Füllstand | Druck | Durchfluss | Temperatur | Flüssigkeits-analyse | Registrierung | Systeme Komponenten | Services | Solutions

Technical Information

Liquiline CM442

Multiparameter controller with two measuring channels based on digital Memosens technology

MEMOSENS

Application

Liquiline CM442 is an extensible multiparameter controller for monitoring and controlling processes in industry and the environmental sector.
Depending on the version ordered, one or two digital sensors with Memosens technology can be connected to the CM442. Furthermore, two or four 0/4 to 20 mA analog outputs are also available. A cleaning function, controller and alarm relay can be selected.

The rugged plastic version is tailored to the following non-hazardous area applications:
- Water and wastewater
- Power stations
- Chemical industry
- Other industrial applications

Your benefits

- Maximum process safety thanks to:
  - Simple and transparent menu guidance via a graphic display
  - Standardized intuitive operating concept for all the devices of the new Liquiline, sampler and analyzer platform
- Fast commissioning thanks to:
  - Memosens: use of lab-calibrated sensors thanks to plug-and-play capabilities
  - Preconfigured Liquiline transmitter
  - Easy connection thanks to cage terminals
  - 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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Endress+Hauser
People for Process Automation

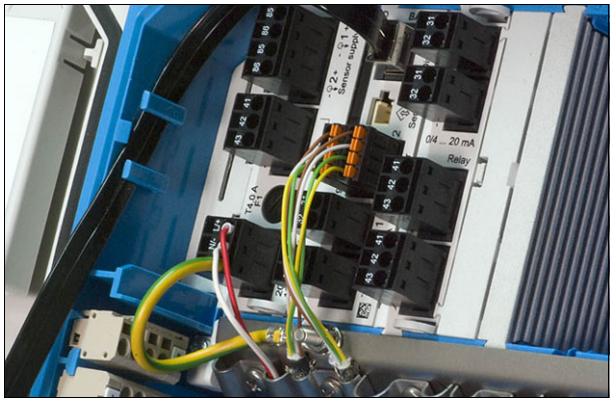
Function and system design

Memosens technology

Memosens makes your measuring point safer and more reliable:
- Non-contact, digital signal transmission enables optimum galvanic isolation
- No galvanic 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

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 and relays
- Upgrade from one to two-channel measurement
- Optional: M12 sensor connector for connecting any kind of Memosens sensor



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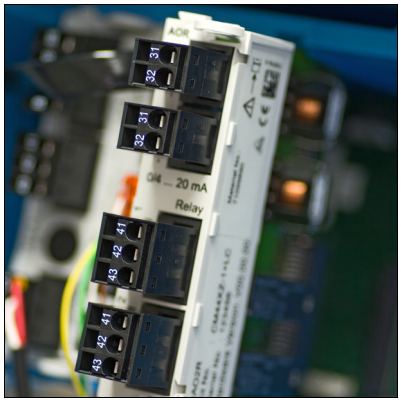
Connections on basic module, e.g. 2 different sensors



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Fitting the extension module

Navigator and plain text display

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 diagnostics thanks to plain-text display
- All languages that can be ordered are available in every device

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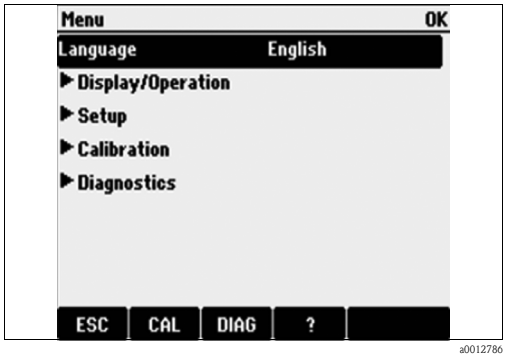
Easy operation



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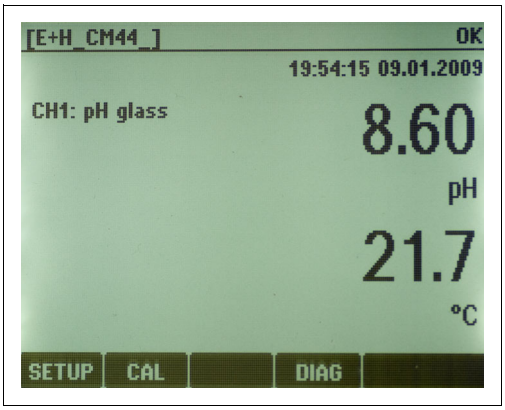
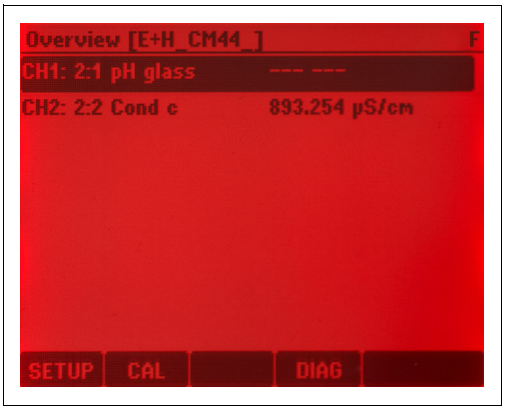
Plain-text menu

Display

Graphic display:
- Backlight 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

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)

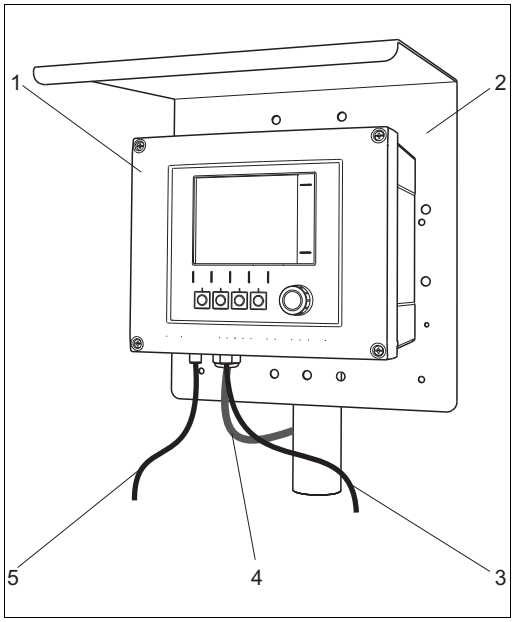
Note!
Endress+Hauser offers industry-approved SD cards as accessories. These memory cards provide maximum data security and integrity.
Other SD cards can also be used. However, Endress+Hauser does not accept any responsibility for the data security of such cards.

Measuring system

Note!
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
- Post or rail mounting (optional)
- Weather protection cover (optional)



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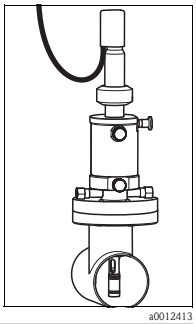
Measuring system (e.g. two-channel device)

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)

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



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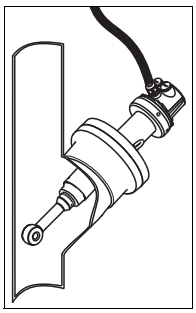
Conductivity

Inductive conductivity measurement in wastewater treatment
- Immersion assembly Dipfit CLA111
- Sensor Indumax CLS50D with fixed cable

Conductive conductivity measurement in power plant cooling water
- Immersion assembly Dipfit CLA111
- Sensor Condumax CLS15D



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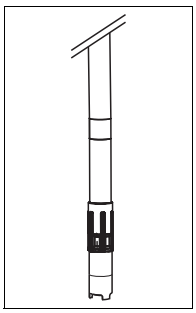
Oxygen

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

Figure: CYA112 with COS61D



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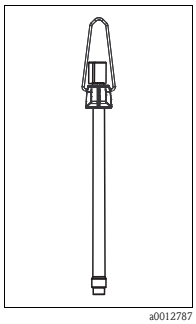
Nitrate

Nitrate in wastewater
- Sensor CAS51D with fixed cable
- Assembly CYA112
- Holder CYH112



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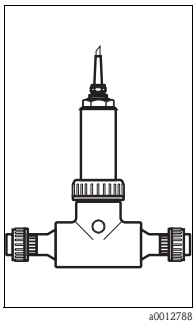
Turbidity

Turbidity in industrial water
- Flow assembly Flowfit CUA250
- Spray head CUR3 (optional)
- Sensor Turbimax CUS51D with fixed cable



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

Input

Measured variables	—> Documentation of the connected sensor
Measuring ranges	—> Documentation of the connected sensor
Input types	Digital sensor inputs
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)

Output

Output signal	Depending on 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
Signal on alarm	Adjustable, as per NAMUR Recommendation NE 43 ■ In measuring range 0 to 20 mA: Error current from 0 to 23 mA ■ In measuring range 4 to 20 mA: Error current from 2.4 to 23 mA ■ Factory setting for both measuring ranges: 21.5 mA
Load	Max. 500 Ω
Linearization/transmission behavior	Linear, bilinear, table

Current outputs, active

Span	0 to 23 mA
Signal characteristic	Linear
Electrical specification	**Output voltage** Max. 24 V
Cable specification	**Cable type** Recommended: shielded cable **Cross-section** Max. 2.5 mm^2 (14 AWG)

Relay outputs

Electrical specification

Relay types

- 1 single-pin changeover contact (alarm relay)
- 2 single-pin changeover contacts (optionally available with add-on module)

Relay switching capacity

- Power unit (alarm relay)
  - Max. 0.5 A with 230 V AC, cosϕ = 0.8 to 1
    Min. 450,000 switching cycles
  - Max. 0.1 A with 230 V AC, cosϕ = 0.8 to 1
    Min. 700,000 switching cycles
  - Max. 0.5 A with 24 V DC, L/R = 0 to 1 ms
    Min. 350,000 switching cycles
  - Max. 0.1 A with 24 V DC, L/R = 0 to 1 ms
    Min. 500,000 switching cycles
- Add-on module
  - Max. 2 A with 230 V AC, cosϕ = 0.8 to 1
    Min. 120,000 switching cycles
  - Max. 0.1 A with 230 V AC, cosϕ = 0.8 to 1
    Min. 700,000 switching cycles
  - Max. 2 A with 24 V DC, L/R = 0 to 1 ms
    Min. 150,000 switching cycles
  - Max. 0.1 A with 24 V DC, L/R = 0 to 1 ms
    Min. 500,000 switching cycles

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

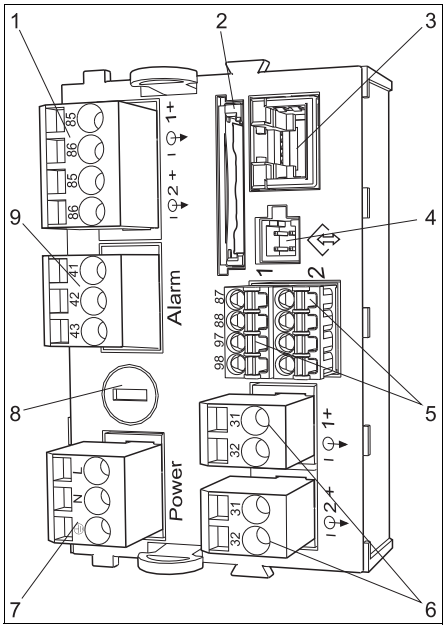
Cross-section

Max. 2.5 mm^2 (14 AWG)

Wiring

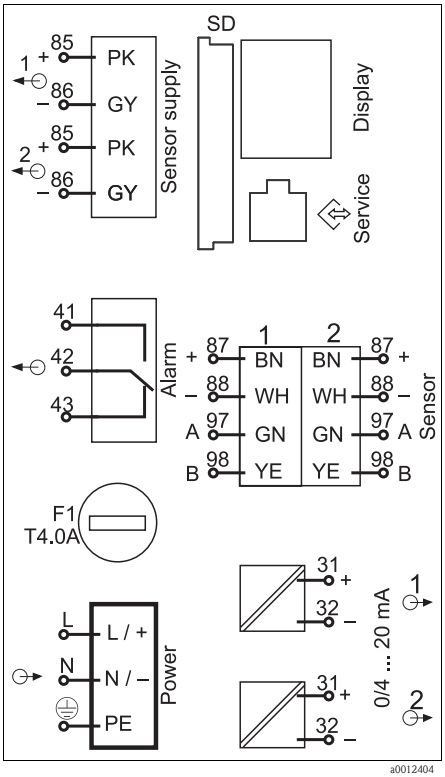
Electrical connection

Connections on basic module



Basic module BASE-H or -L

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

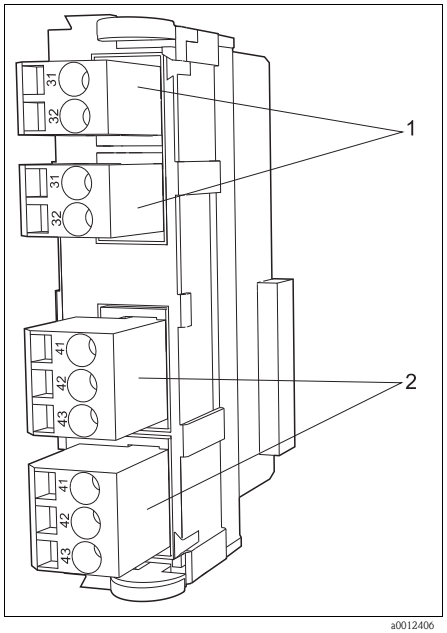


Wiring diagram for basic module BASE-H or -L

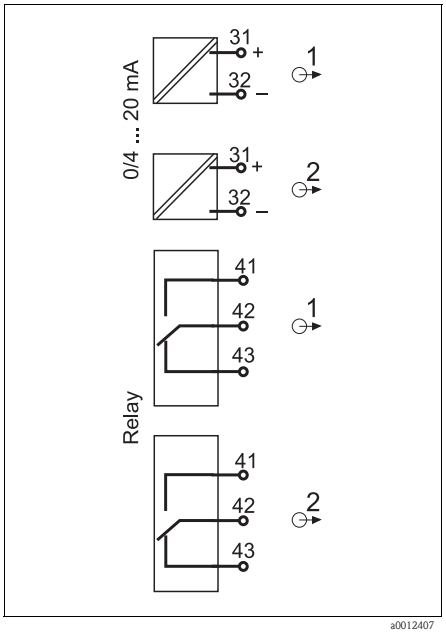
H High power = power unit 100 to 230 VAC
L Low power = power unit 24 VAC or 24 VDC

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

Connecting additional current outputs and relays (optional)



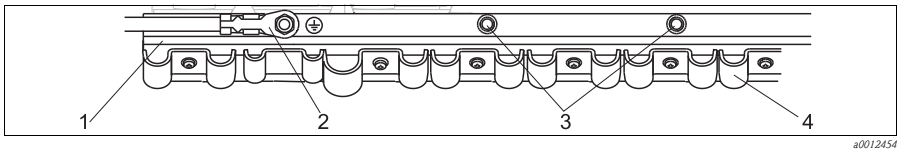
Add-on module AOR



Wiring diagram for add-on module AOR

1 Current outputs
2 Relay connections

Protective ground connection



Cable mounting rail and associated function

1 Cable mounting rail
2 Mounting bolt (protective ground connection, e.g. mains)
3 Additional mounting bolts for ground connections
4 Cable clamps (fixing+grounding the sensor cables)

Sensor connection

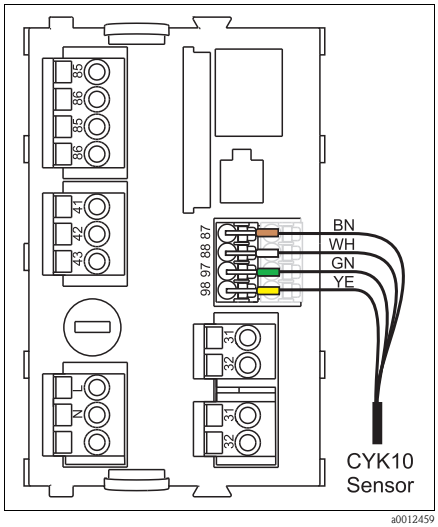
Sensors with Memosens protocol

Sensor types	Sensor cable	Sensors
Digital sensors **without** additional power supply	CYK10 with plug connection and inductive signal transmission	■ pH sensors ■ ORP sensors ■ Amperometric oxygen sensors ■ Conductively measuring conductivity sensors
	Fixed cable	Inductively measuring conductivity sensors
Digital sensors **with** additional power supply	Fixed cable	■ Turbidity sensors ■ Nitrate sensors ■ Optical oxygen sensors

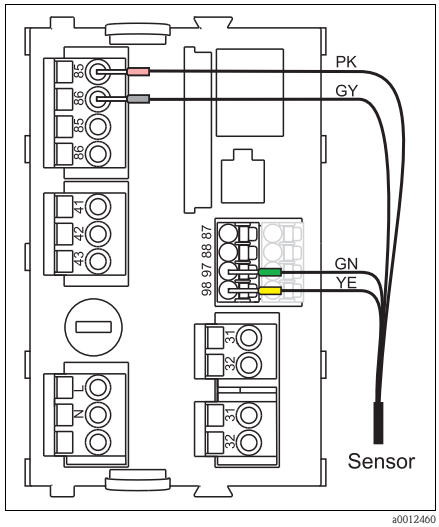
Connection methods

- Sensor cable connected directly to the terminal connector of the basic module
- 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. End sleeves of the sensor cable connected directly to the basic module

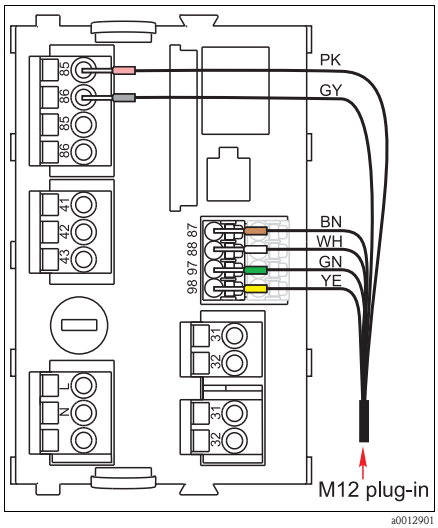


No additional supply voltage



With additional supply voltage

2. Internal connection of M12 socket to basic module



M12 socket –> basic module (factory)

- Device versions with an M12 socket are ready-wired upon delivery.
- You connect the plug of the sensor cable directly to the M12 socket on the underside of the device.
- The internal device wiring is always the same regardless of the kind of sensor you are connecting (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).

Supply voltage

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

Caution!
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.
The device versions for 24V shall be powered from a limited energy source with a max. available current of 8 A, which is separated from hazardous live by double or reinforced insulation at the source of the supply.

Cable entry

Identification of the cable entry on housing base	Suitable gland
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	Socket RJ45
⏚	M12x1.5 mm

Cable specification

Cable gland	Permitted cable diameter
M16x1.5 mm	2 to 6 mm (0.08 to 0.24")
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	2 to 6 mm (0.08 to 0.24")
NPT1/2"	5 to 9 mm (0.20 to 0.35")
G1/2	7 to 12 mm (0.28 to 0.47")

Power consumption

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

Fuse

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

Performance characteristics

Response time

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

Reference temperature

25 °C (77 °F)

Resolution of current output

< 5 µA

Maximum measured error

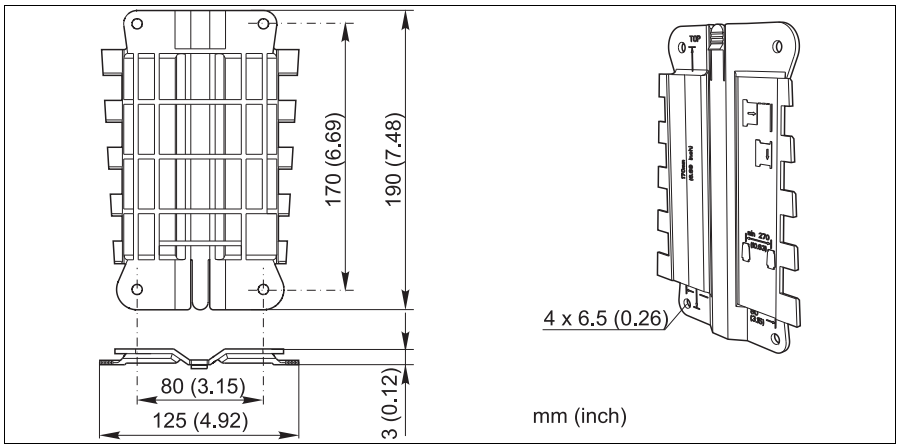
—> Documentation of the connected sensor

Repeatability

—> Documentation of the connected sensor

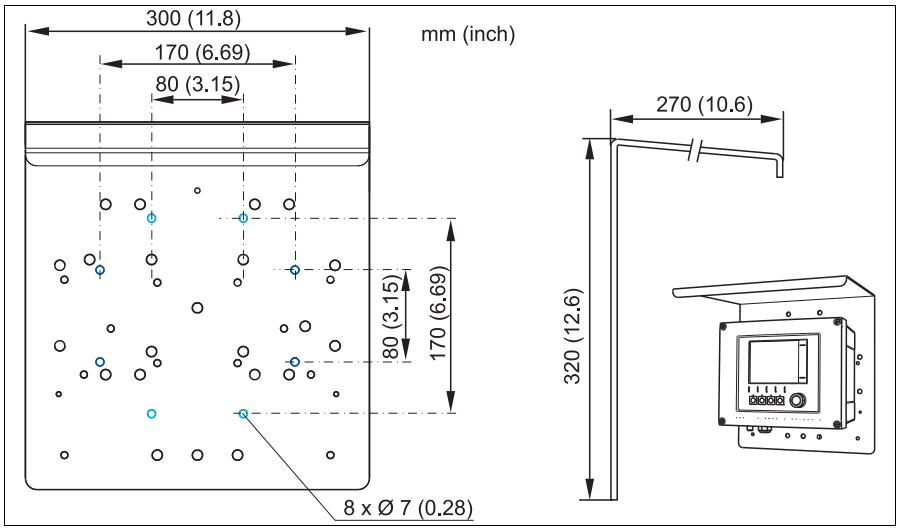
Installation

Mounting plate



Mounting plate

Weather protection cover

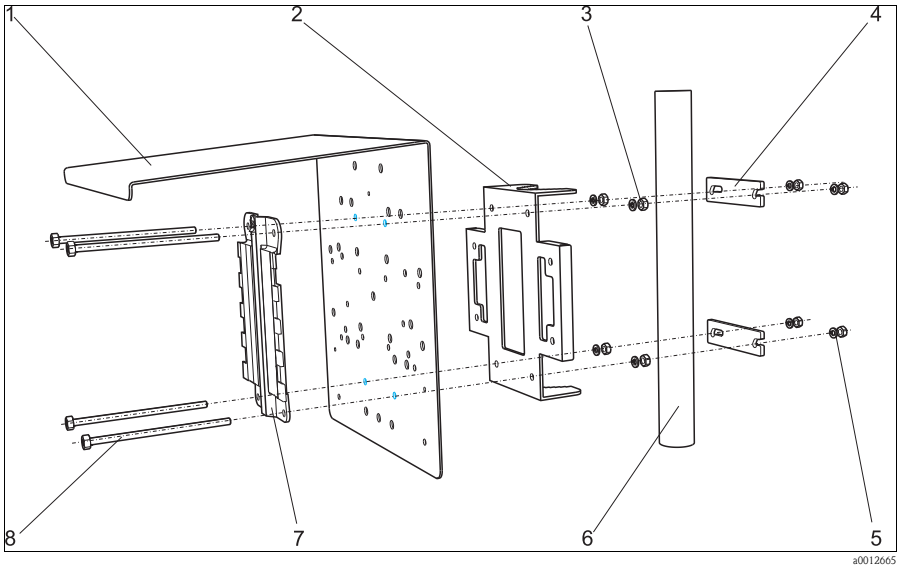


Weather protection cover for CM44x

Installation instructions

Note!
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")).

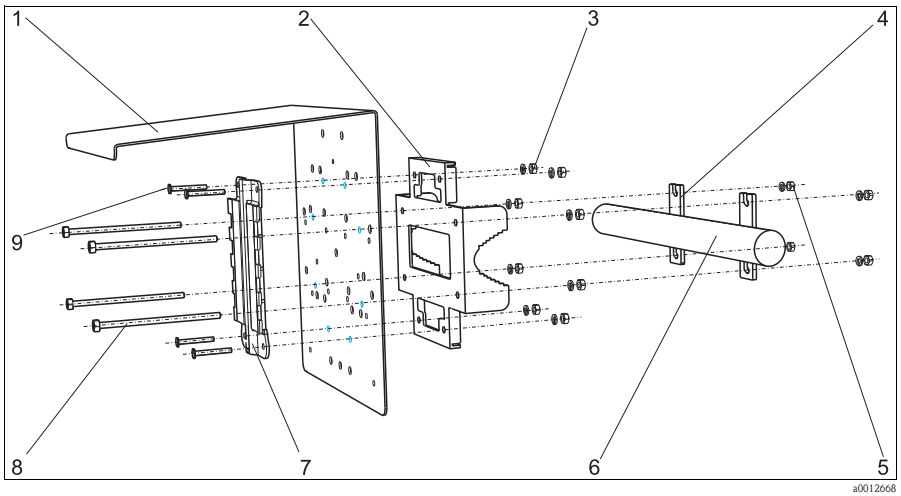
Post mounting



Post mounting (exploded view)

1 Weather protection cover (optional)
2 Post mounting plate (post mounting kit)
3 Spring washers and nuts (post mounting kit)
4 Clamps (post mounting kit)
5 Spring washers and nuts (post mounting kit)
6 Pipe or post (round/square)
7 Mounting plate
8 Threaded rod (post mounting kit)

Rail mounting

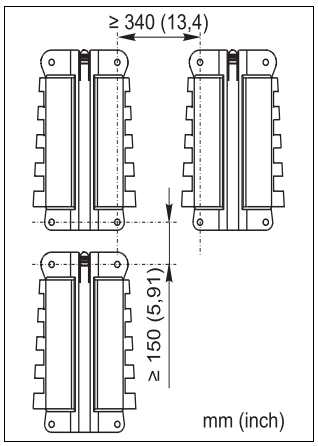


Rail mounting (exploded view)

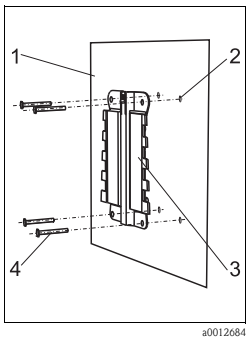
1 Weather protection cover(optional)
2 Post mounting plate (post mounting kit)
3 Spring washers and nuts (post mounting kit)
4 Clamps (post mounting kit)
5 Spring washers and nuts (post mounting kit)
6 Pipe or post (round/square)
7 Mounting plate
8 Threaded rod (post mounting kit)
9 Screws (post mounting kit)

Wall mounting

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

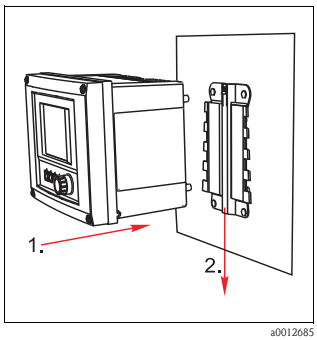


Minimum spacing required for mounting



Wall mounting

1 Wall
2 4 drill holes[1)]
3 Mounting plate
4 Screws Ø 6 mm (not part of scope of supply)



Attach the Liquiline and click it into place

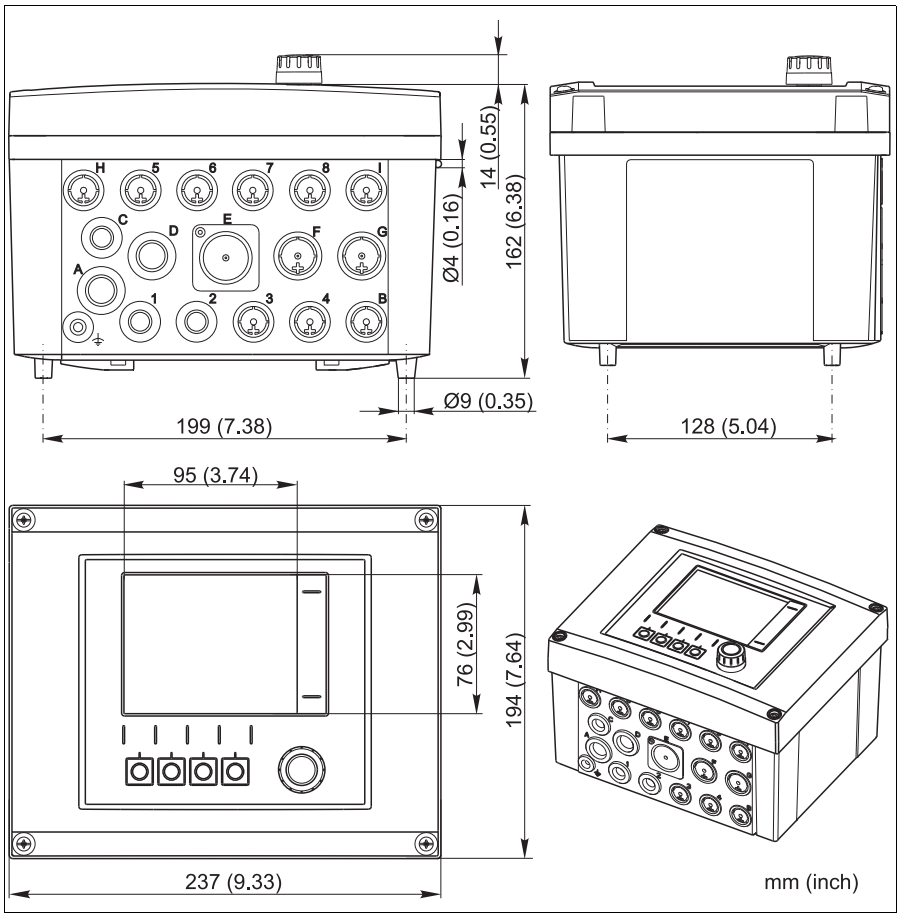
1) The size of the drill holes depends on the wall plugs used. The wall plugs and screws must be provided by the customer.

Environment

Ambient temperature range	–20 to 60 °C (0 to 140 °F)
Storage temperature	–40 to 80 °C (–40 to 175 °F)
Electromagnetic compatibility	Interference emission and interference immunity as per EN 61326-1: 2006, class A for industry
Degree of protection	IP 66/67, leak-tightness and corrosion resistance in accordance with NEMA 4X
Relative humidity	10 to 95%, not condensing

Mechanical construction

Dimensions



Dimensions of field housing

Weight

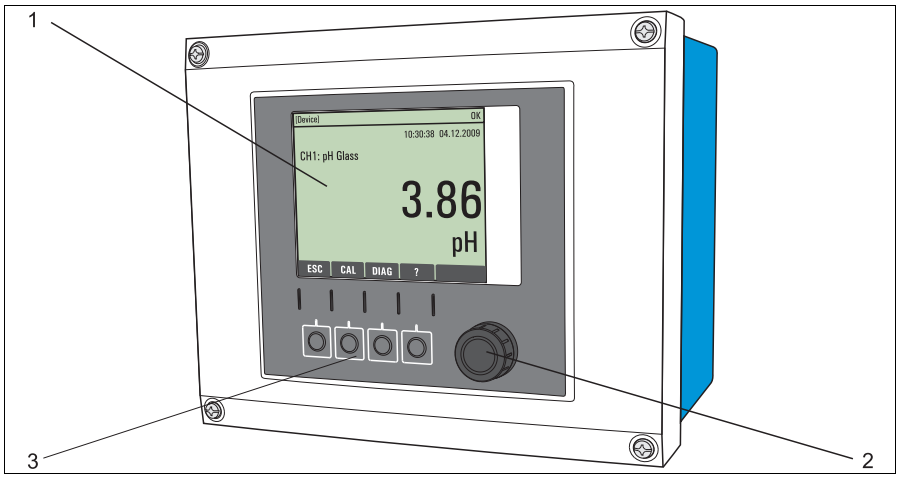
Approx. 2.1 kg (4.63 lbs), depending on the version

Material

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)

Human interface

Operating elements



Overview of operation

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

Ordering information

Product structure

	Approval	
	AA	Non-hazardous area

		Sensor input	
		M1	1 x digital sensor
		M2	2 x digital sensor
		N1	1 x digital sensor, M12 socket
		N2	2 x digital sensor, M12 socket

			Communication	
			A1	2 x analog output 0/4 to 20 mA
			A3	4 x analog output 0/4 to 20 mA

				Additional functions	
				F0	None
				F2	2 x relay for cleaning; limit value

					Power supply	
					1	100 to 230 V AC
					6	24 V DC
					7	24 V AC (cannot be extended to CM448)

						Cable entry	
						0	Metric
						1	NPT
						2	G

							Cable entry set	
							A	Enclosed
							B	Mounted

CM442-									**Order code**

	Initial setting for operating language (only one option may be selected)
AA	English
AB	German
AC	French
AD	Spanish
AE	Italian
AF	Dutch
AG	Portuguese
AK	Chinese

	Service (more than one option may be selected)
K5	Free from paint-wetting impairment substances

	Additional approvals (more than one option may be selected)
MC	cCSAus, general purpose

	Test, certificates (more than one option may be selected)
Q3	Inspection certificate to EN 10204-3.1

	Accessories mounted (more than one option may be selected)
RC	CDI; external socket
RS	SD card, 1 GB, Industrial Flash Drive

	Identification (more than one option may be selected)
Z1	Measuring point (TAG), see additional specification

Simply append the additional options to the order code you selected above. Please contact your sales office if you have any questions.

Scope of delivery

The scope of delivery comprises:
- 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" part 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.

Accessories

Note!
The most important accessories that could be delivered at the time this document went to print are listed below.
Please contact your service department or sales center for accessories that are not listed here.

Weather protection cover

CYY101 weather protection cover for field devices, absolutely essential if operating the unit outdoors
- Material: stainless steel 1.4031 (AISI 304)
- Order No. CYY101-A

Measuring cable

CYK10 Memosens data cable
- For digital sensors with Memosens technology
- Ordering according to product structure, see Technical Information (TI376C/07/en)

CYK81 measuring cable
- Non-terminated measuring cable for extension of sensor cables of e.g. Memosens sensors, CUS31/CUS41
- 2 wires, twisted pair with shield and PVC-sheath (2 x 2 x 0.5 mm^2 + shield)
- Sold by the meter, order no.: 51502543

Sensors

Glass electrodes

Orbisint CPS11D
- pH sensor with Memosens technology
- Dirt-repellent PTFE diaphragm
- Order depending on version, see Technical Information (TI028C/07/en)

Ceraliquid CPS41D
- pH sensor with Memosens technology
- Ceramic diaphragm and KCl liquid electrolyte
- Order depending on version, see Technical Information (TI079C/07/en)

Ceragel CPS71D
- pH sensor with Memosens technology
- Double-chamber reference system and integrated bridge electrolyte
- Order depending on version, see Technical Information (TI245C/07/en)

Orbipore CPS91D
- pH sensor with Memosens technology
- Open aperture diaphragm for media with a high dirt load
- Order depending on version, see Technical Information (TI375C/07/en)

Orbisint CPS12D
- ORP sensor with Memosens technology
- Dirt-repellent PTFE diaphragm;
- Order depending on version, see Technical Information (TI367C/07/en)

Ceraliquid CPS42D
- ORP sensor with Memosens technology
- Ceramic diaphragm and KCl liquid electrolyte
- Order depending on version, see Technical Information (TI373C/07/en)

Ceragel CPS72D
- ORP sensor with Memosens technology
- Double-chamber reference system and integrated bridge electrolyte;
- Order depending on version, see Technical Information (TI374C/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 depending on version, see Technical Information (TI283C/07/en)

Tophit CPS441D
- Sterilizable ISFET sensor with Memosens technology
- For media with
  low conductivity, with liquid KCl electrolyte
- Order depending on version, see Technical Information (TI352C/07/en)

Tophit CPS491D
- ISFET sensor with Memosens technology
- Open aperture diaphragm for media with high dirt load
- Order depending on version, see Technical Information (TI377C/07/en)

Inductively measuring conductivity sensors

Indumax CLS50D
- High-stability inductive conductivity sensor for standard, Ex and high-temperature applications
- Memosens technology
- Order as per product structure, see Technical Information TI182C/07/en

Oxygen sensors

Oxymax COS51D
- Amperometric sensor for dissolved oxygen, with Memosens technology
- Order as per product structure, see 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, see Technical Information (TI387/07/en)

Turbidity sensors

Turbimax CUS51D
- For nephelometric turbidity measurements in wastewater
- 4-beam scattered light method
- With Memosens protocol
- Order as per product structure (Technical Information TI463C/07/EN)

Nitrate sensors

Viomax CAS51D
- Nitrate measurement in drinking water and wastewater
- With Memosens protocol
- Order as per product structure (Technical Information TI464C/07/EN)

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