART communication) digitally via fieldbus <sup>6)</sup>
<b>Load</b>	Max. load with supply voltage of 24 V: 500 $\Omega$ Max. load with supply voltage of 30 V: 750 $\Omega$
<b>Output signal range</b>	3.6 to 22.0 mA

<b>Ex specification current output</b>	 Intrinsically safe supply and signal circuits, passive	
	Max. input voltage $U_i$	30 V
	Max. input current $I_i$	100 mA
	Max. input $P_i$	750 mW
	Max. internal inductance $L_i$	29 $\mu$ H (output 1) 24 $\mu$ H (output 2)
	Max. internal capacitance $C_i$	1.2 nF (output 1)
		0.2 nF (output 2)

<b>Ex specification PROFIBUS and FOUNDATION Fieldbus</b>	 Suitable for use as a field device in a FISCO system as per EN/IEC 60079-27	
	Max. input voltage $U_i$	17.5 V
	Max. input current $I_i$	380 mA
	Max. input $P_i$	5.32 W
	Max. internal inductance $L_i$	<10 $\mu$ H
	Max. internal capacitance $C_i$	< 5 nF

## Current output, passive

<b>Span</b>	3.6 to 22.0 mA
<b>Signal characteristics</b>	Linear
<b>Cable specification</b>	Cable type: shielded wire, $\varnothing$ 2.5 mm (14 AWG)

- 1) Potential isolation for Memosens in sensor plug
- 2) For inductive sensors with Memosens protocol CLS50D and CLS54D not potentially isolated against sensor circuit!
- 3) Current output 1 and current output 2 (optional)
- 4) For version with PROFIBUS PA
- 5) For version with FOUNDATION Fieldbus
- 6) For version with PROFIBUS PA or FOUNDATION Fieldbus

## Power supply

### Grounding the housing

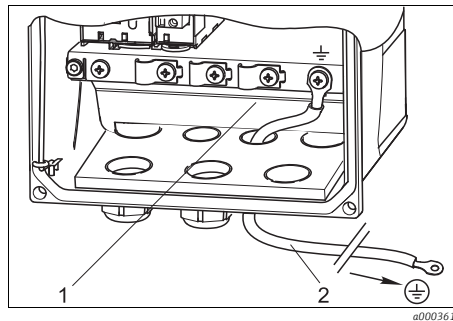
#### Plastic housing

##### **⚠ WARNING**

##### Electric voltage at ungrounded cable mounting rail

No shock protection

- ▶ Connect the cable mounting rail to the foundation ground using a separate  $\geq 2.5 \text{ mm}^2$  (14 AWG) functional ground.



Grounding the housing

- 1 Cable mounting rail  
2  $\geq 2.5 \text{ mm}^2$  (14 AWG) functional ground

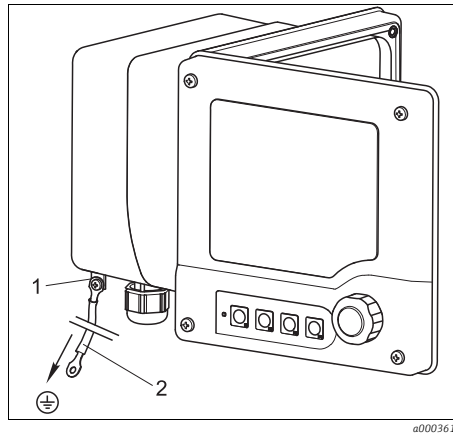
#### Stainless steel housing

##### **⚠ WARNING**

##### Electric voltage at ungrounded housing

No shock protection

- ▶ Connect the external ground connection of the housing to the foundation ground using a separate wire (GN/YE) ( $\geq 2.5 \text{ mm}^2$ , corresponds to 14 AWG).



Grounding the housing

- 1 Outer ground connection  
2  $\geq 2.5 \text{ mm}^2$  (14 AWG) wire (GN/YE)

## Supply and signal voltage

### ⚠ WARNING

In sensor CLS50D, the internal sensor circuits are connected to the shielded wire of the supply cable and are therefore also connected to ground via the shielded connection of the CM42 → 18.

The overheating of electronic components constitutes a fire and explosion hazard and may result in serious injury and death.

- ▶ Never connect the supply circuit to the ground.
- ▶ Use an active barrier (e.g. RN221) to ensure safe galvanic isolation during operation in explosive atmospheres (see Accessories).

### NOTICE

The internal sensor circuits of CLS50D and CLS54D are also connected to ground via the shielded wire of the supply cable and via the shielded connection of the CM42 → 18.

Incorrect connection of the supply circuit results in the overheating of components which in turn results in the transmitter being destroyed.

- ▶ Never connect the supply circuit to the ground.

**i** For sensor CLS50, the following applies:

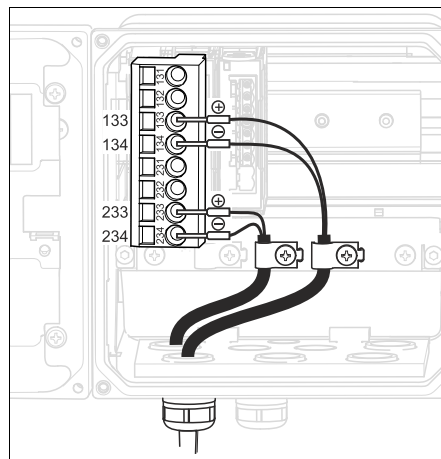
The internal sensor circuits in the sensor are connected to the shielded wire of the supply cable. This results in the sensor circuits also being connected to the ground. The transmitter CM42 features safe galvanic isolation between the supply and sensor circuit.

## 4 to 20 mA

- ▶ 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 at both ends.

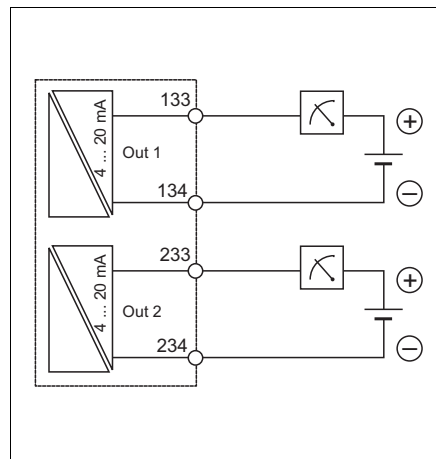
In the case of a SIL device, you must ground both current outputs at both ends.

**i** The second current output can be ordered as an option (see "Ordering information").



a0005037

View in device (CPU module)



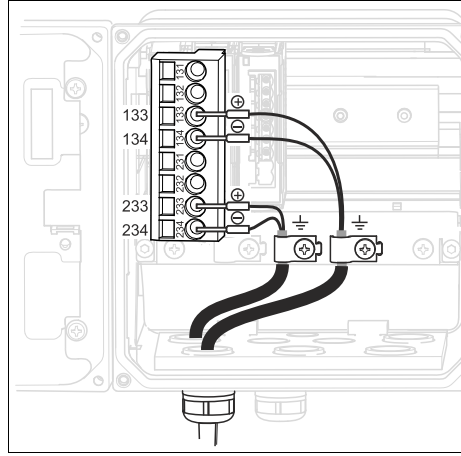
a0005038

Wiring diagram

### 4 to 20 mA / HART

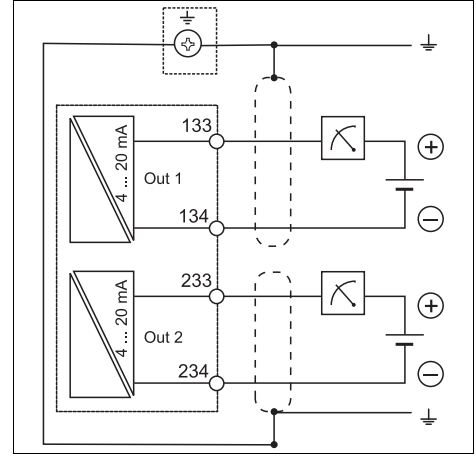
For safe communication via the HART protocol and for compliance with NAMUR NE 21, you must use a two-wire cable that is grounded at both ends.

- ▶ Connect the transmitter to a two-wire cable that is grounded at both ends.



View in device (CPU module)

a0002365



Wiring diagram

a0003100

### PROFIBUS PA and FOUNDATION Fieldbus

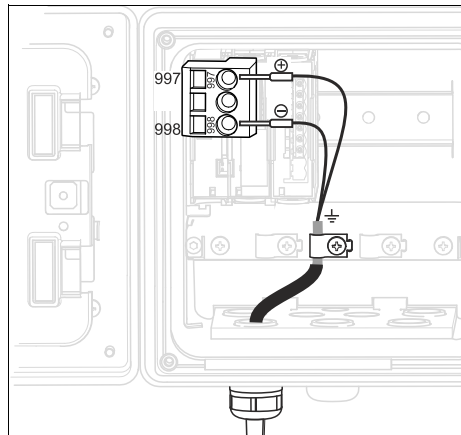
Use a fieldbus cable grounded at both ends (device **and** PCS).

There are various ways of connecting the unit:

1. Two-wire cable grounded at both ends, "hard grounding" (generally to be given priority over "capacitive connection to ground")
2. If there is a risk of large potential equalization currents. Shielded two-wire cabling, "capacitive connection to ground" (shield grounded on device side via capacitor, "C-module" accessory required)  
**Do not use in the hazardous area!**
3. Use the fieldbus connection socket (accessories)

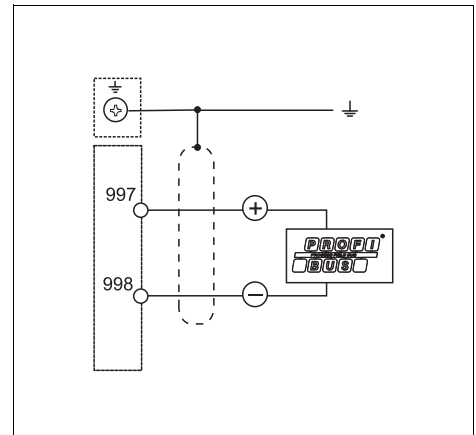
#### "Hard grounding"

1. Connect the cable shield to the cable mounting rail.
2. Connect the cable cores as per the assignment (→ ).



View in device (CPU module)

a0004060

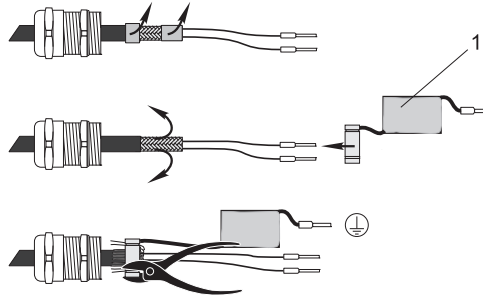



Wiring diagram

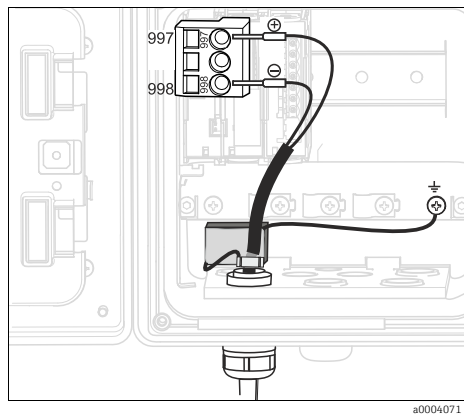
a0001640

### "Capacitive ground connection"

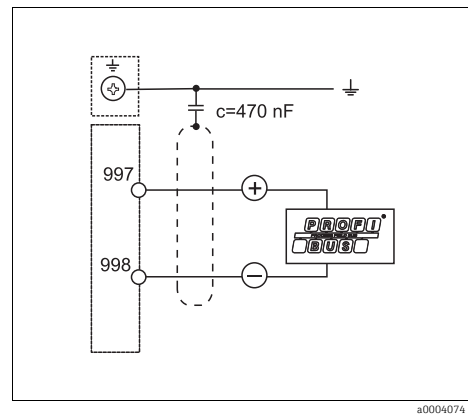
1. Pull back the braided shield, put the stranded extension wire of the C-module (item 1) onto the exposed shield and tighten the clip:



2. Connect the extension wire to the cable mounting rail.
3. Connect the cable cores as per the assignment (→ ).




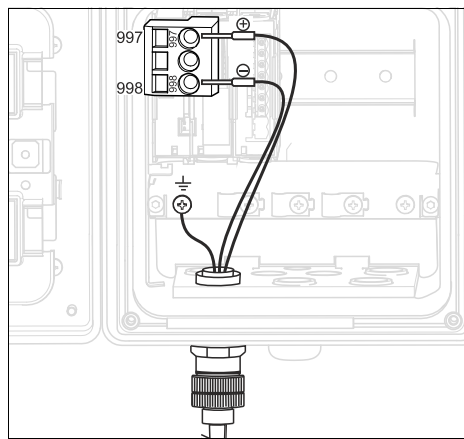
View in device (CPU module)



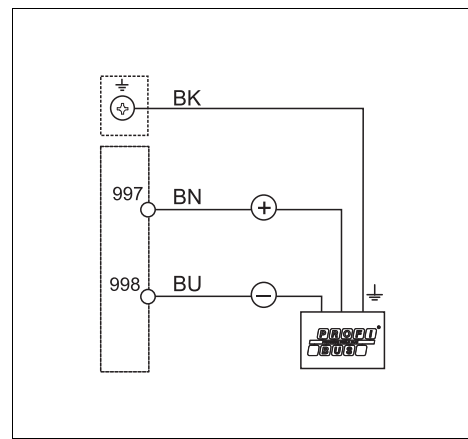
Wiring diagram

### "Fieldbus connection socket"

1. Screw the fieldbus connection socket into the housing bushing.
2. Trim the connection cores of the socket to approx. 15 cm.
3. Connect the cable cores as per the assignment. In doing so, you must place the cable shield (GN/YE) on the cable mounting rail (→ ).



View in device (CPU module)



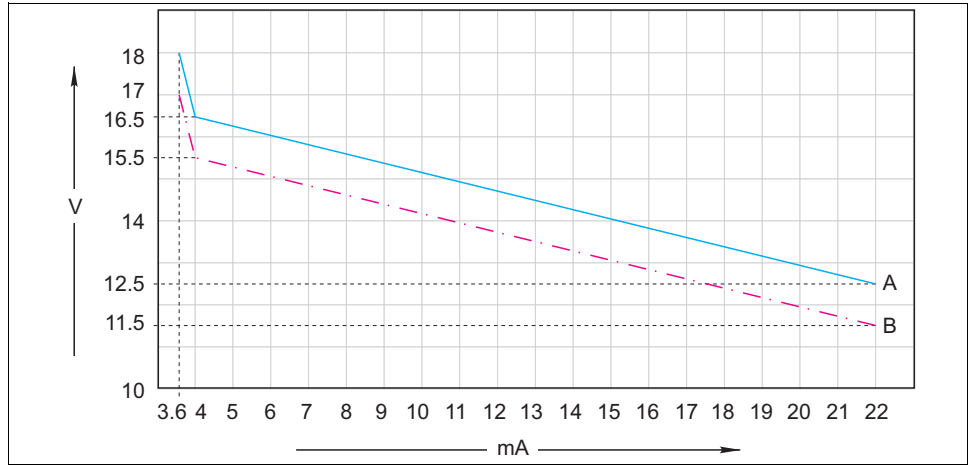
Wiring diagram



**Cable specification**

max. cable cross-section: 2.5 mm<sup>2</sup> (≈14 AWG), GND 4 mm<sup>2</sup> (≈12 AWG)

**Supply voltage**



Minimum supply voltage at the transmitter depending on the output current

A with HART communication  
 B without HART communication

a0008804

Profibus PA / FOUNDATION Fieldbus: 9 to 32 V DC (non-Ex)

9 to 17.5 V DC (Ex)

Bus current consumption:

22 mA

**Sensor connection**

**Explanation of abbreviations in the following diagrams:**

Abbreviation	Meaning
pH	pH signal
Ref	Signal from reference electrode
Src	Source
Drn	Drain
PM	Potential matching
U <sub>+</sub>	Power supply of the digital sensor
U <sub>-</sub>	
Com A	Communication signals of the digital sensor
Com B	
ϕ	Signal of the temperature sensor
d.n.c.	Do not connect!

**NOTICE**

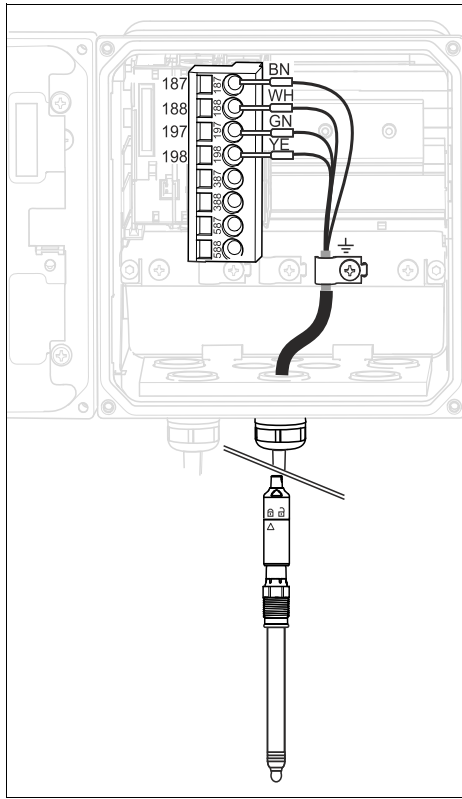
**No shielding against electrical and magnetic interference**

Interference can give erroneous measurement results

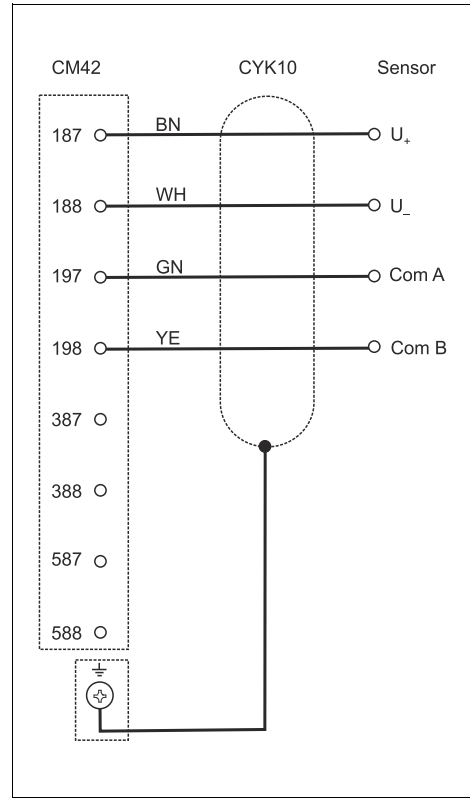
- ▶ You must connect shielded connections or terminals with functional earth (⊕) (there is no protective earth in the case of the plastic housing (⊖)).
- ▶ Keep magnetic interference fields away from the sensor since inductive conductivity sensors use magnetic fields.

Sensor connection:  
Memosens sensors

pH/ORP incl. combined sensors, oxygen, conductivity measured conductivity

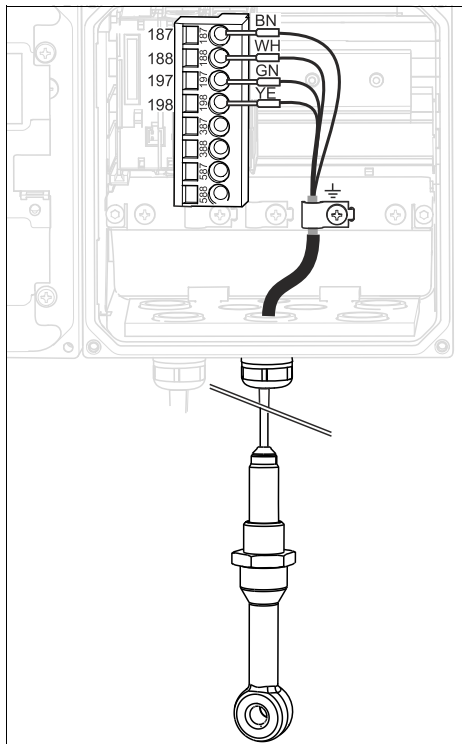


View in device (sensor module)

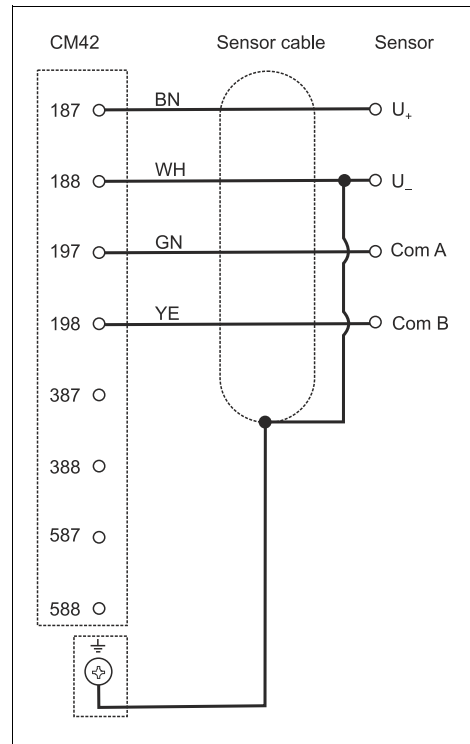


Wiring diagram

Inductively measured conductivity



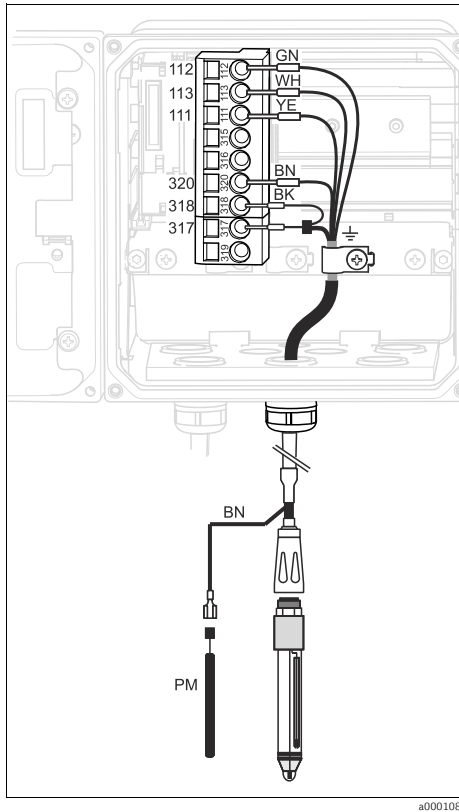
View in device (sensor module)



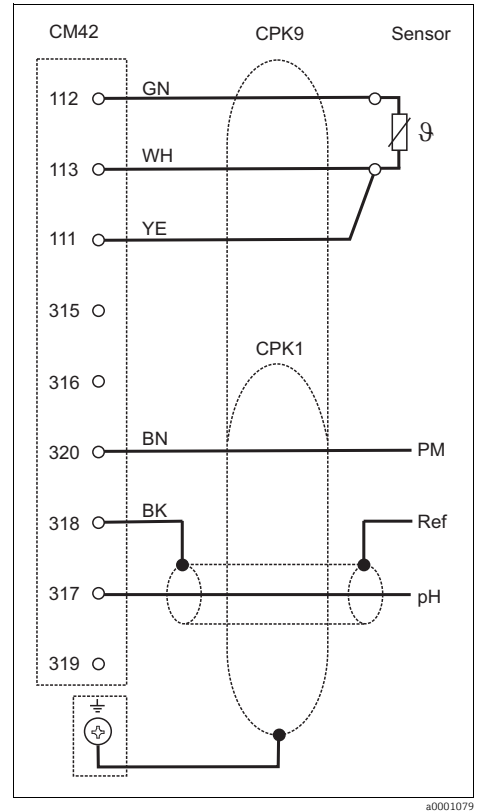
Wiring diagram CLS50D, CLS54D

**Sensor connection:  
analog pH/ORP sensors**

**Glass electrodes, with PAL (symmetrical)**

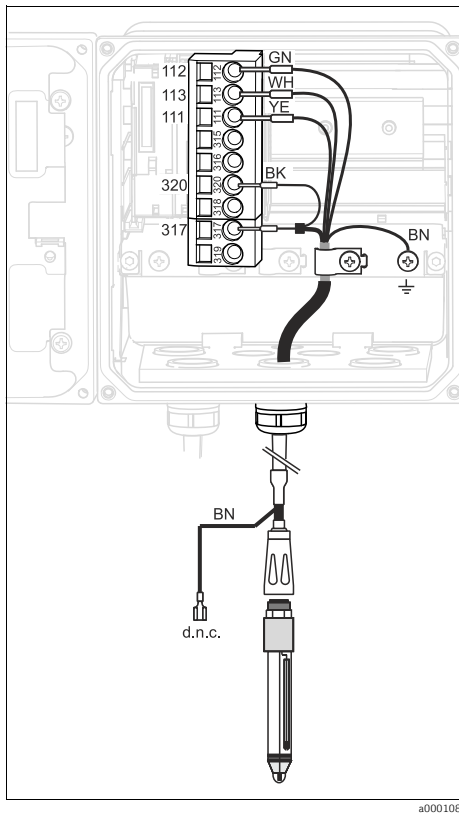


View in device (sensor module)

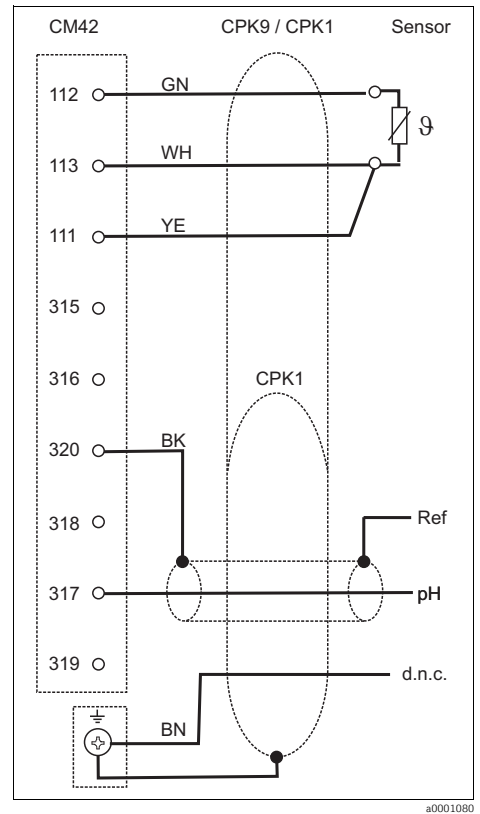


Wiring diagram

**Glass electrodes, without PAL (asymmetrical)**

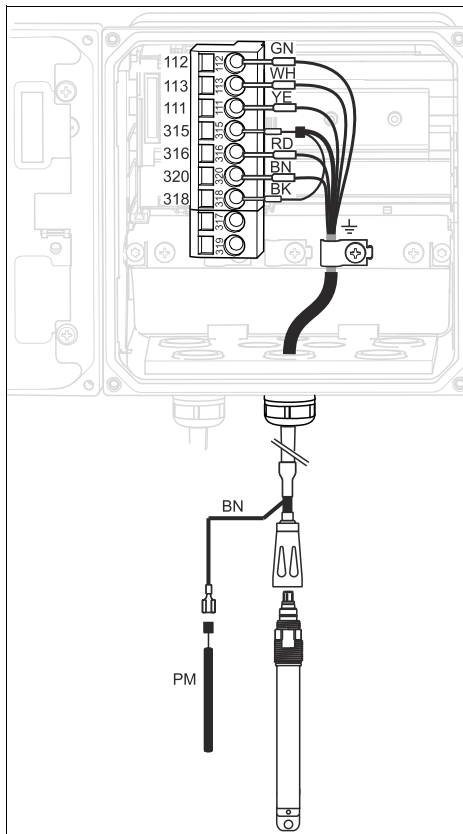


View in device (sensor module)



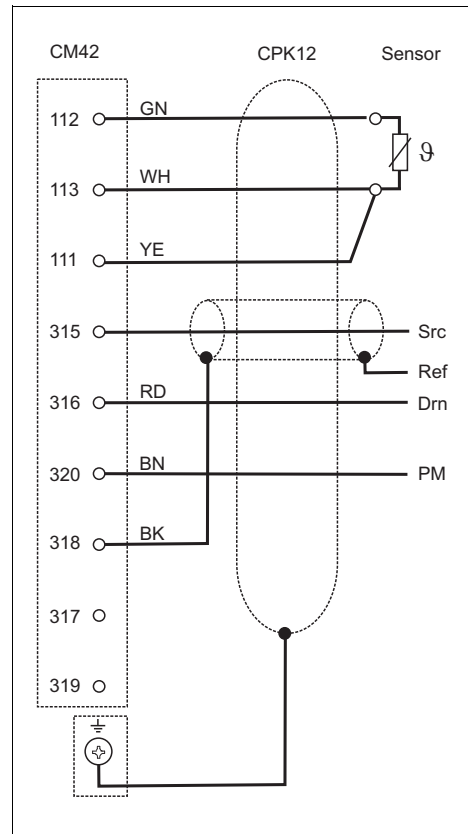
Wiring diagram

**ISFET sensors, with PAL (symmetrical)**



View in device (sensor module)

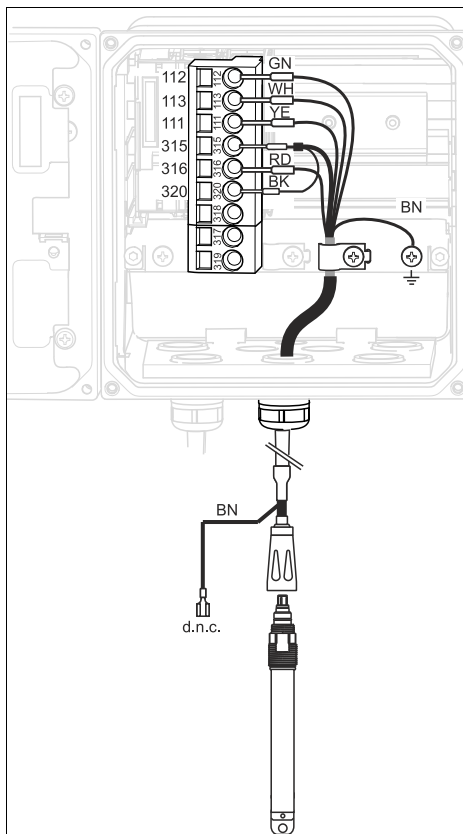
a0001090



Wiring diagram

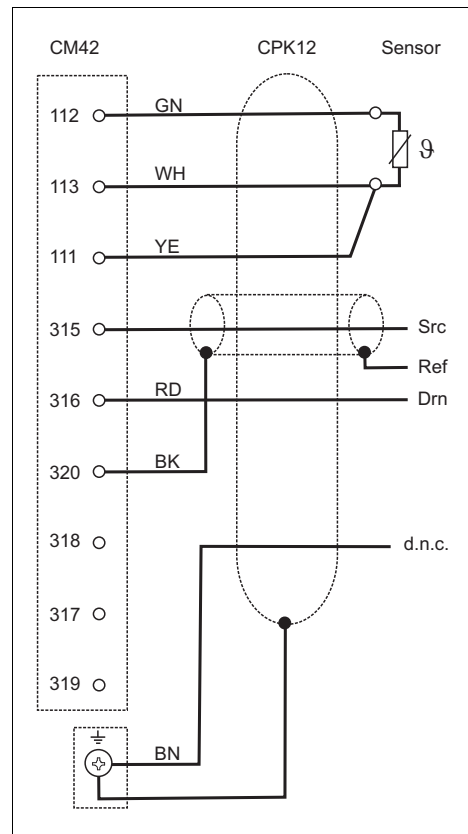
a0001076

**ISFET sensors, without PAL (asymmetrical)**



View in device (sensor module)

a0001084

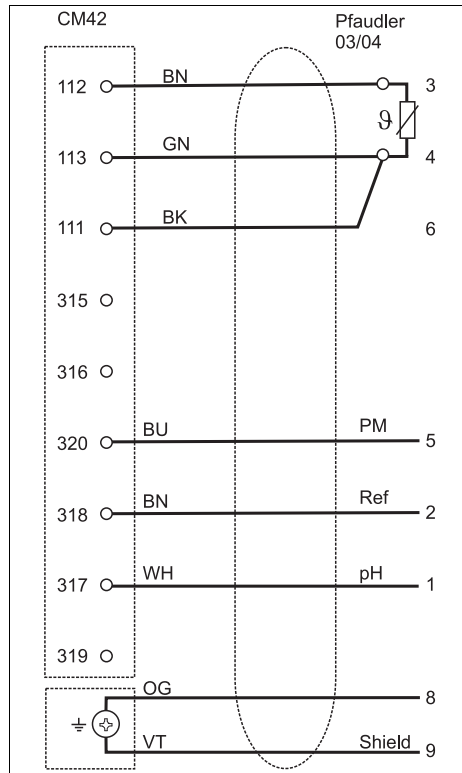


Wiring diagram

a0001077

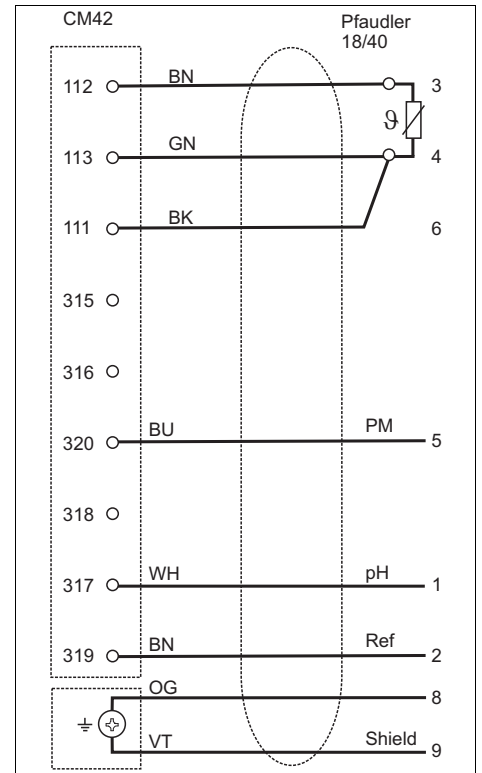
**Pfaunder electrodes**

**With PML (symmetrical)**  
 Pfaunder electrode, absolute  
 Type 03/type 04



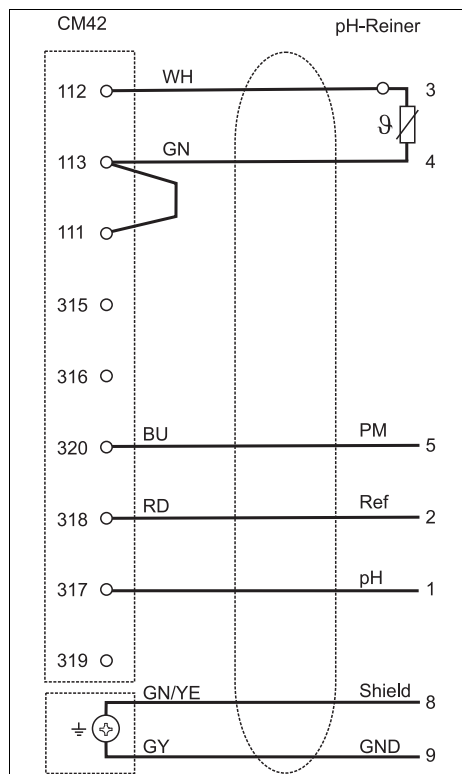
Wiring diagram

**With PML (symmetrical)**  
 Pfaunder electrode, relative  
 Type 18/type 40



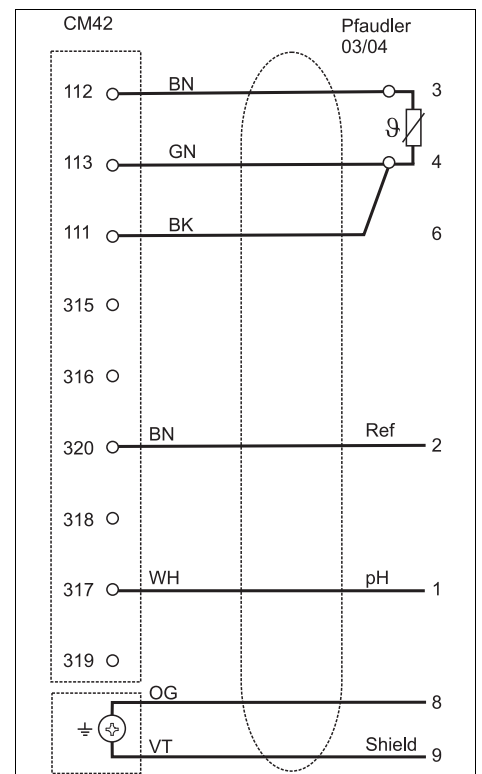
Wiring diagram

**With PML (symmetrical)**  
 pH Reiner



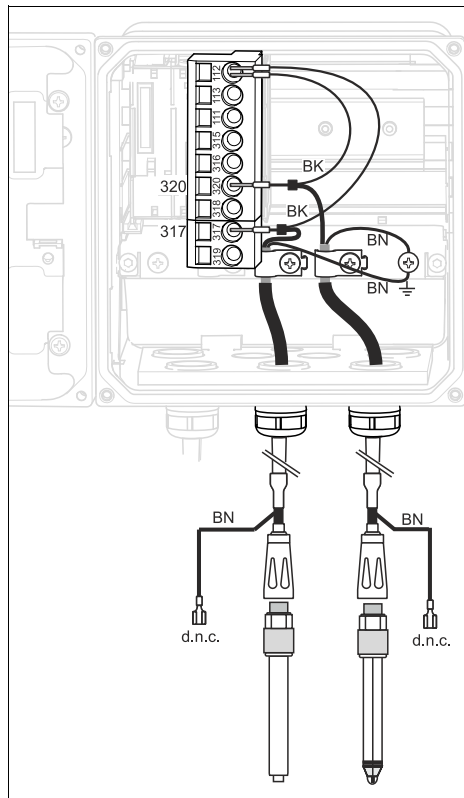
Wiring diagram

**Without PML (asymmetrical)**  
 Pfaunder electrode, absolute  
 Type 03/type 04

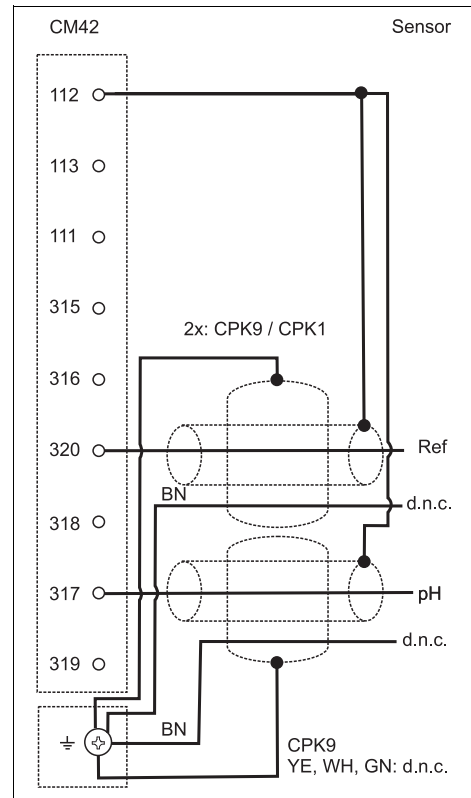


Wiring diagram

Individual electrodes (e.g. CPS64 glass or antimony), without PAL (asymmetrical)

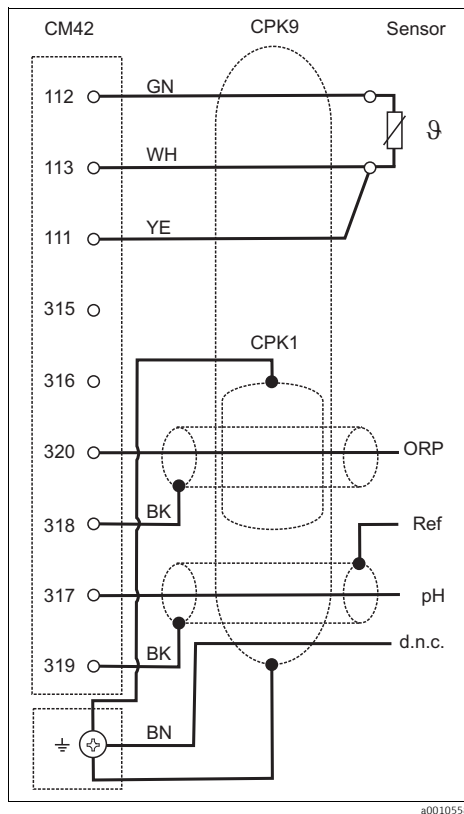


View in device (sensor module)



Wiring diagram

Glass electrode and ORP sensor for rH measurement

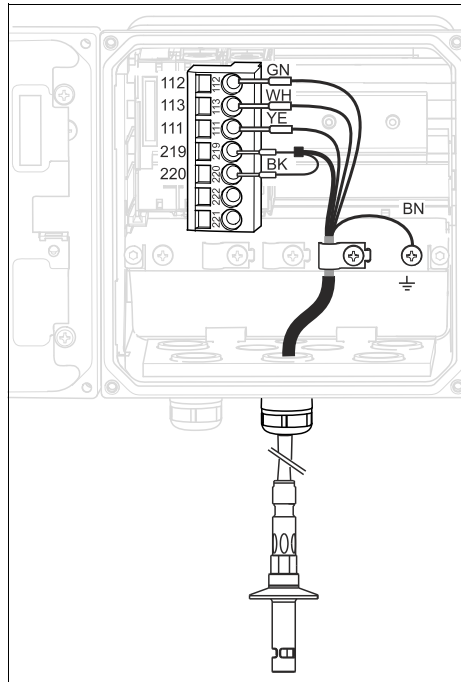


Wiring diagram

**i** For rH measurement, connect a pH combination electrode (e.g. CPS11 with sensor cable CPK9) **and** an ORP sensor (e.g. CPS12 with sensor cable CPK1).

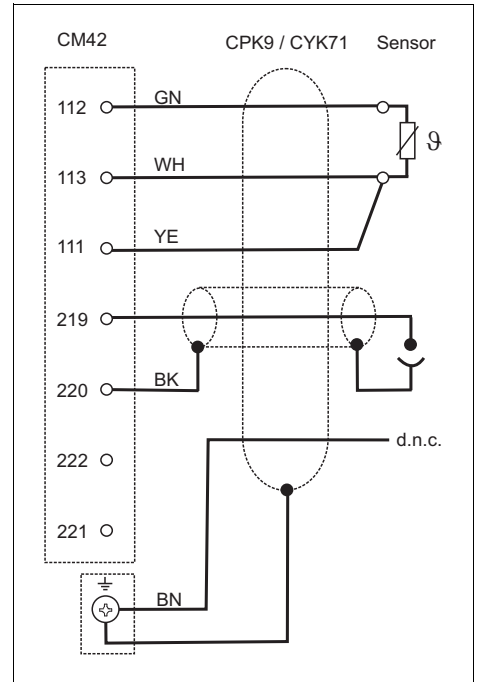
**Sensor connection:  
analog conductivity sensors**

**Conductive sensors, two-electrode sensors**



a0001086

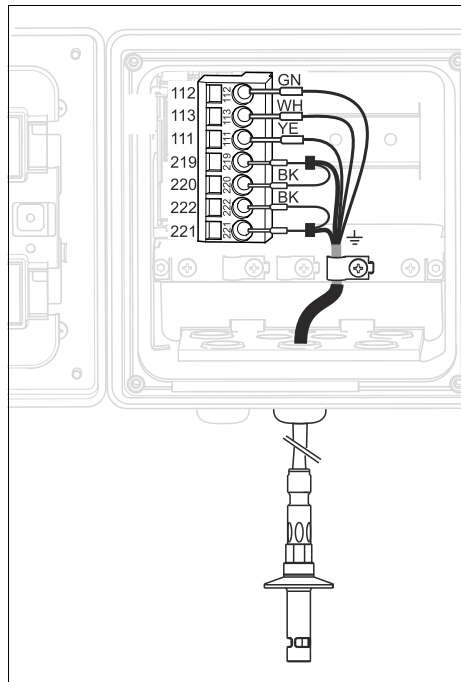
View in device (sensor module)



a0001083

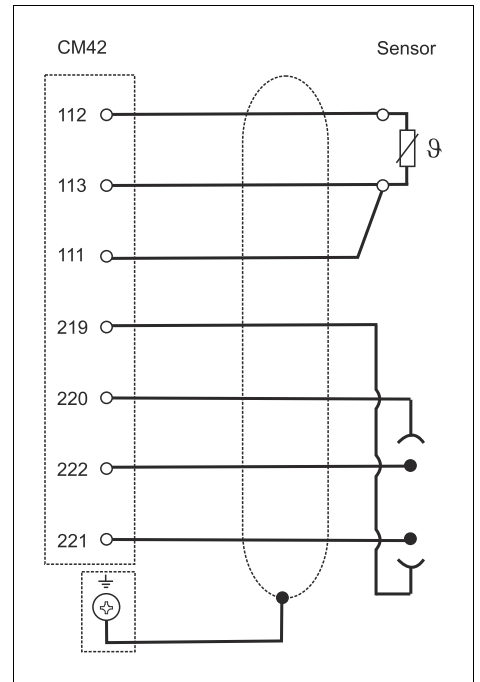
Wiring diagram

**Conductive sensors, four-electrode sensors**



a0002384

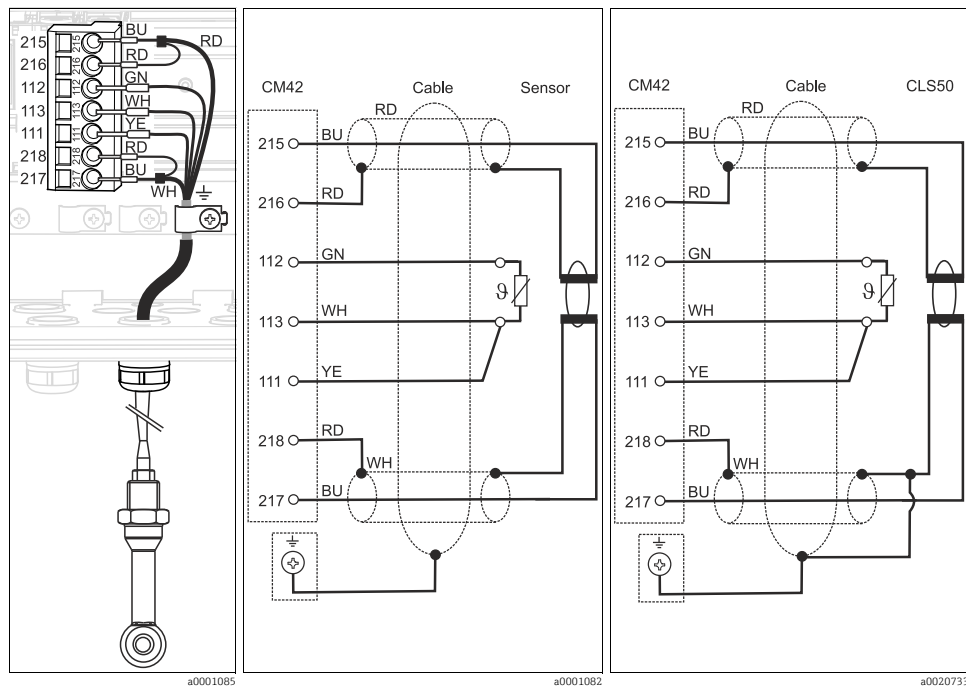
View in device (sensor module)



a0002371

Wiring diagram

**Inductive sensors**



View in device (sensor module)

Wiring diagram CLS52, CLS54

Wiring diagram CLS50



## Performance characteristics

<b>Reference temperature</b>	Standard 25 °C (77 °F) configurable from -5 to 100 °C (23 to 212 °F) <sup>7)</sup>
<b>Current output response time</b>	$t_{90}$ = max. 500 ms for an increase from 4 to 20 mA
<b>Maximum measured error Memosens</b>	Thanks to digital data transmission, the measured value supplied by the sensor at the sensor input is passed on accurately. Measurement accuracy depends solely on the connected sensor and the quality of its adjustment.
<b>Tolerance of current outputs</b>	25 µA, additionally
<b>Repeatability</b>	--> Documentation of the connected sensor

<b>Temperature compensation conductivity</b>	<b>Types of compensation</b>	<b>Range</b>
	None Linear NaCl to IEC 746-3 Natural waters to IEC 7888 Ultrapure water NaCl Ultrapure water HCl (also for NH <sub>3</sub> ) 4 user-definable tables <sup>1)</sup>	$\alpha = 0.00$ to $20.00 \%K^{-1}$ 0 to 100 °C (32 to 212 °F) 0 to 35 °C (32 to 95 °F) 0 to 100 °C (32 to 212 °F) 0 to 60 °C (32 to 140 °F)

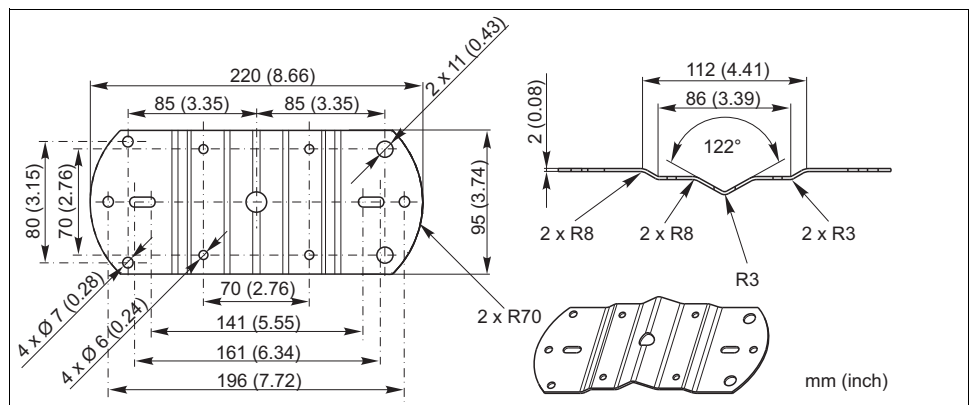
1) with "Advanced" software package

<b>Temperature adjustment</b>	Temperature offset	-5 to +5 °C (23 to 41 °F)
	Temperature increase	0.9 ... 1.1 <sup>1)</sup>

1) with "Advanced" software package

## Installation

### Wall securing plate



Mounting plate

7) with "Advanced" software package

## Weather protection cover

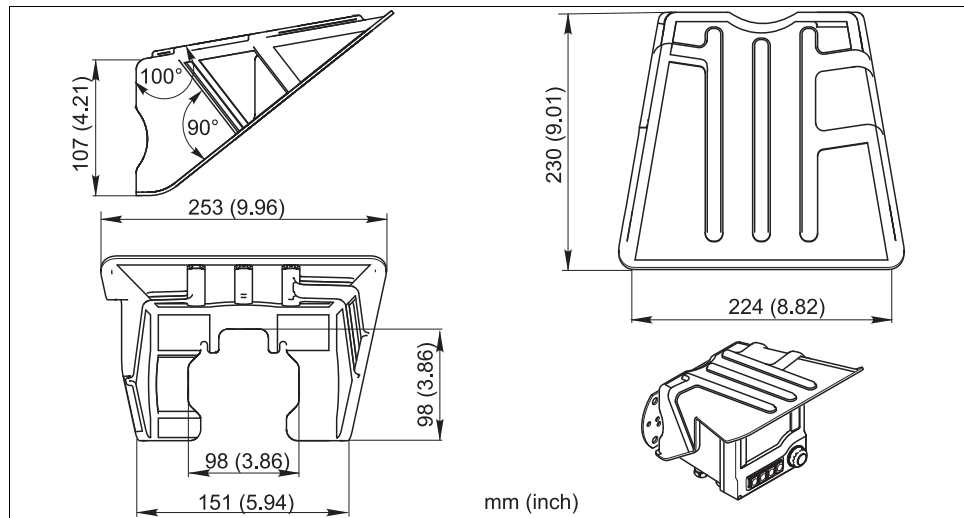
**NOTICE**

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

Impaired operation to complete transmitter failure

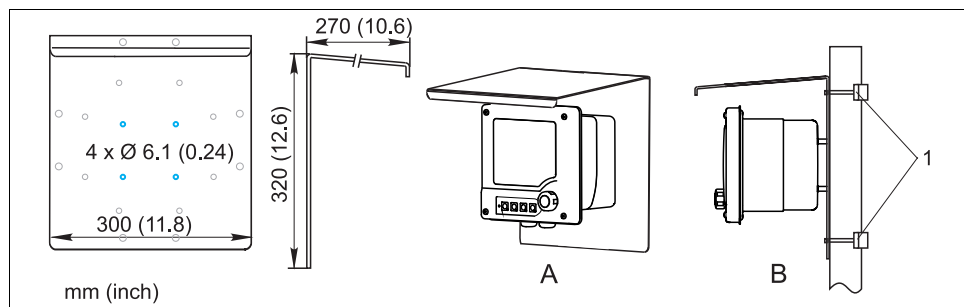
- ▶ When installing outside, always use the weather protection cover (accessory).

## Weather protection cover for plastic housing



Weather protection cover

## Weather protection cover for stainless steel housing

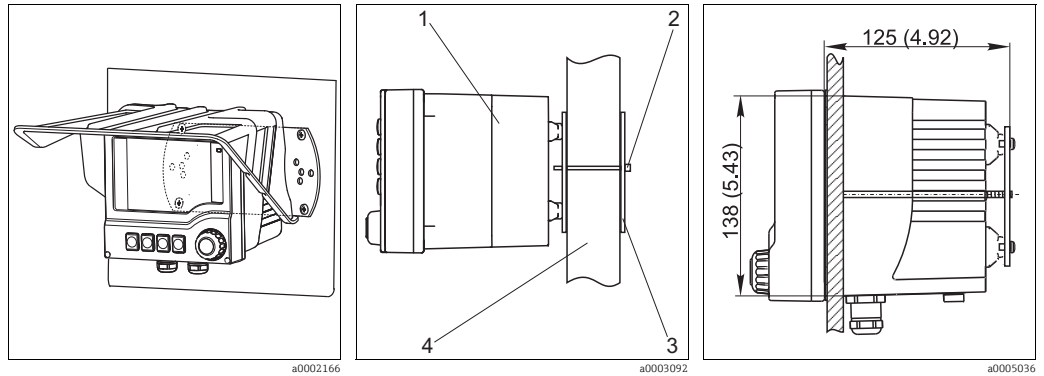


Weather protection cover CYY101

- A Wall mounting  
 B Pipe or circular post mounting  
 1 Circular post fixture (accessory)

- i** To mount the weather protection cover on pipes or round posts, you additionally require a round post mount, --> "Accessories". (or "Installation options")

Installation options



Wall mounting  
- Weather protection cover (optional)

Post mounting  
1 Liquiline  
2, 3 Mounting plate (1x accessory)  
4 Pipe or post (circular/square)

Panel mounting

Wall mounting	Pipe mounting	Panel mounting
---------------	---------------	----------------

Plastic housing

without weather protection cover	Mounting plate Standard	Mounting kit: 51518263	Installation kit: 51518173
with weather protection cover	Protection cover 51517382	Mounting kit: 51518263 Protection cover 51517382	

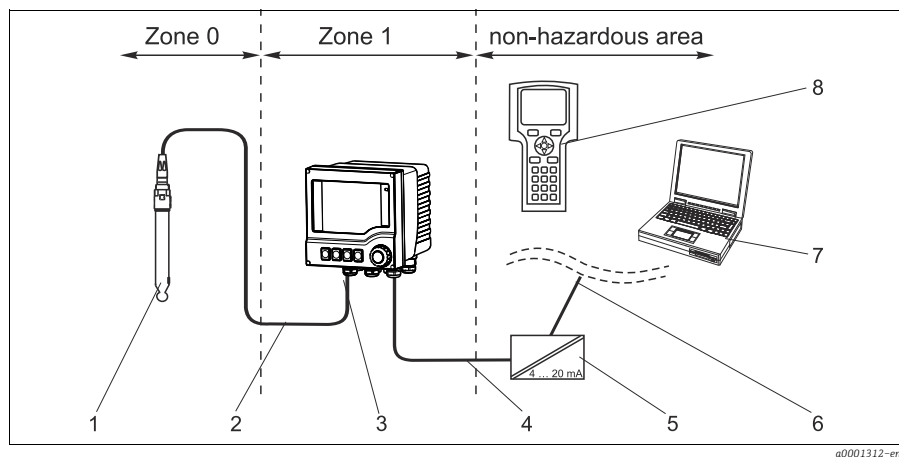
Stainless steel housing

without weather protection cover	Mounting plate Standard	Mounting kit: 51518286	Installation kit: 51518284
with weather protection cover	Protection cover CYY101-A	Protection cover CYY101-A Circular post fixture: 50062121	



Installation in Ex area

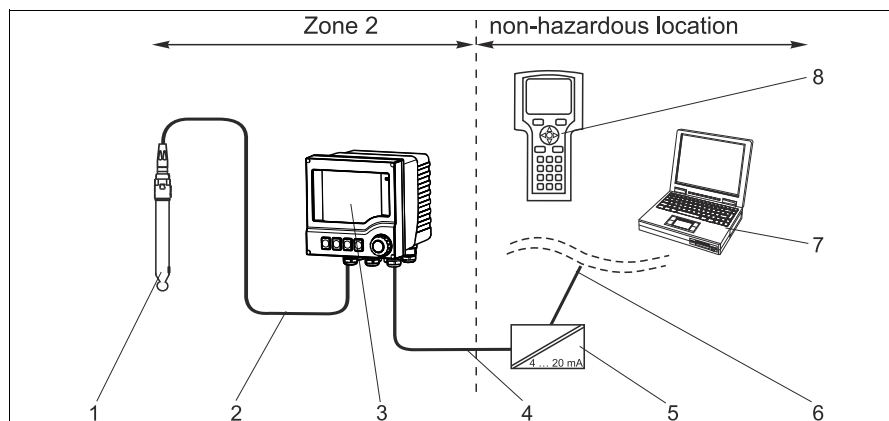
CM42-\*G



Installation in Ex area

- |  |                                      |
|--|--------------------------------------|
| 1 Sensor in Ex version                         | 5 Active barrier, e.g. Preline RN221 |
| 2 Intrinsically safe sensor circuit Ex ia      | 6 Signal line HART/PROFIBUS/FF       |
| 3 Transmitter                                  | 7 Fieldcare via PROFIBUS/FF          |
| 4 Supply and signal circuit Ex ib (4 to 20 mA) | 8 HART handheld terminal             |

## CM42-\*V

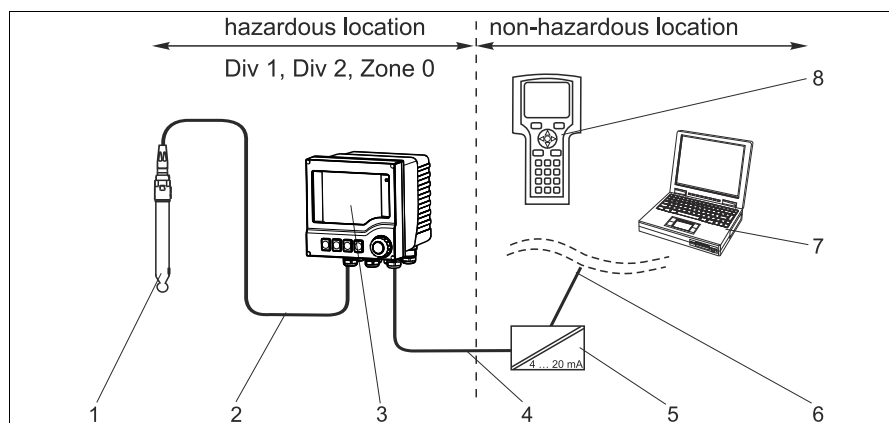


a0014574-en

## Installation in Ex area

- |   |  |   |                                    |
|---|--|---|------------------------------------|
| 1 | Sensor in Ex version                         | 5 | Active barrier, e.g. Preline RN221 |
| 2 | Intrinsically safe sensor circuit Ex ic      | 6 | Signal line HART/PROFIBUS/FF       |
| 3 | Transmitter                                  | 7 | Fieldcare via PROFIBUS/FF          |
| 4 | Supply and signal circuit Ex nA (4 to 20 mA) | 8 | HART handheld terminal             |

## CM42-\*P/S

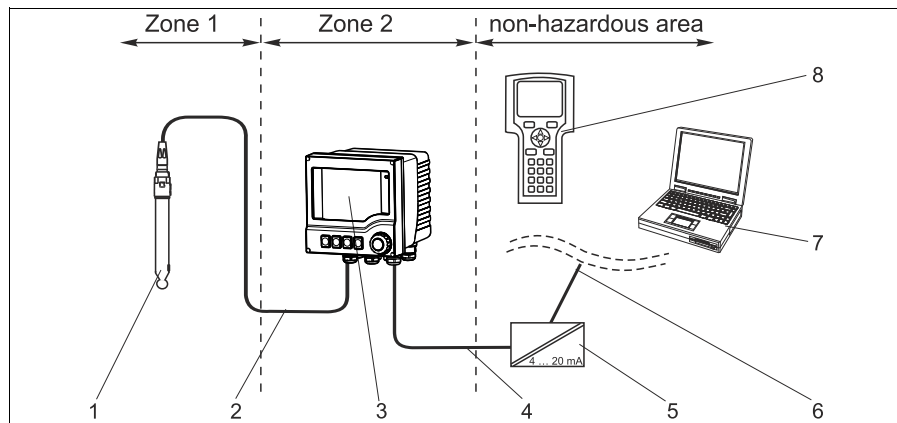


a0014572-en

## Installation in Ex area

- |   |  |   |                                    |
|---|--|---|------------------------------------|
| 1 | Sensor in Ex version                   | 5 | Active barrier, e.g. Preline RN221 |
| 2 | Intrinsically safe sensor circuit      | 6 | Signal line HART/PROFIBUS/FF       |
| 3 | Transmitter                            | 7 | Fieldcare via PROFIBUS/FF          |
| 4 | Supply and signal circuit (4 to 20 mA) | 8 | HART handheld terminal             |

## CM42-\*X/Z

*Installation in Ex area*

- |   |  |   |                                    |
|---|--|---|------------------------------------|
| 1 | Sensor in Ex version                         | 5 | Active barrier, e.g. Preline RN221 |
| 2 | Intrinsically safe sensor circuit Ex ia      | 6 | Signal line HART/PROFIBUS/FF       |
| 3 | Transmitter                                  | 7 | Fieldcare via PROFIBUS/FF          |
| 4 | Supply and signal circuit Ex nA (4 to 20 mA) | 8 | HART handheld terminal             |

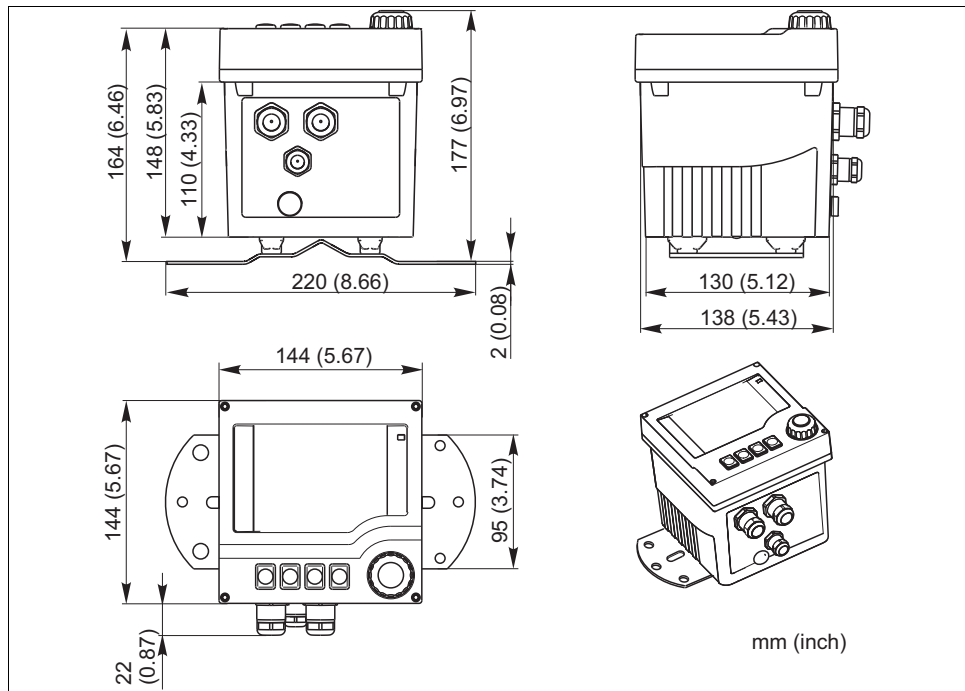
## Environment

<b>Ambient temperature range</b>	<b>Non-Ex version</b>	-30 to 70 °C (-20 to 160 °F)
	<b>Ex version: ATEX II (1)2G</b>	-20 to 50 °C (T6) -20 to 55 °C (T4)
	<b>Ex version: ATEX II 3G</b>	-10 to 50 °C (T6)
	<b>Ex version: FM</b>	-20 to 50 °C (0 to 120 °F) (T6)
	<b>Ex version: CSA</b>	-20 to 50 °C (0 to 120 °F) (T6) -20 to 55 °C (0 to 130 °F) (T4)
<b>Ambient temperature limits</b>		-30 to 80 °C (-20 to 175 °F)
<b>Storage temperature</b>		-40 to 80 °C (-40 to 175 °F) -25 to 85 °C (-13 to 185 °F)
	<b>Electromagnetic compatibility</b>	Interference emission and interference immunity to EN 61326-1: 2004, Category B (residential environments)
<b>Degree of protection</b>	IP66 / IP67 / NEMA 4X	
<b>Relative humidity</b>	10 ... 95%, not condensing	
<b>Pollution degree</b>	The product is suitable for pollution degree 3.	

## Mechanical construction

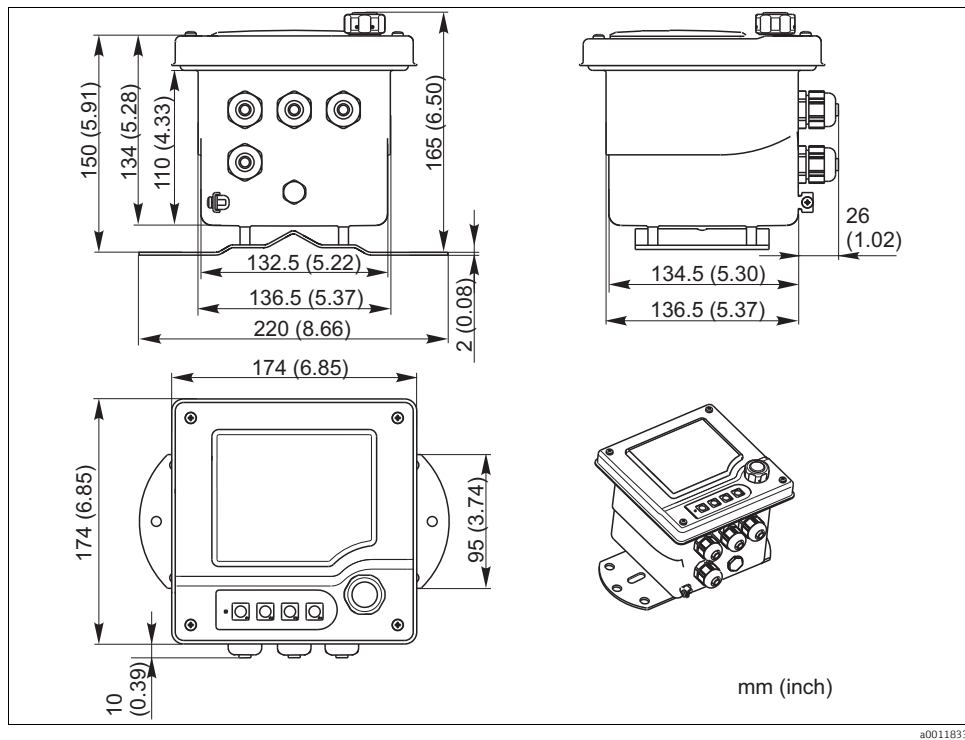
### Dimensions

#### Plastic housing



Dimensions

#### Stainless steel housing



Dimensions

<b>Weight</b>	<b>Plastic housing</b>
	1.5 kg (3.3 lbs)
	<b>Stainless steel housing</b>
	2.1 kg (4.6 lbs)

<b>Material</b>	<b>Plastic housing</b>	
	Housing	PC?FR (polycarbonate, flame-retardant)
	Housing seals	Foamed silicone, EPDM
	<b>Stainless steel housing</b>	
	Housing	Stainless steel 1.4301 (AISI 304)
	Housing seals	EPDM
	<b>Plastic and stainless steel housing</b>	
	Module housing	PC (polycarbonate)
	Soft keys	TPE
	Cable mounting rail	Stainless steel 1.4301 (AISI 304)
	Display panel	PC-FR (polycarbonate, flame-retardant)

## Operability

### Operation concept

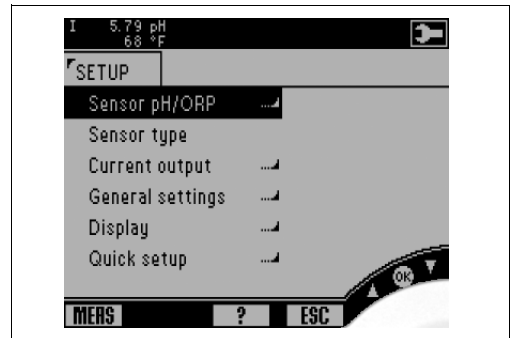
The unique operating concept sets new standards:

- Fewer user errors thanks to very easy operation
- Rapid configuration using the Navigator.
- Intuitive configuration and diagnosis due to plain text display



Navigator

a0001904



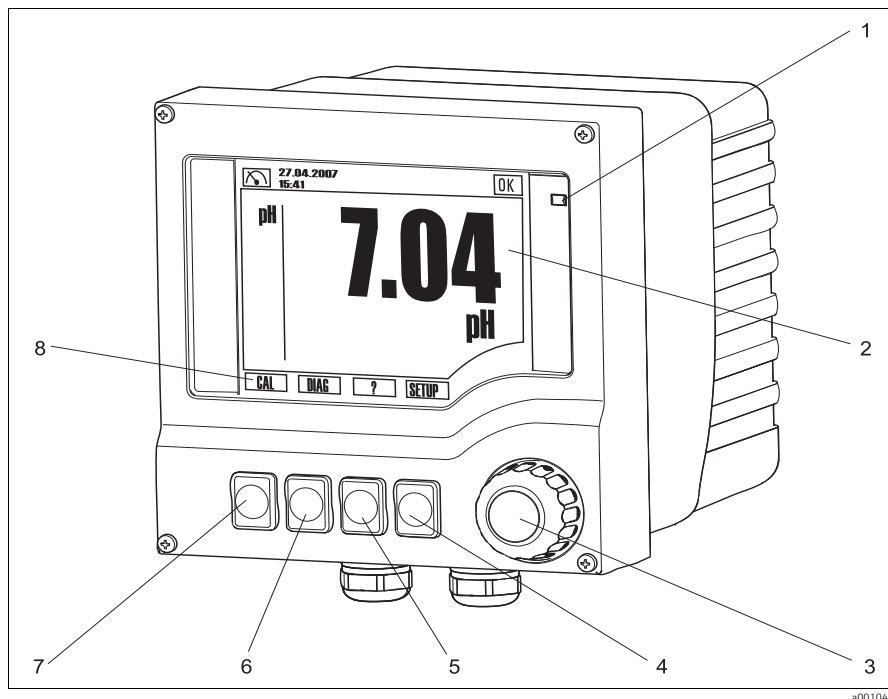
Plain text menu

a0010473

### Display characteristics

LCD display: FSTN technology (FSTN = Foil Super Twisted Nematic)  
 Size: 94 x 76 mm (3.7 x 3.0")  
 Resolution: 240 x 160 dots

Operating elements



Operation overview

- 1 Alarm LED
- 2 Display, current display: pH measuring mode
- 3 Navigator
- 4-7 Softkeys
- 8 Display of softkey function (menu-dependent)

## Ordering information

Product page

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.products.endress.com/cm42](http://www.products.endress.com/cm42)

Product configurator

1. On the right-hand side of the product page, you will find the following selection options:

Product page function
:: Add to product list
:: Price & order information
:: Compare this product
:: Configure this product

2. Click "Configure this product".
3. The Configurator opens in a new window. You can now configure your device, and you will receive the valid and complete order code for it.
4. Now export the order code as a PDF or Excel file. To do so, click the specific button at the top of the page.



**Product structure**

**i** Product structures always reflect the status at time of going to press. You can create an up-to-date and complete order code on the internet using the Configurator.

Sensor input	
A	No module
C	Conductivity, conductive measurement, analog sensor
I	Conductivity, inductive measurement, analog sensor
K	Digital sensor: conductivity, conductive measurement
L	Digital sensor: conductivity, inductive measurement
M	Digital sensor: pH/ORP measurement, glass sensor
N	Digital sensor: pH measurement, ISFET sensor
O	Digital sensor: amperometric oxygen measurement
P	pH (glass/ISFET) or ORP, analog sensor
Approval	
A	Non-hazardous area, CSA GP
G	ATEX II (1)2G Ex ib [ia Ga] IIC T6 Gb / II 3 D tD A22 IP67 T85°C
P	FM IS NI Cl. I, Div. 1&2, Groups A-D
S	CSA IS NI Cl. I, II, III, Div. 1&2, Groups A-G
T	TIIS Ex ib IIC T4
V	ATEX/NEPSI II 3G Ex nA[ic] IIC T6 / II 3 D tD A22 IP67 T85°C
X	ATEX II (2)3G Ex nA[ia] IIC T6 / II 3 D tD A22 IP67 T85°C
Z	NEPSI Ex nA[ia] EC T6
Certificate	
A	Not selected
B	Test certificate to EN 10204, 3.1
C	Test certificate to EN 10204, 3.1, factory calibration certificate
Output	
0	1 current output 4 to 20 mA, HART®
1	2 current outputs 4 to 20 mA, 1x HART®
2	PROFIBUS PA
3	FOUNDATION Fieldbus
4	2 current outputs 4 to 20 mA, SIL
Housing	
0	Plastic housing
1	Housing made of stainless steel 1.4301 (AISI 316L)
Cable entry	
0	M20 x 1.5
1	NPT ½"
2	G½
Software	
EA	Standard version
EB	Advanced version
Device language	
C	Cz/En (Docs, Czech)
D	De/En (Docs, German)
E	En/De (Docs, English)
F	Fr/En (Docs, French)
J	Ja/En (Docs, Japanese)
K	Kr/En (Korean documentation)
L	Pl/En (Docs, Polish)
N	Nl/En (Docs, Dutch)
P	Pt/En (Portuguese documentation)
R	Ru/En (Russian documentation)
S	Es/En (Docs, Spanish)
T	It/En (Docs, Italian)
W	Sv/En (Swedish documentation)
Z	Zh/En (Chinese documentation)
Documentation	
0	Installation and configuration
Additional fittings	
0	Basic version
1	SystemDAT CY42-S1
CM42-	Complete order code

**Optional**

Measuring point identification (Tag), stainless steel 1.4404  
Add a 1 to the end of the order code.

**Scope of delivery**

Depending on the version, the scope of delivery comprises::

- 1 transmitter in the version ordered
- 1 mounting plate incl. 4 flat head screws
- 1 sheet of adhesive labels (nameplate, terminal connection diagrams)
- 1 test certificate to EN 10204-3.1
- 1 factory calibration certificate
- Operating Instructions Part 1 and 2, BA00381C "Commissioning" and BA00382C "Operation" in the language ordered
- 1 CD-ROM with additional documentation
- 1 manufacturer's certificate
- Safety Manual
- Maintenance Documentation SIL 2

**Certificates and approvals****CE-character****Declaration of conformity**


The product meets the requirements of the harmonized European standards.  
It therefore complies with the statutory requirements of the EC directives.  
The manufacturer confirms successful testing of the product by affixing the **CE** symbol.

**Ex approval**

Depending on the version ordered:

- ATEX II (1)2G Ex ib [ia Ga] IIC T6 Gb / II 3 D tD A22 IP67 T85°C
- ATEX II 3G Ex nA[ic] IIC T6 / II 3 D tD A22 IP67 T85°C (applied for)
- ATEX II (2)3G Ex nA[ia] IIC T6 / II 3 D tD A22 IP67 T85°C (applied for)
- NEPSI Ex nA[ia] IIC T6
- NEPSI Ex nA[ic] IIC T6
- CSA IS NI Cl.I, II, III, Div. 1&2, Grps. A-G
- FM IS NI Cl.I, Div. 1&2, Grps. A-D
- TIIS Ex ib IIC T4

## Accessories

 The following is a list of the most important accessories available at the time this documentation was issued. For accessories not listed here, please contact your local service or sales center.

### Mounting kits

Post retainer for plastic housing

- 1 Mounting plate
- 2 Threaded rods  
M5x75 mm A2
- 2 Hexagonal nuts M5 A2, DIN 934
- 2 spring washers A2 DIN127, form B5 (M5)
- 2 Washers A 5.3, DIN125 A2
- Order No. 51518263

Post retainer for stainless steel housing

- 1 Mounting plate
- 2 Threaded rods  
M5x75 mm A2
- 2 Hexagonal nuts M5 A2, DIN 934
- 2 spring washers A2 DIN127, form B5 (M5)
- 2 Washers A 5.3, DIN125 A2
- Order No. 51518286

Panel installation kit for plastic housing for panel cutout 138x138 mm (5.43x5.43 inch)

- 1 Panel installation seal
- 2 Tensioning screws M6x150 mm
- 4 Hexagonal nuts M6, DIN934 A2
- 4 spring washers, A2 DIN127, form B6
- 4 Washers A6.4, DIN125 A2
- Order No. 51518173

Panel installation kit for stainless steel housing for panel cutout 138x138 mm (5.43x5.43 inch)

- 1 Panel installation seal
- 2 Tensioning screws M6x150 mm
- 4 Hexagonal nuts M6, DIN934 A2
- 4 spring washers, A2 DIN127, form B6
- 4 Washers A6.4, DIN125 A2
- Order No. 51518284

### Weather protection cover

Weather protection cover for plastic housing

- Order No. 51517382

Weather protection cover for stainless steel housing

- Order No. CYY101-A

### Active barrier

Active barrier RN221N

- With power supply for safe isolation of 4 to 20 mA standard signal circuits
- Technical Information TI073R/09/EN

## Fieldbus accessories

### HART handheld terminal DXR375

- For communicating with a HART-compatible device via a 4 to 20 mA line
- Order No. DXR375

### Commubox FXA291

- Interface module between CDI and USB PC interface
- Technical Information TI405C/07
- Order No. 51516983

### Fieldbus connection socket

- FOUNDATION Fieldbus M20 7/8" connection
- Order No. 51517974

### M12 connector

- Four-pole metal connector for mounting on transmitter
- For connecting to connection box or cable jack. Cable length 150 mm (5.91").
- Order No. 51502184

### C-module accessories bag

- 1 capacitor for connecting the cable shielding to ground potential
- Kit documentation SD108C/07/A3
- Order No. 71003097

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## Measuring cable

### Memosens data cable CYK10

- For digital sensors with Memosens technology  
pH, ORP, oxygen (amperometric), chlorine, conductivity (conductive)
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cyk10](http://www.products.endress.com/cyk10))
- Technical Information TI00118C/07/EN

### Memosens data cable CYK11

- Extension cable for digital sensors with Memosens protocol
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cyk11](http://www.products.endress.com/cyk11))

### Measuring cable CPK9

- For sensors with ESA plug-in head, for high-temperature and high-pressure applications, IP 68
- Order as per order structure
- Technical Information TI00501C/07/EN

### Special measuring cable CPK12

- For ISFET sensors and pH/ORP glass electrodes with TOP68 plug-in head
- Order as per order structure
- Technical Information TI00118C/07/EN

### Measuring cable CYK71

- non-terminated cable for connecting sensors and for extending sensor cables
- sold by the meter, order numbers:
  - non-Ex version, black: 50085333
  - Ex version, blue: 50085673

### Measuring cable CLK6

- Extension cable for extending CLS50/52/54 and transmitter via VBM junction box, sold by the meter
- Order No. 71183688

## Sensors

### pH/ORP glass sensors

#### Orbisint CPS11/CPS11D

- pH electrode for process engineering
- Optional SIL version for connecting to SIL transmitter
- With dirt-repellent PTFE diaphragm
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps11](http://www.products.endress.com/cps11) or [www.products.endress.com/cps11d](http://www.products.endress.com/cps11d))
- Technical Information TI00028C/07/EN

#### Orbisint CPS12/CPS12D

- ORP electrode for process engineering
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps12](http://www.products.endress.com/cps12) oder [www.products.endress.com/cps12d](http://www.products.endress.com/cps12d))
- With dirt-repellent PTFE diaphragm
- Technical Information TI00367C/07/EN

#### Ceraliquid CPS41/CPS41D

- pH electrode with ceramic diaphragm and KCl liquid electrolyte;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps41](http://www.products.endress.com/cps41) or [www.products.endress.com/cps41d](http://www.products.endress.com/cps41d))
- Technical Information TI00079C/07/EN

#### Ceraliquid CPS42/CPS42D

- Redox electrode with ceramic diaphragm and KCl liquid electrolyte;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps42](http://www.products.endress.com/cps42) or [www.products.endress.com/cps42d](http://www.products.endress.com/cps42d))
- Technical Information TI00373C/07/EN

#### Ceragel CPS71/CPS71D

- pH electrode with double-chamber reference system and integrated bridge electrolyte;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps71](http://www.products.endress.com/cps71) or [www.products.endress.com/cps71d](http://www.products.endress.com/cps71d))
- Technical Information TI00245C/07/EN

#### Ceragel CPS72/CPS72D

- ORP electrode with double-chamber reference system and integrated bridge electrolyte;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps72](http://www.products.endress.com/cps72) or [www.products.endress.com/cps72d](http://www.products.endress.com/cps72d))
- Technical Information TI00374C/07/EN

#### Orbipore CPS91/CPS91D

- pH electrode with open aperture diaphragm for media with high contamination potential;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps91](http://www.products.endress.com/cps91) or [www.products.endress.com/cps91d](http://www.products.endress.com/cps91d))
- Technical Information TI00375C/07/EN

#### Orbipore CPS92/CPS92D

- ORP electrode with open aperture diaphragm for media with high contamination potential;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps92](http://www.products.endress.com/cps92) or [www.products.endress.com/cps92d](http://www.products.endress.com/cps92d))
- Technical Information TI00435C/07/EN

### pH/ORP combined sensors

#### Memosens CPS16D

- pH ORP combined sensor for process engineering, with dirt-repellent PTFE diaphragm
- With Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps16d](http://www.products.endress.com/cps16d))
- Technical Information TI00503C/07/EN

#### Memosens CPS76D

- pH ORP combined sensor for process engineering, hygiene and sterile applications
- With Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps76d](http://www.products.endress.com/cps76d))
- Technical Information TI00506C/07/EN

#### Memosens CPS96D

- pH and ORP combined sensor for chemical processes
- With poison-resistant reference with ion trap
- With Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps96d](http://www.products.endress.com/cps96d))
- Technical Information TI00507C/07/EN

#### pH/ISFET sensors

##### Tophit CPS471/CPS471D

- Sterilizable and autoclavable ISFET sensor for food and pharmaceuticals, process engineering, water treatment and biotechnology;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps471](http://www.products.endress.com/cps471) or [www.products.endress.com/cps471d](http://www.products.endress.com/cps471d))
- Technical Information TI00283C/07/EN

##### Tophit CPS441/CPS441D

- Sterilizable ISFET sensor for media with low conductivity, with liquid KCl electrolyte;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps441](http://www.products.endress.com/cps441) or [www.products.endress.com/cps441d](http://www.products.endress.com/cps441d))
- Technical Information TI00352C/07/EN

##### Tophit CPS491/CPS491D

- ISFET sensor with open aperture diaphragm for media with high contamination potential;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps491](http://www.products.endress.com/cps491) or [www.products.endress.com/cps491d](http://www.products.endress.com/cps491d))
- Technical Information TI00377C/07/EN

#### Enamel pH electrode

##### Ceramax CPS341D

- pH electrode with pH-sensitive enamel
- For the toughest requirements in terms of measurement accuracy, pressure, temperature, sterility and operating life
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cps341d](http://www.products.endress.com/cps341d))
- Technical Information TI00468C/07/EN

#### Inductive conductivity sensors

##### Indumax P CLS50/CLS50D

- Highly-resistant inductive conductivity sensor for standard, Ex and high-temperature applications
- With or without Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cls50d](http://www.products.endress.com/cls50d) or [www.products.endress.com/cls50](http://www.products.endress.com/cls50))
- Technical Information TI00182C/07/EN

##### Indumax H CLS52

- Inductive conductivity sensor with fast-acting temperature sensor for applications in the food industry
- Order as product structure (--> Online Configurator, [www.products.endress.com/cls52](http://www.products.endress.com/cls52))
- Technical Information TI00167C/07/EN

##### Indumax H CLS54D

- Inductive conductivity sensor with certified, hygienic design for foodstuffs, beverages, pharmaceuticals and biotechnology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cls54d](http://www.products.endress.com/cls54d))
- Technical Information TI00508C/07/EN

##### Indumax H CLS54

- Inductive conductivity sensor with certified, hygienic design for foodstuffs, beverages, pharmaceuticals and biotechnology
- Order as product structure (--> Online Configurator, [www.products.endress.com/cls54](http://www.products.endress.com/cls54))
- Technical Information TI00400C/07/EN

### Conductive conductivity sensors

#### Condumax W CLS12

- For process temperatures up to 160 °C (320 °F) and process pressures up to 40 bar (580 psi)
- Order as product structure (--> Online Configurator, [www.products.endress.com/cls12](http://www.products.endress.com/cls12))
- Technical Information TI00082C/07/EN

#### Condumax W CLS13

- For process temperatures up to 250 °C (480 °F) and process pressures up to 40 bar (580 psi)
- Order as product structure (--> Online Configurator, [www.products.endress.com/cls13](http://www.products.endress.com/cls13))
- Technical Information TI00083C/07/EN

#### Condumax CLS15/CLS15D

- Conductive conductivity sensor for pure and ultrapure water and Ex applications
- With Memosens protocol (CLS15D) or analog (CLS15)
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cls15d](http://www.products.endress.com/cls15d))
- Technical Information TI00109C/07/EN

#### Condumax H CLS16/CLS16D

- Hygienic, conductive conductivity sensor for pure, ultrapure water and Ex applications
- With EHEDG and 3A approval
- Optionally available with Memosens (CLS16D)
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cls16d](http://www.products.endress.com/cls16d))
- Technical Information TI00227C/07/EN

#### Condumax W CLS19

- Inexpensive, conductive conductivity sensor for pure and ultrapure water applications;
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cls19](http://www.products.endress.com/cls19))
- Technical Information TI00110C/07/EN

#### Condumax W CLS21/CLS21D

- Two-electrode sensor in version with plug-in head and fixed cable
- Optionally available with Memosens (CLS21D)
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cls21d](http://www.products.endress.com/cls21d))
- Technical Information TI00085C/07/EN

### Amperometric oxygen sensors

#### Oxymax COS22D

- Sterilizable sensor for dissolved oxygen
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cos22d](http://www.products.endress.com/cos22d))
- Technical Information TI00446C/07/EN

#### Oxymax COS51D

- Amperometric sensor for dissolved oxygen, with Memosens technology
- Order as per product structure (--> Online Configurator, [www.products.endress.com/cos51d](http://www.products.endress.com/cos51d))
- Technical Information TI00413C/07/EN

### Software update and upgrade

#### CY42 DAT module

- Function upgrade, update and memory module
- Ordering as per order structure

Version	
S1	SystemDAT, for software update, changeover to other parameters, language catalog extension
F1	FunctionDAT for extending the function to 2 current outputs
F2	FunctionDAT for extending the function to advanced software
C1	CopyDAT, for saving the configuration and transferring it to other devices
CY42-	Complete order code

[www.addresses.endress.com](http://www.addresses.endress.com)

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