

# Technical Information

## Liquiline CM442/CM444/CM448

Multiparameter transmitter with a maximum of eight measuring channels based on digital Memosens technology



Extensible multiparameter controller for monitoring and controlling processes in industry and the environmental sector

### Application

- Possible to connect up to 8 Memosens sensors
- Mathematic functions calculate new measured values
- Max. 8 analog outputs 0/4 to 20 mA
- Digital fieldbuses (HART, PROFIBUS, Modbus) and integrated web server
- Cleaning function, controller and alarm relay can be selected
- Optional digital inputs/outputs or current inputs for signal transmission from other devices

The rugged non-Ex plastic version is tailored to:

- Water and wastewater
- Power stations
- Chemical industry
- Other industrial applications

### Your benefits

- Maximum process safety thanks to:
  - Simple and transparent menu guidance via graphic display
  - Standardized operating concept for all the devices of the Liquiline, sampler and analyzer platform
- Fast commissioning thanks to:
  - Memosens: use of lab-calibrated sensors thanks to hot plug-and-play capabilities
  - Preconfigured Liquiline transmitter
  - Easy to expand and adapt system to meet new requirements
- Minimum inventory:
  - Cross-platform, modular concept (e.g. identical modules irrespective of parameters)
  - Fieldcare + W@M: effective asset management possible

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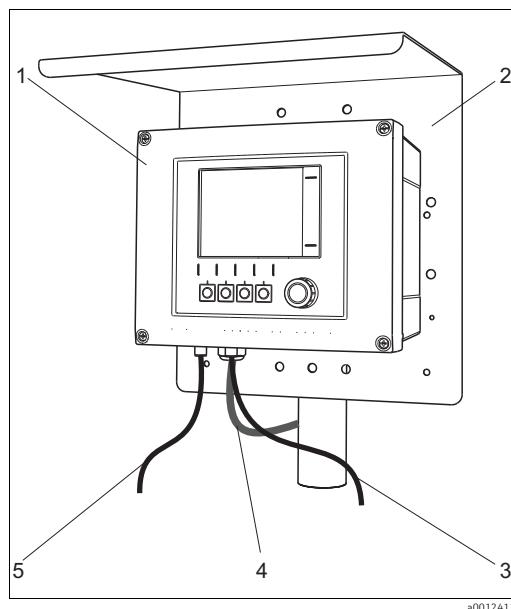
## Function and system design

### Measuring system

The following overview shows examples of the design and layout of a measuring system. Other sensors and assemblies can be ordered for conditions specific to your application (→ [www.endress.com/products](http://www.endress.com/products)).

#### Measuring point

- A complete measuring system consists of:
- Liquiline transmitter
  - Sensors with Memosens technology
  - Assemblies to suit the sensors used
  - Post or rail mounting (optional)
  - Weather protection cover (optional)



Measuring system (e.g. two-channel device)

- 1 Liquiline
- 2 Weather protection cover CYY101 (optional)
- 3, 5 Sensor cable CYK10 or fixed cable (digital fixed cable sensors with Memosens protocol)
- 4 Power supply cable (to be provided by the customer, not part of the scope of supply)

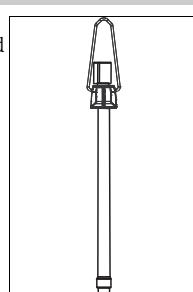
#### Nitrate and SAC

Nitrate in wastewater

- Sensor CAS51D-\*\*A2 with fixed cable
- Assembly CYA112
- Holder CYH112

SAC in wastewater treatment

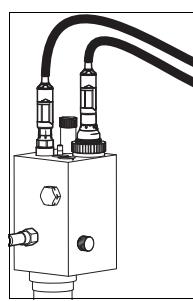
- Sensor CAS51D-\*\*2C2 with fixed cable
- Assembly CYA112
- Holder CYH112



#### Chlorine

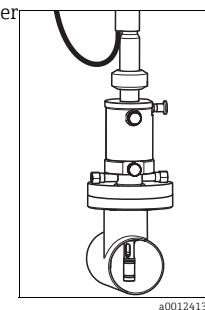
Chlorine (and pH) in drinking water

- Sensor CCS142D
- Sensor CPS11D
- Measuring cable CYK10
- Flow assembly CCA250



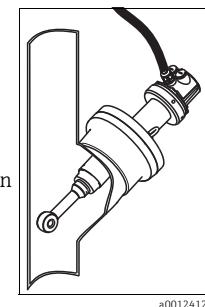
#### pH value or ORP

- pH measurement in drinking water
- Retractable assembly Cleanfit CPA471
  - Sensor Orbisint CPS11D
  - Measuring cable CYK10
  - > graphic



ORP in drinking water

- Immersion assembly Dipfit CYA112
- Sensor Orbisint CPS12D
- Measuring cable CYK10



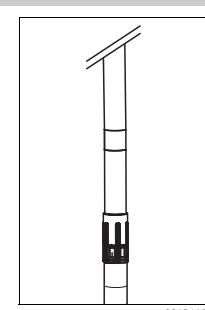
#### Conductivity

Inductively meas. conductivity in wastewater treatment

- Immersion assembly Dipfit CLA111
- Sensor Indumax CLS50D with fixed cable

Conductively meas. conductivity in power plant cooling water

- Immersion assembly Dipfit CLA111
- Sensor Condumax CLS15D

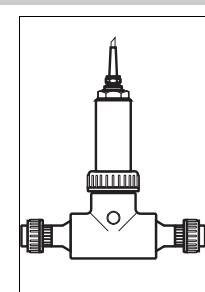


#### Oxygen

Oxygen in aeration basins

- Immersion assembly CYA112
- Holder CYH112
- Sensor
  - COS61D (optical) with fixed cable,
  - COS51D (amperometric) cable CYK10

Figure: CYA112 with COS61D



#### Turbidity and interface

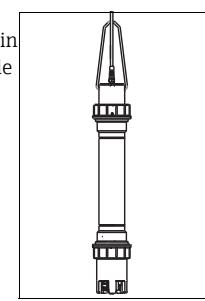
Turbidity in industrial water

- Sensor Turbimax CUS51D with fixed cable
- Assembly Flowfit CUA250
- Spray head CUR3 (optional)

Interface in the primary clarifier

- Sensor Turbimax CUS71D
- Assembly CYA112
- Holder CYH112

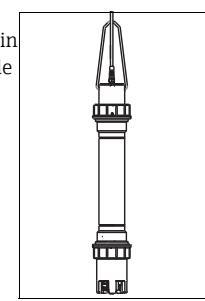
Figure: CUA250 with CUS51D



#### Ion selective electrodes

Ammonium and nitrate measurement in the aeration basin

- Sensor CAS40D with fixed cable
- Holder CYH112

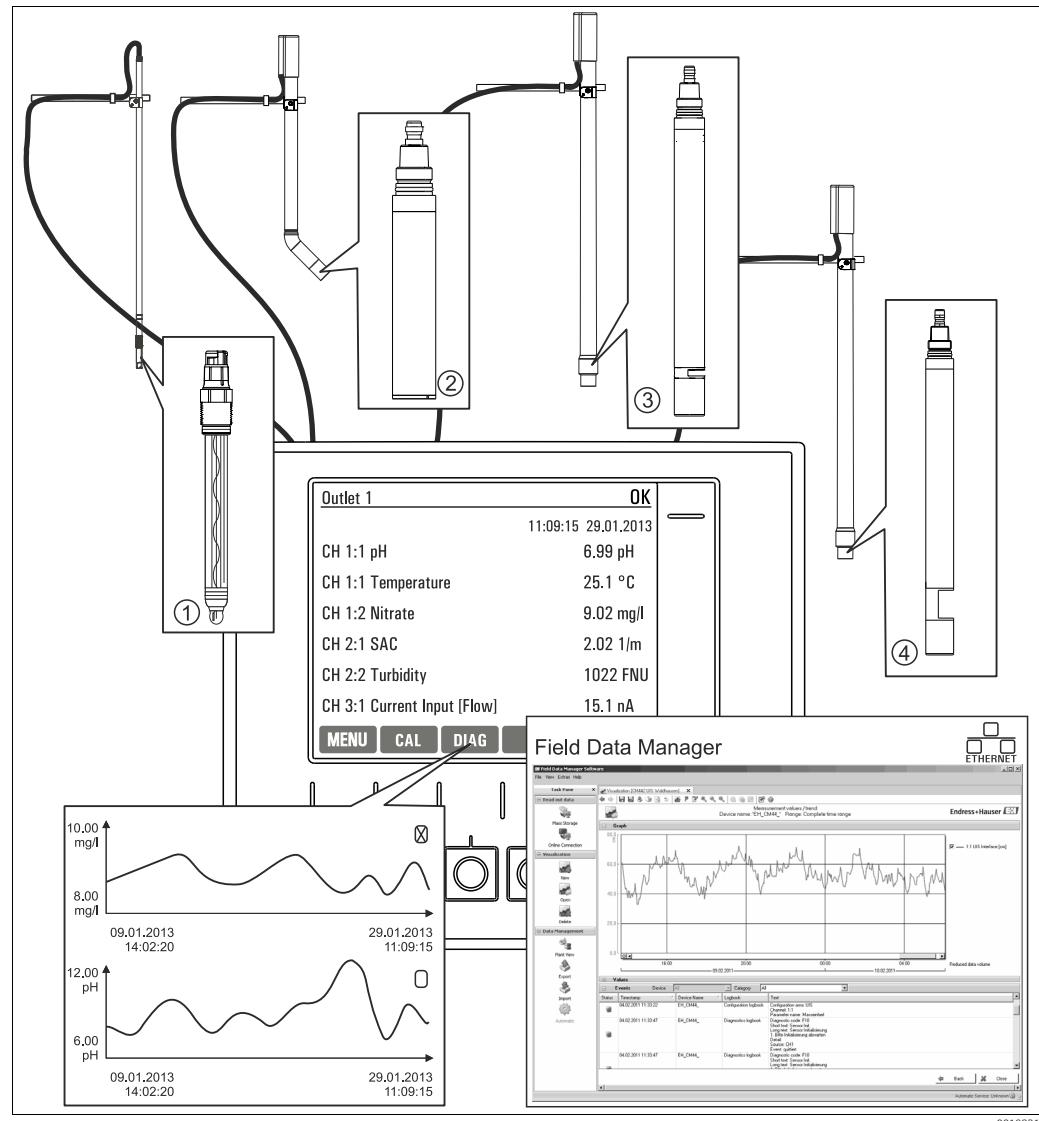


If mounting outdoors, always use the weather protection cover (see "Accessories") to protect the transmitter against weather conditions.

### Application example

#### Measuring point at wastewater treatment plant outlet (open channel)

- Transmitter CM444-AAM44A0FF with:
  - 4x Memosens, Modbus TCP, 4x relay for cleaning/limit value, 2x analog current input
  - pH and temperature with CPS11D, item 1, ([www.products.endress.com/cps11d](http://www.products.endress.com/cps11d))
  - Turbidity with CUS51D, item 2, ([www.products.endress.com/cus51d](http://www.products.endress.com/cus51d))
  - Nitrate with CAS51D, item 3, ([www.products.endress.com/cas51d](http://www.products.endress.com/cas51d))
  - Spectral absorption coefficient with CAS51D, item 4, ([www.products.endress.com/cas51d](http://www.products.endress.com/cas51d))
  - Flow from external measurement via current input
  - Assembly holder CYH112 with assemblies CYA112 ([www.products.endress.com/cyh112](http://www.products.endress.com/cyh112))



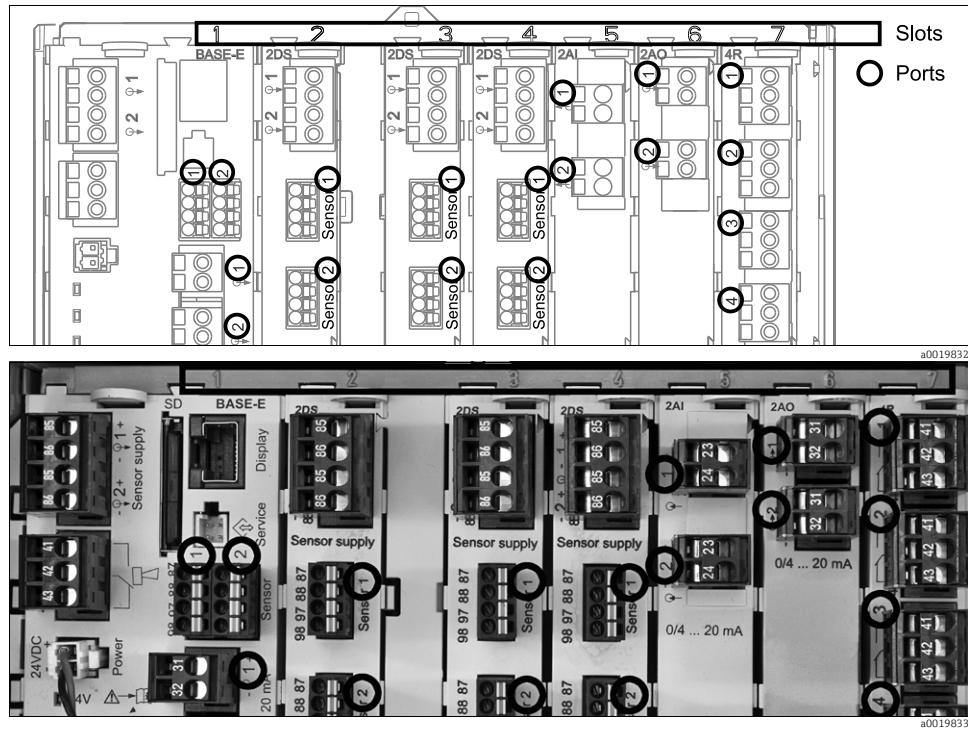
Measuring point at wastewater treatment plant outlet

#### Data retention

- Storage of all measured values, incl. values of external sources, in the non-volatile memory (data logbook)
- Data called up on site via user-defined measuring menu and load curve display of the data logbook
- Transmission of data by ethernet and storage in a tamper-proof database (Field Data Manager)
- Data export to csv file (for Microsoft Excel)

## Equipment architecture

### Slot and port assignment



Slot and port assignment of the hardware modules

| Outlet 1                |                 | OK          |
|-------------------------|-----------------|-------------|
| CH1: 1:1 pH Glass       | ATC 6.95 pH     | Port        |
| CH2: 1:2 TU/TS          | 500.0 g/l       | Slot        |
| CH3: 5:1 SAC            | 500.0 1/m       |             |
| CH4: 5:2 Cond i         | ATC 2.62 mS/cm  |             |
| CH5: 6:1 Chlorine       | 28.33 mg/l      |             |
| CH6: 6:2 Redox          | ± 51 mV         |             |
| CH7: 7:1 Oxygen (am...) | 32.86 mg/l      |             |
| CH8: 7:2 Cond c         | ATC 131.1 µS/cm |             |
| <b>MENU</b>             | <b>CAL</b>      | <b>DIAG</b> |
|                         |                 | <b>HOLD</b> |

- Inputs are assigned to measuring channels in the ascending order of the slots and ports.  
Adjacent example:  
"CH1: 1:1 pH glass" means:  
Channel 1 (CH1) is slot 1 (basic module) : Port 1 (input 1), pH glass sensor
- Outputs and relays are named according to their function, e.g. "current output", and are displayed with the slot and port numbers in ascending order

Slot and port assignment on the display

### Order of the modules

Depending on the version ordered, the device is supplied with a number of electronic modules, which are assigned in a specific sequence in ascending order to slots 0 to 7.

If you do not have a particular module, the next moves up automatically:

- The basic module (which is always present) always occupies slots 0 and 1
- Fieldbus module 485
- Memosens input module 2DS (DS = digital sensor)
- Extension module for digital inputs and outputs DIO (DIO = digital input and output)
- Current input module 2AI (AI = analog input)
- Current output module 4AO or 2AO (AO = analog output)
- Relay modules AOR, 4R or 2R (AOR = analog output + relay, R = relay)

**i** Modules with 4 ports are connected before modules of the same type with 2 ports.

### Basic rule for hardware upgrades

**i** Please note the following if upgrading the device:

The sum of all current inputs and outputs may not exceed 8!

## Determining the hardware delivery status

You must be aware of the type of modules and the number of them supplied with the device you have ordered to determine the delivery status of your Liquiline.

- Basic module
    - One basic module in all versions. Always occupies slots 0 and 1.
  - Fieldbus module
    - Optional, and only one fieldbus module is possible.
  - Input modules
    - Must be clearly assigned to the number of optional inputs ordered.
    - Examples:
      - 2 current inputs = module 2AI
      - 4 Memosens inputs = 2 inputs with basic module + module 2DS with 2 further inputs
  - Current outputs and relays
    - Various module combinations can exist.
- The following table will help you find out which modules you get depending on the type and number of outputs.

| Current outputs | Relay             |                            |                            |
|-----------------|-------------------|----------------------------|----------------------------|
|                 | 0                 | 2                          | 4                          |
| 2               | -                 | 1 x 2R                     | 1 x 4R                     |
| 4               | 1 x 2AO           | 1 x AOR                    | 1 x 2AO + 1 x 4R           |
| 6               | 1 x 4AO           | 1 x 4AO + 1 x 2R           | 1 x 4AO + 1 x 4R           |
| 8               | 1 x 4AO + 1 x 2AO | 1 x 4AO + 1 x 2AO + 1 x 2R | 1 x 4AO + 1 x 2AO + 1 x 4R |

- ▶ Sum up the number of modules and sort them according to the specified sequence.
- ↳ This will give you the slot assignment for your device.

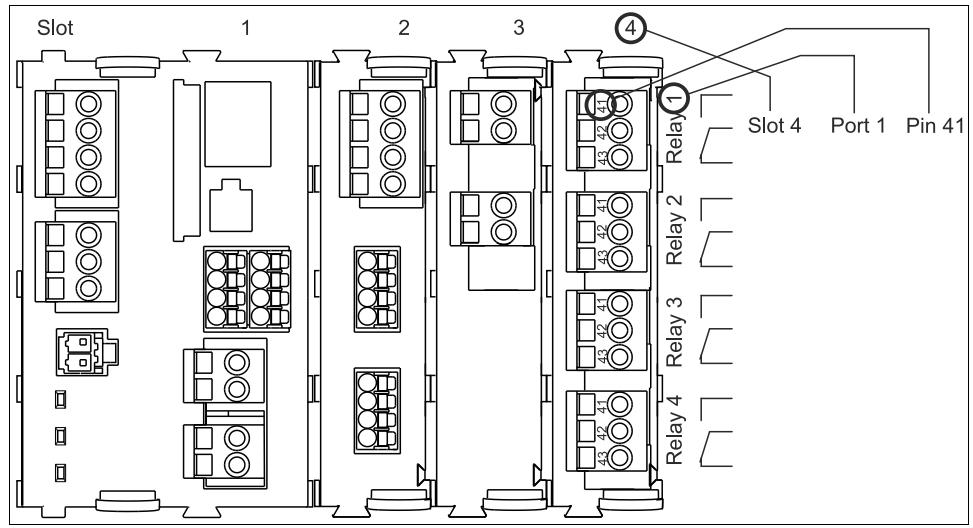
## Terminal diagram

**i** The unique terminal name is derived from the following:  
Slot no. : Port no. : Terminal

### Example, NO contact of a relay:

Device with 4 inputs for digital sensors, 4 current outputs and 4 relays

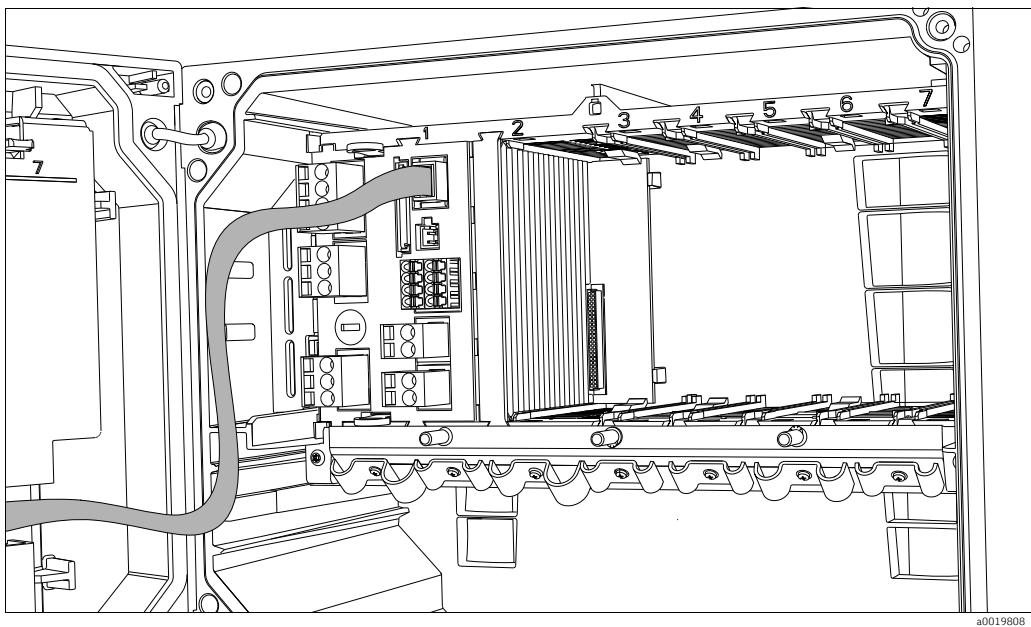
- Basic module BASE-E (contains 2 sensor inputs, 2 current outputs)
- Module 2DS (2 sensor inputs)
- Module 2AO (2 current outputs)
- Module 4R (4 relays)



Creating a terminal diagram using the example of the NO contact (terminal 41) of a relay

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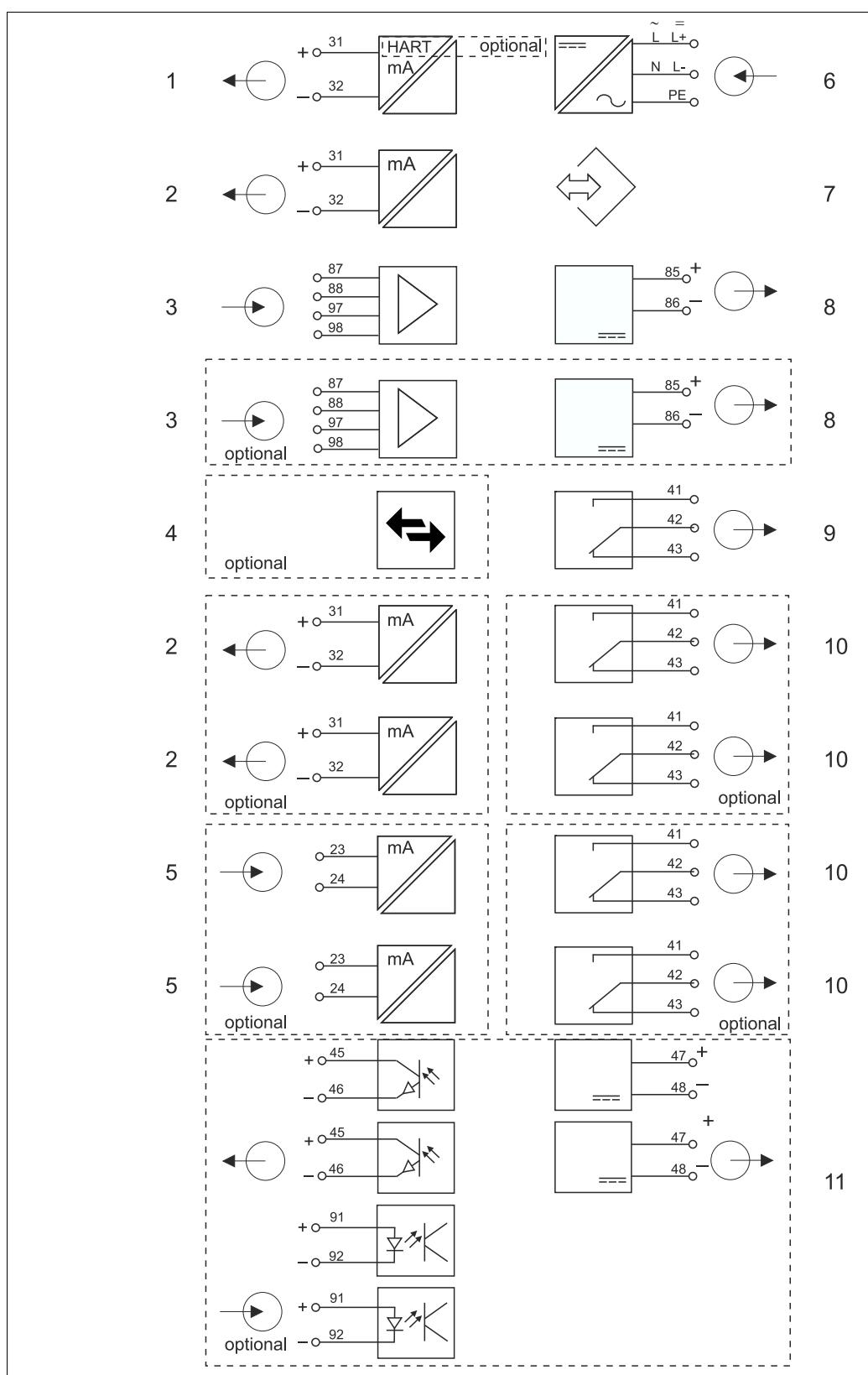
Device configuration using  
the example of a CM442-  
**\*\*M2A1F0\***



CM442-\*\*M1A1F0\*

|   |   |
|---|---|
| <b>Ordered basic device (example)</b>                                 | <ul style="list-style-type: none"> <li>▪ Order code CM442-**M1A1F0*</li> <li>▪ Functionality: 1 x Memosens, 2 current outputs without HART, no extension module</li> </ul>  |
| <b>Extension options without additional modules</b>                   | <ul style="list-style-type: none"> <li>▪ Second Memosens input (71114663)</li> <li>▪ HART with activation code (71128428)</li> </ul>  |
| <b>Extension options by using an extension module in free slot 2</b>  | <ul style="list-style-type: none"> <li>▪ Ethernet/PROFIBUS DP/Modbus with module 485 <b>incl.</b> activation code for the desired communication type: <ul style="list-style-type: none"> <li>- PROFIBUS DP (71140888)</li> <li>- Modbus RS485 (71140889)</li> <li>- Modbus TCP (71140890)</li> <li>- Only Ethernet without fieldbus (71135634)</li> </ul> If fieldbus communication is subsequently required, an activation code is needed for this. </li> <li>▪ Additional inputs or outputs, relays: <ul style="list-style-type: none"> <li>- Module 2AI (71135639): 2 current inputs</li> <li>- Module 2AO (71135632): 2 current outputs</li> <li>- Module AOR (71111053): 2 current outputs, 2 relays</li> <li>- Module 2R (71125375) or 4R (71125376): 2 or 4 relays</li> <li>- Module DIO (71135638): 2 digital inputs and 2 digital outputs</li> </ul> </li> </ul> |
| <b>Device upgrade to CM444 or CM448</b>                               | <ul style="list-style-type: none"> <li>▪ Upgrade kit 71135644 (100 to 230 V AC) or 71211434 (24 V DC) <ul style="list-style-type: none"> <li>- Extension power supply unit and backplane</li> <li>- Basic module BASE-E</li> <li>- 6 slots for extension modules</li> </ul> </li> <li>▪ Extension options: <ul style="list-style-type: none"> <li>- Additional functionality like CM442</li> <li>- Up to 8 measuring channels by using an appropriate number of Memosens input modules 2DS (71135631)</li> </ul> </li> </ul>  |
| <b>Basic rule for extensions</b>                                      | The sum of all current inputs and outputs may not exceed 8!   |
| <b>Restrictions if using CUS71D sensors for interface measurement</b> | <ul style="list-style-type: none"> <li>▪ CM442: <ul style="list-style-type: none"> <li>Only one CUS71D can be connected. The second Memosens input may not be used.</li> </ul> </li> <li>▪ If extending to CM444: <ul style="list-style-type: none"> <li>Every combination of CUS71D or other sensors is possible. All Memosens inputs (max. 4) can be used.</li> </ul> </li> <li>▪ An extension to CM448 is <b>not advisable</b> as the maximum number of Memosens inputs remains limited to 4.</li> </ul>   |
| <b>Product Configurator</b>   | <a href="http://www.products.endress.com/cm442">www.products.endress.com/cm442</a>  |

## Function diagram CM442

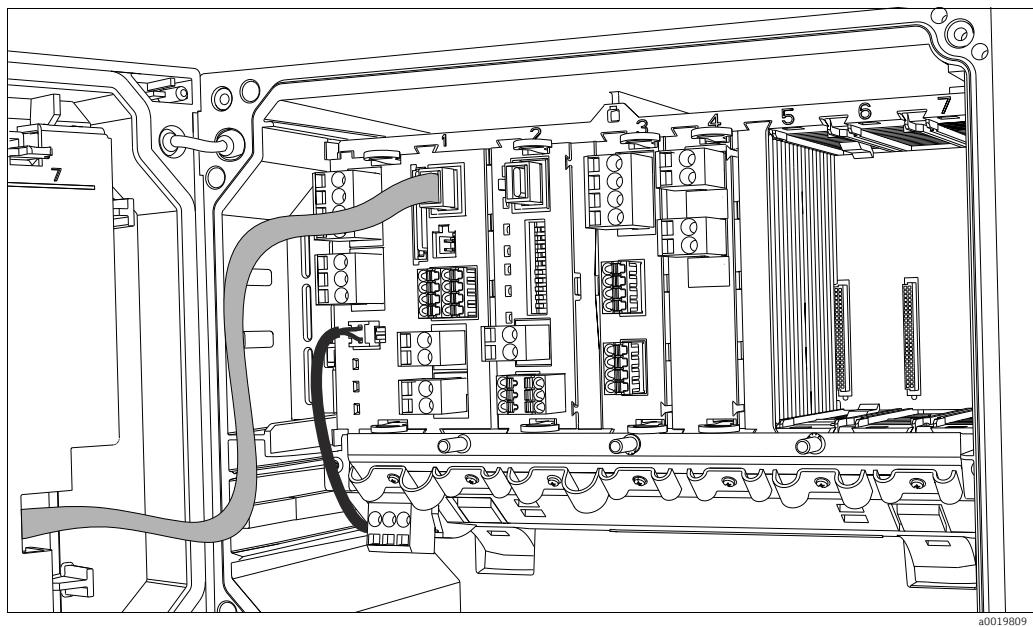


Function diagram CM442

|   |  |    |   |
|---|--|----|---|
| 1 | Current output 1:1, + HART (optional)  | 6  | Power supply                            |
| 2 | Current outputs (2 x optional)         | 7  | Service interface                       |
| 3 | 2 x Memosens input (1 x optional)      | 8  | Power supply, fixed cable sensors       |
| 4 | PROFIBUS DP/Modbus/Ethernet (optional) | 9  | Alarm relay                             |
| 5 | 2 x current input (optional)           | 10 | 2 or 4 x relays (optional)              |
|   |  | 11 | 2 digital inputs and outputs (optional) |

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Device configuration using  
the example of a CM444-  
**\*\*M42A1FA\***

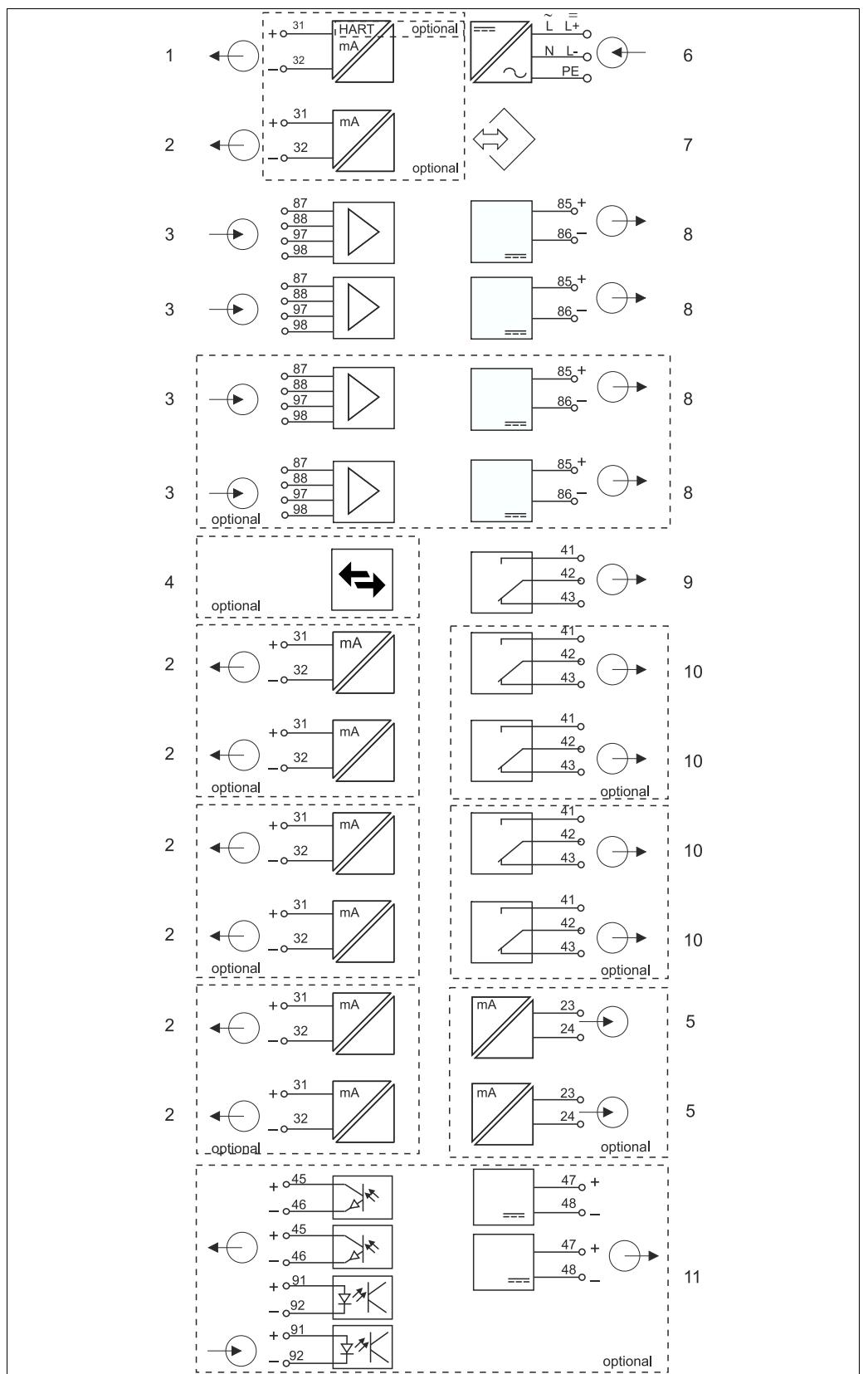


CM444-\*\*M42A1FA\*

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|   |  |
|---|--|
| <b>Ordered basic device (example)</b>                                 | <ul style="list-style-type: none"> <li>▪ Order code CM444-**M42A1FA*</li> <li>▪ Functionality:           <ul style="list-style-type: none"> <li>- 4 x Memosens (2 on BASE-E module + 2 on an extension module 2DS)</li> <li>- PROFIBUS communication (module 485)</li> <li>- 2 current outputs without HART (on BASE-E module)</li> <li>- 2 current inputs (module 2AI)</li> </ul> </li> <li>▪ 3 slots are still free in this example. More or fewer slots can be free in other versions.</li> </ul> |
| <b>Extension options without additional modules</b>                   | None   |
| <b>Modification options without additional modules</b>                | <ul style="list-style-type: none"> <li>▪ Communication type changed by entering activation code<br/>This disables the communication type used previously!           <ul style="list-style-type: none"> <li>- Modbus RS485 (71135636)</li> <li>- Modbus TCP (71135637)</li> </ul> </li> <li>▪ Retrofit to HART by removing module 485 and entering activation code for HART (71128428)</li> </ul>   |
| <b>Extension options by using extension modules in free slots 5-7</b> | <ul style="list-style-type: none"> <li>▪ Additional inputs or outputs, relays:           <ul style="list-style-type: none"> <li>- Module 2AI (71135639): 2 current inputs</li> <li>- Module AOR (71111053): 2 current outputs, 2 relays</li> <li>- Module 2R (71125375) or 4R (71125376): 2 or 4 relays</li> <li>- Module DIO (71135638): 2 digital inputs and 2 digital outputs</li> </ul> </li> <li>▪ If fieldbus module 485 is used, no other current outputs are available!</li> </ul>           |
| <b>Device upgrade to CM448</b>  | 6 or 8 measuring channels by using one or two Memosens input modules 2DS (71135631)  |
| <b>Basic rule for extensions</b>                                      | The sum of all current inputs and outputs may not exceed 8!  |
| <b>Restrictions if using CUS71D sensors for interface measurement</b> | <ul style="list-style-type: none"> <li>▪ Every combination of sensors is possible with CM444. All Memosens inputs (max. 4) can be used.</li> <li>▪ An extension to CM448 is <b>not advisable</b> as the maximum number of Memosens inputs remains limited to 4 if a CUS71D is used.</li> </ul>   |
| <b>Product Configurator</b>   | <a href="http://www.products.endress.com/cm444">www.products.endress.com/cm444</a>   |

## Function diagram CM444

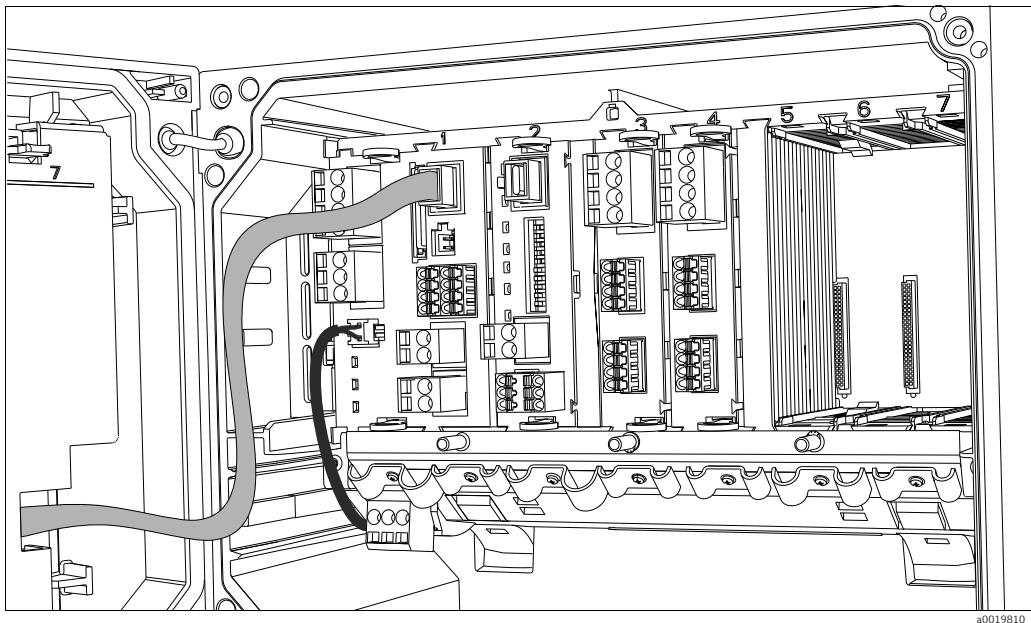


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Function diagram CM444

- |   |  |    |   |
|---|--|----|---|
| 1 | Current output 1:1 + HART (both optional)    | 6  | Power supply                            |
| 2 | Max. 7 x current output (optional)           | 7  | Service interface                       |
| 3 | Memosens input (2 x standard + 2 x optional) | 8  | Power supply, fixed cable sensors       |
| 4 | PROFIBUS DP/Modbus/Ethernet (optional)       | 9  | Alarm relay                             |
| 5 | 2 x current input (optional)                 | 10 | 2 or 4 x relays (optional)              |
|   |  | 11 | 2 digital inputs and outputs (optional) |

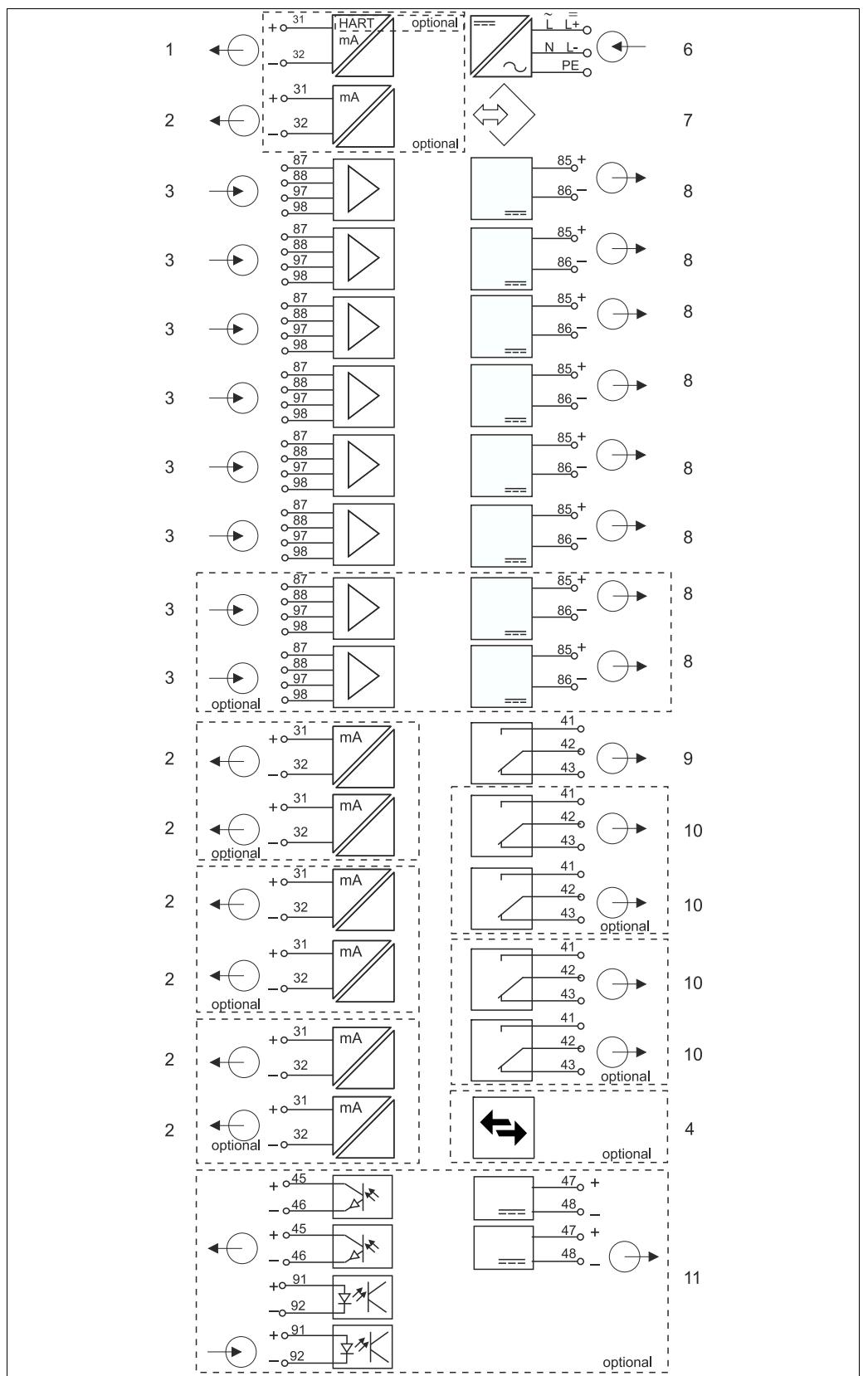
Device configuration using  
the example of a CM448-  
\*\*26A1\*



CM448-\*\*26A1\*

|   |  |
|---|--|
| <b>Ordered basic device (example)</b>                                 | <ul style="list-style-type: none"> <li>▪ Order code CM448-**26A1*</li> <li>▪ Functionality:           <ul style="list-style-type: none"> <li>- 6 x Memosens (2 on BASE-E module + 2 on two extension modules 2DS)</li> <li>- PROFIBUS communication (module 485)</li> <li>- 2 current outputs without HART (on BASE-E module)</li> </ul> </li> <li>▪ 3 slots are still free in this example. More or fewer slots can be free in other versions.</li> </ul>   |
| <b>Extension options without additional modules</b>                   | None   |
| <b>Modification options without additional modules</b>                | <ul style="list-style-type: none"> <li>▪ Communication type changed by entering activation code<br/>This disables the communication type used previously!           <ul style="list-style-type: none"> <li>- Modbus RS485 (71135636)</li> <li>- Modbus TCP (71135637)</li> </ul> </li> <li>▪ Retrofit to HART by removing module 485 and entering activation code for HART (71128428)</li> </ul>   |
| <b>Extension options by using extension modules in free slots 5-7</b> | <p>Only the following is possible for the example above:</p> <ul style="list-style-type: none"> <li>▪ Module 2R (71125375) or 4R (71125376): 2 or 4 relays</li> </ul> <p>If extending to eight measuring channels:</p> <ul style="list-style-type: none"> <li>▪ Module 2DS (71135631): 2 Memosens inputs</li> <li>▪ Use of the 2 current outputs in the basic module by entering activation code (71140891)</li> </ul> <p>Additional inputs or outputs and relays if fieldbus module 485 is removed:</p> <ul style="list-style-type: none"> <li>▪ Module 2AO (71135632): 2 current outputs</li> <li>▪ Module AOR (71111053): 2 current outputs, 2 relays</li> <li>▪ Module 2R (71125375) or 4R (71125376): 2 or 4 relays</li> <li>▪ Module DIO (71135638): 2 digital inputs and 2 digital outputs</li> </ul> |
| <b>Basic rule for extensions</b>                                      | The sum of all current inputs and outputs may not exceed 8!  |
| <b>Restrictions if using CUS71D sensors for interface measurement</b> | The maximum number of Memosens inputs that can be used is limited to 4! Here, every combination of CUS71D and other Memosens sensors is then possible.   |
| <b>Product Configurator</b>   | <a href="http://www.products.endress.com/cm448">www.products.endress.com/cm448</a>   |

## Function diagram CM448



a0015828

Function diagram CM448

- |   |   |    |   |
|---|---|----|---|
| 1 | Current output 1:1 + HART (both optional)       | 7  | Service interface                       |
| 2 | Max. 7 x current output (optional)              | 8  | Power supply, fixed cable sensors       |
| 3 | Max. 8 x Memosens input (of which 2 x optional) | 9  | Alarm relay                             |
| 4 | PROFIBUS DP/Modbus/Ethernet (optional)          | 10 | 2 or 4 x relays (optional)              |
| 6 | Power supply                                    | 11 | 2 digital inputs and outputs (optional) |

## Communication and data processing

### Types of communication:

- Fieldbuses
  - HART
  - PROFIBUS DP (Profile 3.02)
  - Modbus TCP or RS485
- Configuration via Ethernet

**i** Only one type of Fieldbus communication can ever be active. The last activation code entered decides which bus is used.

### Extension module 485 and current outputs

For communication types PROFIBUS DP, Modbus and Ethernet:

- CM442:  
Current outputs cannot be used in parallel. Any existing current outputs are deactivated with the installation of 485.
- CM444/CM448:  
Max. of 2 current outputs can be used in parallel.

### Bus termination on the device

- Via slide switch at bus module 485
- Displayed via LED "T" on bus module 485

## Dependability

### Reliability

#### Memosens technology



Memosens makes your measuring point safer and more reliable:

- Non-contact, digital signal transmission enables optimum galvanic isolation
- No contact corrosion
- Completely watertight
- Laboratory sensor calibration possible, thus increasing measured value availability
- 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
  - Hours of operation with high temperatures
  - Number of steam sterilizations
  - Sensor condition

#### Sensor Check System (SCS)

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.

#### 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 specific period (several measured values).

The main causes of stagnating measured values are:

- Contaminated sensor, or sensor outside of medium
- Sensor failure
- Process error (e.g. through control system)

### Sensor Condition Check (SCC)

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

### Self-monitoring functions

Current inputs are deactivated in the event of overcurrent and reactivated once the overcurrent stops. Board voltages are monitored and the board temperature is also measured.

### USP and EP

The limit functions for pharmaceutical water in accordance with USP and EP specifications are implemented in the software for conductivity measurements:

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

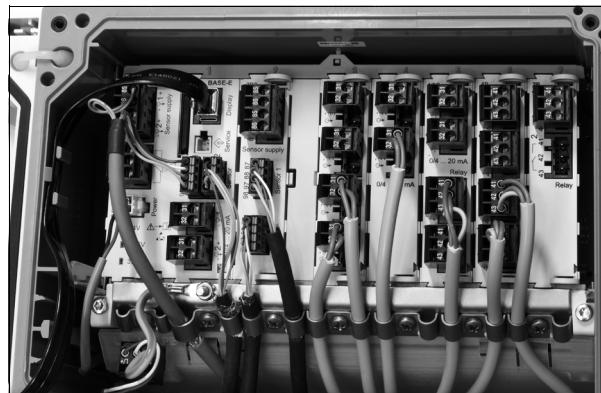
The uncompensated conductivity value and the temperature are measured for the USP/EP limit functions. The measured values are compared against the tables defined in the standards. An alarm is triggered if the limit value is exceeded. Furthermore, it is also possible to configure an early warning alarm that signals undesired operating states before they occur.

### Maintainability

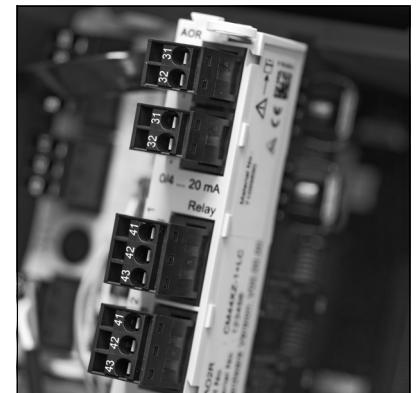
### Modular design

The modular transmitter design means it can be easily adapted to suit your needs:

- Retrofit extension modules for new or extended range of functions, e.g. current outputs, relays and digital communication
- Upgrade to maximum of eight-channel measurement
- Optional: M12 sensor connector for connecting any kind of Memosens sensor



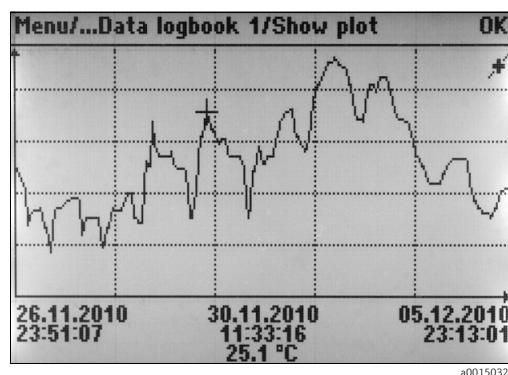
CM448: Sample



Fitting the extension module

### Data logger function

- Adjustable scan time: 1 to 3600 s (6 h)
- Data logbooks:
  - Max. 8 data logbooks
  - 150,000 entries per logbook
  - Graphic display (load curves) or numerical list
- Calibration logbook: max. 75 entries
- Hardware version logbook:
  - Hardware configuration and modifications
  - Max. 125 entries
- Version logbook:
  - E.g. software updates
  - Max. 50 entries
- Operation logbook: max. 250 entries
- Diagnostics logbook: max. 250 entries



*Data logbook: Graphic display*

**i** Logbooks remain unchanged even after a software update.

### SD card

The exchangeable storage medium enables:

- Quick and easy software updates and upgrades
- Data storage of internal device memory (e.g. logs)
- Transfer of complete configurations to a device with an identical setup (backup function)
- Transfer of configurations without the TAG and bus address to devices with an identical setup (copy function)

Endress+Hauser offers industry-approved SD cards as accessories. These memory cards provide maximum data security and integrity.

Other SD cards can also be used. However, Endress+Hauser does not accept any responsibility for the data security of such cards.

### External signals for device control and activation of external devices

The optional "DIO" hardware module with 2 digital inputs and 2 digital outputs enables the following

- via a digital input signal
  - measuring range switching for conductivity (upgrade code required, see accessories)
  - an external hold
  - a cleaning interval to be triggered
  - a PID controller to be switched on and off, e.g. via the proximity switch of CCA250
  - the use of the input as an "analog input" for pulse-frequency modulation (PFM)
- via a digital output signal
  - the static transmission (similar to a relay) of diagnostic states, point level switch states etc.
  - the dynamic transmission (comparable to a non-wearing "analog output") of PFM signals, e.g. to control dosing pumps.

## FieldCare and Field Data Manager

### FieldCare

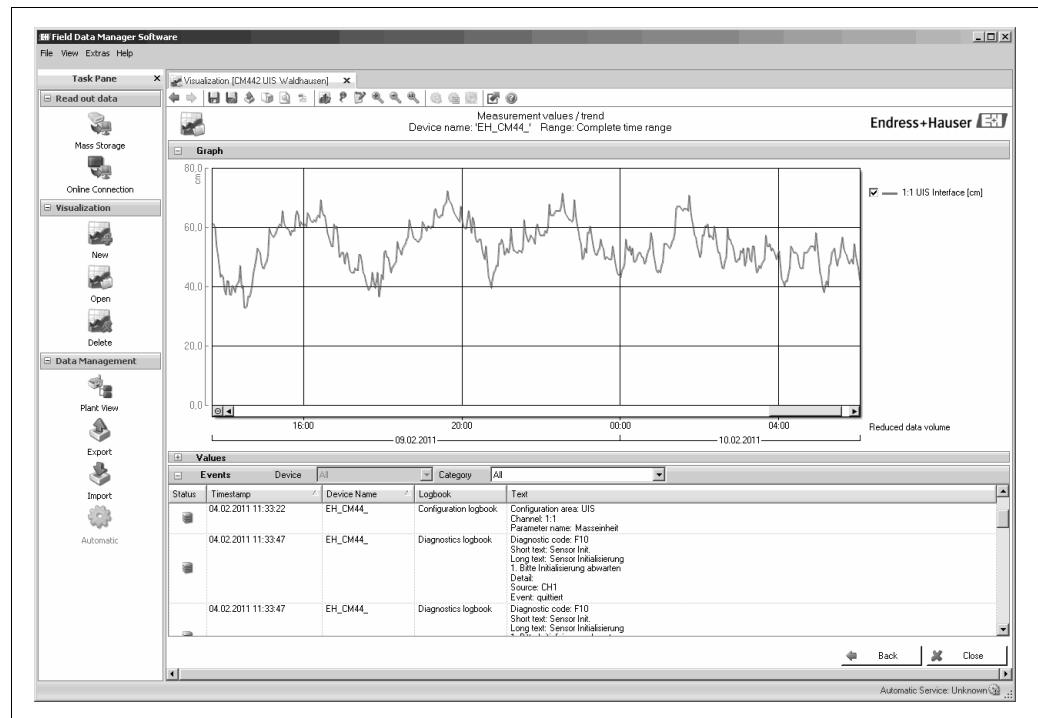
Configuration and asset management software based on FDT/DTM technology

- Complete device configuration when connected via FXA291 and service interface
- Access to a number of configuration parameters and identification, measuring and diagnostic data when connected via HART modem
- Logbooks can be downloaded in CSV format or binary format for "Field Data Manager" software

### Field Data Manager

Visualization software and database for measuring, calibration and configuration data

- SQL database which is protected against manipulation
- Functions to import, save and print out logbooks
- Load curves to display measured values



Field Data Manager: Load curves

## Virtual process values (mathematical functions)

In addition to "real" process values, which are provided by connected physical sensors or analog inputs, mathematical functions can be used to calculate a maximum of 6 "virtual" process values.

The "virtual" process values can be:

- Output via a current output or a Fieldbus
- Used as a regulating control variable
- Assigned as a measured variable to a limit contactor
- Used as a measured variable to trigger cleaning
- Displayed in user-defined measuring menus.

The following mathematical functions are possible:

- pH calculation based on two conductivity values acc. to VGB 405 RL, e.g. in boiler feed water
- Difference between two measured values from different sources, e.g. for membrane monitoring
- Differential conductivity , e.g. monitoring the efficiency of ion exchangers
- Degassed conductivity, e.g. for process controls in power plants
- Redundancy for monitoring two or three redundantly measuring sensors
- rH calculation based on the measured values of a pH and an ORP sensor

### Concentration tables

When the device is delivered from the factory, tables are saved in the device that allow inductive conductivity measurements to be converted to concentrations of certain substances. 4 user-defined tables are also possible.

The following factory concentration tables are available:

|                                |                          |                            |
|--------------------------------|--------------------------|----------------------------|
| NaOH                           | 0 to 15 %                | 0 to 100 °C (32 to 212 °F) |
| HCl                            | 0 to 20 %                | 0 to 65 °C (32 to 149 °F)  |
| HNO <sub>3</sub>               | 0 to 30 %                | 2 to 80 °C (36 to 176 °F)  |
| H <sub>2</sub> SO <sub>4</sub> | 0 to 28 % and 35 to 85 % | 0 to 100 °C (32 to 212 °F) |
| H <sub>2</sub> SO <sub>4</sub> | 93 to 100 %              | 0 to 100 °C (32 to 212 °F) |
| H <sub>3</sub> PO <sub>4</sub> | 0 to 40 %                | 2 to 80 °C (36 to 176 °F)  |
| NaCl                           | 0 to 26 %                | 2 to 80 °C (36 to 176 °F)  |

---

## Security

### Real-time clock

The device has a real-time clock, which is buffered by a button cell battery if the power supply fails. This ensures that the device continues to keep the correct date and time when it is restarted and that the time stamp for the logbooks is correct.

### Data security

All settings, logbooks etc. are stored in a non-volatile memory to ensure that the data are retained even in the event of a disruption to the power supply.

## Input

---

### Measured variables

--> Documentation of the connected sensor

### Measuring ranges

--> Documentation of the connected sensor

### Types of input

- Digital sensor inputs for sensors with Memosens protocol
- Analog current inputs (optional)
- Digital inputs (optional)

### Input signal

Depending on version

- Max. 8 x binary sensor signal
- 2 x 0/4 to 20 mA (optional), passive, potentially isolated from one another and from the sensor inputs
- 0 to 10 V

### Cable specification

#### Cable type

Memosens data cable CYK10 or sensor fixed cable, each with cable end sleeves or M12 round-pin connector

#### Cable length

Max. 100 m (330 ft)

## Digital inputs, passive

|                                 |   |
|---------------------------------|---|
| <b>Electrical specification</b> | <ul style="list-style-type: none"><li>■ drawing power (passive)</li><li>■ galvanically isolated</li></ul> |
| <b>Span</b>                     | High: 11 to 30 V DC<br>Low: 0 to 5 V DC   |
| <b>Nominal input current</b>    | Max. 8 mA   |
| <b>PFM function</b>             | Minimum pulse width: 500 µs (1 kHz)   |
| <b>Test voltage</b>             | 500 V   |
| <b>Cable specification</b>      | Max. 2.5 mm <sup>2</sup> (14 AWG)   |

## Current input, passive

|                              |              |
|------------------------------|--------------|
| <b>Span</b>                  | > 0 to 20 mA |
| <b>Signal characteristic</b> | Linear       |
| <b>Internal resistance</b>   | Non-linear   |
| <b>Test voltage</b>          | 500 V        |

## Output

### Output signal

Depending on version:

- 1 x 0/4 to 20 mA, active, potentially isolated from one another and from the sensor circuits
- 2 x 0/4 to 20 mA, active, potentially isolated from one another and from the sensor circuits
- 4 x 0/4 to 20 mA, active, potentially isolated from one another and from the sensor circuits
- 6 x 0/4 to 20 mA, active, potentially isolated from one another and from the sensor circuits
- 8 x 0/4 to 20 mA, active, potentially isolated from one another and from the sensor circuits
- Thereof one current output with optional HART communication (exclusively via current output 1:1)

### HART

|                                 |                                   |
|---------------------------------|-----------------------------------|
| Signal coding                   | FSK ± 0.5 mA above current signal |
| Data transmission rate          | 1200 baud                         |
| Galvanic isolation              | Yes                               |
| Load (communication resistance) | 250 Ω                             |

### PROFIBUS DP/RS485

|                        |   |
|------------------------|---|
| Signal coding          | EIA/TIA-485, PROFIBUS DP-compliant acc. to IEC 61158  |
| Data transmission rate | 9.6 kBd, 19.2 kBd, 45.45kBd, 93.75 kBd, 187.5 kBd, 500 kBd, 1.5 MBd, 6 MBd, 12 MBd                |
| Galvanic isolation     | Yes   |
| Connectors             | Spring-cage terminal (max. 1.5 mm) bridged internally in the connector (T function), M12 optional |
| Bus termination        | Internal slide switch with LED display  |

### Modbus RS485

|                        |   |
|------------------------|---|
| Signal coding          | EIA/TIA-485   |
| Data transmission rate | 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200 baud                                      |
| Galvanic isolation     | Yes   |
| Connectors             | Spring-cage terminal (max. 1.5 mm) bridged internally in the connector (T function), M12 optional |
| Bus termination        | Internal slide switch with LED display  |

### Ethernet and Modbus TCP

|                        |                                  |
|------------------------|----------------------------------|
| Signal coding          | IEEE 802.3 (Ethernet)            |
| Data transmission rate | 10/100 MBd                       |
| Galvanic isolation     | Yes                              |
| Connection             | RJ45, M12 optional               |
| IP address             | DHCP or configuration using menu |

|  |   |
|--|---|
| <b>Signal on alarm</b>                     | Adjustable, as per NAMUR Recommendation NE 43<br><ul style="list-style-type: none"> <li>■ In measuring range 0 to 20 mA (HART is not available with this measuring range):<br/>Error current from 0 to 23 mA</li> <li>■ In measuring range 4 to 20 mA:<br/>Error current from 2.4 to 23 mA</li> <li>■ Factory setting for error current for both measuring ranges:<br/>21.5 mA</li> </ul> |
| <b>Load</b>                                | Max. 500 Ω  |
| <b>Linearization/transmission behavior</b> | Linear  |

## Digital outputs, passive

|                                 |   |
|---------------------------------|---|
| <b>Electrical specification</b> | <ul style="list-style-type: none"> <li>■ passive</li> <li>■ open collector, max. 30 V, 15 mA</li> </ul>   |
| <b>PFM function</b>             | Minimum pulse width: 500 μs (1 kHz)   |
| <b>Auxiliary voltage</b>        | <b>Electrical specification</b> <ul style="list-style-type: none"> <li>■ galvanically isolated</li> <li>■ unregulated, 24 V DC ± 20%</li> <li>■ max. 50 mA</li> </ul> |
| <b>Test voltage</b>             | 500 V   |
| <b>Cable specification</b>      | Max. 2.5 mm <sup>2</sup> (14 AWG)   |

## Current outputs, active

|                                 |   |
|---------------------------------|---|
| <b>Span</b>                     | 0 to 23 mA<br>2.4 to 23 mA for HART communication   |
| <b>Signal characteristic</b>    | Linear  |
| <b>Electrical specification</b> | <b>Output voltage</b><br>Max. 24 V<br><br><b>Test voltage</b><br>500 V  |
| <b>Cable specification</b>      | <b>Cable type</b><br>Recommended: shielded cable<br><br><b>Cross-section</b><br>Max. 2.5 mm <sup>2</sup> (14 AWG) |

## Relay outputs

### Electrical specification

#### Relay types

- 1 single-pin changeover contact (alarm relay)
- 2 or 4 single-pin changeover contacts (optional with extension modules)

#### Relay switching capacity

##### Basic module (alarm relay)

| Switching voltage         | Load (max.) | Switching cycles (min.) |
|---------------------------|-------------|-------------------------|
| 230 V AC, cosφ = 0.8 to 1 | 0.1 A       | 700.000                 |
|                           | 0.5 A       | 450.000                 |
| 115 V AC, cosφ = 0.8 to 1 | 0.1 A       | 1.000.000               |
|                           | 0.5 A       | 650.000                 |
| 24 V DC, L/R = 0 to 1 ms  | 0.1 A       | 500.000                 |
|                           | 0.5 A       | 350.000                 |

##### Extension modules

| Switching voltage         | Load (max.) | Switching cycles (min.) |
|---------------------------|-------------|-------------------------|
| 230 V AC, cosφ = 0.8 to 1 | 0.1 A       | 700.000                 |
|                           | 0.5 A       | 450.000                 |
|                           | 2 A         | 120.000                 |
| 115 V AC, cosφ = 0.8 to 1 | 0.1 A       | 1.000.000               |
|                           | 0.5 A       | 650.000                 |
|                           | 2 A         | 170.000                 |
| 24 V DC, L/R = 0 to 1 ms  | 0.1 A       | 500.000                 |
|                           | 0.5 A       | 350.000                 |
|                           | 2 A         | 150.000                 |

##### Minimum load (typical)

- Min. 100 mA with 5 V DC
- Min. 1 mA with 24 V DC
- Min. 5 mA with 24 V AC
- Min. 1 mA with 230 V AC

### Cable specification

#### Cross-section

Max. 2.5 mm<sup>2</sup> (14 AWG)

## Protocol-specific data

**HART**

|                                   |  |
|-----------------------------------|--|
| Manufacturer ID                   | 11 <sub>h</sub>  |
| Device type                       | 119C <sub>h</sub> (CM44x), 119D <sub>h</sub> (CSFxx)                           |
| Device revision                   | 001 <sub>h</sub>   |
| HART version                      | 7.2  |
| Device description files (DD/DTM) | www.endress.com<br>Device Integration Manager (DIM)                            |
| Device variables                  | 16 configured by the user and 16 pre-defined, dynamic variables PV, SV, TV, QV |
| Supported features                | PDM DD, AMS DD, DTM, FieldXpert DD   |

**PROFIBUS DP**

|                    |   |
|--------------------|---|
| Manufacturer ID    | 11 <sub>h</sub>   |
| Device type        | 155D <sub>h</sub> (CM44x), 155C <sub>h</sub> (CSFxx)  |
| Profile version    | 3.02  |
| GSD files          | www.products.endress.com/profibus<br>Device Integration Manager DIM   |
| Output variables   | 16 AI blocks, 8 DI blocks   |
| Input variables    | 8 AO blocks, 4 DO blocks  |
| Supported features | <ul style="list-style-type: none"> <li>■ 1 MSCY0 connection (cyclical communication, master class 1 to slave)</li> <li>■ 1 MSAC1 connection (acyclic communication, master class 1 to slave)</li> <li>■ 2 MSAC2 connections (acyclic communication, master class 2 to slave)</li> <li>■ Device lock: The device can be locked using the hardware or software.</li> <li>■ Addressing using DIL switches or software</li> <li>■ GSD, PDM DD, DTM</li> </ul> |

**Modbus RS485**

|                                      |   |
|--------------------------------------|---|
| Protocol                             | RTU/ASCII   |
| Function codes                       | 03, 04, 06, 08, 16, 23  |
| Broadcast support for function codes | 06, 16, 23  |
| Output data                          | 16 measured values (value, unit, status), 8 digital values (value, status)                  |
| Input data                           | 4 setpoints (value, unit, status), 4 digital values (value, status), diagnostic information |
| Supported features                   | Address can be configured using switch or software  |

**Modbus TCP**

|                                      |   |
|--------------------------------------|---|
| TCP port                             | 502   |
| TCP connections                      | 3   |
| Protocol                             | RTU   |
| Function codes                       | 03, 04, 06, 08, 16, 23  |
| Broadcast support for function codes | 06, 16, 23  |
| Output data                          | 16 measured values (value, unit, status), 8 digital values (value, status)                  |
| Input data                           | 4 setpoints (value, unit, status), 6 digital values (value, status), diagnostic information |
| Supported features                   | Address can be configured using DHCP or software  |

**Web server**

The web server enables full access to the device configuration, measured values, diagnostic messages, logbooks and service data via standard WiFi/WLAN/LAN/GSM or 3G router with a user-defined IP address.

|                    |   |
|--------------------|---|
| TCP port           | 80  |
| Supported features | <ul style="list-style-type: none"> <li>■ Remote-controlled device configuration</li> <li>■ Save/restore device configuration</li> <li>■ Logbook export (file formats: CSV, FDM)</li> <li>■ Access to web server via DTM or Internet Explorer</li> </ul> |

## Power supply

**Supply voltage****CM442**

Depending on version:

100 to 230 V AC ± 15 %, 50/60 Hz  
24 V AC/DC +20/-15 %, 50/60 Hz

**CM444 and CM448**

Depending on version:

100 to 230 V AC ± 15 %, 50/60 Hz  
24 V DC +20 / -15 %

**NOTICE**

**The device does not have a mains switch.**

- The customer must provide a protected circuit breaker in the vicinity of the device.
- This must be a switch or a power-circuit breaker and must be labeled as the circuit breaker for the device.
- At the supply point, the power supply for the 24 V versions must be isolated from dangerous live cables by double or reinforced insulation.

**Fieldbus connection**

Supply voltage: not applicable

**Power consumption****CM442**

Depending on supply voltage

- 100 to 230 V AC and 24 V AC:  
Max. 55 VA
- 24 V DC:  
Max. 22 W

**CM444 and CM448**

Depending on supply voltage

- 100 to 230 V AC:  
Max. 73 VA
- 24 V DC:  
Max. 68 W

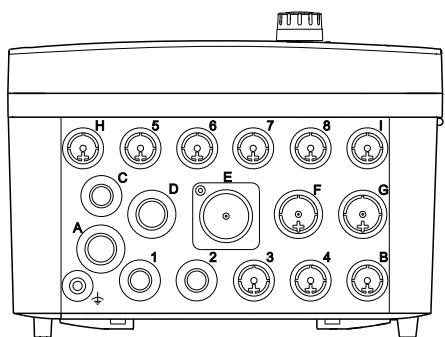
**Fuse****CM442**

5x20 mm, 250 V, 4.0 A, slow-blow (T4.0A)

**CM444 and CM448**

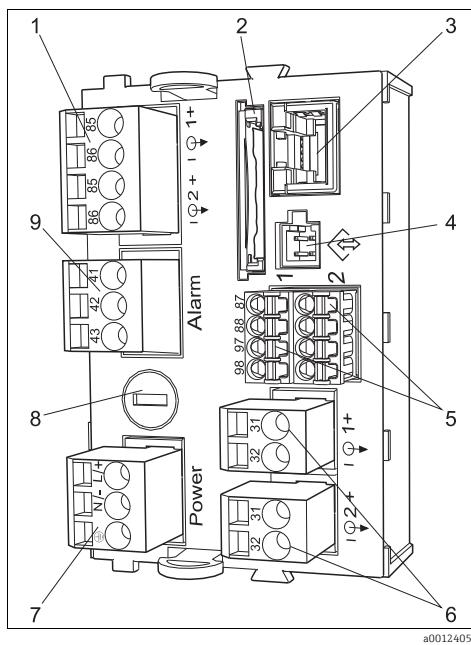
Fuse not exchangeable

**Cable entries**

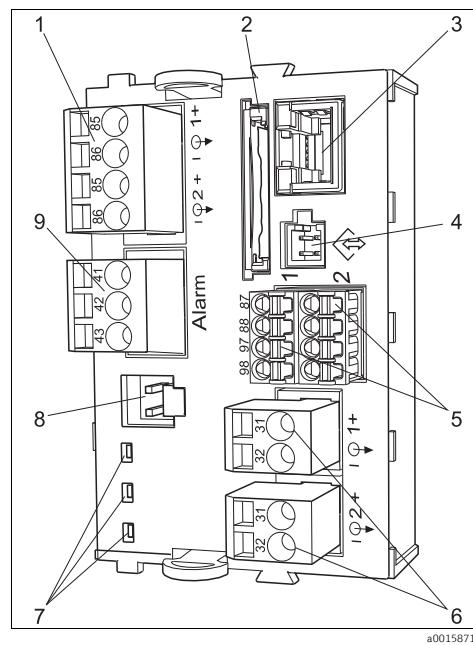
| <b>Identification of the cable entry on housing base</b>  | <b>Suitable gland</b>              |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
|---|------------------------------------|-----|-------------|---|--------------|---|--------------------------|---|------------|-------|------------------------------------|---|------------|---|---------------------------|---|------------|
| B, C, H, I, 1-8   | M16x1.5 mm/NPT3/8"/G3/8            |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| A, D, F, G  | M20x1.5 mm/NPT1/2"/G1/2            |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| E   | -                                  |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| $\pm$   | M12x1.5 mm                         |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
|  <p><b>Recommended assignment</b></p> <table> <tr><td>1-8</td><td>Sensors 1-8</td></tr> <tr><td>A</td><td>Power supply</td></tr> <tr><td>B</td><td>RS485 In or M12 DP/RS485</td></tr> <tr><td>C</td><td>Do not use</td></tr> <tr><td>D,F,G</td><td>Current outputs and inputs, relays</td></tr> <tr><td>H</td><td>Do not use</td></tr> <tr><td>I</td><td>RS485 Out or M12 Ethernet</td></tr> <tr><td>E</td><td>Do not use</td></tr> </table> <p>a0018025</p> |                                    | 1-8 | Sensors 1-8 | A | Power supply | B | RS485 In or M12 DP/RS485 | C | Do not use | D,F,G | Current outputs and inputs, relays | H | Do not use | I | RS485 Out or M12 Ethernet | E | Do not use |
| 1-8   | Sensors 1-8                        |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| A   | Power supply                       |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| B   | RS485 In or M12 DP/RS485           |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| C   | Do not use                         |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| D,F,G   | Current outputs and inputs, relays |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| H   | Do not use                         |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| I   | RS485 Out or M12 Ethernet          |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |
| E   | Do not use                         |     |             |   |              |   |                          |   |            |       |                                    |   |            |   |                           |   |            |

**Cable specification**

| <b>Cable gland</b> | <b>Permitted cable diameter</b> |
|--------------------|---------------------------------|
| M16x1.5 mm         | 4 to 8 mm (0.16 to 0.32")       |
| M12x1.5 mm         | 2 to 5 mm (0.08 to 0.20")       |
| M20x1.5 mm         | 6 to 12 mm (0.24 to 0.48")      |
| NPT3/8"            | 4 to 8 mm (0.16 to 0.32")       |
| G3/8               | 4 to 8 mm (0.16 to 0.32")       |
| NPT1/2"            | 6 to 12 mm (0.24 to 0.48")      |
| G1/2               | 7 to 12 mm (0.28 to 0.48")      |

**Electrical connection****Basic module***Basic module BASE-H or -L (two-channel device)*

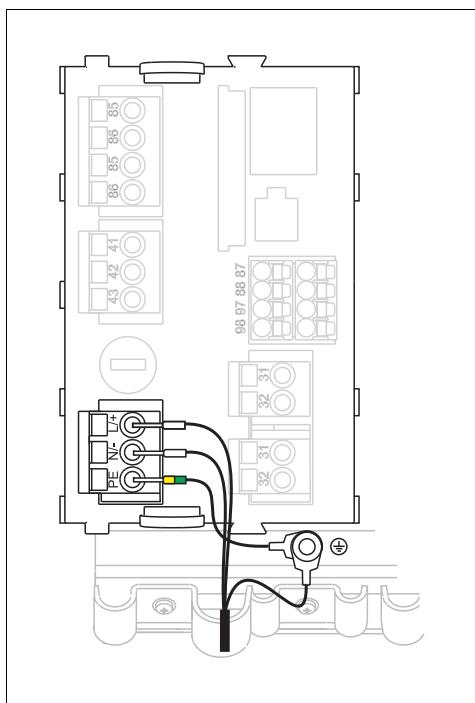
- 1 Power supply for digital fixed cable sensors with Memosens protocol
- 2 SD card slot
- 3 Slot for display cable<sup>1)</sup>
- 4 Service interface
- 5 Connections for 2 Memosens sensors
- 6 Current outputs
- 7 Power connection
- 8 Fuse
- 9 Alarm relay connection

*Basic module BASE-E (four- and eight-channel device)*

- 1 Power supply for digital fixed cable sensors with Memosens protocol
- 2 SD card slot
- 3 Slot for display cable<sup>1)</sup>
- 4 Service interface
- 5 Connections for 2 Memosens sensors
- 6 Current outputs
- 7 LEDs
- 8 Socket for internal supply cable<sup>1)</sup>
- 9 Alarm relay connection

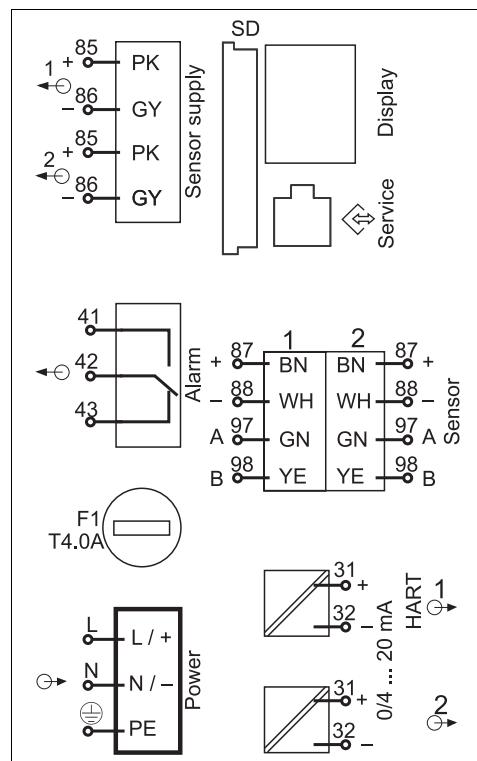
1) Internal device connection. Do not disconnect the plug!

## Connecting supply voltage for CM442



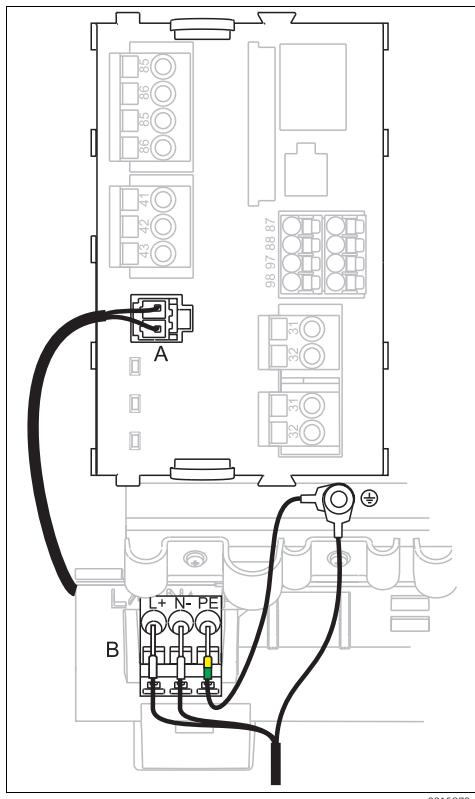
*Connecting power supply on the BASE-H or -L*

*H* Power unit 100 to 230 VAC  
*L* Power unit 24 VAC or 24 VDC



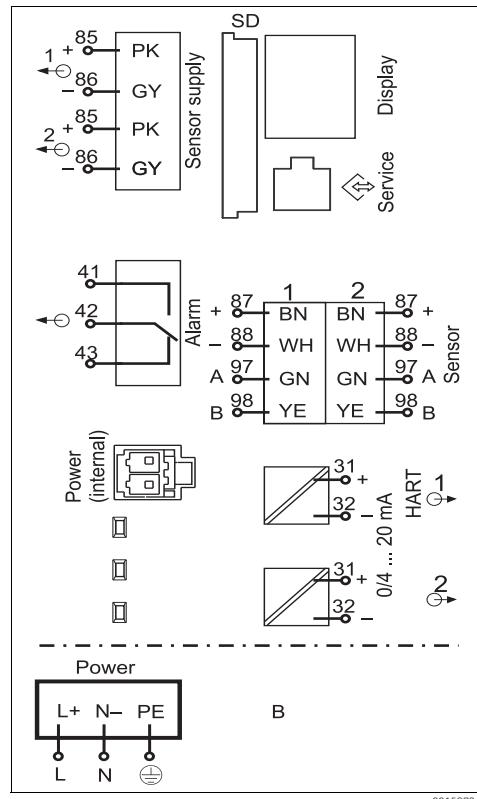
### *Overall wiring diagram for BASE-H or -L*

## Connecting supply voltage for CM444 and CM448



### *Connecting power supply with BASE-E*

A Internal supply cable  
 B Extension power supply unit



## *Overall wiring diagram for BASE-E and extension power supply unit*

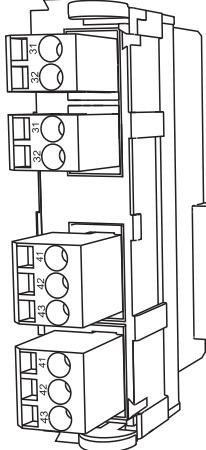
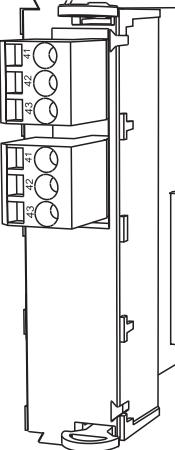
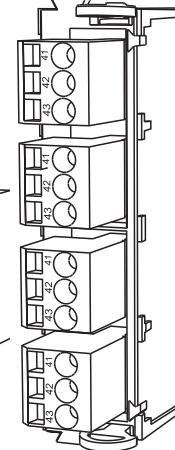
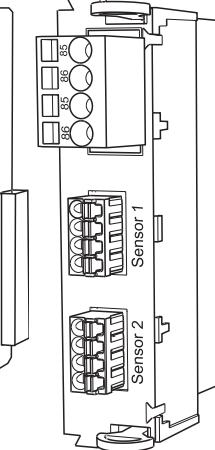
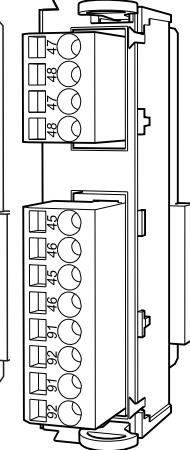
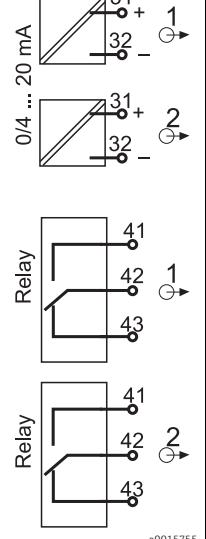
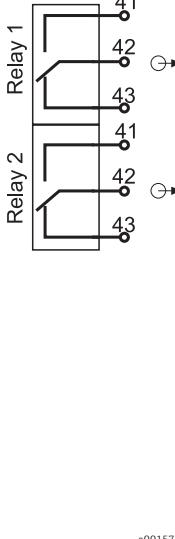
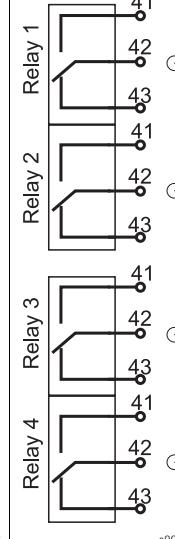
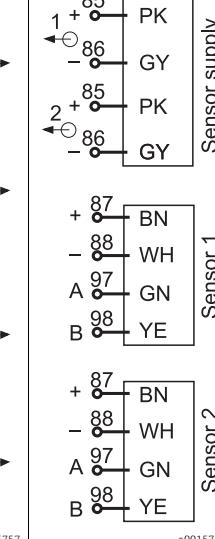
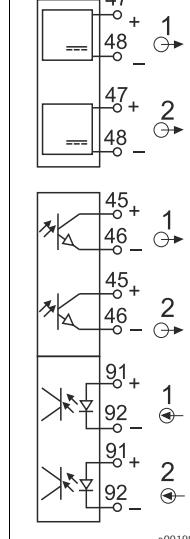
**Connecting optional modules**

With extension modules you can purchase additional functions for your device.

**NOTICE****Unacceptable hardware combinations (due to conflicts in power supply)**

Incorrect measurements or total failure of the measuring point as a result of heat build-up or overloading

- ▶ If you are planning to extend your controller, make sure the resulting hardware combination is permitted (Configurator on [www.products.endress.com/cm442](http://www.products.endress.com/cm442) or .../cm444 or .../CM448).
- ▶ Please note that if you are extending CM442 to CM444 or CM448, you must additionally fit an extension power supply unit and an extension backplane. You must then also use basic module BASE-E.
- ▶ Remember that the sum of all current inputs and outputs may not exceed 8!
- ▶ Please contact your Endress+Hauser sales center should you have any questions.

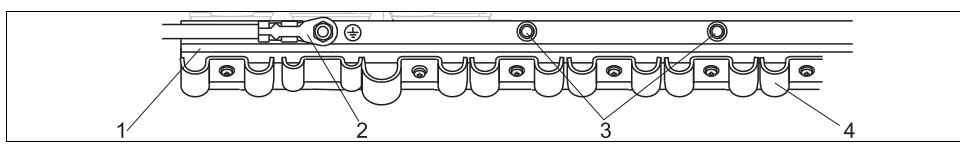
| Module name | AOR   | 2R  | 4R  | 2DS   | DIO  |
|-------------|---|---|---|---|--|
|             | <br>a0015747  | <br>a0015748  | <br>a0015749  | <br>a0015754   | <br>a0019835   |
|             | <ul style="list-style-type: none"> <li>■ 2 x 0/4 to 20 mA analog outputs</li> <li>■ 2 relays</li> <li>■ Order no. 71111053</li> </ul> | <ul style="list-style-type: none"> <li>■ 2 relays</li> <li>■ Order no. 71125375</li> </ul>      | <ul style="list-style-type: none"> <li>■ 4 relays</li> <li>■ Order no. 71125376</li> </ul>      | <ul style="list-style-type: none"> <li>■ 2 digital sensor inputs</li> <li>■ 2 power supply systems for digital sensors</li> <li>■ Order no. 71135631</li> </ul> | <ul style="list-style-type: none"> <li>■ 2 digital inputs</li> <li>■ 2 digital outputs with auxiliary voltage</li> <li>■ Order no. 71135638</li> </ul> |
|             | <br>a0015755                                       | <br>a0015758 | <br>a0015757 | <br>a0015756  | <br>a0019836  |

| Module name | 2AO   | 4AO   | 2AI  | 485   |
|-------------|---|---|--|---|
|             |   |   |  |   |
|             | <ul style="list-style-type: none"> <li>■ 2 x 0/4 to 20 mA analog outputs</li> <li>■ Order no. 71135632</li> </ul> | <ul style="list-style-type: none"> <li>■ 4 x 0/4 to 20 mA analog outputs</li> <li>■ Order no. 71135633</li> </ul> | <ul style="list-style-type: none"> <li>■ 2 x 0/4 to 20 mA analog inputs</li> <li>■ Order no. 71135639</li> </ul> | <ul style="list-style-type: none"> <li>■ Ethernet (web server or Modbus TCP)</li> <li>■ 5V power supply for PROFIBUS DP termination</li> <li>■ RS485 (PROFIBUS DP or Modbus RS485)</li> <li>■ Order no. 71135634</li> </ul> |
|             | <p>a0015759</p>   | <p>a0015760</p>   | <p>a0015761</p>  | <p>a0015762</p>   |

### PROFIBUS DP (module 485)

Contacts A - A', B - B' and C - C' are bridged in the connector. This ensures that PROFIBUS communication is not interrupted if the connector is disconnected.

### Protective ground connection



Cable mounting rail and associated function

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

**Sensor connection****Sensors with Memosens protocol**

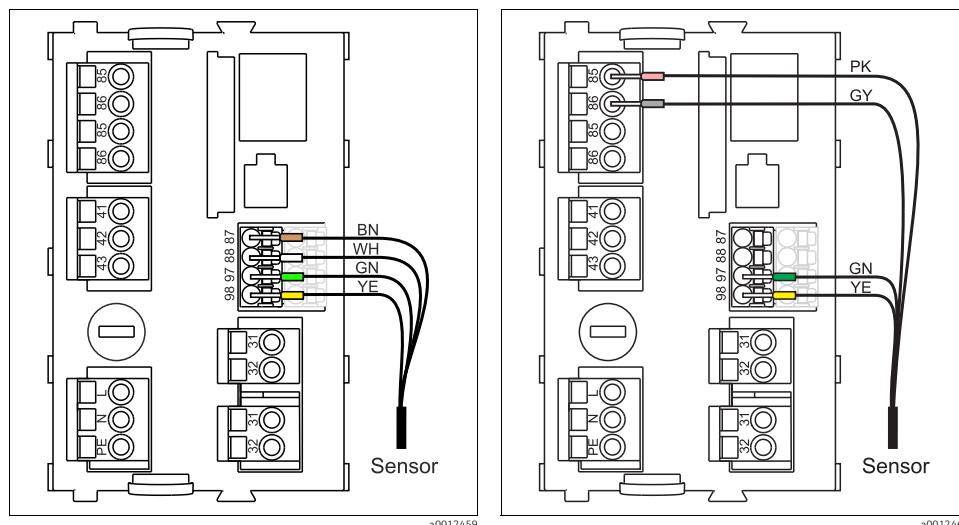
| <b>Sensor types</b>   | <b>Sensor cables</b>  | <b>Sensors</b>  |
|---|---|---|
| Digital sensors <b>without</b> additional internal power supply | CYK10 with plug-in connection and inductive signal transmission | <ul style="list-style-type: none"> <li>▪ pH sensors</li> <li>▪ ORP sensors</li> <li>▪ Combi sensors</li> <li>▪ Amperometric oxygen sensors</li> <li>▪ Conductive conductivity sensors</li> <li>▪ Chlorine sensors</li> </ul>  |
|   | Fixed cable   | Inductive conductivity sensors  |
| Digital sensors <b>with</b> additional internal power supply    | Fixed cable   | <ul style="list-style-type: none"> <li>▪ Turbidity sensors</li> <li>▪ Sensors for interface measurement</li> <li>▪ Sensors for measuring the spectral absorption coefficient (SAC)</li> <li>▪ Nitrate sensors</li> <li>▪ Optical oxygen sensors</li> <li>▪ Ion-sensitive sensors</li> </ul> |

**The following rule applies if connecting CUS71D sensors:**

- CM442
  - Only one CUS71D is possible; an additional sensor is not allowed.
  - The second sensor input may also not be used for another type of sensor.
- CM444
  - No restrictions. All the sensor inputs can be used as required.
- CM448
  - If a CUS71D is connected, the number of sensor inputs that can be used is limited to a maximum of 4.
  - Of these, all 4 inputs can be used for CUS71D sensors.
  - Every combination of CUS71D and other sensors is possible provided that the total number of connected sensors does not exceed 4.

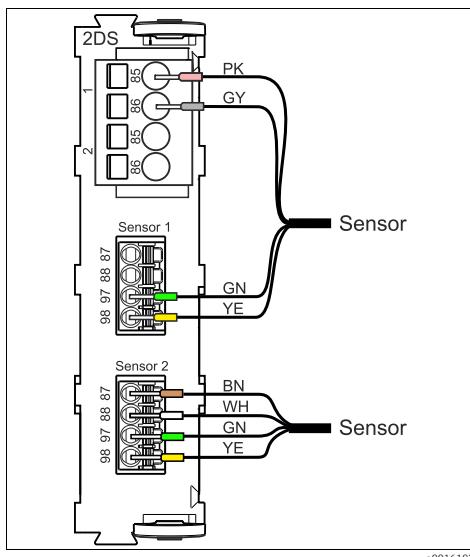
**Connection methods**

1. Sensor cable connected directly to the terminal connector of the sensor module 2DS or of the basic module L, H or E
2. Optional: plug connection of the sensor cable connected to the M12 sensor socket on the underside of the device. With this type of connection, the device is already wired at the factory.

**1. Sensor cable connected directly**

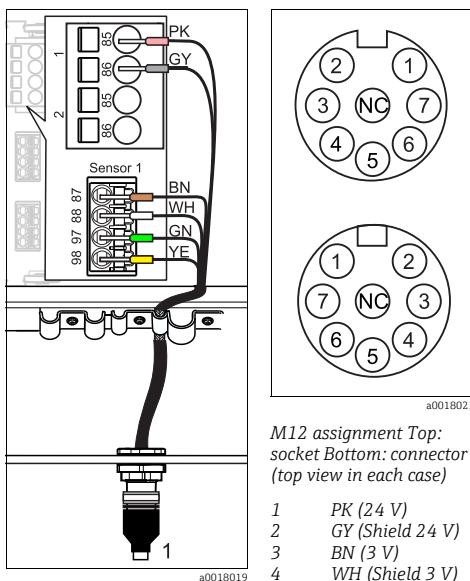
Sensors without additional supply voltage

Sensors with additional supply voltage



Sensors with and without additional supply voltage at sensor module 2DS

## 2. Connection via M12 plug-in connection



Device versions with a pre-installed M12 socket are ready-wired upon delivery.

Install an M12 socket, which is available as an accessory, in a suitable cable gland opening in the base of the housing, and connect the cables to the Memosens terminals of the sensor or basic module as per the wiring diagram (→ ).

Connecting the sensor

- Connect the sensor cable plug (pos. 1) directly to the M12 socket.

Please note the following for these device versions:

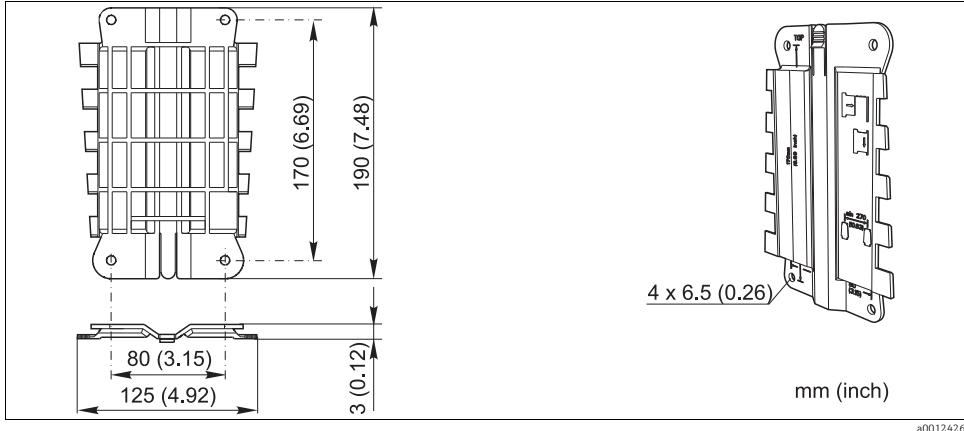
- The internal device wiring is always the same regardless of what kind of sensor you connect to the M12 socket (plug&play).
- The signal and power supply cables are assigned in the sensor plug-in head in such a way that the PK and GY power supply cables are either used (e.g. optical sensors) or not (e.g. pH or ORP sensors).

## Performance characteristics

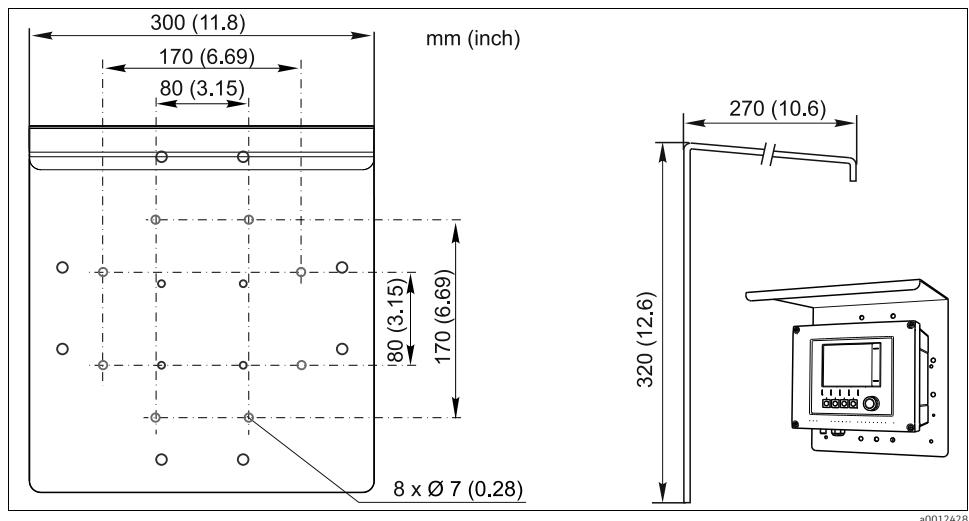
|   |   |
|---|---|
| <b>Response time</b>                            | <p><b>Current outputs</b><br/> <math>t_{90}</math> = max. 500 ms for an increase from 0 to 20 mA</p> <p><b>Current inputs</b><br/> <math>t_{90}</math> = max. 330 ms for an increase from 0 to 20 mA</p> <p><b>Digital inputs and outputs</b><br/> <math>t_{90}</math> = max. 330 ms for an increase from low to high</p> |
| <b>Reference temperature</b>                    | 25 °C (77 °F)   |
| <b>Maximum measured error of sensor inputs</b>  | --> Documentation of the connected sensor   |
| <b>Tolerance of digital inputs and outputs</b>  | ≤ 1 %   |
| <b>Tolerance of current inputs and outputs</b>  | <p>Typical measured errors:<br/> &lt; 20 µA (with current values &lt; 4 mA)<br/> &lt; 50 µA (with current values 4 to 20 mA)<br/> at 25 °C (77 °F) each</p> <p>Additional measured error depending on the temperature:<br/> &lt; 1.5 µA/K</p>   |
| <b>Resolution of current inputs and outputs</b> | < 5 µA  |
| <b>Repeatability</b>                            | --> Documentation of the connected sensor   |

## Installation

## Mounting plate



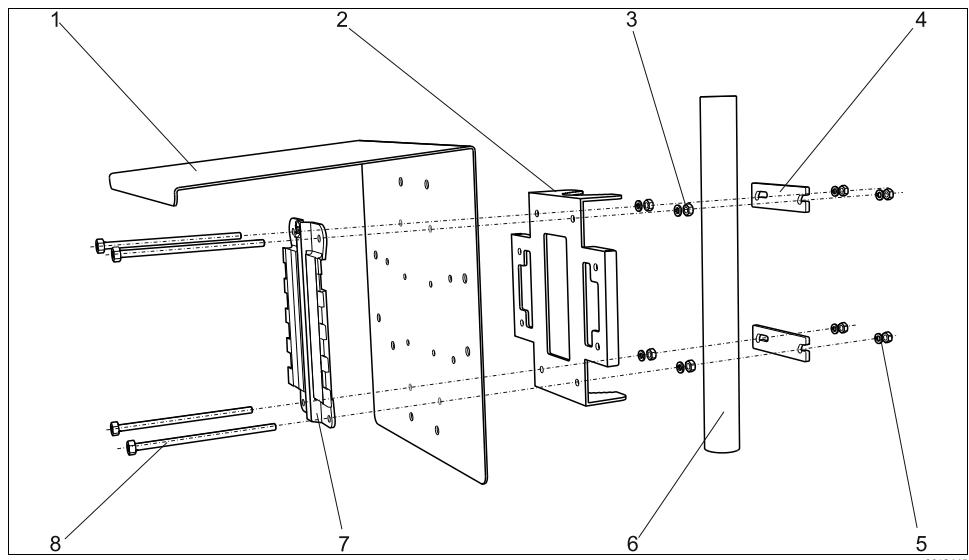
### *Mounting plate*

**Weather protection cover**

a0012428

*Weather protection cover***Installation instructions**

You require the post mounting kit (optional) to mount the unit on a pipe, post or railing (square or circular, span range 20 to 61 mm (0.79 to 2.40')).

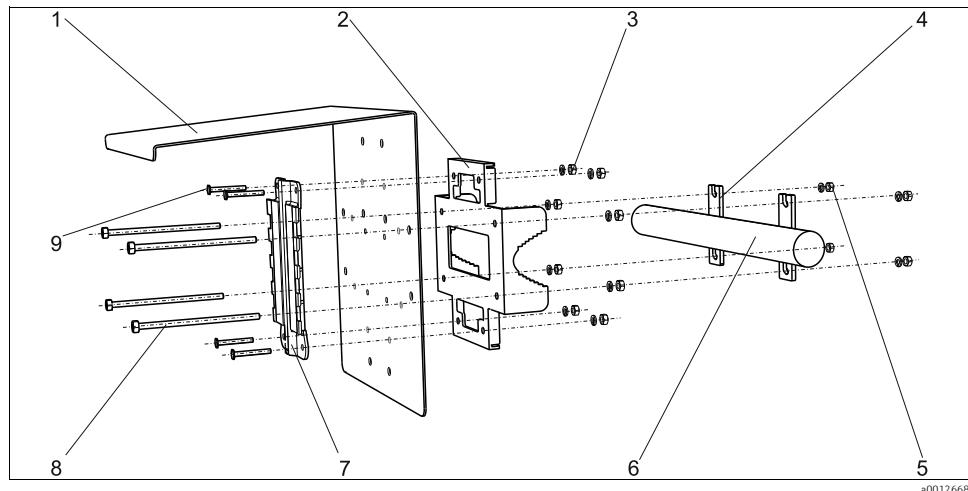
**Post mounting**

a0012665

*Post mounting*

- |  |  |
|--|--|
| 1 Weather protection cover (optional)      | 5 Spring washers, nuts (post mounting kit) |
| 2 Post mounting plate (post mounting kit)  | 6 Pipe or railing (circular/square)        |
| 3 Spring washers, nuts (post mounting kit) | 7 Mounting plate                           |
| 4 Pipe clamps (post mounting kit)          | 8 Threaded rods (post mounting kit)        |

### Rail mounting



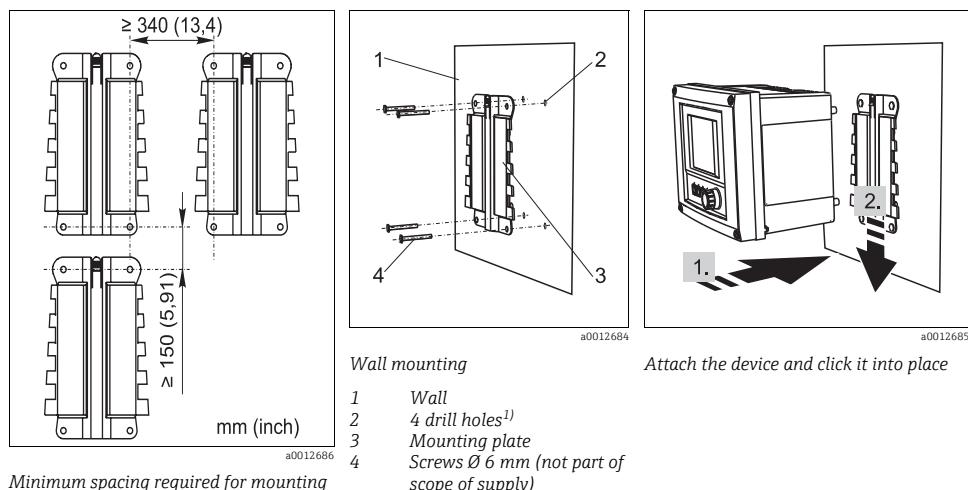
a0012668

#### Rail mounting

- |  |                                     |
|--|-------------------------------------|
| 1 Weather protection cover (optional)      | 6 Pipe or railing (circular/square) |
| 2 Post mounting plate (post mounting kit)  | 7 Mounting plate                    |
| 3 Spring washers, nuts (post mounting kit) | 8 Threaded rods (post mounting kit) |
| 4 Pipe clamps (post mounting kit)          | 9 Screws (post mounting kit)        |
| 5 Spring washers, nuts (post mounting kit) |                                     |

### Wall mounting

Mount the controller in such a way that the wall support surface is at least the size of the rear housing panel.



- 1) The size of the drill holes depends on the wall plugs used. The wall plugs and screws must be provided by the customer.

## Environment

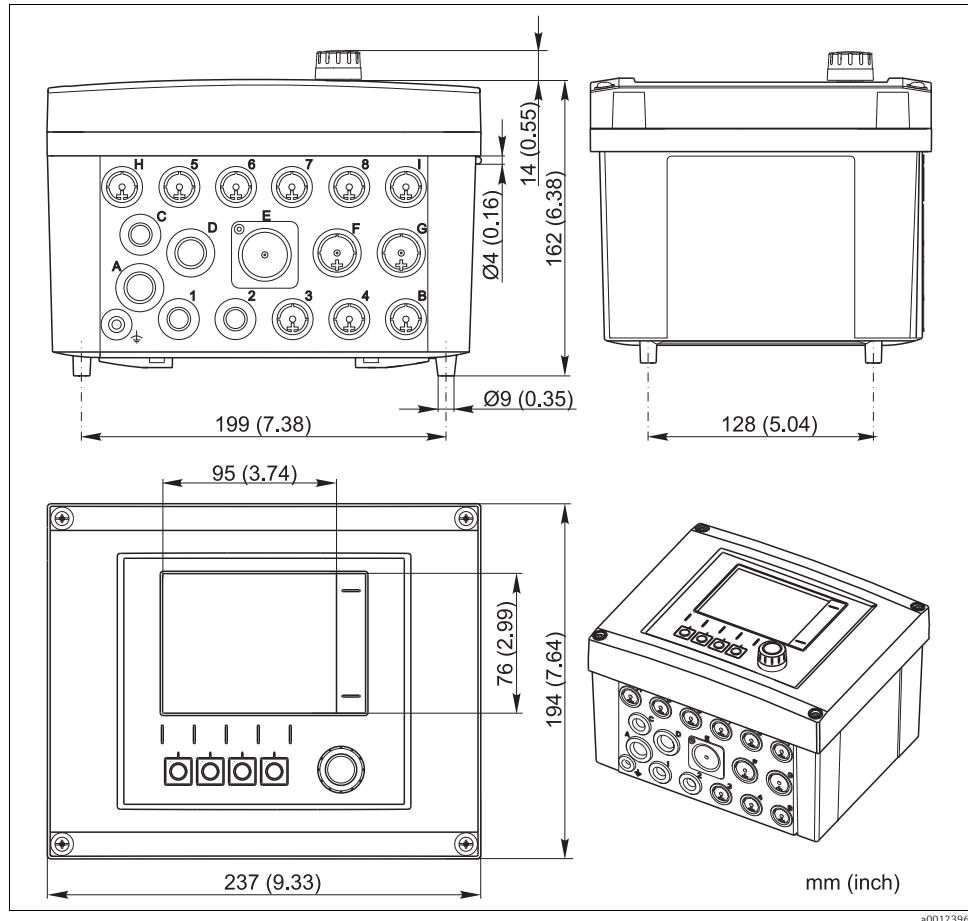
|                                      |  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
|--------------------------------------|--|------------------------------|--|-----------------|---------------------------|-----------|------------------------|--|-----------------------------------|---------------|---|----------------------|--|-----------------|---------------------------|-----------|------------------------|--|-------------------------------------|---------------|---|
| <b>Ambient temperature range</b>     | <b>CM442</b><br>-20 to 60 °C (0 to 140 °F)   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
|                                      | <b>CM444</b> <ul style="list-style-type: none"> <li>■ -20 to 55 °C (0 to 130 °F) in general, apart from the packages listed under the 2nd bullet point</li> <li>■ -20 to 50 °C (0 to 120 °F) for the following packages: <ul style="list-style-type: none"> <li>- CM444-**M40A7FI*****+...</li> <li>- CM444-**M40A7FK*****+...</li> <li>- CM444-**N40A7FI*****+...</li> <li>- CM444-**N40A7FK*****+...</li> </ul> </li> </ul>  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
|                                      | <b>CM448</b> <ul style="list-style-type: none"> <li>■ -20 to 55 °C (0 to 130 °F) in general, apart from the packages listed under the 2nd bullet point</li> <li>■ -20 to 50 °C (0 to 120 °F) for the following packages: <ul style="list-style-type: none"> <li>- CM448-***6AA*****+...</li> <li>- CM448-***8A4*****+...</li> <li>- CM448-***8A5*****+...</li> <li>- CM448-**28A3*****+...</li> <li>- CM448-**38A3*****+...</li> <li>- CM448-**48A3*****+...</li> <li>- CM448-**58A3*****+...</li> <li>- CM448-**68A3*****+...</li> <li>- CM448-**26A5*****+...</li> <li>- CM448-**36A5*****+...</li> <li>- CM448-**46A5*****+...</li> <li>- CM448-**56A5*****+...</li> <li>- CM448-**66A5*****+...</li> </ul> </li> </ul>   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Storage temperature</b>           | -40 to 80 °C (-40 to 175 °F)   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Humidity</b>                      | 10 to 95%,<br>not condensing   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Degree of protection</b>          | IP 66/67, leak-tightness and corrosion resistance in accordance with NEMA TYPE 4X  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Vibration resistance</b>          | <p><b>Environmental tests</b></p> <p>Vibration test based on DIN EN 60068-2, October 2008<br/>Vibration test based on DIN EN 60654-3, August 1998</p> <table> <tr> <td><b>Post or pipe mounting</b></td> <td></td> </tr> <tr> <td>Frequency range</td> <td>10 to 500 Hz (sinusoidal)</td> </tr> <tr> <td>Amplitude</td> <td>10 to 57.5 Hz: 0.15 mm</td> </tr> <tr> <td></td> <td>57.5 to 500 Hz: 2 g<sup>1)</sup></td> </tr> <tr> <td>Test duration</td> <td>10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min)</td> </tr> <tr> <td><b>Wall mounting</b></td> <td></td> </tr> <tr> <td>Frequency range</td> <td>10 to 150 Hz (sinusoidal)</td> </tr> <tr> <td>Amplitude</td> <td>10 to 12.9 Hz: 0.75 mm</td> </tr> <tr> <td></td> <td>12.9 to 150 Hz: 0.5 g<sup>1)</sup></td> </tr> <tr> <td>Test duration</td> <td>10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min)</td> </tr> </table> <p>1) g ... gravitational acceleration (1 g ≈ 9.81 m/s<sup>2</sup>)</p> | <b>Post or pipe mounting</b> |  | Frequency range | 10 to 500 Hz (sinusoidal) | Amplitude | 10 to 57.5 Hz: 0.15 mm |  | 57.5 to 500 Hz: 2 g <sup>1)</sup> | Test duration | 10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min) | <b>Wall mounting</b> |  | Frequency range | 10 to 150 Hz (sinusoidal) | Amplitude | 10 to 12.9 Hz: 0.75 mm |  | 12.9 to 150 Hz: 0.5 g <sup>1)</sup> | Test duration | 10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min) |
| <b>Post or pipe mounting</b>         |  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| Frequency range                      | 10 to 500 Hz (sinusoidal)  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| Amplitude                            | 10 to 57.5 Hz: 0.15 mm   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
|                                      | 57.5 to 500 Hz: 2 g <sup>1)</sup>  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| Test duration                        | 10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min)  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Wall mounting</b>                 |  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| Frequency range                      | 10 to 150 Hz (sinusoidal)  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| Amplitude                            | 10 to 12.9 Hz: 0.75 mm   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
|                                      | 12.9 to 150 Hz: 0.5 g <sup>1)</sup>  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| Test duration                        | 10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min)  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Electromagnetic compatibility</b> | Interference emission<br>and interference immunity as per EN 61326-1: 2006, class A for industry   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Electrical safety</b>             | IEC 61010-1, Class I equipment<br>Low voltage: overvoltage category II<br>Environment < 3000 m (< 9840 ft) above MSL   |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |
| <b>Pollution degree</b>              | The product is suitable for pollution degree 4.  |                              |  |                 |                           |           |                        |  |                                   |               |   |                      |  |                 |                           |           |                        |  |                                     |               |   |

**Pressure compensation to environment**

Filter made of GORE-TEX used as pressure compensation element  
Ensures pressure compensation to environment and guarantees IP protection.

## Mechanical construction

**Dimensions**



Dimensions of field housing

a0012396

**Weight**

Approx. 2.1 kg (4.63 lbs), depending on the version

**Materials**

|                            |   |
|----------------------------|---|
| Lower housing section      | PC-FR   |
| Display cover              | PC-FR   |
| Display film and soft keys | PE  |
| Housing seal               | EPDM  |
| Module side panels         | PC-FR   |
| Module covers              | PBT GF30 FR                                   |
| Cable mounting rail        | PBT GF30 FR, stainless steel 1.4301 (AISI304) |
| Clamps                     | Stainless steel 1.4301 (AISI304)              |
| Screws                     | Stainless steel 1.4301 (AISI304)              |

## Operability

### Display

Graphic display:

- Back light with switch-off function
- Red display background for alarms alerts users to errors
- Transflective display technology for maximum contrast even in bright environments
- User-definable measuring menus mean you can always keep track of the values that are important for your application.
- Load curve display



*Backlit display*



*Red background indicates an error*

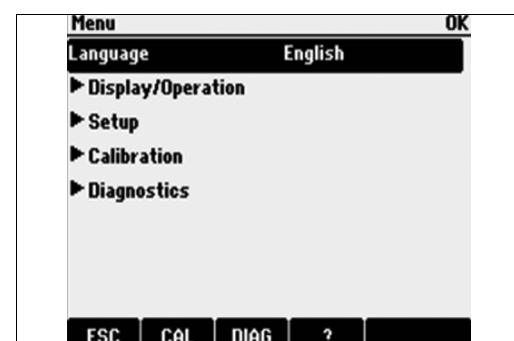
### Operating concept

The simple and structured operating concept sets new standards:

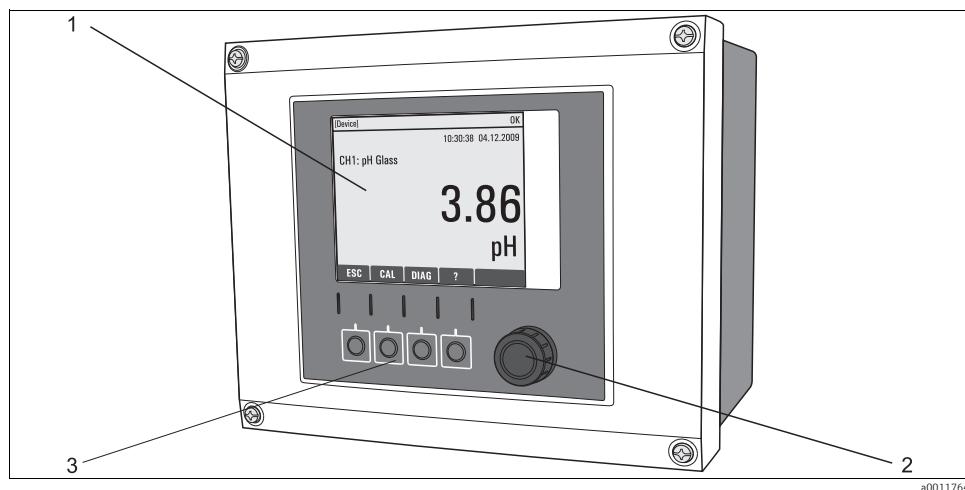
- Intuitive operation with the navigator and soft keys
- Fast configuration of application-specific measurement options
- Easy configuration and diagnosis thanks to plain-text display
- All languages that can be ordered are available in every device



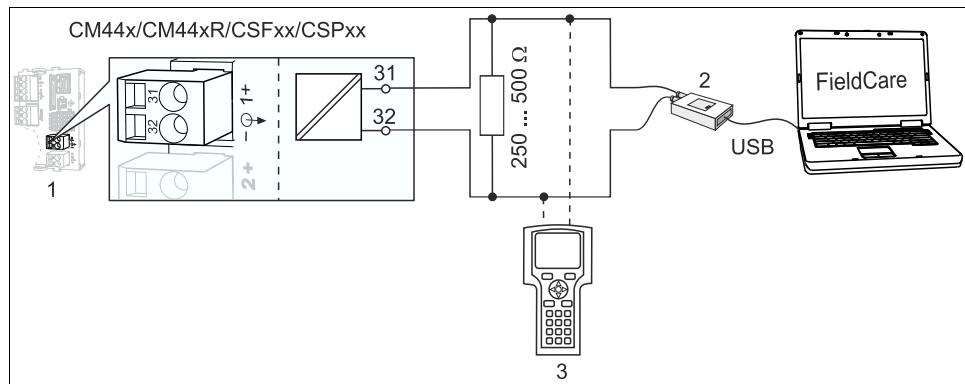
*Easy operation*



*Plain-text menu*

**Local operation****Human interface***Overview of operation*

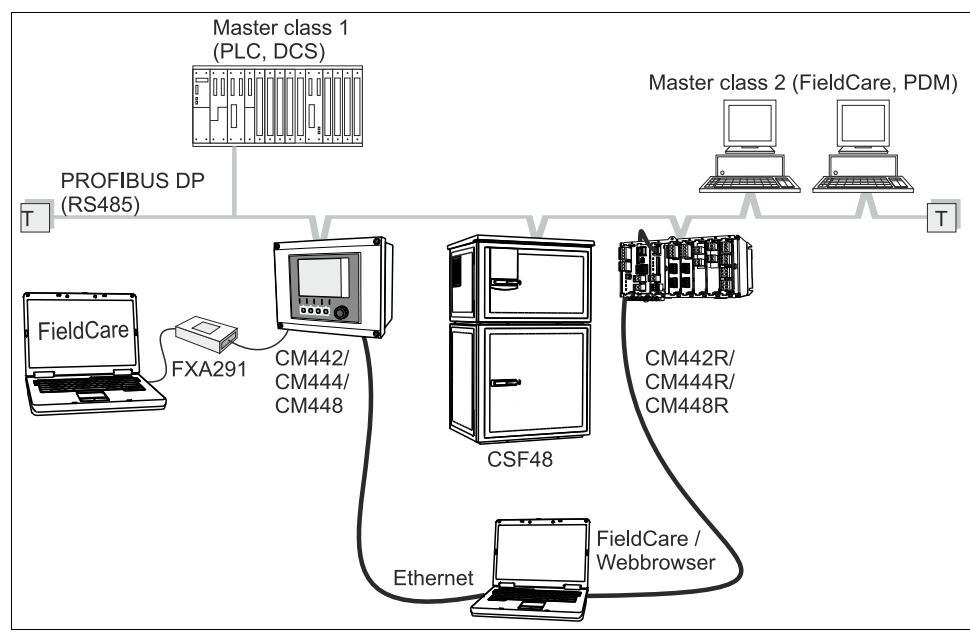
- 1 Display (with red display background in alarm condition)
- 2 Navigator (jog/shuttle function)
- 3 Soft keys (function depends on menu)

**Remote operation****Via HART (e.g. using HART modem and FieldCare)***HART using modem*

- 1 Device module Base-L, -H or -E: current output 1 with HART
- 2 HART modem to connect to PC, e.g. Commubox FXA191 (RS232) or FXA195<sup>1)</sup> (USB)
- 3 HART handheld terminal

1) Switch position "on" (replaces resistance)

### Via PROFIBUS DP

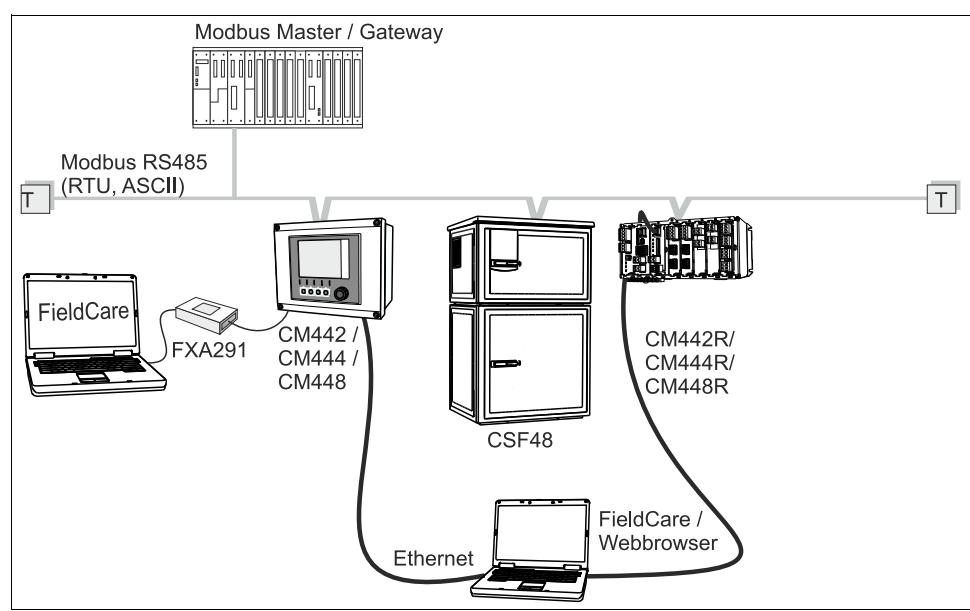


a0015874

*PROFIBUS DP*

T *Terminating resistor*

### Via Modbus RS485

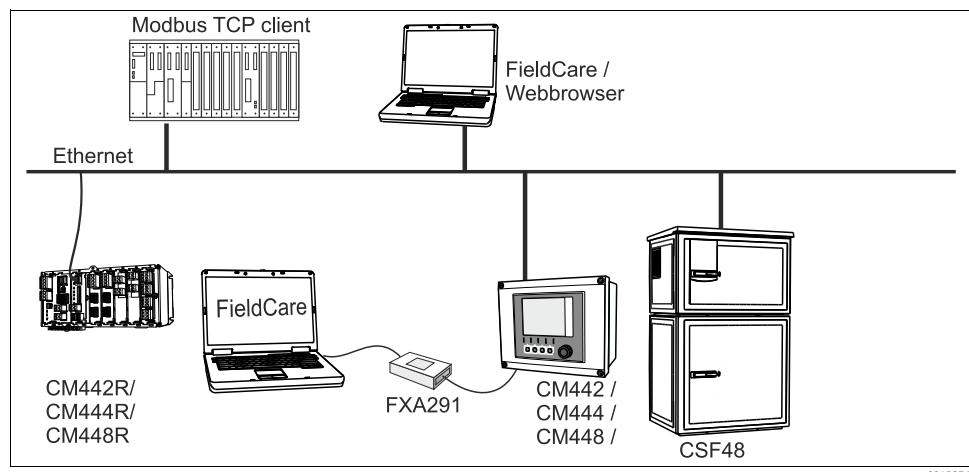


a0015875

*Modbus RS485*

T *Terminating resistor*

### Via Ethernet/Web server/Modbus TCP



*Modbus TCP and/or Ethernet*

### Language packages

The language selected in the product structure is the operating language preset at the factory. All other languages can be selected using the menu.

- English (US)
- German
- French
- Swedish
- Spanish
- Italian
- Dutch
- Portuguese
- Polish
- Russian
- Turkish
- Chinese (Simplified, PR China)
- Japanese
- Czech

## Ordering information

### Product structure

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

Enter the following addresses in your browser to access the relevant product page:

[www.products.endress.com/cm442](http://www.products.endress.com/cm442)  
[www.products.endress.com/cm444](http://www.products.endress.com/cm444)  
[www.products.endress.com/cm448](http://www.products.endress.com/cm448)

1. The following options are available on the right-hand side of the page:

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

2. Select "Configure this product".
3. A new window opens with the Configurator. Using this tool, you can configure your device and you will receive a valid and complete order code for this.
4. Then export the order code as a PDF or as an Excel file selecting from the buttons provided at the top of the page.

### Scope of delivery

- 1 controller in the version ordered
- 1 mounting plate
- 1 wiring label (attached at the factory to the inside of the display cover)
- 1 CD with Operating Instructions
- 1 printed copy of the "Commissioning" section of the Operating Instructions in the language ordered

## Certificates and approvals

### CE mark

#### Declaration of Conformity

The product meets the requirements of the harmonized European standards.

As such, it complies with the legal specifications of the EC directives.

The manufacturer confirms successful testing of the product by affixing to it the CE mark.

### cCSAus

The product complies with "CLASS 2252 05 - Process Control Equipment" and "CLASS 2252 85 - Process Control Equipment - Certified to US Standards" requirements.

### FM/CSA

#### CM442 only

FM/CSA Cl. 1, Div. 2

The device has been developed and tested according to the following standards:

- FM3600 (1998)
- FM3611 (2004)
- FM3810 (2005)
- ANSI/ISA NEMA250 (1999)
- ANSI/IEC 60529 (2001)

### MCERTS

Application made for CM442

## Accessories

- i** The most important accessories that could be delivered at the time this document went to print are listed below.  
For information on accessories that are not listed here, please contact your local service or sales representation.

|                                 |   |
|---------------------------------|---|
| <b>Weather protection cover</b> | CYY101 weather protection cover for field devices, absolutely essential if operating the unit outdoors <ul style="list-style-type: none"> <li>▪ Material: stainless steel 1.4301 (AISI 304)</li> <li>▪ Order No. CYY101-A</li> </ul>  |
| <b>Post mounting kit</b>        | Post mounting kit CM44x <ul style="list-style-type: none"> <li>▪ For securing the field housing to horizontal and vertical posts and pipes</li> <li>▪ Order no. 71096920</li> </ul>   |
| <b>Measuring cable</b>          | Memosens data cable CYK10 <ul style="list-style-type: none"> <li>▪ For digital sensors with Memosens technology<br/>pH, redox, oxygen (amperometric), chlorine, conductivity (conductive)</li> <li>▪ Order as per product structure (→ online Configurator, <a href="http://www.products.endress.com/cyk10">www.products.endress.com/cyk10</a>)</li> </ul> Memosens data cable CYK11 <ul style="list-style-type: none"> <li>▪ Extension cable for digital sensors with Memosens protocol</li> <li>▪ Order as per product structure (→ online Configurator, <a href="http://www.products.endress.com/cyk11">www.products.endress.com/cyk11</a>)</li> </ul> Measuring cable CYK81 <ul style="list-style-type: none"> <li>▪ Unterminated cable for extending sensor cables (e.g. Memosens)</li> <li>▪ 2 x 2 cores, twisted with shielding and PVC sheath (2 x 2 x 0.5 mm<sup>2</sup> + shielding)</li> <li>▪ Material sold by the meter, Order No.: 51502543</li> </ul>  |
| <b>Sensors</b>                  | <b>Glass electrodes</b><br>Orbisint CPS11D <ul style="list-style-type: none"> <li>▪ pH sensor with Memosens technology</li> <li>▪ Dirt-repellent PTFE diaphragm</li> <li>▪ Order as per product structure (→ online Configurator, <a href="http://www.products.endress.com/cps11d">www.products.endress.com/cps11d</a>)</li> <li>▪ Technical Information TI028C/07/EN</li> </ul> Ceraliquid CPS41D <ul style="list-style-type: none"> <li>▪ pH sensor with Memosens technology</li> <li>▪ Ceramic diaphragm and KCl liquid electrolyte</li> <li>▪ Order as per product structure (→ online Configurator, <a href="http://www.products.endress.com/cps41d">www.products.endress.com/cps41d</a>)</li> <li>▪ Technical Information TI079C/07/EN</li> </ul> Ceragel CPS71D <ul style="list-style-type: none"> <li>▪ pH sensor with Memosens technology</li> <li>▪ Double-chamber reference system and integrated bridge electrolyte</li> <li>▪ Order as per product structure (→ online Configurator, <a href="http://www.products.endress.com/cps71d">www.products.endress.com/cps71d</a>)</li> <li>▪ Technical Information TI245C/07/EN</li> </ul> Orbipore CPS91D <ul style="list-style-type: none"> <li>▪ pH sensor with Memosens technology</li> <li>▪ Open aperture diaphragm for media with high dirt load</li> <li>▪ Order as per product structure (→ online Configurator, <a href="http://www.products.endress.com/cps91d">www.products.endress.com/cps91d</a>)</li> <li>▪ Technical Information TI375C/07/EN</li> </ul> Orbipac CPF81D <ul style="list-style-type: none"> <li>▪ Compact pH sensor for installation or immersion operation in process water and wastewater</li> <li>▪ Order as per product structure (→ online Configurator, <a href="http://www.products.endress.com/cpf81d">www.products.endress.com/cpf81d</a>)</li> <li>▪ Technical Information TI191C/07/EN</li> </ul> |

### Pfaudler electrodes

Ceramax CPS341D

- pH electrode with pH-sensitive enamel
- Meets highest demands of measuring accuracy, pressure, temperature, sterility and durability
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps341d](http://www.products.endress.com/cps341d))
- Technical Information TI468C/07/EN

### ORP sensors

Orbisint CPS12D

- ORP sensor with Memosens technology
- Dirt-repellent PTFE diaphragm;
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps12d](http://www.products.endress.com/cps12d))
- Technical Information TI367C/07/EN

Ceraliquid CPS42D

- ORP sensor with Memosens technology
- Ceramic diaphragm and KCl liquid electrolyte
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps42d](http://www.products.endress.com/cps42d))
- Technical Information TI373C/07/EN

Ceragel CPS72D

- ORP sensor with Memosens technology
- Double-chamber reference system  
and integrated bridge electrolyte;
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps72d](http://www.products.endress.com/cps72d))
- Technical Information TI374C/07/EN

Orbipac CPF82D

- Compact ORP sensor for installation or immersion operation in process water and wastewater
- Order as per product structure (-> online Configurator, [www.products.endress.com/cpf82d](http://www.products.endress.com/cpf82d))
- Technical Information TI191C/07/EN

Orbipore CPS92D

- ORP sensor with Memosens technology
- Open aperture diaphragm for media with high dirt load
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps92d](http://www.products.endress.com/cps92d))
- Technical Information TI435C/07/EN

### pH ISFET sensors

Tophit CPS471D

- Sterilizable and autoclavable ISFET sensor with Memosens technology
- For the food and pharmaceutical industries, process engineering, water treatment and biotechnology
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps471d](http://www.products.endress.com/cps471d))
- Technical Information TI283C/07/EN

Tophit CPS441D

- Sterilizable ISFET sensor with Memosens technology
- For media with  
low conductivity, with liquid KCl electrolyte
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps441d](http://www.products.endress.com/cps441d))
- Technical Information TI352C/07/EN

Tophit CPS491D

- ISFET sensor with Memosens technology
- Open aperture diaphragm for media with high dirt load
- Order as per product structure (-> online Configurator, [www.products.endress.com/cps491d](http://www.products.endress.com/cps491d))
- Technical Information TI377C/07/EN

### Inductive conductivity sensors

Indumax CLS50D

- High-stability inductive conductivity sensor for standard, Ex and high-temperature applications
- Memosens protocol
- Order as per product structure (-> online Configurator, [www.products.endress.com/cls50d](http://www.products.endress.com/cls50d))
- Technical Information TI182C/07/EN

## **Conductive conductivity sensors**

### Condumax CLS15D

- Conductive conductivity sensor for measurement in pure and ultrapure water and in Ex applications
- Order as per product structure (--> online Configurator, [www.products.endress.com/cls15d](http://www.products.endress.com/cls15d))
- Technical Information TI109C/07/EN

### Condumax CLS16D

- Hygienic conductivity sensor for measurement in pure and ultrapure water and in Ex applications
- With EHEDG and 3A certificates
- Order as per product structure (--> online Configurator, [www.products.endress.com/cls16d](http://www.products.endress.com/cls16d))
- Technical Information TI227C/07/EN

### Condumax CLS21D

- Two-electrode sensor in fixed cable and plug-in head version
- Order as per product structure (--> online Configurator, [www.products.endress.com/cls21d](http://www.products.endress.com/cls21d))
- Technical Information TI085C/07/EN

## **Oxygen sensors**

### 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 TI413C/07/EN

### Oxymax COS61D

- Optical oxygen sensor for drinking water and industrial water measurement
- Measuring principle: quenching
- Memosens protocol
- Material: stainless steel 1.4571 (AISI 316Ti)
- Order as per product structure (--> online Configurator, [www.products.endress.com/cos61d](http://www.products.endress.com/cos61d))
- Technical Information TI387C/07/EN

### 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 TI446C/07/EN

## **Chlorine sensors**

### CCS142D

- Membrane-covered amperometric sensor for free chlorine
- Memosens technology
- Measuring range 0.01 to 20 mg/l
- Order as per product structure (--> online Configurator, [www.products.endress.com/ccs142d](http://www.products.endress.com/ccs142d))
- Technical Information TI419C/07/EN

## **Ion selective sensors**

### ISEmax CAS40D

- Ion selective sensors
- Order as per product structure (--> online Configurator, [www.products.endress.com/cas40d](http://www.products.endress.com/cas40d))
- Technical Information TI491C/07/EN

## **Turbidity sensors**

### Turbimax CUS51D

- For nephelometric measurements of turbidity and solids in wastewater
- 4-beam scattered light method
- With Memosens protocol
- Order as per product structure (--> online Configurator, [www.products.endress.com/cus51d](http://www.products.endress.com/cus51d))
- Technical Information TI461C/07/EN

## **SAC and nitrate sensors**

### Viomax CAS51D

- SAC and nitrate measurement in drinking water and wastewater
- With Memosens protocol
- Order as per product structure (--> online Configurator, [www.products.endress.com/cas51d](http://www.products.endress.com/cas51d))
- Technical Information TI459C/07/EN

### Interface measurement

Turbimax CUS71D

- Immersion sensor for interface measurement
- Ultrasonic interface sensor
- Order as per product structure (-> online Configurator, [www.products.endress.com/cus71d](http://www.products.endress.com/cus71d))
- Technical Information TI490C/07/EN

### Additional functionality

#### Hardware extension modules

Kit CM442/CM444/CM448/CSF48: extension module AOR

- 2 x relay, 2 x 0/4 to 20 mA analog output
- Order no. 71111053

Kit CM442/CM444/CM448/CSF48: extension module 2R

- 2 x relay
- Order no. 71125375

Kit CM442/CM444/CM448/CSF48: extension module 4R

- 4 x relay
- Order no. 71125376

Kit CM442/CM444/CM448/CSF48: extension module 2AO

- 2 x 0/4 to 20 mA analog output
- Order no. 71135632

Kit CM444/CM448/CSF48: extension module 4AO

- 4 x analog output 0/4 to 20 mA
- Order no. 71135633

Kit CM444/CM448/CSF48: extension module 2DS

- 2 x digital sensor, Memosens
- Order no. 71135631

Kit CM442/CM444/CM448/CSF48: extension module 2AI

- 2 x 0/4 to 20 mA analog input
- Order no. 71135639

Kit CM442/CM444/CM448/CSF48: extension module DIO

- 2 x digital input
- 2 x digital output
- Auxiliary voltage supply for digital output
- Order no. 71135638

Kit CM442/CM444/CM448/CSF48: extension module 485

- Ethernet configuration
- Can be extended to PROFIBUS DP or Modbus RS485 or Modbus TCP. This requires an additional activation code which can be ordered separately (-> [46](#)).
- Order no. 71135634

Upgrade kit CM442/CM444/CM448/CSF48

- Extension module 485
- PROFIBUS DP (+ Ethernet configuration)
- Order no. 71140888

Upgrade kit CM442/CM444/CM448/CSF48

- Extension module 485
- Modbus RS485 (+ Ethernet configuration)
- Order no. 71140889

Upgrade kit CM442/CM444/CM448/CSF48

- Extension module 485
- Modbus TCP (+ Ethernet configuration)
- Order no. 71140890

Kit CM442: upgrade kit to CM444/CM448

- Extension power supply unit 100 to 230 V AC and extension backplane
- Basic module BASE-E
- Order no. 71135644

Kit CM442: upgrade kit to CM444/CM448

- Extension power supply unit 24 V DC and extension backplane
- Basic module BASE-E
- Order no. 71211434

#### Software and activation codes

SD card with Liquiline firmware

- Industrial Flash Drive, 1 GB
- Order no. 71127100

Activation code for digital HART communication

- Order no. 71128428

Activation code for PROFIBUS DP

- Order no. 71135635

Activation code for Modbus RS485

- Order no. 71135636

Activation code for Modbus TCP

- Order no. 71135637

Kit CM442: activation code for 2nd digital sensor input

- Order no. 71114663

Kit CM444/CM448: upgrade code for 2 x 0/4 to 20 mA for BASE-E

- Order no. 71140891

Activation code for feedforward control

- Order no. 71211288

Activation code for measuring range switch

- Order no. 71211289

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## Other accessories

### SD card

SD card

- Industrial Flash Drive, 1 GB
- Order no. 71110815

### Cable glands

Kit CM44x: gland M

- Set, 6 pieces
- Order no. 71101768

Kit CM44x: gland NPT

- Set, 6 pieces
- Order no. 71101770

Kit CM44x: gland G

- Set, 6 pieces
- Order no. 71101771

Kit CM44x: dummy plug for cable gland

- Set, 6 pieces
- Order no. 71104942

#### **M12 socket and cable junction**

Kit CM42/CM442/CM444/CM448: external CDI socket

- Socket with terminated connecting cables and counter nut
- Order no. 51517507

Kit CM442/CM444/CM448/CSF48: M12 socket for digital sensors

- Pre-terminated
- Order no. 71107456

Kit CM442/CM444/CM448/CSF48: M12 socket for PROFIBUS DP/Modbus RS485

- B-coded, pre-terminated
- Order no. 71140892

Kit CM442/CM444/CM448/CSF48: M12 socket for Ethernet

- D-coded, pre-terminated
- Order no. 71140893

Cable junction with Velcro strip

- 4 pieces, for sensor cable
- Order no. 71092051

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

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