

Technical Information

Liquiline

CM442R/CM444R/CM448R

Cabinet controller 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, EtherNet/IP) and integrated web server
- Selectable: ceaning function, controller and alarm relay
- Optional digital inputs/outputs or current inputs for signal transmission from other devices

The primary applications comprise:

- Food and beverages
- Life science
- Water and wastewater
- Chemical industry

Your benefits

- Maximum process safety thanks to:
 - Simple and transparent menu guidance via an optional graphic display
 - Standardized operating concept across all devices from the Liquiline, sampler and analyzer platform
- Fast commissioning thanks to:
 - Memosens: lab-calibrated sensors & hot plug-and-play
 - 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)
 - Integration into Fieldcare and W@M facilitates effective asset management

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Function and system design

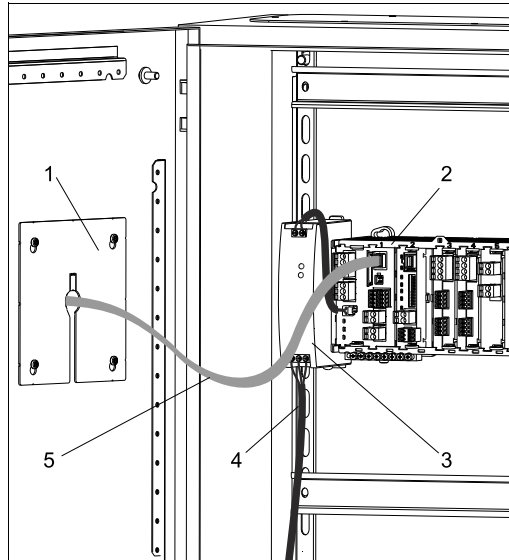
Measuring system

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).

Measuring point

A complete measuring system consists of:

- Liquiline transmitter
- Sensors with Memosens technology
- Assemblies to suit the sensors used



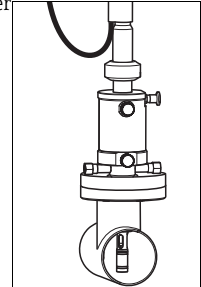
Cabinet installation (excluding sensor cable and signal cable)

- 1 Optional display (back)
- 2 Liquiline
- 3 External power unit (only CM444R and CM448R)
- 4 Power supply cable (to be provided by the customer, not part of the scope of supply)
- 5 Display cable

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

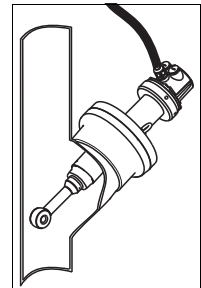
Conductivity

Inductive conductivity measurement in wastewater treatment

- Sensor Indumax CLS50D with fixed cable

Conductive conductivity measurement in power plant cooling water

- Sensor Condumax CLS15D

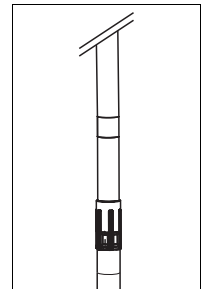


Oxygen

Oxygen in aeration basins

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

Figure: CYA112 with COS61D



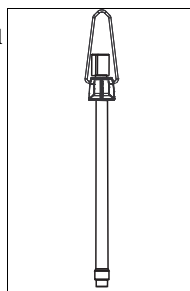
Nitrate and SAC

Nitrate in wastewater

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

SAC in the wastewater treatment outlet

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



Turbidity and interface

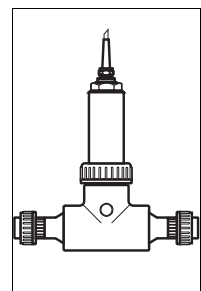
Turbidity in industrial water

- 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

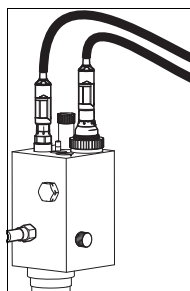
Figure: CUA250 with CUS51D



Chlorine

Chlorine (and pH) in drinking water

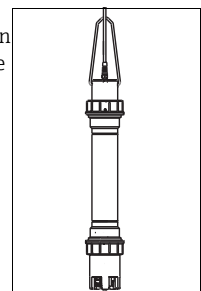
- Sensor CCS142D
- Sensor CPS11D
- Measuring cable CYK10
- Flow assembly CCA250



Ion selective electrodes

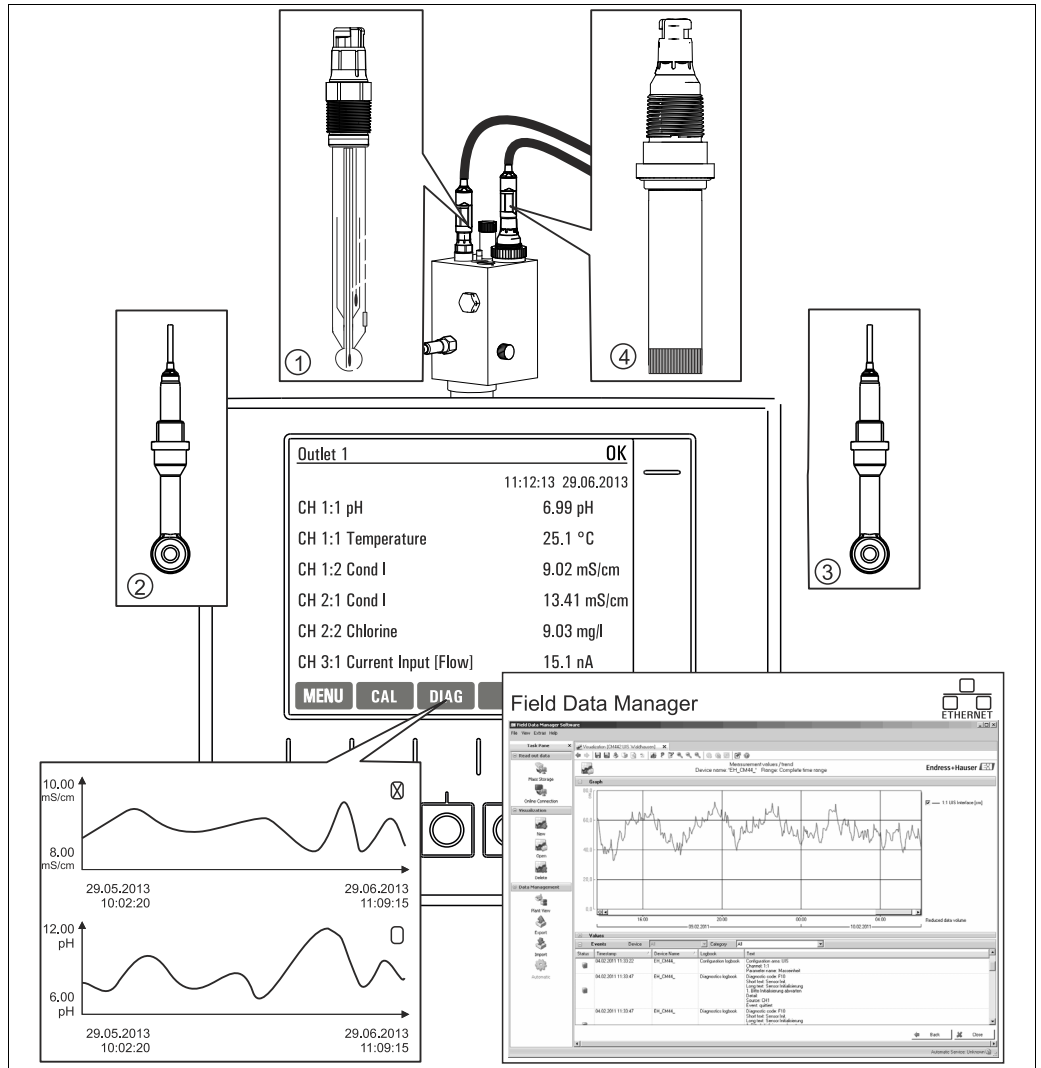
Ammonium and nitrate measurement in the aeration basin

- Sensor CAS40D with fixed cable
- Holder CYH112



Application example

- Transmitter CM444R-AAM44A0FM6 with:
 - 4 x Memosens, Modbus TCP, 2 x digital input and 2 x digital output, 2 x relay for cleaning/limit value, 2 x analog current input
- pH and temperature with CPS71D, item 1, (www.products.endress.com/cps71d)
- Chlorine with CCS142D, item 4 (www.products.endress.com/ccs142d)
- 2 x inductive conductivity with CLS50D, item 2 and 3, (www.products.endress.com/cus50d)
- 1 x conductivity measuring range switching via Modbus module
- Flow assembly CCA250 with optional proximity switch INS (www.products.endress.com/cca250)
- Chlorine regulation with dosing stopped in the event of no flow: proximity switch via digital input of DIO module, flow feedforward control (via digital or analog input), PFM-controlled dosing pump via digital output of DIO module



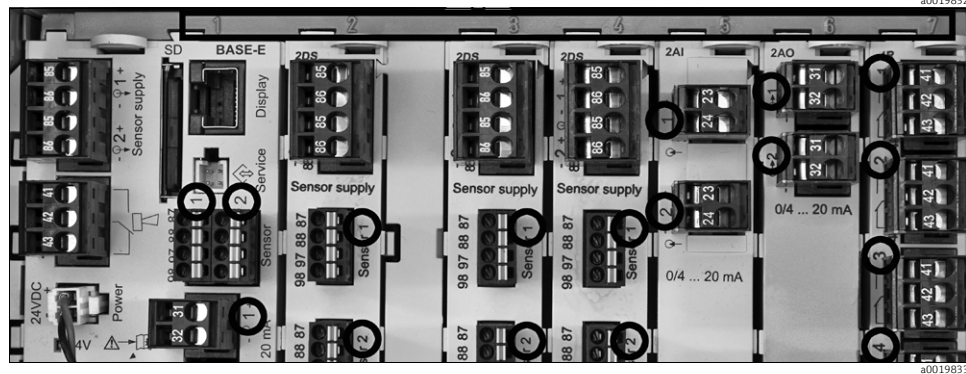
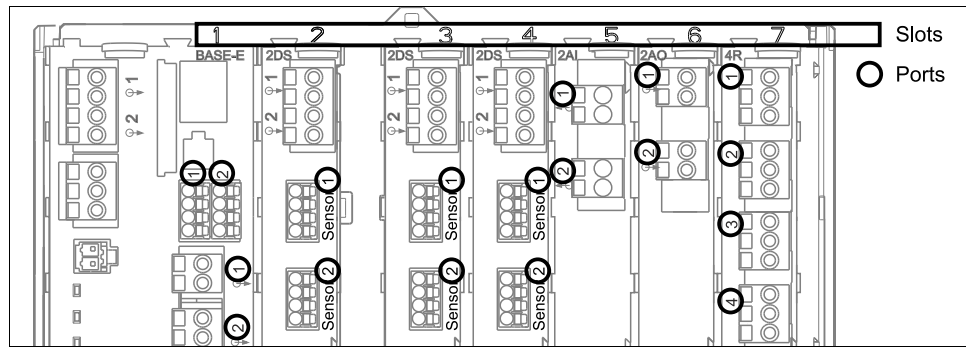
Measuring point in CIP process

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)

Device 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
CH2: 1:2	TU/TS	500.0 g/l
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

MENU CAL DIAG HOLD

Slot and port assignment on the display

- 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
- The outputs and relays are named after their function, e.g. "Current output", and are displayed in ascending order with the slot and port numbers

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 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.
- 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	Relays		
	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.

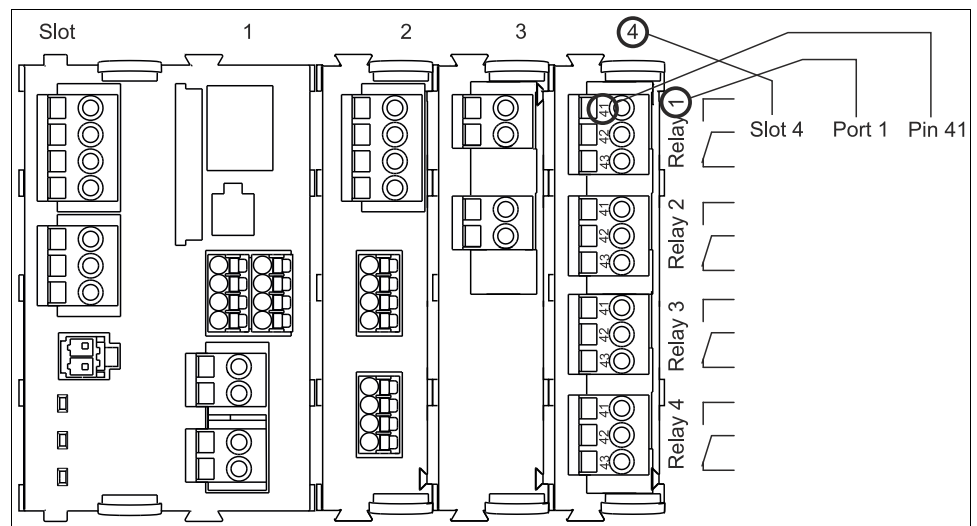
Terminal diagram

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

Example, NO contact of a relay:

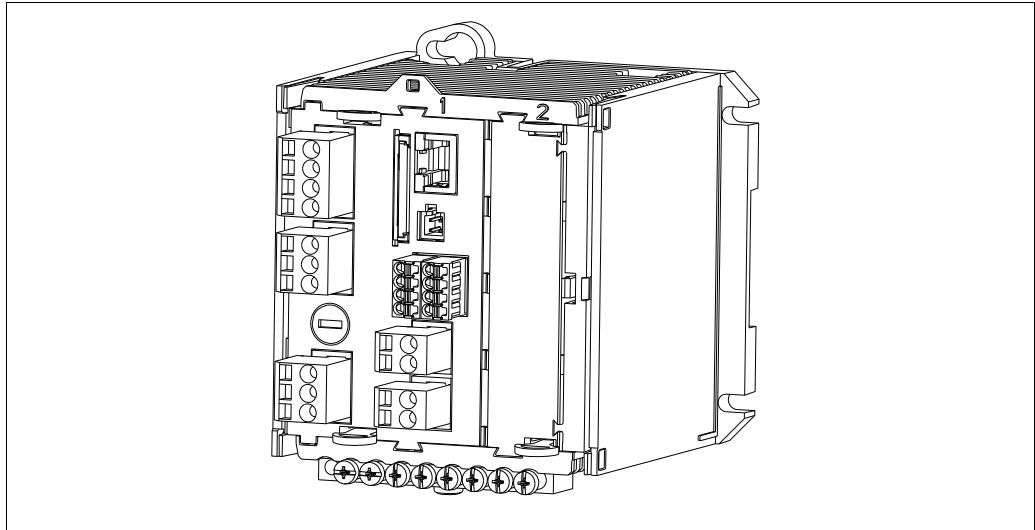
Device with 4 inputs for digital sensors, 4 current outputs and 4 relays

- 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 taking the example of the NO contact (terminal 41) of a relay

Device configuration using the example of a CM442R-****M1A1F0***

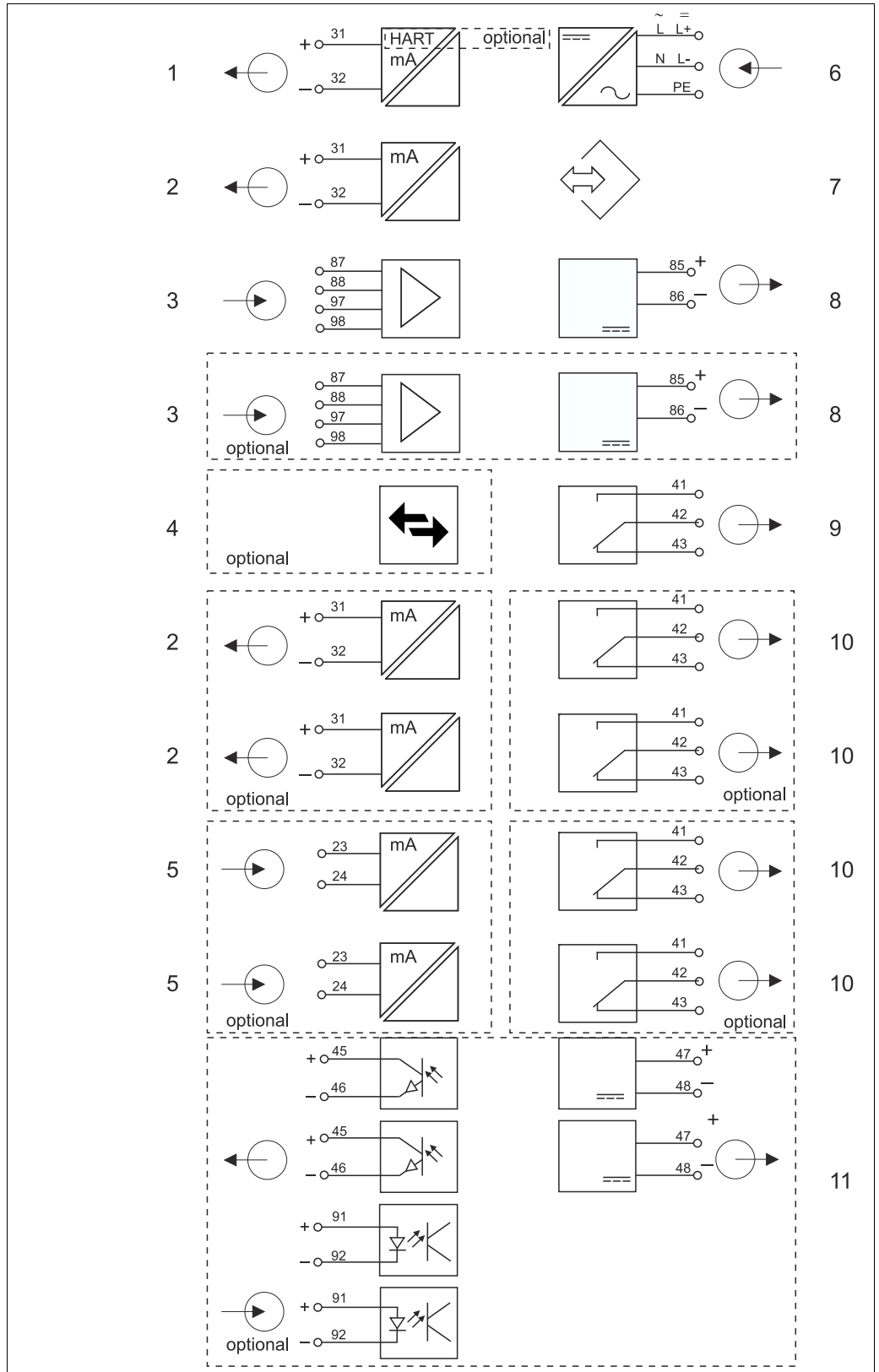


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CM442R-****M1A1F0***

Ordered basic device (example)	<ul style="list-style-type: none"> ▪ Order code CM442R-**M1A1F0* ▪ Functionality: 1 x Memosens, 2 current outputs without HART, no extension module
Extension options without additional modules	<ul style="list-style-type: none"> ▪ Second Memosens input (7114663) ▪ HART with activation code (71128428)
Extension options by using an extension module in free slot 2	<ul style="list-style-type: none"> ▪ Ethernet/PROFIBUS DP/Modbus with module 485 incl. activation code for the desired communication type: <ul style="list-style-type: none"> - PROFIBUS DP (71140888) - Modbus RS485 (71140889) - Modbus TCP (71140890) - EtherNet/IP (71219868) - Only Ethernet without fieldbus (71135634) If fieldbus communication is subsequently required, an activation code is needed for this. i If you retrofit a 485 module, any existing current outputs are disabled! ▪ Additional inputs or outputs, relays: <ul style="list-style-type: none"> - Module 2AI (71135639): 2 current inputs - Module 2AO (71135632): 2 current outputs - Module AOR (71111053): 2 current outputs, 2 relays - Module 2R (71125375) or 4R (71125376): 2 or 4 relays - Module DIO (71135638): 2 digital inputs and 2 digital outputs
Basic rule for extensions	The sum of all current inputs and outputs may not exceed 8!
Restrictions if using CUS71D sensors for interface measurement	<ul style="list-style-type: none"> ▪ Only one CUS71D can be connected. The second Memosens input may not be used.
Product Configurator	www.products.endress.com/cm442r

Function diagram CM442R

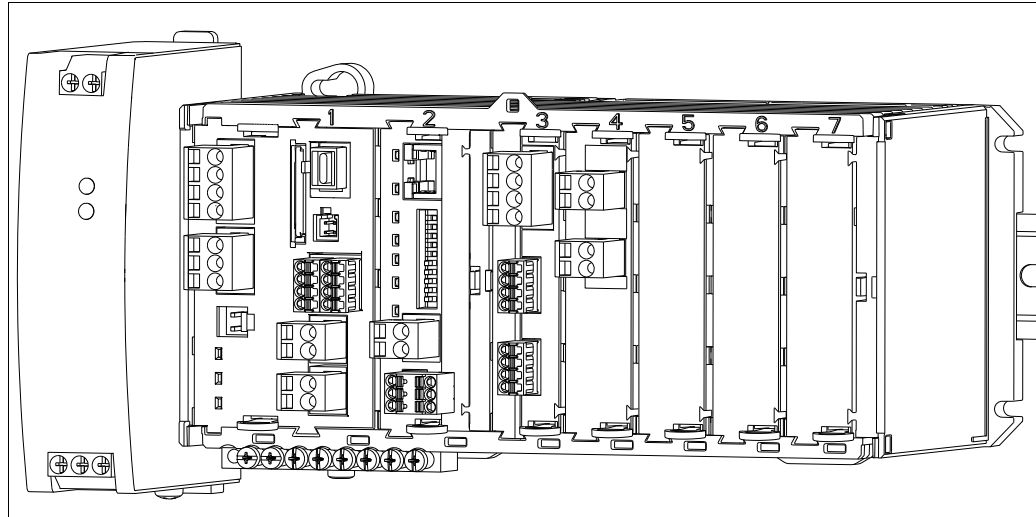


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Function diagram CM442R

- | | | | |
|---|--|----|---|
| 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 relays |
| 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 CM444R-
**M42A1FA*

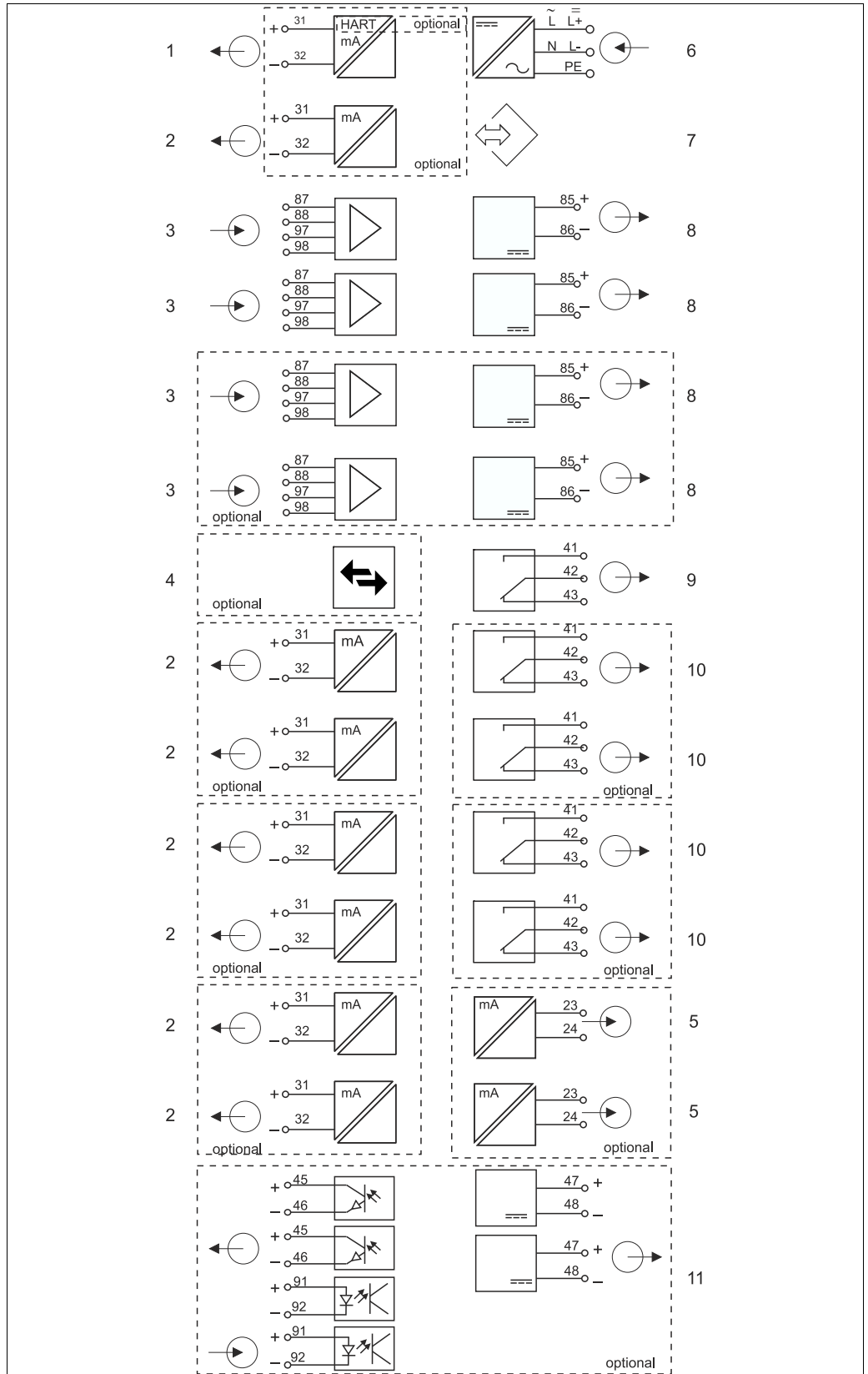


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CM444R-**M42A1FA*

Ordered basic device (example)	<ul style="list-style-type: none"> ▪ Order code CM444R-**M42A1FA* ▪ Functionality: <ul style="list-style-type: none"> - 4 x Memosens (2 on BASE-E module + 2 on an extension module 2DS) - PROFIBUS communication (module 485) - 2 current outputs without HART (on BASE-E module) - 2 current inputs (module 2AI) ▪ 3 slots are still free in this example. More or fewer slots can be free in other versions.
Extension options without additional modules	None
Modification options without additional modules	<ul style="list-style-type: none"> ▪ Communication type changed by entering activation code This disables the communication type used previously! <ul style="list-style-type: none"> - Modbus RS485 (71135636) - Modbus TCP (71135637) - EtherNet/IP (71219868) ▪ Retrofit to HART by removing module 485 and entering activation code for HART (71128428)
Extension options by using extension modules in free slots 5-7	<ul style="list-style-type: none"> ▪ Additional inputs or outputs, relays: <ul style="list-style-type: none"> - Module 2AI (71135639): 2 current inputs - Module AOR (71111053): 2 current outputs, 2 relays - Module 2R (71125375) or 4R (71125376): 2 or 4 relays - Module DIO (71135638): 2 digital inputs and 2 digital outputs ▪ If fieldbus module 485 is used, no other current outputs are available!
Device upgrade to CM448R	6 or 8 measuring channels by using one or two Memosens input modules 2DS (71135631)
Basic rule for extensions	The sum of all current inputs and outputs may not exceed 8!
Restrictions if using CUS71D sensors for interface measurement	<ul style="list-style-type: none"> ▪ Any combination of a maximum of 4 Memosens sensors is possible with CM444R. ▪ An extension to CM448R is not advisable as the maximum number of Memosens inputs remains limited to 4 if a CUS71D is used.
Product Configurator	www.products.endress.com/cm444r

Function diagram CM444R

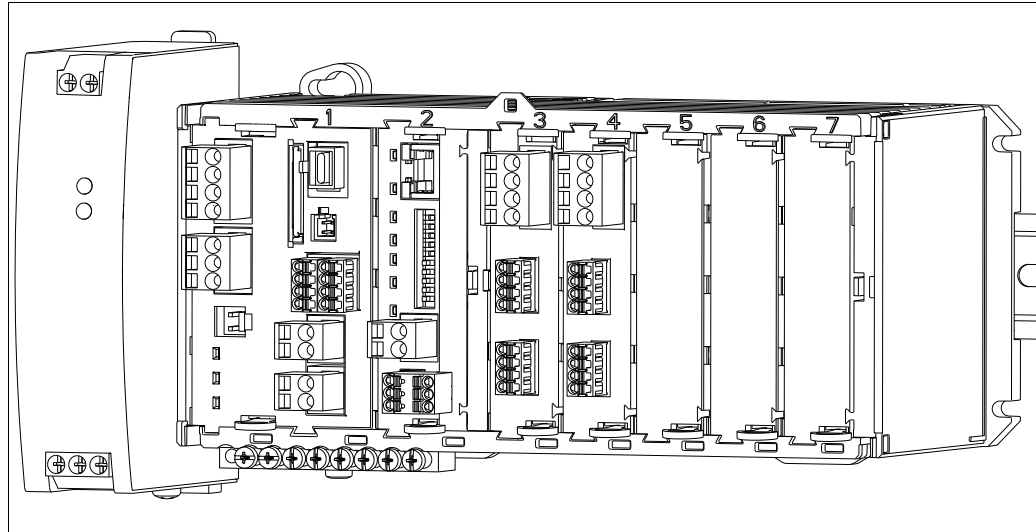


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Function diagram CM444R

- | | | | |
|---|--|----|--|
| 1 | Current output 1:1 + HART (both optional) | 6 | Power supply (on separate DIN rail power unit) |
| 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 relays |
| 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 CM448R-**26A1*

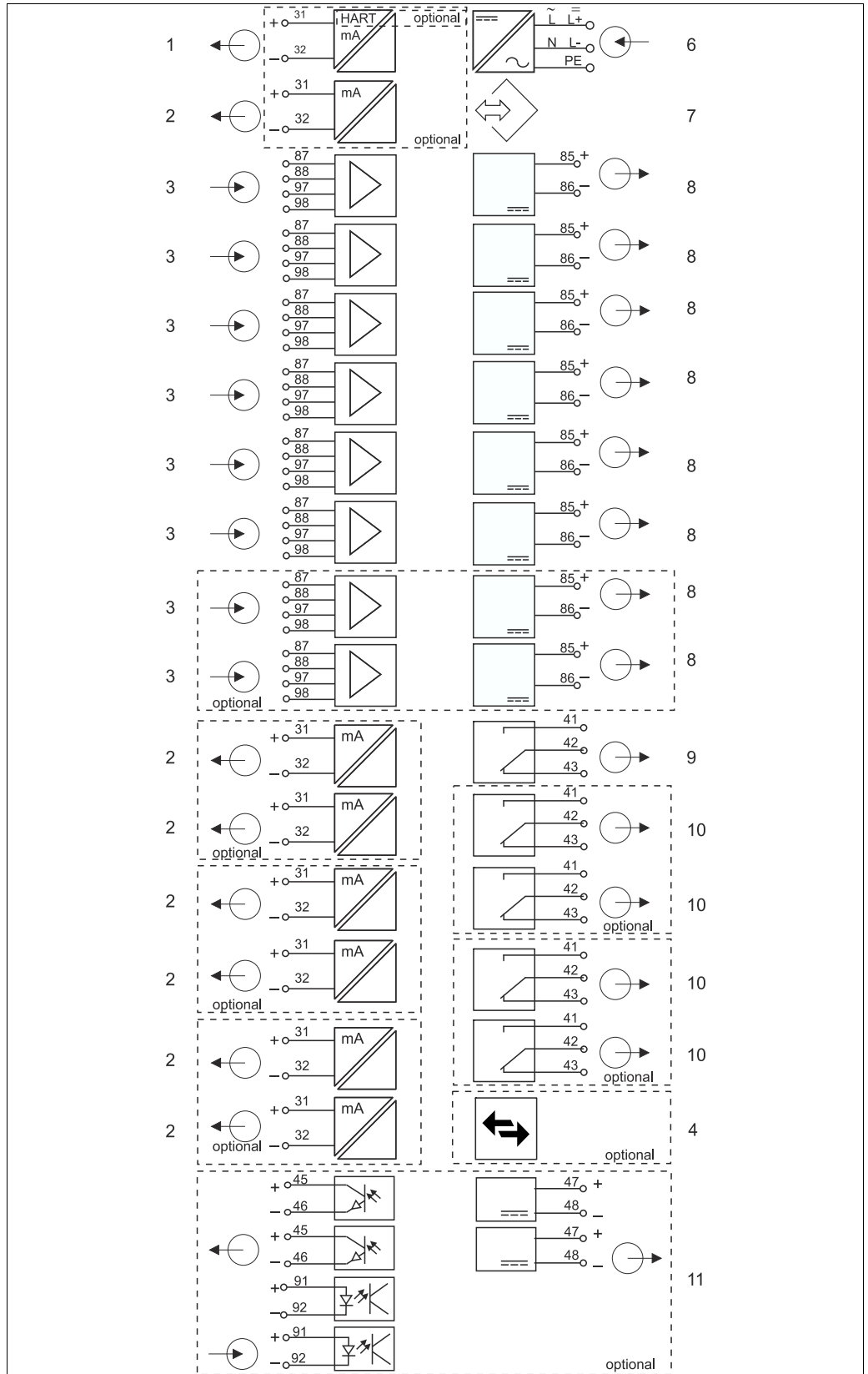


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CM448R-**26A1*

<p>Ordered basic device (example)</p>	<ul style="list-style-type: none"> ▪ Order code CM448R-**26A1* ▪ Functionality: <ul style="list-style-type: none"> - 6 x Memosens (2 on BASE-E module + 2 on two extension modules 2DS) - PROFIBUS communication (module 485) ▪ 3 slots are still free in this example. More or fewer slots can be free in other versions.
<p>Extension options without additional modules</p>	<p>None</p>
<p>Modification options without additional modules</p>	<ul style="list-style-type: none"> ▪ Communication type changed by entering activation code This disables the communication type used previously! <ul style="list-style-type: none"> - Modbus RS485 (71135636) - Modbus TCP (71135637) - EtherNet/IP (71219868) ▪ Retrofit to HART by removing module 485 and entering activation code for HART (71128428)
<p>Extension options by using extension modules in free slots 5-7</p>	<p>Only the following is possible for the example above:</p> <ul style="list-style-type: none"> ▪ Module 2R (71125375) or 4R (71125376): 2 or 4 relays <p>If extending to eight measuring channels:</p> <ul style="list-style-type: none"> ▪ Module 2DS (71135631): 2 Memosens inputs ▪ Use of the 2 current outputs in the basic module by entering activation code (71140891) <p>Additional inputs or outputs and relays if fieldbus module 485 is removed:</p> <ul style="list-style-type: none"> ▪ Module 2AO (71135632): 2 current outputs ▪ Module AOR (71111053): 2 current outputs, 2 relays ▪ Module 2R (71125375) or 4R (71125376): 2 or 4 relays ▪ Module DIO (71135638): 2 digital inputs and 2 digital outputs
<p>Basic rule for extensions</p>	<p>The sum of all current inputs and outputs may not exceed 8!</p>
<p>Restrictions if using CUS71D sensors for interface measurement</p>	<p>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.</p>
<p>Product Configurator</p>	<p>www.products.endress.com/cm448r</p>

Function diagram CM448R



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Function diagram CM448R

- | | | | |
|---|---|----|---|
| 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 relays |
| 4 | PROFIBUS DP/Modbus/Ethernet (optional) | 10 | 2 or 4 x relays (optional) |
| 6 | Power supply (on separate DIN rail power unit) | 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
 - EtherNet/IP
- 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:

- CM442R:
 - Current outputs cannot be used in parallel. Any existing current outputs are deactivated with the installation of 485.
- CM444R/CM448R:
 - 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.

i Upper and lower limit values can be enabled or disabled independently of one another for the SCS.

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)

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 with the tables set down in the standards. An alarm is triggered if the limit value is exceeded. In addition, a prealarm can be set that flags undesirable operating statuses before they occur.

ChemocleanPlus

Freely programmable sequence control

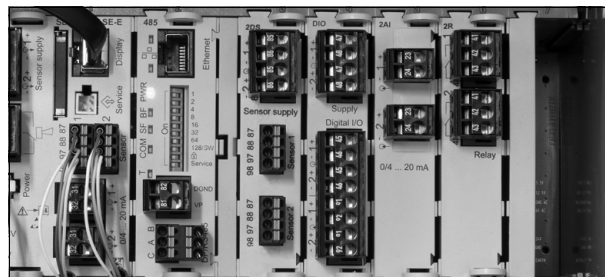
- e.g. for automatic sensor cleaning in retractable assemblies for reliable measurement results in processes with a high risk of contamination
- Individual, time-based activation of 4 outputs e.g. relays
- Starting, stopping or pausing of activities via digital input or fieldbus signals e.g. from limit position switches

Maintainability

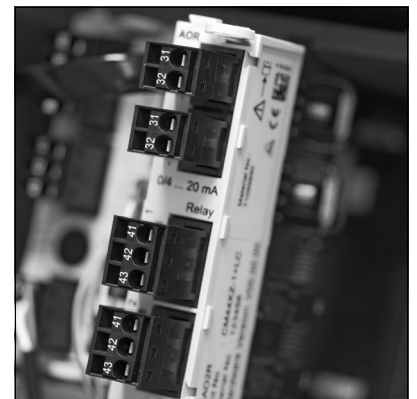
Modular design

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: external graphic display for cabinet installation or portable service display for commissioning



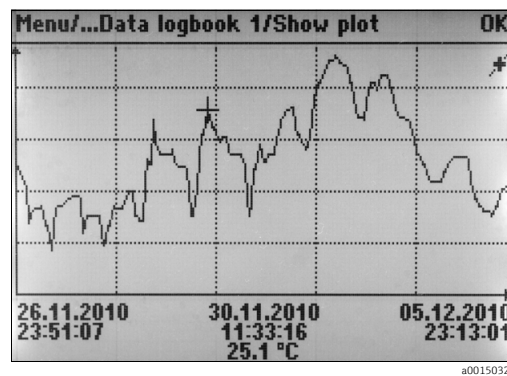
CM448R: example



Fitting the extension module

Data logger function

- Adjustable scan time: 1 to 3600 s (1 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.

FieldCare and Field Data Manager

FieldCare

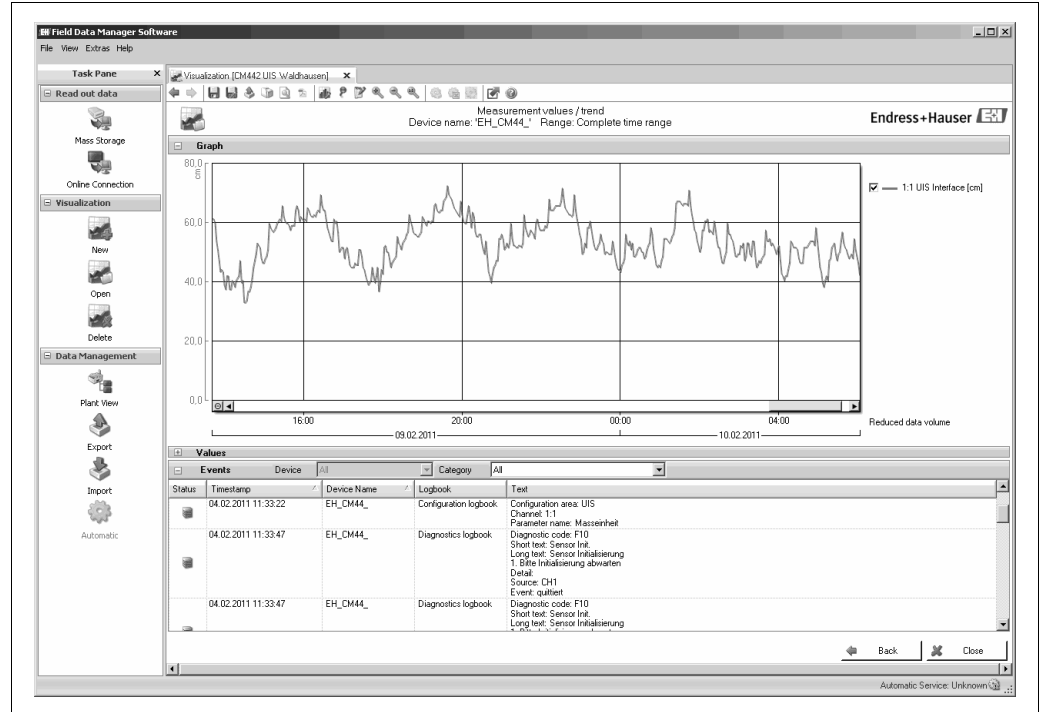
Configuration and asset management software based on FDT/DTM technology

- 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

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.

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

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.

Measuring range switching for conductivity

- Can be used in CIP processes e.g. for safe monitoring of phase separations
- Switching between 4 complete parameter sets:
 - Conductivity operating mode
 - Concentration tables
 - Temperature compensation
 - Output signal range
 - Limit value switch
- Via digital inputs or fieldbus

Measured value compensation for oxygen and conductivity

- Pressure or temperature compensation
- Input signals from external sensors via current input or fieldbus
- Signals from connected temperature sensors

Password protection

Password-protected login

- For remote operation via web server
- For local operation

Process safety

Two independent PID controllers

- One- or two-sided control
- Limit switches
- 4 cleaning programs which can be programmed independently of each other

IT security

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

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves. Support in the performance of this task can be requested from Endress+Hauser.

Input

Measured variables	--> Documentation of the connected sensor
Measuring ranges	--> Documentation of the connected sensor
Types of input	<ul style="list-style-type: none"> ■ Digital sensor inputs for sensors with Memosens protocol ■ Analog current inputs (optional) ■ Digital inputs (optional)
Input signal	Depending on the version <ul style="list-style-type: none"> ■ 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 30 V
Cable specification	<p>Cable type</p> Memosens data cable CYK10 or fixed sensor cable, each with cable end sleeves or M12 round pin plug
	<p>Cable length</p> Max. 100 m (330 ft)

Digital inputs, passive

Electrical specification	<ul style="list-style-type: none"> ■ drawing power (passive) ■ galvanically isolated
Span	High: 11 to 30 V DC Low: 0 to 5 V DC
Nominal input current	Max. 8 mA
PFM function	Minimum pulse width: 500 μ s (1 kHz)

Current input, passive

Span	> 0 to 20 mA
Signal characteristic	Linear
Internal resistance	Non-linear
Testing voltage	500 V

Output

Output signal

Depends on the version:

- 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
- Optional HART communication (only via current output 1:1)

HART

Signal encoding	FSK \pm 0.5 mA above current signal
Data transmission rate	1200 baud
Galvanic isolation	Yes
Load (communication resistor)	250 Ω

PROFIBUS DP/RS485

Signal encoding	EIA/TIA-485, PROFIBUS-DP-compliant as per 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
Bus termination	Internal slide switch with LED display

Modbus RS485

Signal encoding	EIA/TIA-485
Data transmission rate	2400, 4800, 9600, 19200, 38400, 57600 and 115200 Baud
Galvanic isolation	Yes
Bus termination	Internal slide switch with LED display

Ethernet and Modbus TCP

Signal encoding	IEEE 802.3 (ethernet)
Data transmission rate	10 / 100 MBd
Galvanic isolation	Yes
IP address	DHCP or configuration via menu

EtherNet/IP

Signal encoding	IEEE 802.3 (ethernet)
Data transmission rate	10 / 100 MBd
Galvanic isolation	Yes
Connection	RJ45
IP address	DHCP (default) or configuration via menu

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

Electrical specification	<ul style="list-style-type: none"> ▪ passive ▪ open collector, max. 30 V, 15 mA
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PFM function	Minimum pulse width: 500 μ s (1 kHz)
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Auxiliary voltage	Electrical specification <ul style="list-style-type: none"> ▪ galvanically isolated ▪ unregulated, 24 V DC \pm 20% ▪ max. 50 mA
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Current outputs, active

Span	0 to 23 mA 2.4 to 23 mA for HART communication
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Signal characteristic	Linear
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Electrical specification	Output voltage Max. 24 V Testing voltage 500 V
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Cable specification	Cable type Recommendation: shielded cable Cable specification Max. 2.5 mm ² (14 AWG)
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Relay outputs

Electrical specification

Relay types

- 1 one-pin changeover contact (alarm relay)
- 2 or 4 one-pin changeover contacts, (optionally with extension modules)

Relay switching capacity

Basic module (Alarm relay)

Switching voltage	Load (max.)	Switching cycles (min.)
230 V AC, $\cos\phi = 0.8$ to 1	0.1 A	700,000
	0.5 A	450,000
115 V AC, $\cos\phi = 0.8$ 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, $\cos\phi = 0.8$ to 1	0.1 A	700,000
	0.5 A	450,000
	2 A	120,000
115 V AC, $\cos\phi = 0.8$ 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 mm² (14 AWG)

Protocol-specific data

HART

Manufacturer ID	11 _h
Device type	119C _h (CM44x), 119D _h (CSFxx)
Device revision	001 _h
HART version	7.2
Device description files (DD/DTM)	www.endress.com Device Integration Manager (DIM)
Device variables	16 user-definable and 16 predefined device variables, dynamic variables PV, SV, TV, QV
Supported features	PDM DD, AMS DD, DTM, Field Xpert DD

PROFIBUS DP

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

Modbus RS485

Protocol	RTU / ASCII
Function codes	03, 04, 06, 08, 16, 23
Broadcast supported 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), 8 digital values (value, status), diagnostic information
Supported features	Address can be configured via switches or the software

Modbus TCP

TCP port	502
TCP connections	3
Protocol	TCP
Function codes	03, 04, 06, 08, 16, 23
Broadcast supported 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), 8 digital values (value, status), diagnostic information
Supported features	Address can be configured via DHCP or the software

EtherNet/IP

Protocol	EtherNet/IP	
ODVA certification	Yes	
Device profile	Generic device (product type: 0x2B)	
Manufacturer ID	0x049E _h	
Device type ID	0x109C _h	
Polarity	Auto-MIDI-X	
Connections (max.)	CIP	12
	I/O	6
	Explicit message	6
	Multicast	3 consumers
Minimum RPI	100 ms (default)	
Maximum RPI	10000 ms	
System integration	EtherNet/IP	EDS
	Rockwell	Add-on Profile Level 3, Faceplate for FactoryTalk SE
IO data	Input (T --> O)	Device status and diagnostic message with highest priority Measured values: <ul style="list-style-type: none"> ▪ 16 AI (analog input) + Status + Unit ▪ 8 DI (discrete input) + Status
	Output (O --> T)	Actuating values: <ul style="list-style-type: none"> ▪ 4 AO (analog output) + status + unit ▪ 8 DO (discrete output) + Status

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.

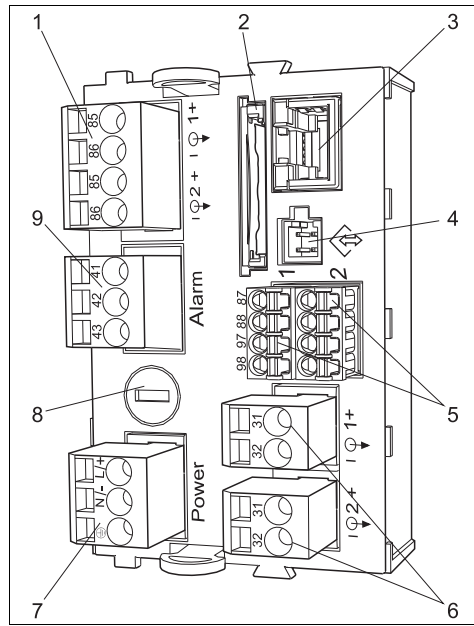
TCP port	80
Supported features	<ul style="list-style-type: none"> ▪ Remote-controlled device configuration (1 session) ▪ Device configuration saved/restored ▪ Logbook export (file formats: CSV, FDM) ▪ Web server accessed via DTM or Internet Explorer ▪ Login ▪ Web server can be switched off

Power supply

Supply voltage	<p>CM442R Depending on the version: 100 to 230 V AC \pm 15%, 50/60 Hz 24 V AC/DC +20/-15 %, 50/60 Hz</p> <p>CM444R and CM448R Via external DIN rail power unit depending on version: 100 to 230 V AC \pm 15%, 50/60 Hz 24 V DC +20 / -15 %</p> <p>NOTICE The device does not have a power switch</p> <ul style="list-style-type: none"> ▶ You must provide a protected circuit breaker in the vicinity of the device. ▶ This must be a switch or a power-circuit breaker and you must label it 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	<p>CM442R Depending on supply voltage</p> <ul style="list-style-type: none"> ■ 100 to 230 V AC and 24 V AC: Max. 55 VA ■ 24 V DC: Max. 22 W <p>CM444R and CM448R Depending on supply voltage</p> <ul style="list-style-type: none"> ■ 100 to 230 V AC: Max. 150 VA ■ 24 V DC: Max. 59 W
Fuse	<p>CM442R 5x20 mm, 250 V, 4.0 A, slow-blow (T4.0A)</p> <p>CM444R and CM448R Fuse cannot be replaced</p>

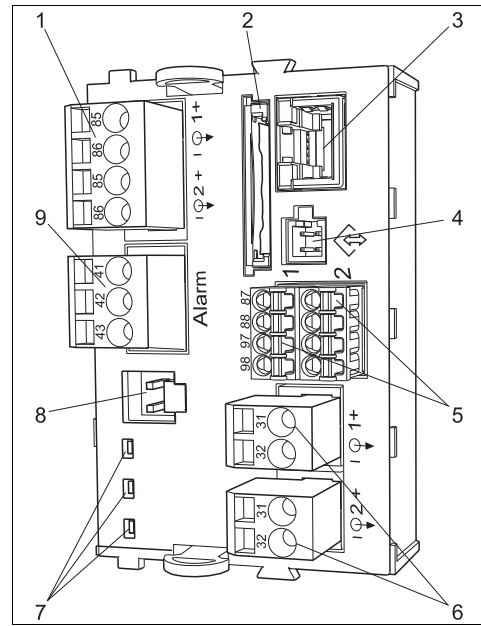
Electrical connection

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 cable¹⁾
- 4 Service interface
- 5 Connections for 2 Memosens sensors
- 6 Current outputs
- 7 Power connection
- 8 Fuse
- 9 Alarm relay connection

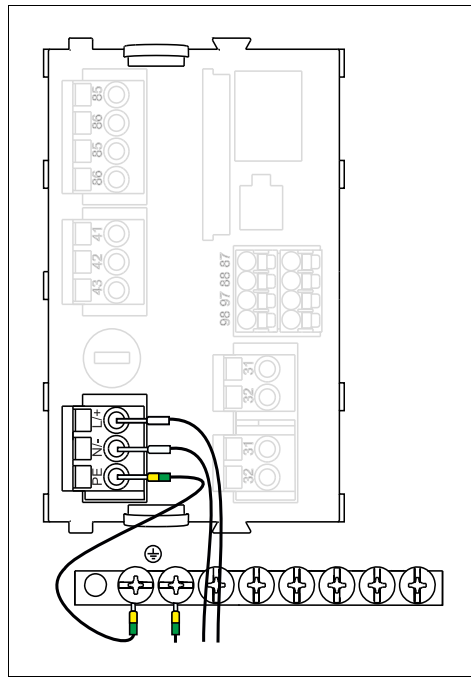


Basic module BASE-E (four- and eight-channel device)

- 1 Power supply for digital fixed cable sensors with Memosens protocol
- 2 SD card slot
- 3 Slot for display cable¹⁾
- 4 Service interface
- 5 Connections for 2 Memosens sensors
- 6 Current outputs
- 7 LEDs
- 8 Socket for internal supply cable²⁾
- 9 Alarm relay connection

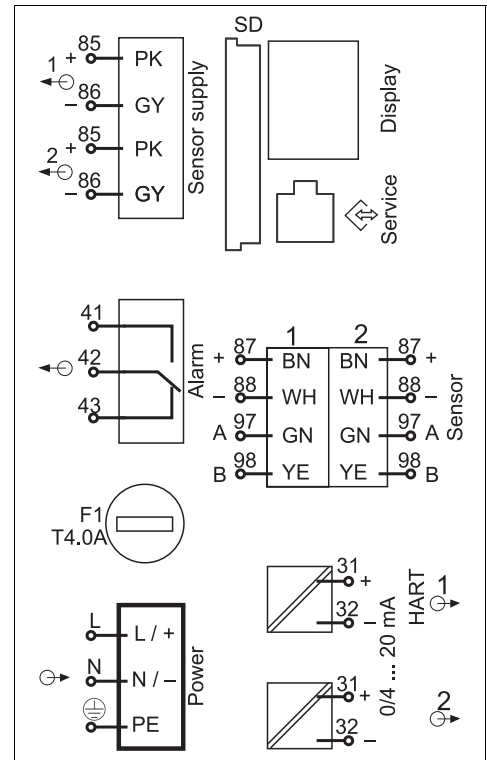
- 1) For optional external display
- 2) Power supply for DIN rail power unit

Connecting supply voltage for CM442R



Power supply connection on BASE-H or -L

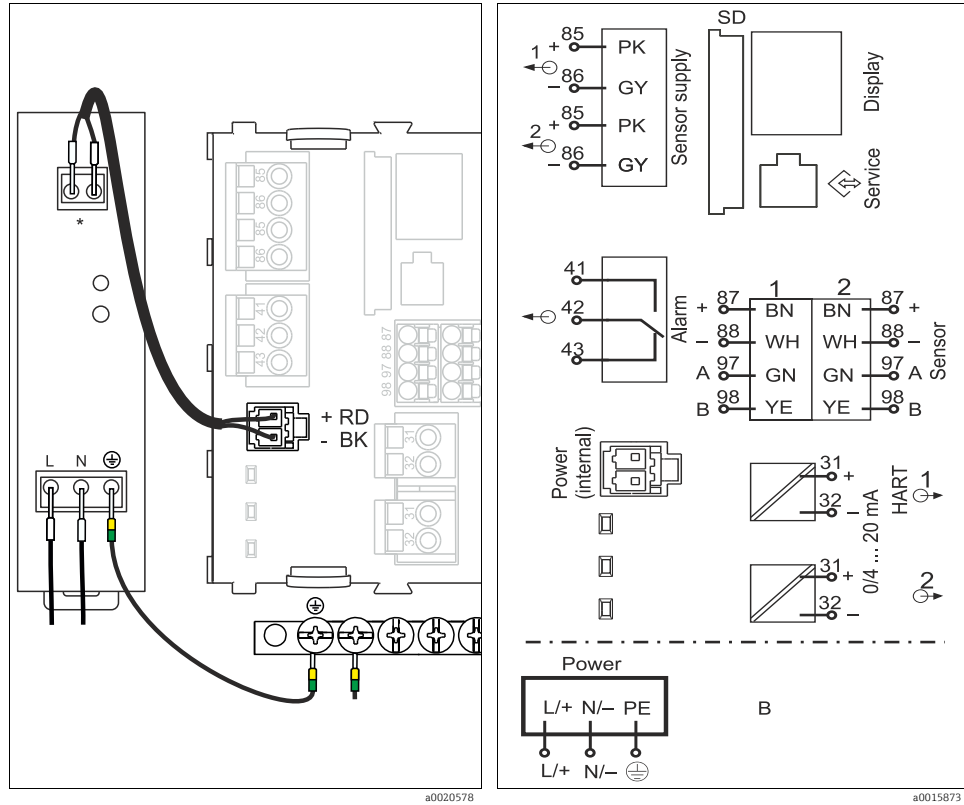
H Power unit 100 to 230 VAC
 L Power unit 24 VAC or 24 VDC



Overall wiring diagram BASE-H or -L

Connecting supply voltage for CM444R and CM448R

i Both device versions must be operated exclusively using the power unit provided, including its cable. Also comply with the instructions in the Operating Instructions supplied with the power unit.



Power supply connection with BASE-E

Overall wiring diagram BASE-E

* Assignment depending on power unit, ensure that the connection is correct

B External power unit

Connecting optional modules

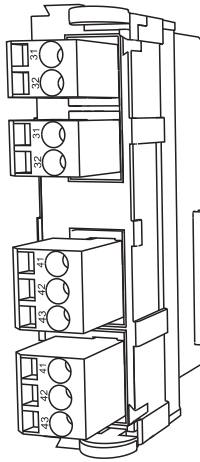
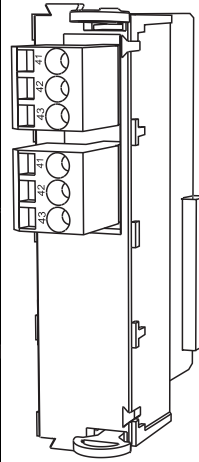
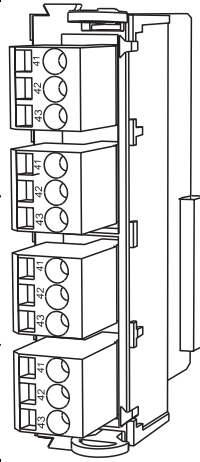
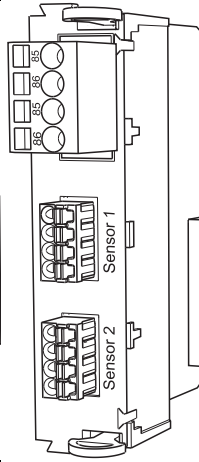
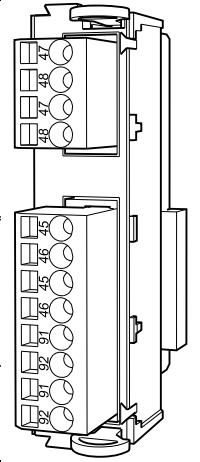
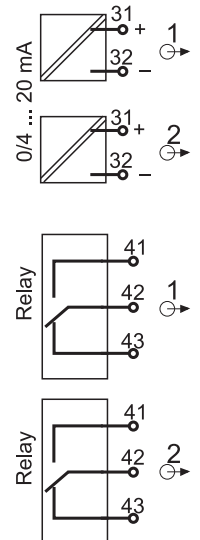
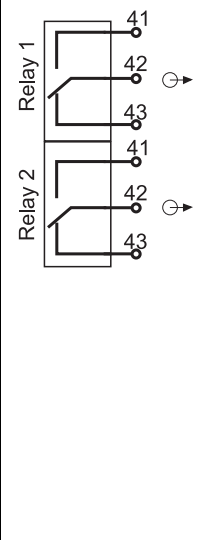
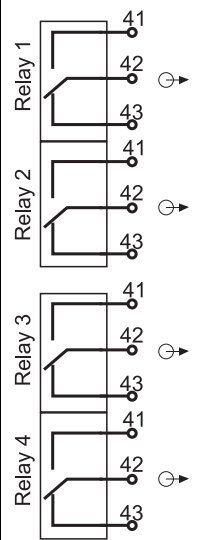
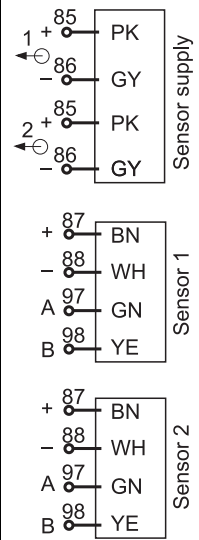
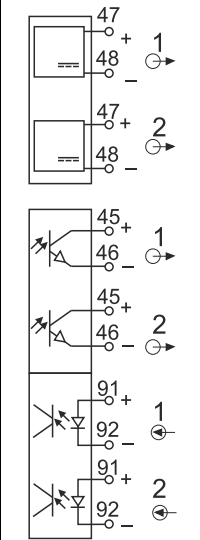
With extension modules you can purchase additional functions for your device.

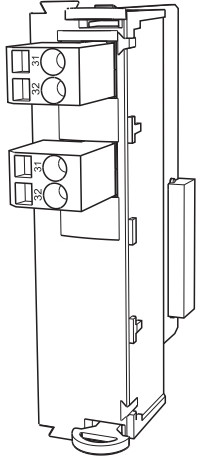
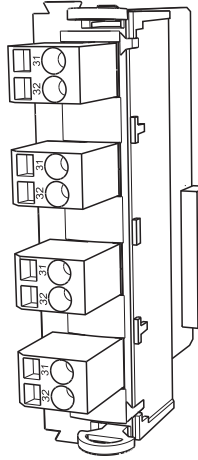
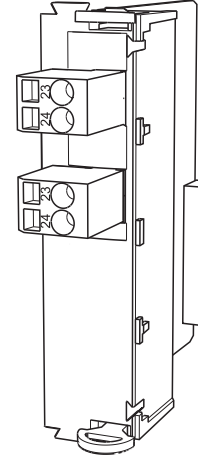
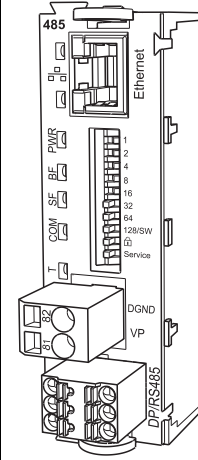
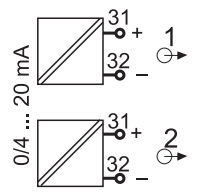
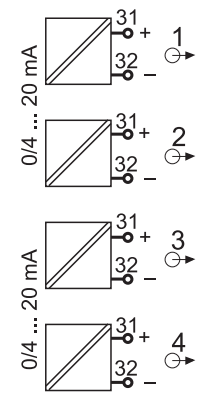
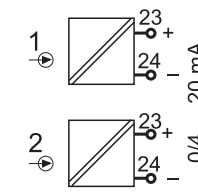
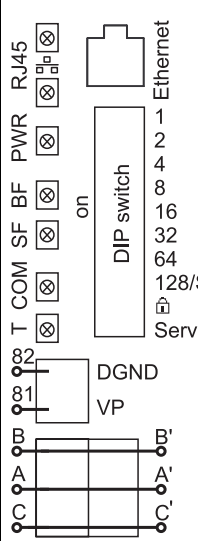
NOTICE

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

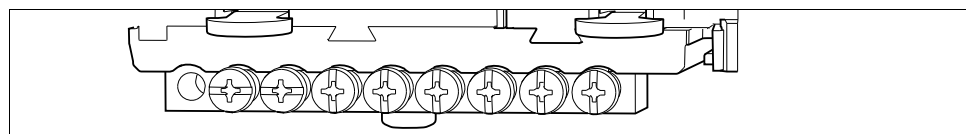
- ▶ If you are planning to extend your controller, make sure the resulting hardware combination is permitted (Configurator at www.products.endress.com/cm442r or .../cm444r or .../CM448r).
- ▶ Remember that the sum of all current inputs and outputs may not exceed 8!
- ▶ Please contact your Endress+Hauser sales center should you have any questions.

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

Module name			
2AO	4AO	2AI	485
			
a0015750	a0015751	a0015752	a0015753
<ul style="list-style-type: none"> 2 x 0/4 to 20 mA analog outputs Order no. 71135632 	<ul style="list-style-type: none"> 4 x 0/4 to 20 mA analog outputs Order no. 71135633 	<ul style="list-style-type: none"> 2 x 0/4 to 20 mA analog inputs Order no. 71135639 	<ul style="list-style-type: none"> Ethernet (web server or Modbus TCP) 5V power supply for PROFIBUS DP termination RS485 (PROFIBUS DP or Modbus RS485) Order no. 71135634
			
a0015759	a0015760	a0015761	a0015762

i **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.

Functional ground connection



Mounting rail for functional ground connections

Sensor connection

Sensors with Memosens protocol

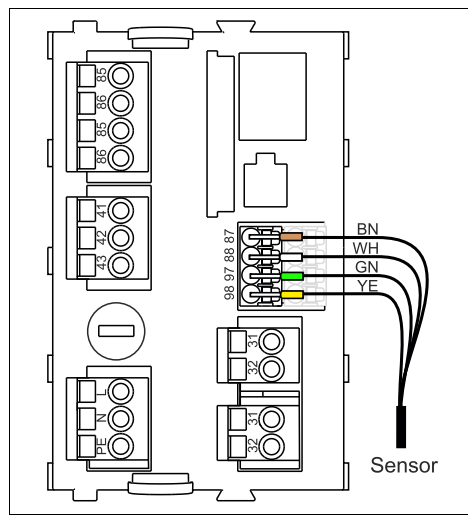
Sensor types	Sensor cable	Sensors
Digital sensors without additional internal power supply	CYK10 with plug-in connection and inductive signal transmission	<ul style="list-style-type: none"> ▪ pH sensors ▪ ORP sensors ▪ Combined sensors ▪ Amperometric oxygen sensors ▪ Conductive conductivity sensors ▪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

The following rule applies if connecting CUS71D sensors:

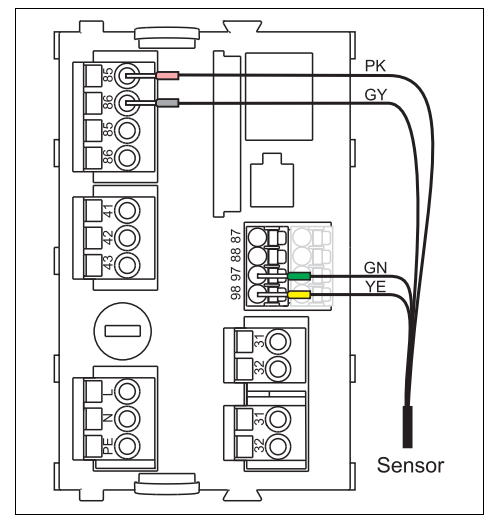
- CM442R
 - Only one CUS71D is possible; an additional sensor is not permitted.
 - The second sensor input may also not be used for another type of sensor.
- CM444R
 - No restrictions. All the sensor inputs can be used as required.
- CM448R
 - If a CUS71D is connected, the number of sensor inputs that 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

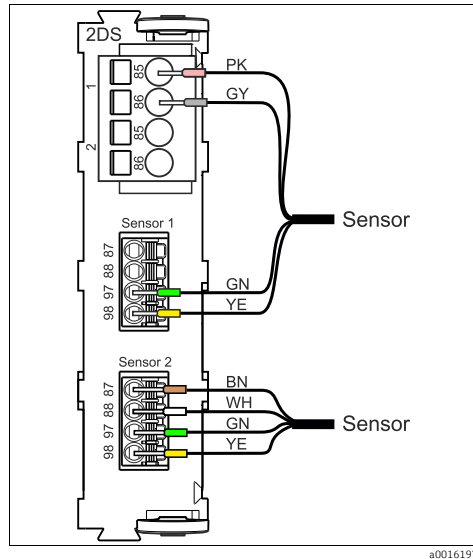
1. Sensor cable directly connected to the terminal connector of the sensor module 2DS or the basic module -L, -H or -E



Sensors without additional supply voltage



Sensors with additional supply voltage



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

Performance characteristics

Response time

Current outputs

t_{90} = max. 500 ms for an increase from 0 to 20 mA

Current inputs

t_{90} = max. 330 ms for an increase from 0 to 20 mA

Digital inputs and outputs

t_{90} = max. 330 ms for an increase from low to high

Reference temperature

25 °C (77 °F)

Maximum measured error of sensor inputs

--> Documentation of the connected sensor

Measured error for current inputs and outputs

Typical measured errors:
 < 20 μ A (for current values < 4 mA)
 < 50 μ A (for current values
 4 to 20 mA)
 each at 25 °C (77 °F)

Additional measured error depending on the temperature:
 < 1.5 μ A/K

Frequency tolerance of digital inputs and outputs

≤ 1 %

Resolution of current inputs and outputs

< 5 μ A

Repeatability

--> Documentation of the connected sensor

Installation

DIN rail mounting

Mounting on DIN rail as per IEC 60715

NOTICE

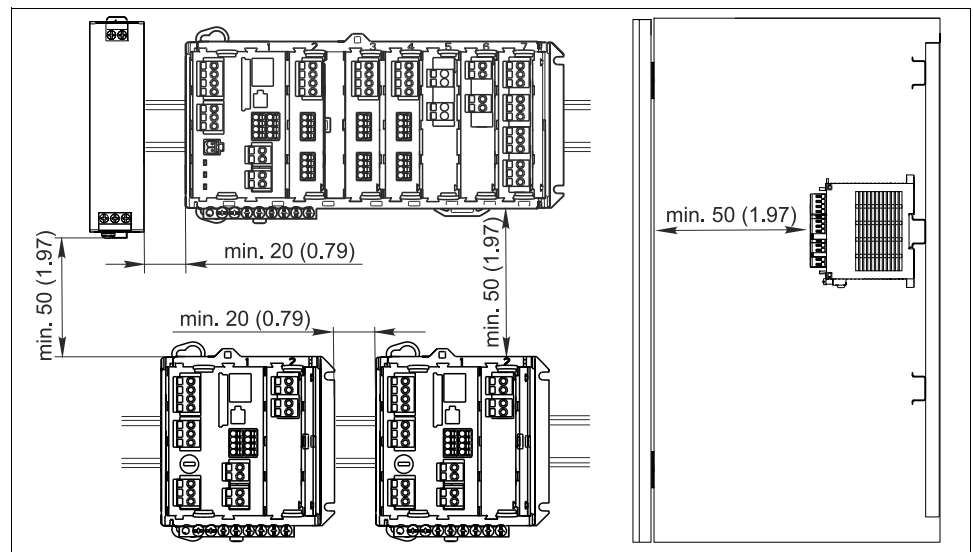
Incorrect mounting location in cabinet, safety distances not observed

Possible failure as a result of heat generation, interference from neighboring devices

- ▶ Do not position the device directly above sources of heat. Comply with temperature specifications.
- ▶ The components are designed for convection-based cooling. Avoid heat build-up and ensure openings are not covered over (by cables, for instances).
- ▶ Make sure to maintain the specified distances to other devices.
- ▶ Physically separate the device from frequency converters and high-voltage instruments.
- ▶ Recommended installation direction: horizontal. The specified ambient conditions, and particularly the ambient temperatures, only apply for this orientation.
- ▶ A vertical alignment is possible. For this, however, you must provide additional fixing clamps at the point of installation to hold the device in position on the DIN rail.
- ▶ Recommended installation position of the power unit on CM444R and CM448R devices: to the left of the device.

The following minimum spacing must be observed:

- Distances at the side in relation to other devices incl. power units and to the wall of the cabinet:
At least 20 mm (0.79 inch)
- Above and below the device and with regard to the depth of the device (in relation to the cabinet door or other devices installed there):
At least 50 mm (1.79 inch)

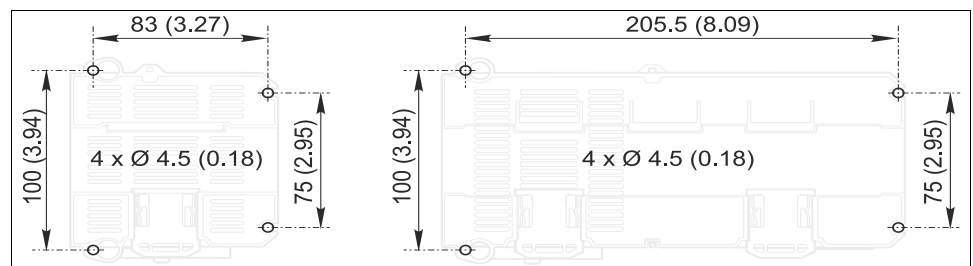


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Minimum distances in mm (inch)

Wall mounting

Using eyelets and slotted holes on housing

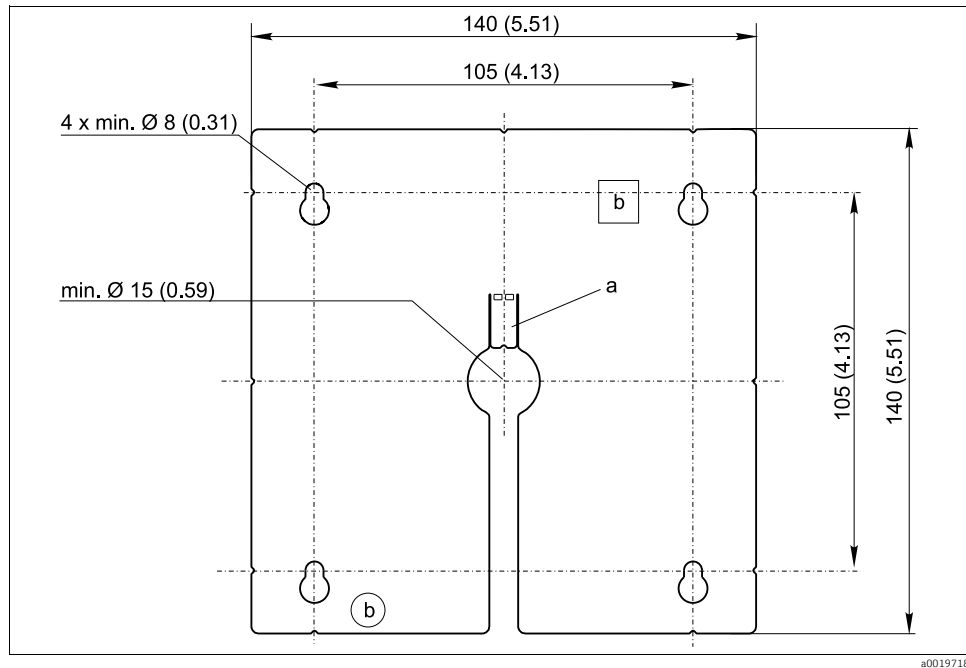


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Hole pattern for wall mounting in mm (inch)

Mounting the external display

- i** The mounting plate also acts as the drilling template. The marks at the side help you mark out the position for the drill holes.



Mounting plate for external display in mm (inch)

- a* Holding clip
b Production-related cut-outs, no function for user

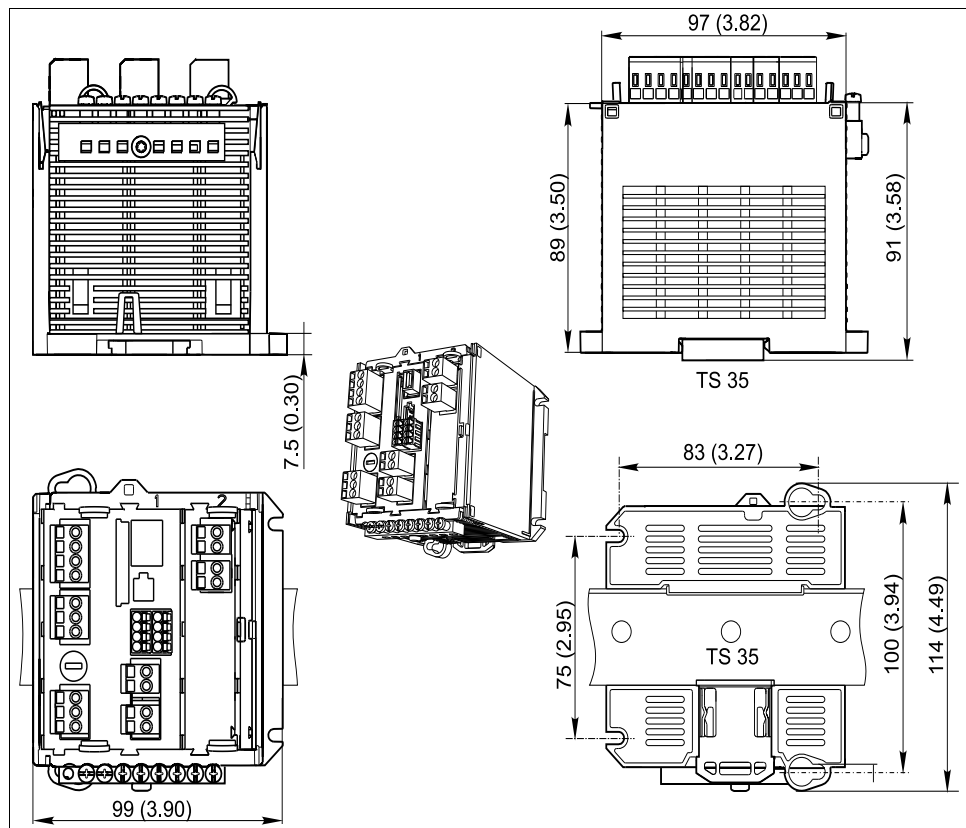
Environment

Ambient temperature range	CM442R 0 to 60 °C (32 to 140 °F)										
	CM444R <ul style="list-style-type: none"> ■ Generally 0 to 55 °C (32 to 130 °F), with the exception of packages under the second point in the list. ■ 0 to 50 °C (32 to 120 °F) for the following packages: <ul style="list-style-type: none"> - CM444R-***M40A7FI*+... - CM444R-***M40A7FK*+... 										
	CM448R <ul style="list-style-type: none"> ■ Generally 0 to 55 °C (32 to 130 °F), with the exception of packages under the second point in the list. ■ 0 to 50 °C (32 to 120 °F) for the following packages: <ul style="list-style-type: none"> - CM448R-***6AA*+... - CM448R-***8A4*+... - CM448R-***8A5*+... - CM448R-***28A3*+... - CM448R-***38A3*+... - CM448R-***48A3*+... - CM448R-***58A3*+... - CM448R-***68A3*+... - CM448R-***26A5*+... - CM448R-***36A5*+... - CM448R-***46A5*+... - CM448R-***56A5*+... - CM448R-***66A5*+... - CM448R-***22A7*+... - CM448R-***32A7*+... - CM448R-***42A7*+... - CM448R-***52A7*+... - CM448R-***62A7*+... 										
External display (optional) -20 to 60 °C (0 to 140 °F)											
Storage temperature	-25 to 85 °C (-13 to 185 °F)										
Relative humidity	DIN rail device 5 to 85%, not condensing										
	External display (when installed) 10 to 95%, not condensing										
Degree of protection	DIN rail device Shock protection IP20										
	External display IP 66 at front, when installed correctly and using appropriate protective enclosure										
Climate class	As per 60654-1: B2										
Vibration resistance	Environmental tests Vibration test based on DIN EN 60068-2, October 2008 Vibration test based on DIN EN 60654-3, August 1998										
	Wall mounting										
	<table border="0"> <tr> <td>Frequency range</td> <td colspan="2">10 to 150 Hz (sinusoidal)</td> </tr> <tr> <td rowspan="2">Amplitude</td> <td>10 to 12.9 Hz:</td> <td>0.75 mm</td> </tr> <tr> <td>12.9 to 150 Hz:</td> <td>0.5 g¹⁾</td> </tr> <tr> <td>Test duration</td> <td colspan="2">10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min)</td> </tr> </table>	Frequency range	10 to 150 Hz (sinusoidal)		Amplitude	10 to 12.9 Hz:	0.75 mm	12.9 to 150 Hz:	0.5 g ¹⁾	Test duration	10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min)
Frequency range	10 to 150 Hz (sinusoidal)										
Amplitude	10 to 12.9 Hz:	0.75 mm									
	12.9 to 150 Hz:	0.5 g ¹⁾									
Test duration	10 frequency cycles/ spatial axis, in 3 spatial axes (1 oct./min)										

Electromagnetic compatibility	Interference emission and interference immunity as per EN 61326-1: 2006, class A for industry
Electrical safety	IEC 61010-1, Class I equipment Low voltage: overvoltage category II Environment < 2000 m (< 6562 ft) above MSL
Pollution degree	DIN rail device The product is suitable for pollution degree 2. External display The product is suitable for pollution degree 4.

Mechanical construction

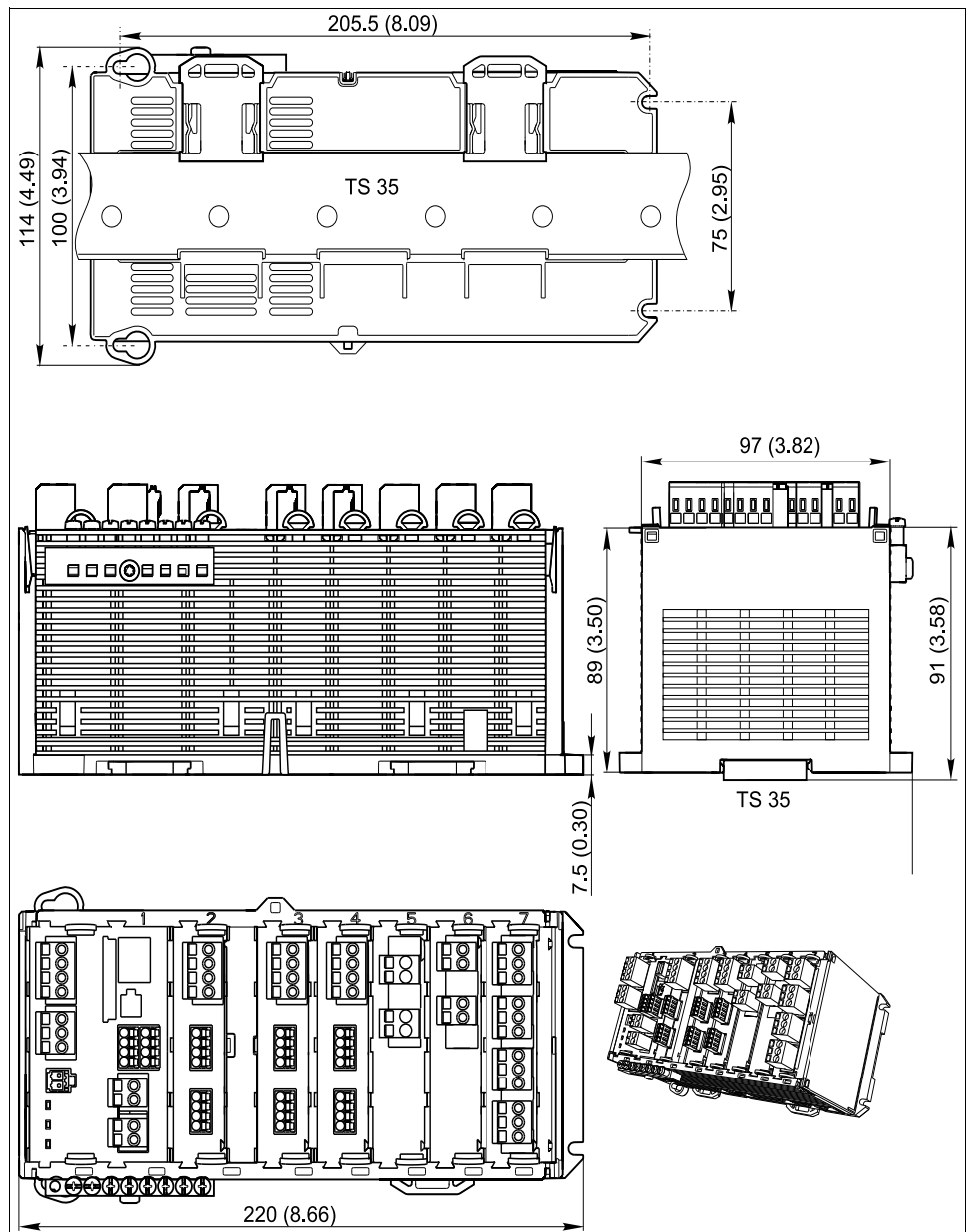
Dimensions CM442R



Dimensions in mm (inch)

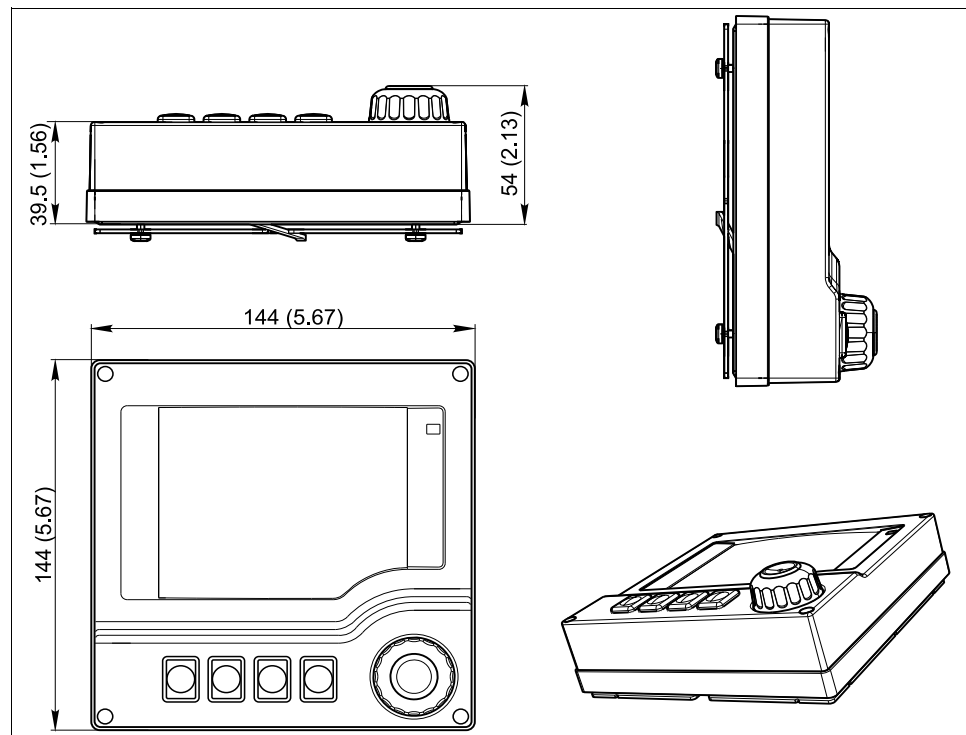
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CM444R and CM448R



a0019715

Dimensions in mm (inch)

Optional, external display

Dimensions of external optional display in mm (inch)

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External power units (only CM444R and CM448R)

For the dimensions please refer to the enclosed operating manuals of the power units

Weight

Depending on the version

CM442R (fully assembled)

approx. 0.45 kg (1 lbs)

CM444R and CM448R (fully assembled)

approx. 0.95 kg (2.1 lbs)

Individual module

approx. 0.06 kg (0.13 lbs)

External display (excluding cable)

approx. 0.56 kg (1.2 lbs)

External power unit (CM444R, CM448R) See Operating Instructions for power unit

Material

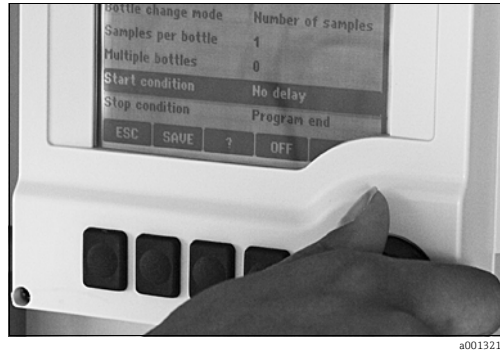
DIN rail housing	PC-FR
Display cover	PC-FR
Soft keys	EPDM
Display seal	EPDM
Module covers	PBT GF30 FR
Terminal strip	Brass, nickel-plated
Ground terminals	Stainless steel 1.4301 (AISI304)
Screws	Stainless steel 1.4301 (AISI304)
Mounting plate (display)	Stainless steel 1.4301 (AISI304)
Securing screws (display)	Steel, galvanized

Operability

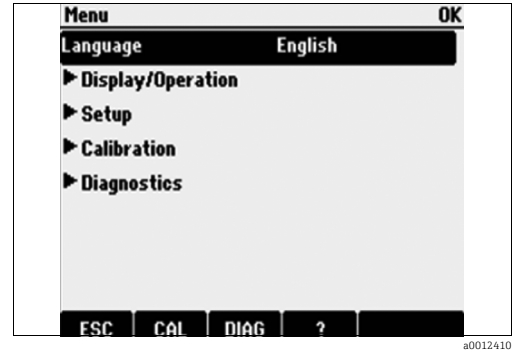
Operation concept

The simple and structured operating concept sets new standards:

- Local operation via external, optional display or remote operation via web server/Ethernet or fieldbus (optional)
- 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



Operation via external, optional display



Plain-text menu

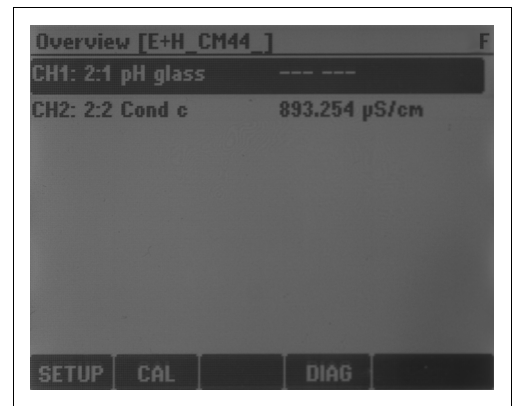
External display

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

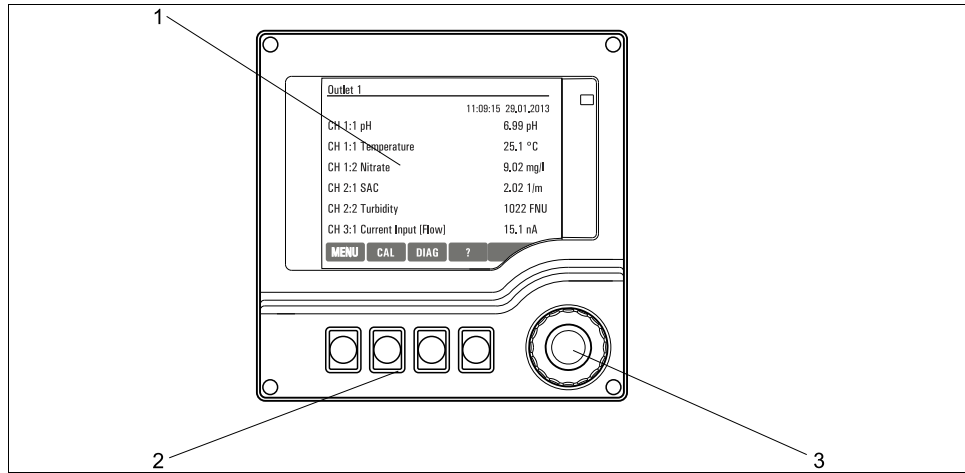


Backlit display



Red background indicates an error

Local operation via external, optional display



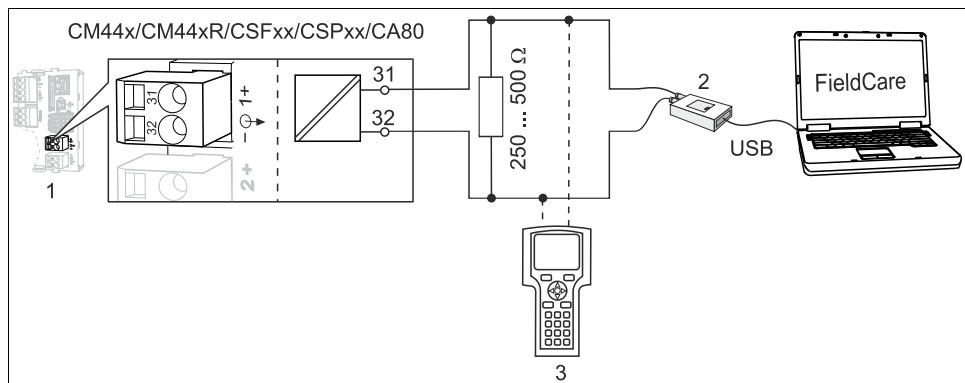
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Operation via external display

- 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)



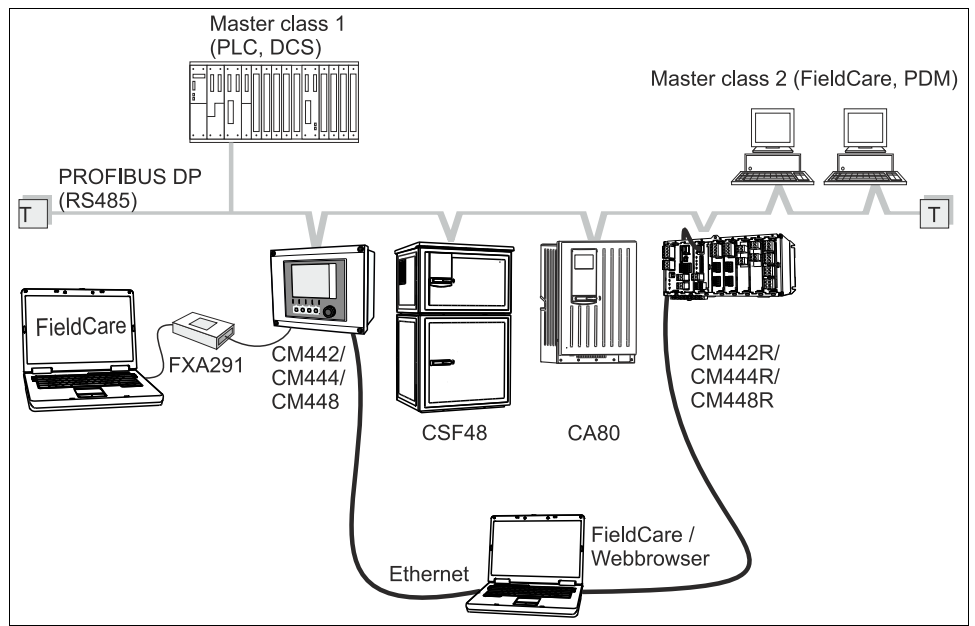
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HART via modem

- 1 Device module Base-L, -H or -E: current output 1 with HART
- 2 HART modem to connect to PC, e.g. FXA195¹⁾
- 3 HART handheld terminal

1) Switch position "on" (replaces resistance)

Via PROFIBUS DP

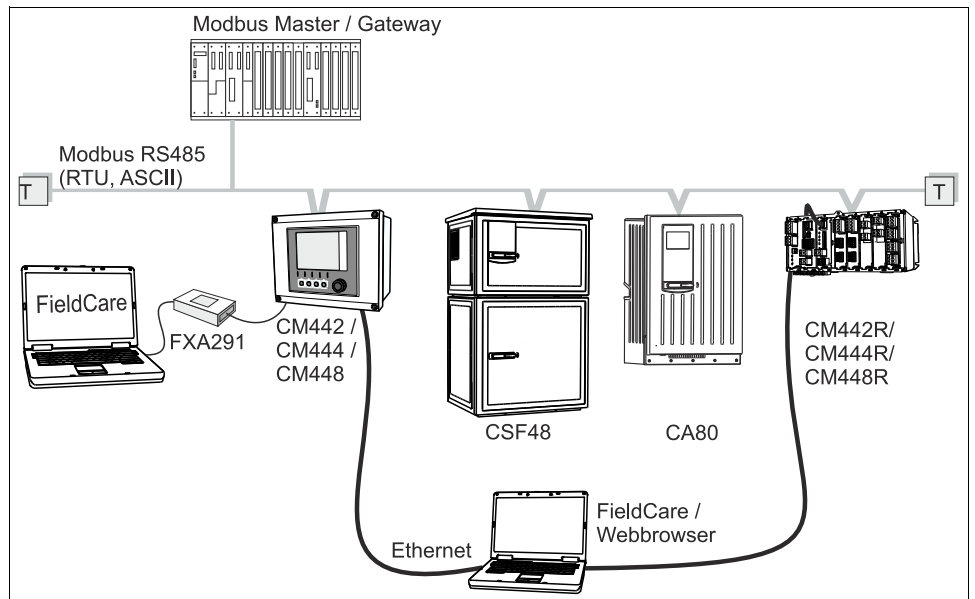


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PROFIBUS DP

T Terminating resistor

Via Modbus RS485

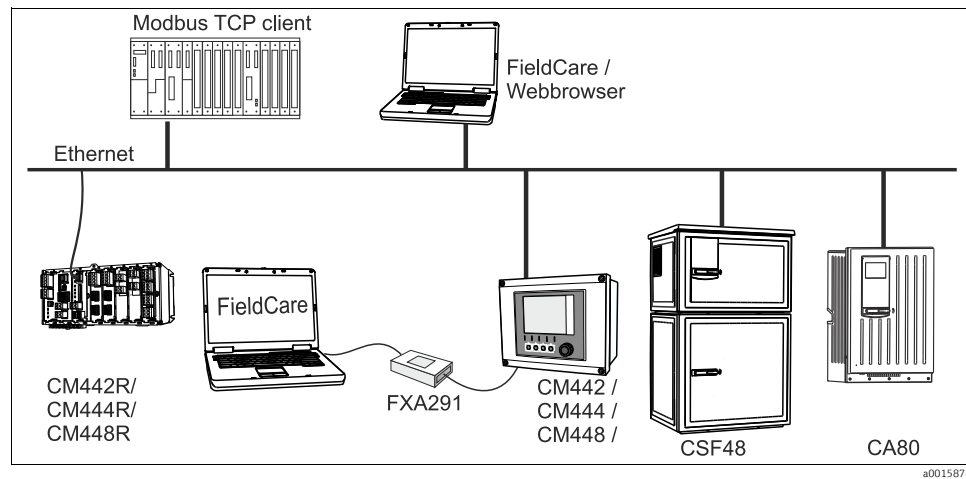


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Modbus RS485

T Terminating resistor

Via Ethernet/Web server/Modbus TCP/EtherNet/IP



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

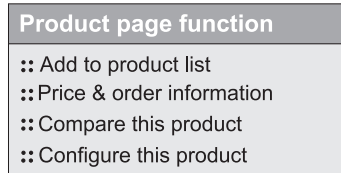
Ordering information

Product structure

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

www.products.endress.com/cm442r
www.products.endress.com/cm444r
www.products.endress.com/cm448r

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



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 external display (optional)
- 1 DIN rail power unit incl. cable (only CM444R and CM448R)
- 1 printed copy of the Operating Instructions for the DIN rail power unit
- 1 CD with Operating Instructions
- 1 printed copy of the Brief 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 the successful testing of the product by affixing the CE mark.

cSAus

Application submitted.

Accessories

-  The most important accessories available 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.

Measuring cable

Memosens data cable CYK10

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

Memosens data cable CYK11

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

Measuring cable CYK81

- Unterminated cable for extending sensor cables (e.g. Memosens)
 - 2 x 2 cores, twisted with shielding and PVC sheath (2 x 2 x 0.5 mm² + shielding)
 - Material sold by the meter, Order No.: 51502543
-

Sensors

Glass electrodes

Orbisint CPS11D

- pH sensor with Memosens technology
- Dirt-repellent PTFE diaphragm
- Order as per product structure (--> online Configurator, www.products.endress.com/cps11d)
- Technical Information TI00028C/07/EN

Memosens CPS31D

- pH sensor with Memosens technology
- Gel-filled reference system with ceramic diaphragm
- Order as per product structure (--> online Configurator, www.products.endress.com/cps31d)
- Technical Information TI00030C/07/EN

Ceraliquid CPS41D

- pH sensor with Memosens technology
- Ceramic diaphragm and KCl liquid electrolyte
- Order as per product structure (--> online Configurator, www.products.endress.com/cps41d)
- Technical Information TI00079C/07/EN

Ceragel CPS71D

- pH sensor with Memosens technology
- Poison-resistant reference with ion trap
- Order as per product structure (--> online Configurator, www.products.endress.com/cps71d)
- Technical Information TI00245C/07/EN

Orbipore CPS91D

- pH sensor with Memosens technology
- Open aperture diaphragm for media with high dirt load
- Order as per product structure (--> online Configurator, www.products.endress.com/cps91d)
- Technical Information TI00375C/07/EN

Orbipac CPF81D

- Compact pH sensor for installation or immersion operation in process water and wastewater
- Order as per product structure (--> online Configurator, www.products.endress.com/cpf81d)
- Technical Information TI191C/07/EN

Enamel pH 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)
- Technical Information TI00468C/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)
- 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)
- Technical Information TI373C/07/EN

Ceragel CPS72D

- ORP sensor with Memosens technology
- Poison-resistant reference with ion trap
- Order as per product structure (--> online Configurator, 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)
- 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)
- 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)
- 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)
- 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)
- Technical Information TI377C/07/EN

pH ORP combined sensors

Memosens CPS16D

- pH ORP combined sensor for process engineering with dirt-repellant PTFE junction
- With Memosens technology
- Order as per product structure (--> online Configurator, www.products.endress.com/cps16d)
- Technical Information TI00503C/07/EN

Memosens CPS76D

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

Memosens CPS96D

- pH/ORP combined sensor for chemical processes
- With poison-resistant reference with ion trap
- With Memosens technology
- Order as per product structure (--> online Configurator, www.products.endress.com/cps96d)
- Technical Information TI00507C/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)
- Technical Information TI182C/07/EN

Indumax H CLS54D

- Inductive conductivity sensor with certified, hygienic design for foodstuffs, beverages, pharmaceuticals and biotechnology
- Order as per product structure, (--> Online Configurator, www.products.endress.com/cls54d)
- Technical Information TI00508C/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)
- Technical Information TI00109C/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)
- 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)
- 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)
- Technical Information TI00413C/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)
- Technical Information TI387C/07/EN

Oxymax COS22D

- Sterilizable sensor for dissolved oxygen
- Order as per product structure (--> online Configurator, 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)
- 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)
- 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)
- 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)
- 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)
- Technical Information TI490C/07/EN

Additional functionality

Hardware extension modules

Kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48: extension module AOR

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

Kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48: extension module 2R

- 2 x relay
- Order no. 71125375

Kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48: extension module 4R

- 4 x relay
- Order no. 71125376

Kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48: extension module 2AO

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

Kit CM444/CM448/CM444R/CM448R/CSF48: extension module 4AO

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

Kit CM444/CM448/CM444R/CM448R/CSF48: extension module 2DS

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

Kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48: extension module 2AI

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

Kit CM442/CM444/CM448/CM442R/CM444R/CM448R/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/CM442R/CM444R/CM448R/CSF48: extension module 485

- Ethernet configuration
- Can be extended to PROFIBUS DP or Modbus RS485 or Modbus TCP or EtherNet/IP. This requires an additional activation code which can be ordered separately (→ 48).
- Order no. 71135634

Upgrade kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48

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

Upgrade kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48

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

Upgrade kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48

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

Upgrade kit CM442/CM444/CM448/CM442R/CM444R/CM448R/CSF48

- Extension module 485
- EtherNet/IP
(+ Ethernet configuration)
- Order no. 71219868

Firmware 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

Activation code for EtherNet/IP

- Order no. 71219871

Kit CM442R: activation code for 2nd digital sensor input

- Order no. 71114663

Kit CM444R/CM448R: 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

Software

Memobase Plus CYP71D

- PC software to support laboratory calibration
- Visualization and documentation of sensor management
- Sensor calibrations saved in the database
- Order as per product structure, www.products.endress.com/cyp71d
- Technical Information TI00502C/07/EN

Field Data Manager Software MS30

- PC software for central data management
- Visualization of series of measurements and logbook events
- SQL database for secure data storage
- Order no. 71129799

Other accessories**External display**

Graphic display

- For installation in the cabinet door or cover panel
- Order no. 71185295

Service display

- Portable, for commissioning
- Order no. 71185296

SD card

SD card

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

Communication-specific accessories

Commubox FXA195 HART

- Intrinsically safe HART communication with FieldCare via the USB port
- Technical Information TI00404F

Commubox FXA291

- Connects the CDI interface of measuring devices with the USB port of the computer or laptop
- Technical Information TI00405C

WirelessHART adapter SWA70

- Wireless device connection
- Easily integrated, offers data protection and transmission safety, can be operated in parallel with other wireless networks, minimum cabling complexity
- Technical Information TI00061S

Fieldgate FXA320

- Gateway for the remote interrogation of 4-20 mA measuring devices via a Web browser
- Technical Information TI00025S

Fieldgate FXA520

- Gateway for the remote diagnostics and configuration of connected HART devices via a Web browser
- Technical Information TI00051S

Field Xpert SFX100

- Compact, flexible and robust industrial handheld terminal for remote configuration and for obtaining measured values via the HART current output
- Operating Instructions BA00060S

System components

RIA14, RIA16

- Field display unit for integration into 4-20 mA circuits
- RIA14 in flameproof metal enclosure
- Technical Information TI00143R and TI00144R

RIA15

- Process display unit,
Digital display unit for integration into 4-20 mA circuits
- Panel mounting
- With optional HART communication
- Technical Information TI01043K

www.addresses.endress.com
