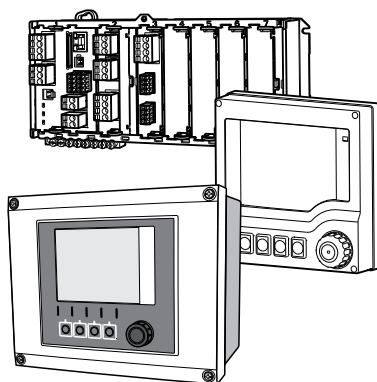


Brief Operating Instructions

Liquiline CM44P

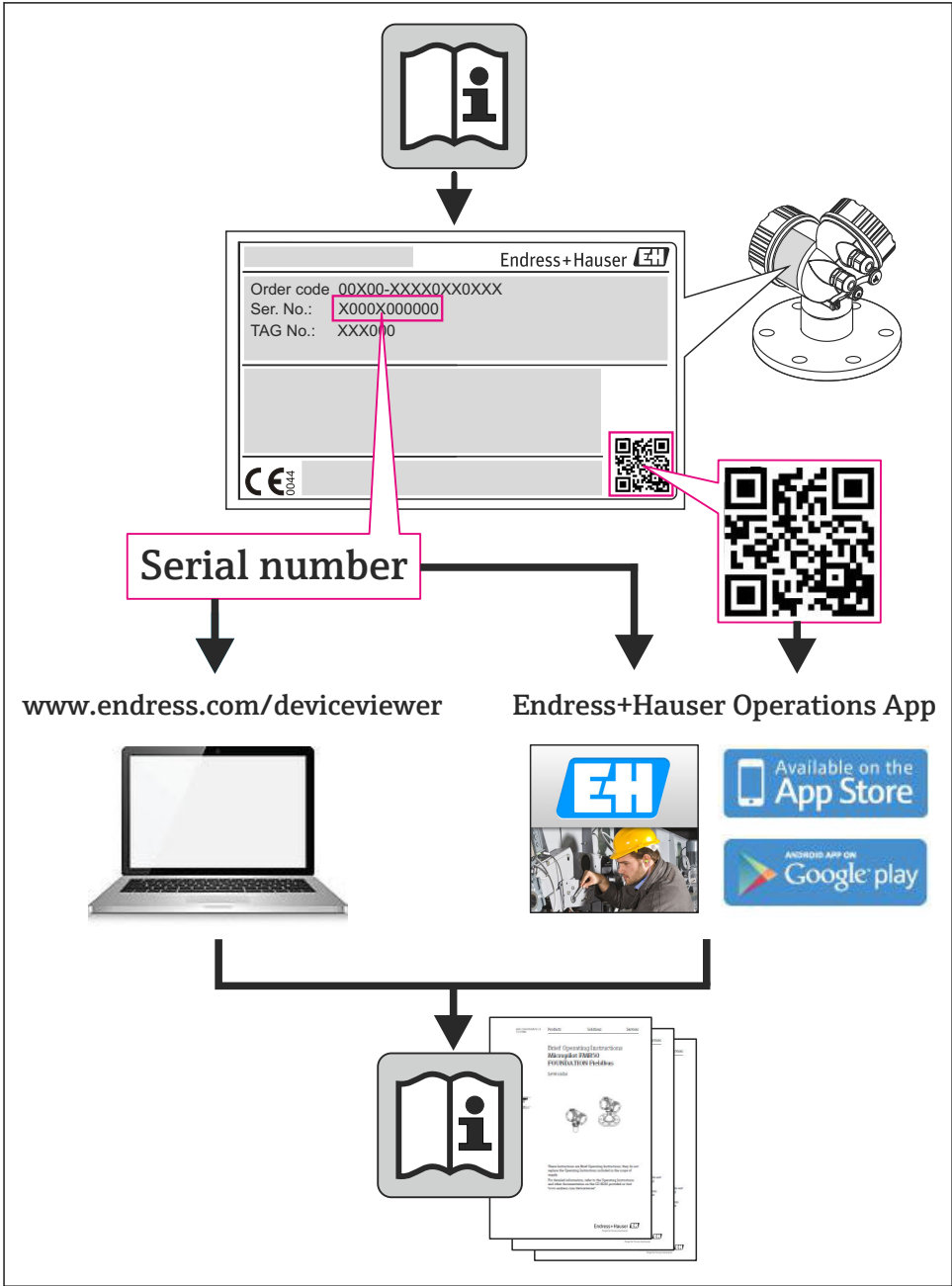
Universal four-wire multichannel controller for process photometers and Memosens sensors



These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

Detailed information on the device can be found in the Operating Instructions and in the other documentation available at:

- www.endress.com/device-viewer
- Smart phone/tablet: Endress+Hauser Operations App



A0023555

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1 About this document

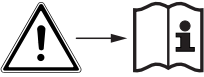
1.1 Warnings

Structure of information	Meaning
 Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.
 Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.
 Causes (/consequences) If necessary, Consequences of non-compliance (if applicable) ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
 Cause/situation If necessary, Consequences of non-compliance (if applicable) ▶ Action/note	This symbol alerts you to situations which may result in damage to property.

1.2 Symbols

Symbol	Meaning
	Additional information, tips
	Permitted or recommended
	Not permitted or not recommended
	Reference to device documentation
	Reference to page
	Reference to graphic
	Result of a step

1.3 Symbols on the device

Symbol	Meaning
	Reference to device documentation

1.4 Documentation

The following instructions complement these Brief Operating Instructions and are available on the product pages on the internet:

- Operating Instructions Liquiline CM44P, BA01570C
 - Device description
 - Commissioning
 - Operation
 - Software description (without sensor menus, these are described in a separate manual, see below)
 - Device-specific diagnostics and troubleshooting
 - Maintenance
 - Repair and spare parts
 - Accessories
 - Technical data
- Operating Instructions Memosens, BA01245C
 - Software description for Memosens inputs
 - Calibration of Memosens sensors
 - Sensor-specific diagnostics and troubleshooting
- Operating Instructions for HART communication, BA00486C
 - Onsite settings and installation instructions for HART
 - Description of HART driver
- Guidelines for communication via fieldbus and web server
 - HART, SD01187C
 - PROFIBUS, SD01188C
 - Modbus, SD01189C
 - Web server, SD01190C
 - EtherNet/IP, SD01293C

2 Basic safety instructions

2.1 Requirements for personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.



Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

2.2 Designated use

2.2.1 Non-hazardous atmosphere

Liquiline CM44P is a multichannel controller for connecting analog photometers and digital sensors with Memosens technology in non-hazardous environments.

The device is designed for use in the following applications:

- Food and beverages
- Life science
- Power stations
- Chemical industry
- Other industrial applications

2.2.2 Non-designated use

NOTICE

Objects stored on top of the housing

May cause short-circuits or fire or result in the failure of individual cabinet components or complete failure of the measuring point!

- ▶ Never place any objects, such as tools, cables, paper, food, liquid containers or similar, on top of the housing.
- ▶ Always observe the operator's regulations, in particular with regard to fire safety (smoking) and foodstuffs (beverages).

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

2.2.3 Installation environment (cabinet device only)

The device and the associated power units can be operated with 24 V AC, 24 V DC or 100 to 230 V AC and provide shock protection in accordance with IP20.

The components have been designed for pollution degree 2, and moisture must not be allowed to collect in them. The components must therefore be installed in an appropriate enclosure for protection. The ambient conditions specified in the instructions must be observed here.

2.3 Workplace safety

As the user, you are responsible for complying with the following safety conditions:

- Installation guidelines
- Local standards and regulations

Electromagnetic compatibility

- The product has been tested for electromagnetic compatibility in accordance with the applicable European standards for industrial applications.
- The electromagnetic compatibility indicated applies only to a product that has been connected in accordance with these Operating Instructions.

2.4 Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.
3. Do not operate damaged products, and protect them against unintentional operation.
4. Label damaged products as defective.

During operation:

- ▶ If faults cannot be rectified:
products must be taken out of service and protected against unintentional operation.

CAUTION

Cleaning not switched off during calibration or maintenance activities

Risk of injury due to medium or cleaning agent!

- ▶ If a cleaning system is connected, switch it off before removing a sensor from the medium.
- ▶ If you wish to check the cleaning function and have therefore not switched off the cleaning system, wear protective clothing, goggles and gloves or take other appropriate measures.

2.5 Product safety

2.5.1 State of the art

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

2.5.2 IT security

We only provide a warranty 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.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

1. Verify that the packaging is undamaged.
 - ↳ Notify the supplier of any damage to the packaging.
Keep the damaged packaging until the issue has been resolved.
2. Verify that the contents are undamaged.
 - ↳ Notify the supplier of any damage to the delivery contents.
Keep the damaged goods until the issue has been resolved.
3. Check that the delivery is complete and nothing is missing.
 - ↳ Compare the shipping documents with your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
 - ↳ The original packaging offers the best protection.
Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local Sales Center.

3.2 Product identification

3.2.1 Nameplate

Nameplates can be found:

- on the outside of the housing (field device)
- on the packaging (adhesive label, portrait format)
- on the inside of the display cover (field device)
- on the back of the external display (not visible when installed) (cabinet device)

The nameplate provides you with the following information on your device:

- Manufacturer identification
 - Order code
 - Extended order code
 - Serial number
 - Ambient and process conditions
 - Input and output values
 - Activation codes
 - Safety information and warnings
- Compare the information on the nameplate with the order.

3.2.2 Product identification

Product page

www.endress.com/cm44p

Interpreting the order code

The order code and serial number of your product can be found in the following locations:

- On the nameplate
- In the delivery papers

Obtaining information on the product

1. Open the product website.
2. At the top of the page, select the link **Services**.
 - ↳ An additional sidebar opens up.
3. Select **Online Tools** followed by **Access device specific information**.
 - ↳ An additional window opens.
4. Enter the order code from the nameplate into the search field. Then select **Show details**.
 - ↳ Details of each feature (selected option) of the order code are displayed.

3.2.3 Manufacturer's address

Endress+Hauser Conducta GmbH+Co. KG
Dieselstraße 24
D-70839 Gerlingen

3.3 Scope of delivery

The scope of delivery comprises:

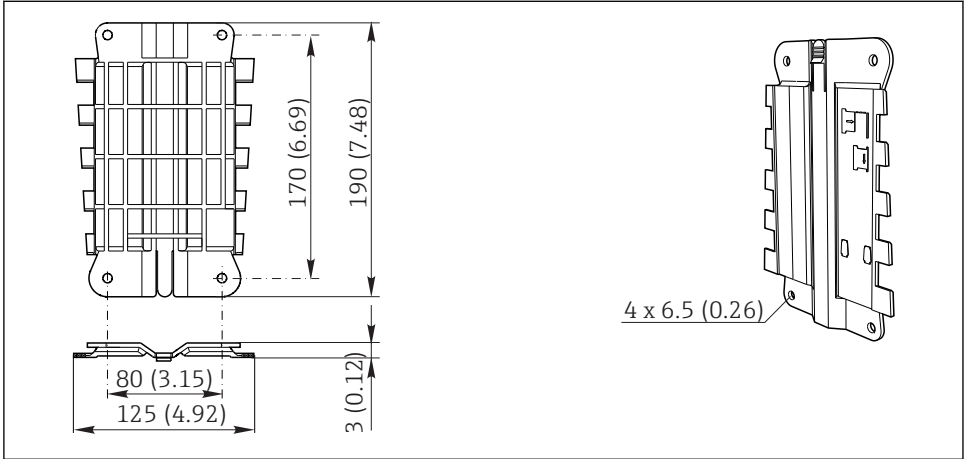
- 1 multichannel controller in the version ordered
 - 1 mounting plate
 - 1 wiring label (attached at the factory to the inside of the display cover)
 - 1 external display (if selected as an option) ¹⁾
 - 1 DIN rail power unit incl. Cable (cabinet device only)
 - 1 printed copy of the Operating Instructions for DIN rail power unit (cabinet device only)
 - 1 printed copy of the Brief Operating Instructions in the language ordered
- If you have any queries:
Please contact your supplier or local sales center.

1) The external display can be selected as an option in the order structure or ordered as an accessory at a later stage.

4 Installation

4.1 Installation conditions

4.1.1 Mounting plate



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1 Mounting plate, dimensions in mm (in)

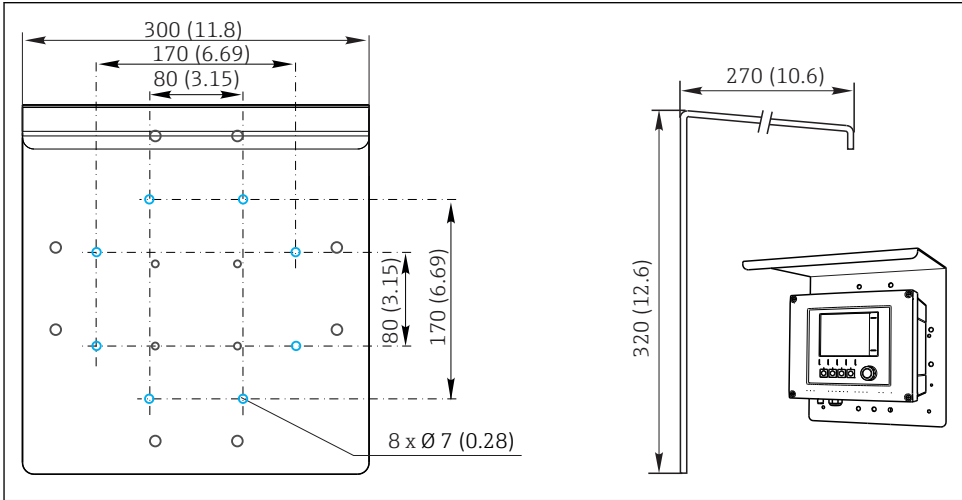
4.1.2 Protective cover

NOTICE

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

Impaired operation to complete transmitter failure are possible!

- ▶ Always use the weather protection cover (accessory) when installing the device outdoors.



2 Dimensions in mm (in)

4.1.3 Mounting on DIN rail as per IEC 60715

CAUTION

The power unit can get very hot under full load

Burn hazard!

- ▶ Avoid touching the power unit during operation.
- ▶ The minimum distances to other devices must be observed.
- ▶ After switching off the power unit, allow it to cool down before carrying out any work on it.

CAUTION

Impermissible collection of moisture in the device

puts the safety of the user at risk!

- ▶ The device has IP20 shock protection. Never allow moisture to collect in the device.
- ▶ Comply with the specified ambient conditions, e.g. by installing the device in an appropriate protective enclosure.

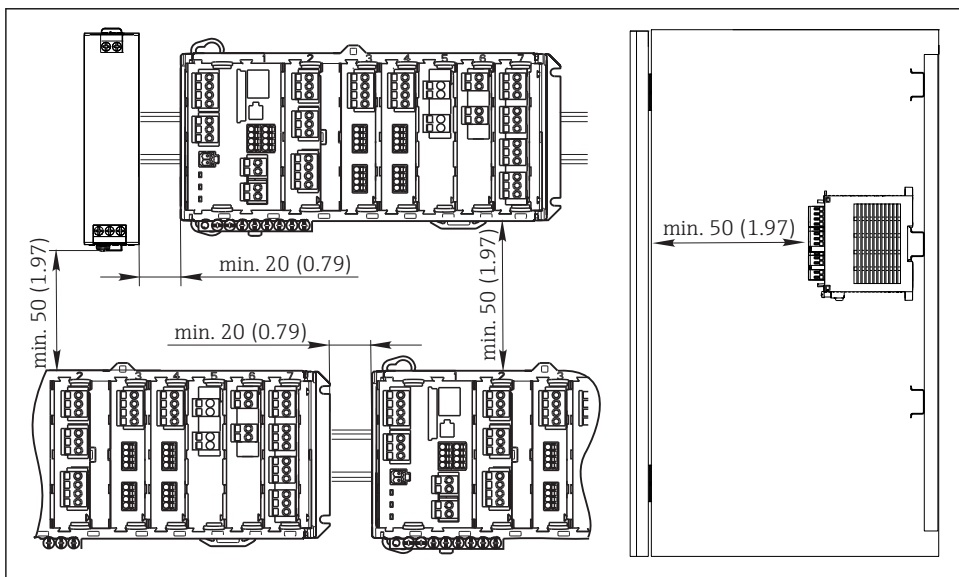
NOTICE**Incorrect mounting location in the cabinet, spacing regulations not observed**

Possible malfunctions as a result of heat buildup and interference from neighboring devices!

- ▶ Do not position the device directly above sources of heat. The temperature specification must be observed.
- ▶ The components are designed for convection-based cooling. Avoid heat buildup. Ensure openings are not covered, e. g. by cables.
- ▶ Observe the specified distances to other devices.
- ▶ Physically separate the device from frequency converters and high-voltage devices.
- ▶ Recommended installation direction: horizontal. The specified ambient conditions, and particularly the ambient temperatures, only apply for horizontal installation.
- ▶ Vertical orientation is also possible. However, this requires additional fixing clips at the place of installation to hold the device in position on the DIN rail.
- ▶ Recommended installation of power unit: to the left of the device.

The following minimum clearance specifications must be observed:

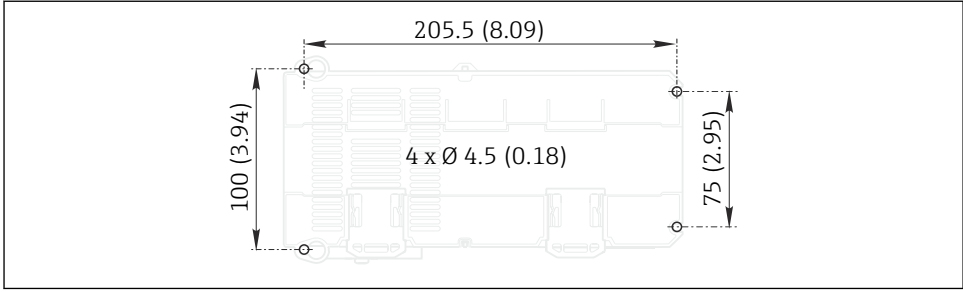
- Distances at the side in relation to other devices incl. power units and to the wall of the cabinet:
at least 20 mm (0.79 inch)
- Distance above and below the device and depth distance (to control cabinet door or other devices installed there):
at least 50 mm (1.97 inch)



A0027858

3 Minimum clearance in mm (in)

4.1.4 Wall mounting

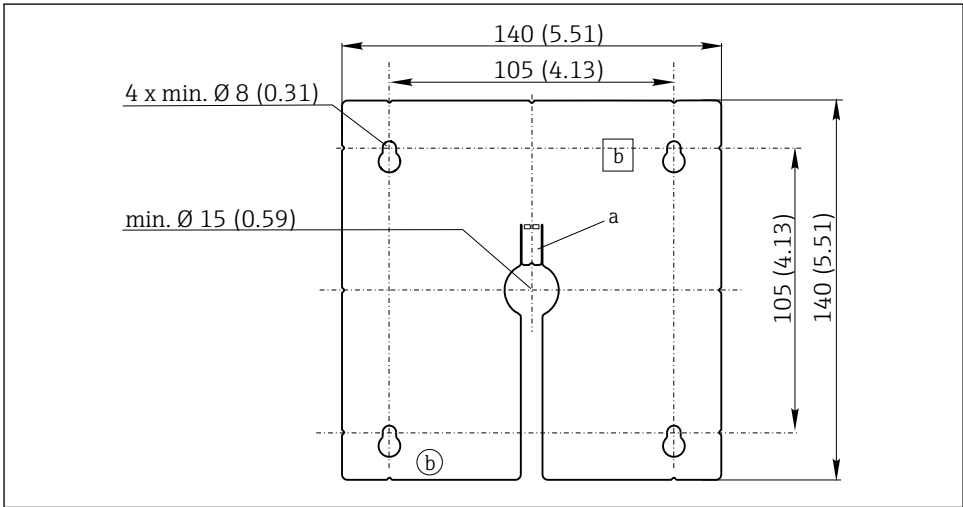


A0027859

4 Drilling pattern for wall mounting in mm (in)

4.1.5 Mounting the external display

i The mounting plate also serves as the drilling template. The marks on the side help you mark the position of the drill holes.



A0025371

5 Mounting plate of external display, dimensions in mm (in)

- a Retaining tab
- b Production-related recesses, no function for the user

4.1.6 Cable length for optional display

Length of display cable provided (cabinet device only):

3 m (10 ft)

Maximum permitted length of a display cable (cabinet device only):

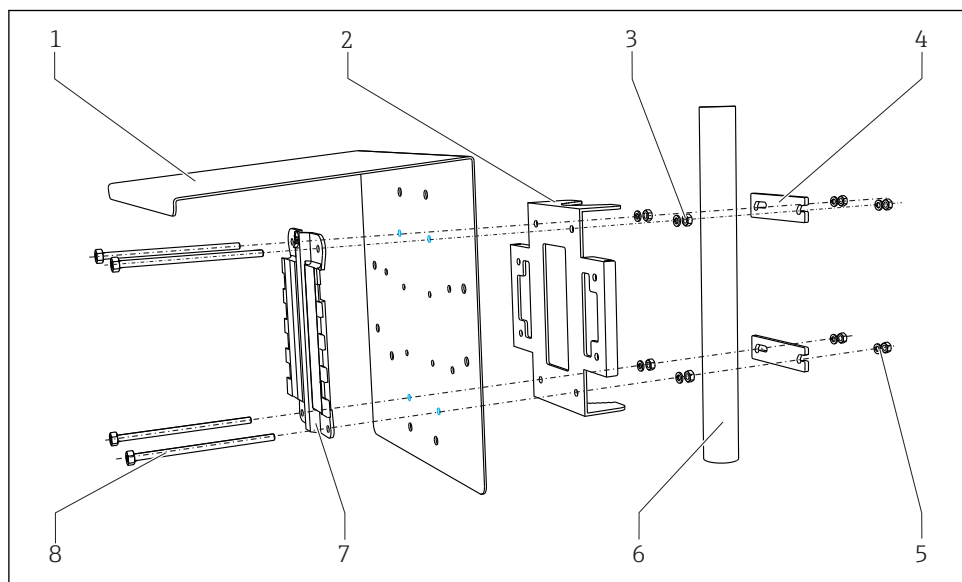
5 m (16.5 ft)

4.2 Mounting measuring device (field device)

4.2.1 Post mounting



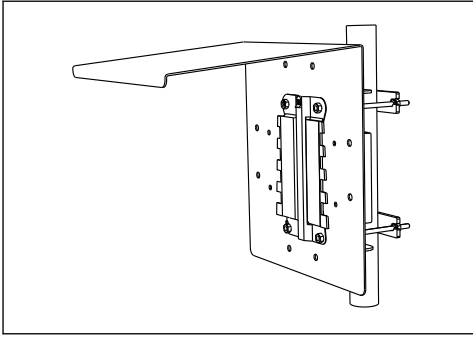
You require the post mounting kit (optional) to mount the unit on a pipe, post or railing (square or circular, clamping range 20 to 61 mm (0.79 to 2.40")).



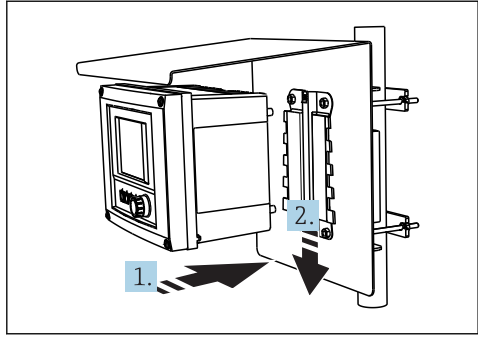
A0033044

6 Post mounting

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



A0033045



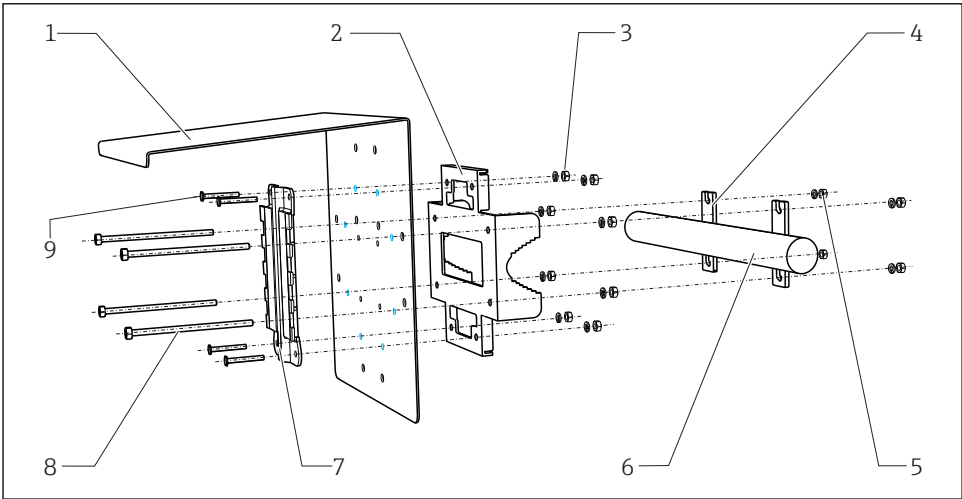
A0025885

7 Post mounting

8 Attach the device and click it into place

1. Place the device on the mounting plate.
2. Slide the device downwards in the guide on the mounting rail until it clicks into place.

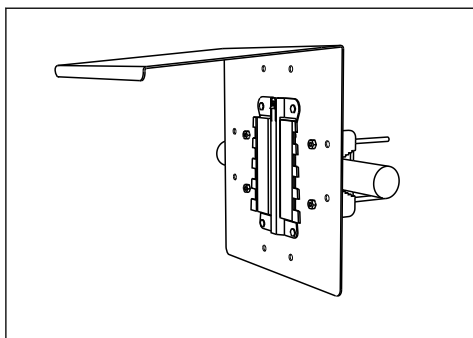
4.2.2 Rail mounting



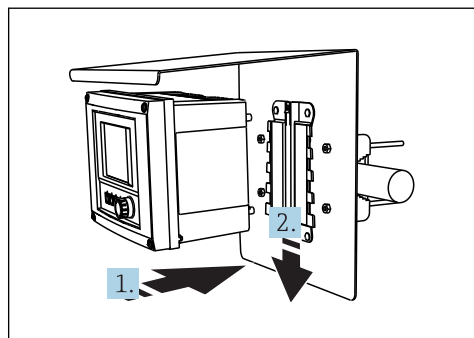
A0012668

9 Rail mounting

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



A0025886



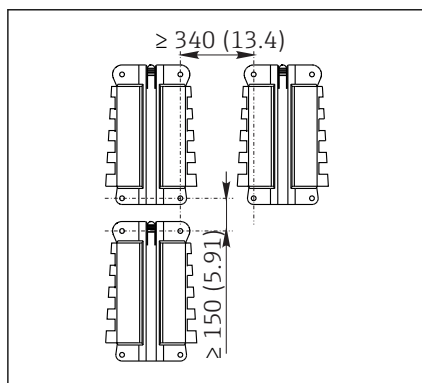
A0027803

10 Rail mounting

11 Attach the device and click it into place

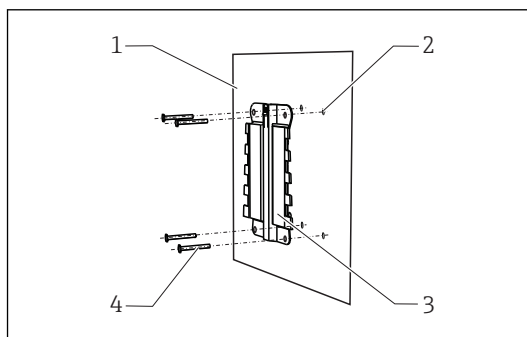
1. Place the device on the mounting plate.
2. Slide the device downwards in the guide on the mounting rail until it clicks into place.

4.2.3 Wall mounting



A0012686

12 Installation clearance in mm (in)

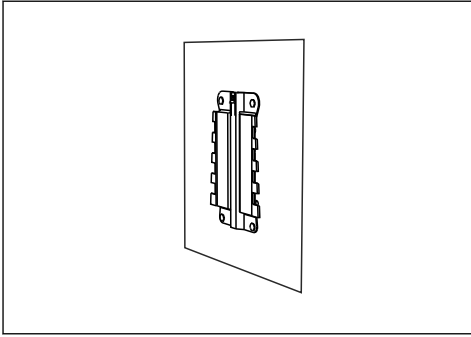


A0027798

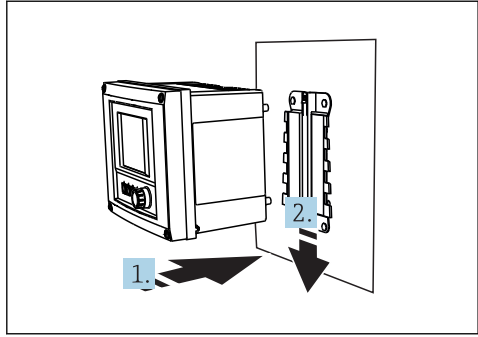
13 Wall mounting

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

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



A0027799



A0027797

14 Wall mounting

15 Attach the device and click it into place

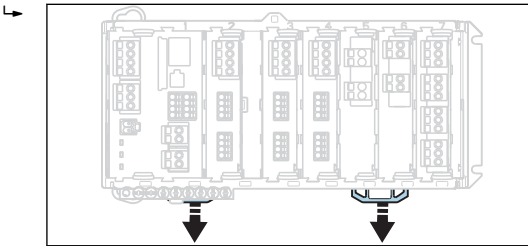
1. Place the device on the mounting plate.
2. Slide the device downwards in the guide on the mounting rail until it clicks into place.

4.3 Mounting the measuring device (cabinet device)

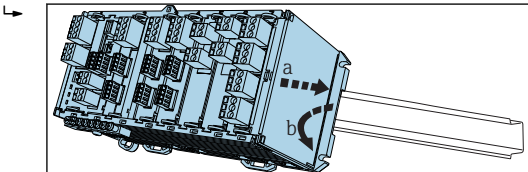
4.3.1 DIN rail mounting

The mounting procedure is the same for all Liquiline devices. The example shows a CM448R.

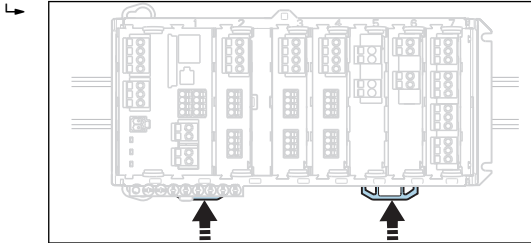
1. In the order configuration, the securing clips are "tightened" to secure the DIN rail. Release the securing clips by pulling them downwards.



2. Attach the device from the top to the DIN rail (a) and secure it by pressing down (b).



3. Slide the securing clips upwards until they click, thereby securing the device to the DIN rail.



4. Mount the external power unit in the same way.

4.3.2 Wall mounting



Mounting material (screws, dowels) are not included in the scope of delivery and must be provided by the customer.

The external power unit can be mounted on a DIN rail only.

Use the back of the housing to mark the mounting holes.

1. Drill the corresponding holes and insert wall plugs if necessary.
2. Screw the housing onto the wall.

4.3.3 Mounting the optional external display

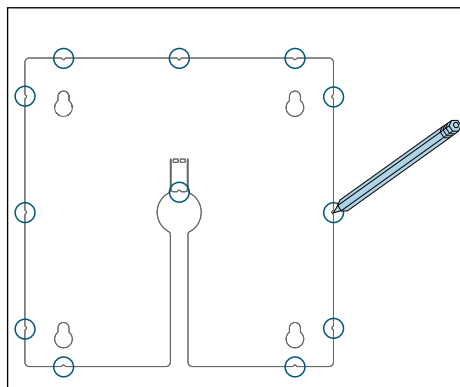
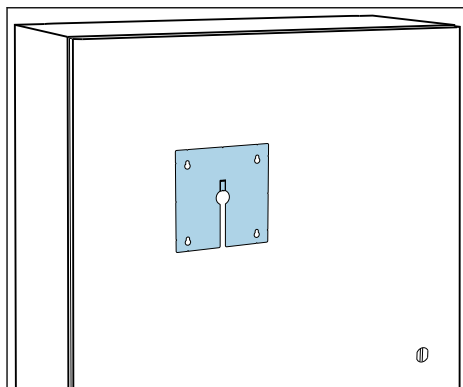


Sharp-edged, non-deburred drill holes

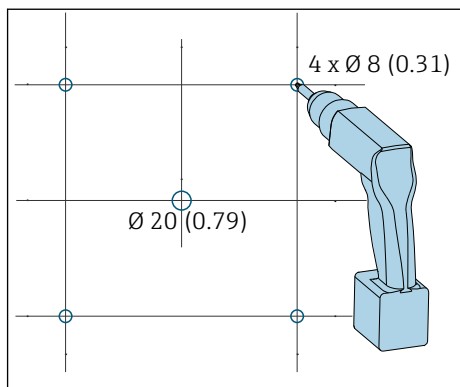
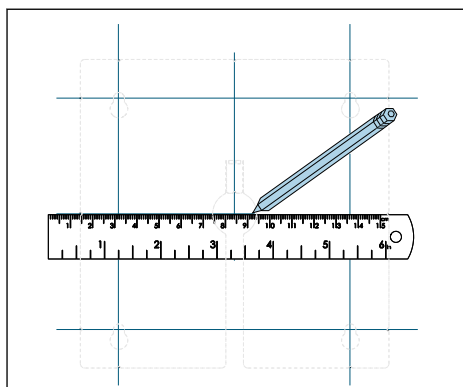
Risk of injury, display cable may get damaged!

- In particular, deburr the central drill hole for the display cable.

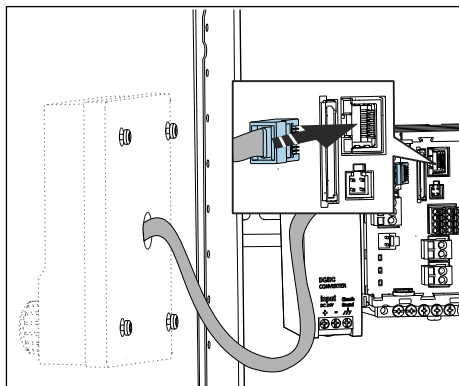
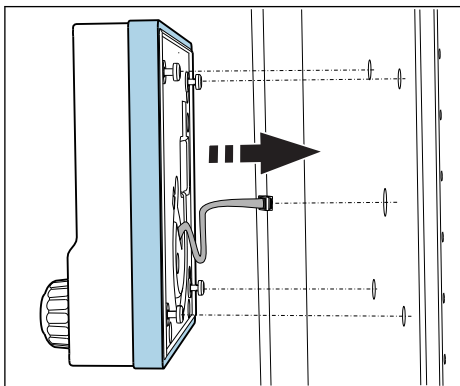
Mounting the display on the door of the cabinet



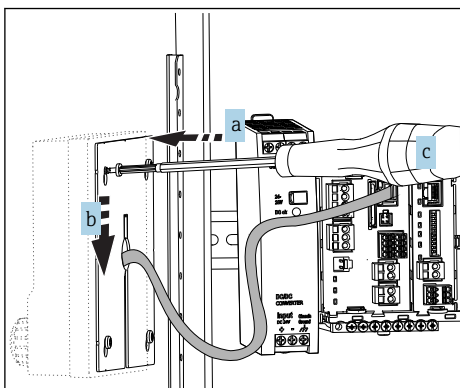
1. Hold the mounting plate from the outside against the door of the control cabinet. Choose the point at which you wish to install the display.
2. Make all the markings.



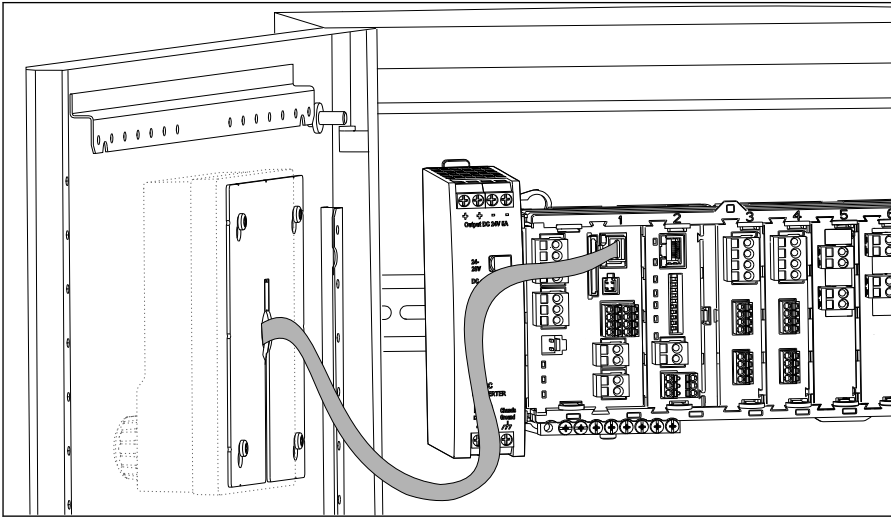
3. Draw lines to interconnect all the marks.
↳ This will indicate the position of the five drill holes needed.
4. Drill the holes (→  5,  14).



5. Pull the display cable through the hole in the middle, and place the display from the outside through the four holes drilled for this purpose, ensuring that the torx screws have been unscrewed to the last half turn but are still in place. Ensure that the rubber frame (seal, highlighted blue) does not become damaged and is properly positioned on the surface of the door.
6. Connect the display cable to the RJ-45 socket in the base module.



7. Place the mounting plate on the inside over the screws (a), slide it down (b) and tighten the screws (c).
 - ↳ The display is now mounted and ready to use.



16 Mounted display

NOTICE

Installation error

Damage, e.g. to the cable, or malfunctions are possible!

- Lay cables in such a way that they do not get squashed e.g. when closing the cabinet door.
- Plug the display cable only into the RJ45 socket in the base module. Otherwise, the display will not function.

4.4 Post-installation check

1. After installation, check the transmitter for damage.
2. Check whether the transmitter is protected against precipitation and direct sunlight (e.g. by the weather protection cover).
3. After mounting, check all devices (controller, power unit, display) for damage.
4. Verify that the specified installation clearances have been observed.
5. Verify that all securing clips have been snapped into place and that the components are securely positioned on the DIN rail.
6. Ensure that the temperature limits are observed at the mounting location.

5 Electrical connection

5.1 Connecting the measuring device

⚠ WARNING

Device is live!

Incorrect connection may result in injury or death!

- ▶ The electrical connection may be performed only by an electrical technician.
- ▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions contained therein.
- ▶ **Prior** to commencing connection work, ensure that no voltage is present on any cable.

NOTICE

The device does not have a power switch!

- ▶ Provide a protected circuit breaker in the vicinity of the device at the place of installation.
- ▶ The circuit breaker must be a switch or power switch, and must be labeled as the circuit breaker for the device.
- ▶ At the supply point, the power supply must be isolated from dangerous live cables by double or reinforced insulation in the case of devices with a 24 V supply voltage.

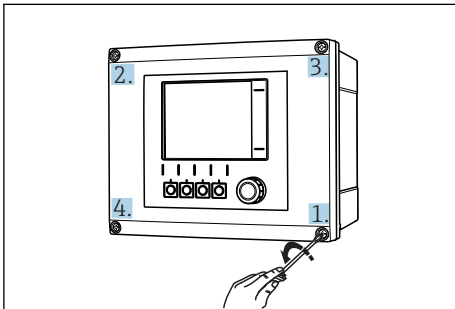
5.1.1 Open the housing

NOTICE

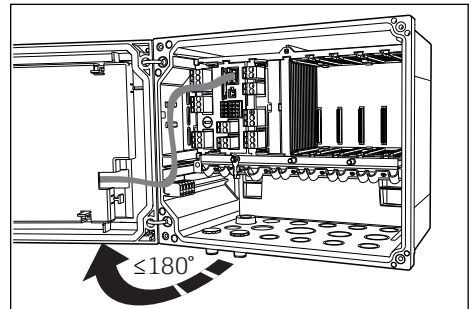
Pointed or sharp tools

If unsuitable tools are used, they can scratch the housing or damage the seal, and thus have a negative impact on the leak-tightness of the housing!

- ▶ Do not use any sharp or pointed objects, such as a knife, to open the housing.
- ▶ Only use a suitable Phillips screwdriver.



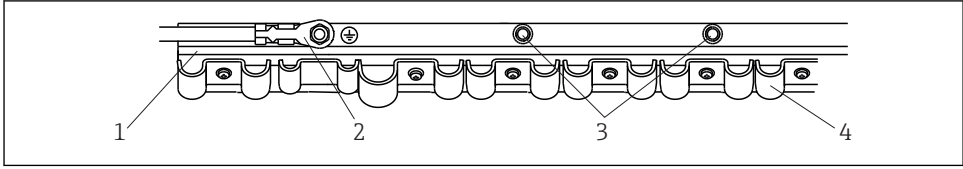
17 Releasing housing screws in a diagonally opposite sequence with Phillips screwdriver



18 Opening display cover, max. opening angle 180° (depends on installation position)

1. Release the housing screws on a step-by-step basis. Start with any screw of your choice. Then release the screw diagonally opposite this screw etc.
2. To close the housing: tighten the screws in a similar step-by-step, diagonally opposite sequence.

5.1.2 Cable mounting rail



A0025171

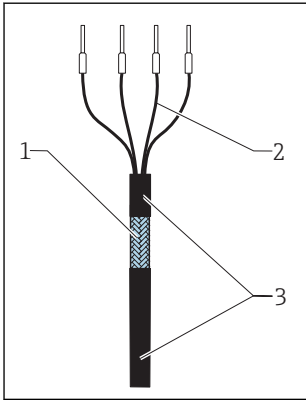
19 Cable mounting rail and associated function (field device)

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

5.1.3 Connecting the cable shield

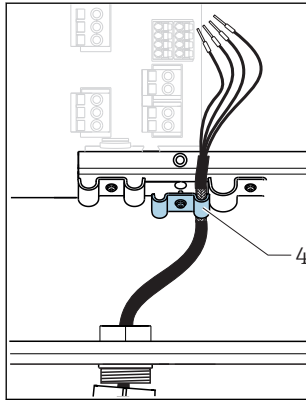
i If possible, only use terminated original cables. The sensor, fieldbus and ethernet cables must be shielded.

Cable sample (does not necessarily correspond to the original cable supplied)



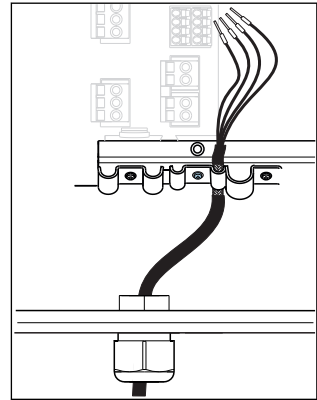
20 Terminated cable

- 1 Outer shield (exposed)
- 2 Cable cores with ferrules
- 3 Cable sheath (insulation)



21 Inserting the cable

- 4 Grounding clip



22 Tighten screw (2 Nm)

The cable shield is grounded using the grounding clamp. ¹⁾

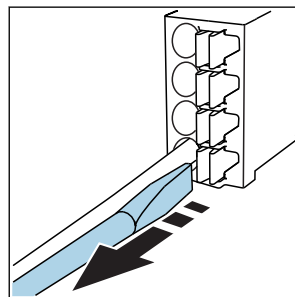
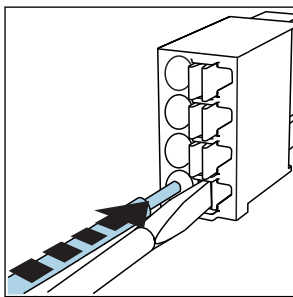
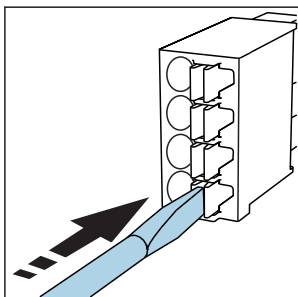
- 1) Please note the instructions in the "Ensuring the degree of protection" section. (→ 42)

1. Release a suitable cable gland on the bottom of the housing and remove the dummy plug.
2. Making sure the gland is facing the right direction, thread the gland onto the cable end and pull the cable through the entry and into the housing.

3. Route the cable in the housing in such a way that the **exposed** cable shield fits into one of the cable clamps and the cable cores can be easily routed as far as the connection plug on the electronics module.
4. Open the cable clamp and clamp the cable in place. Then tighten the screw of the cable clamp again.
5. Connect cable cores as per the wiring diagram.
6. Tighten the cable gland from outside.

5.1.4 Cable terminals

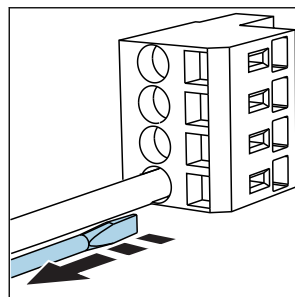
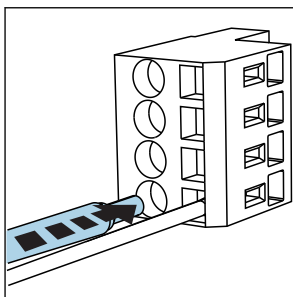
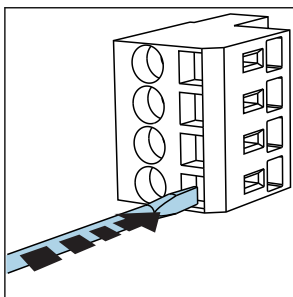
Plug-in terminals for Memosens and PROFIBUS/RS485 connections



- ▶ Press the screwdriver against the clip (opens the terminal).
- ▶ Insert the cable until the limit stop.
- ▶ Remove the screwdriver (closes the terminal).

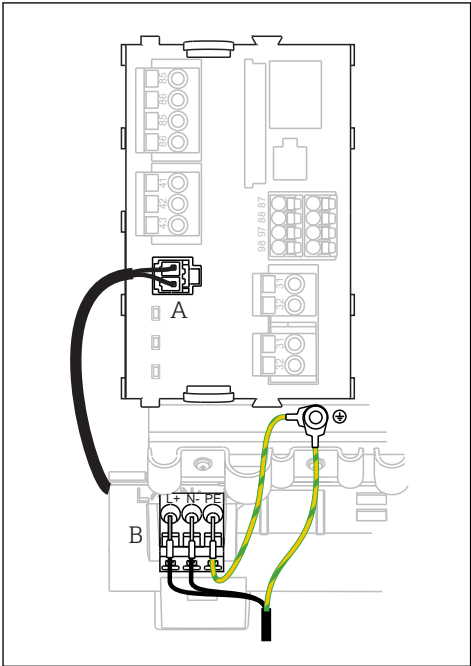
i After connection, make sure that every cable end is securely in place. Terminated cable ends, in particular, tend to come loose easily if they have not been correctly inserted as far as the limit stop.

All other plug-in terminals

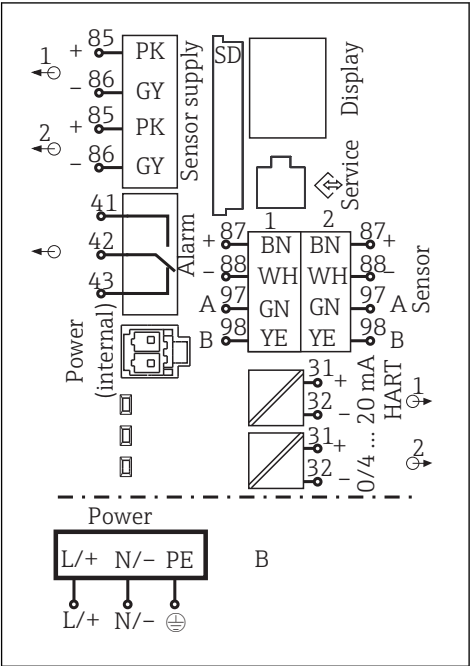


- ▶ Press the screwdriver against the clip (opens the terminal).
- ▶ Insert the cable until the limit stop.
- ▶ Remove the screwdriver (closes the terminal).

5.1.5 Connecting the supply voltage



A0015872

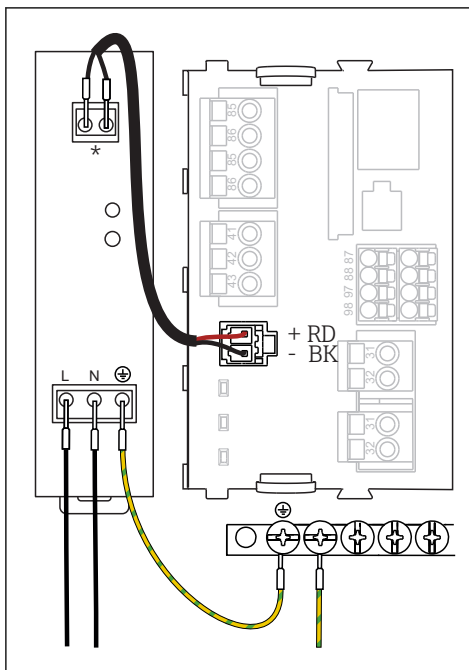


A0015873

23 Power supply connection on the BASE-E (field device)

24 Overall wiring diagram BASE-E and extension power unit (B)

- A Internal power supply cable
- B Extension power unit

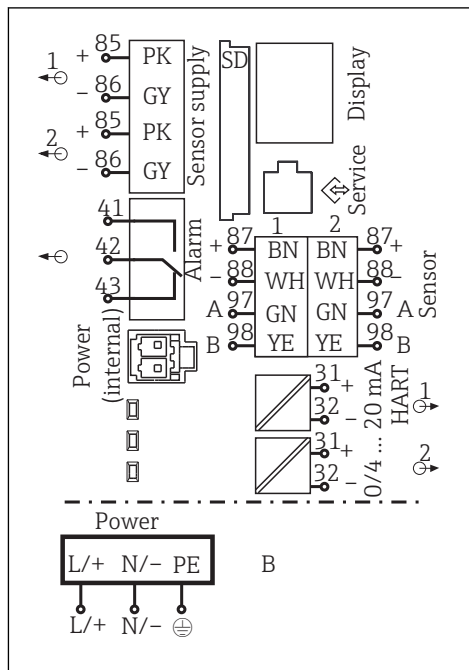


A0025365

25 Power supply connection with BASE-E (cabinet device)

* Assignment depending on power unit, make sure to connect correctly

i The two device versions may only be operated with the power unit supplied and the power unit cable. Also pay attention to the information in the operating manual supplied for the power unit.



A0015873

26 Overall wiring diagram BASE-E and external power unit (B)

Connecting the supply voltage

1. Route the power supply cable into the housing through the suitable cable entry.
2. Step 2 applies **only to the 100 to 230 V AC power unit**.
Connect the protective ground of the power unit to the threaded bolt specially provided on the cable mounting rail.
3. Protective ground or grounding provided by customer (**absolutely essential for 24 V power unit, additionally recommended for 100 to 230 V AC power unit**): Provide a ground cable (min. 0.75 mm² (corresponding to 18 AWG))¹! Guide the ground cable also through the cable entry and connect it to the threaded bolt on the cable mounting rail.
4. Connect the cable cores L and N (100 to 230 V AC) or + and - (24 V DC) to the plug-in terminals on the power unit in accordance with the wiring diagram.

NOTICE

Protective ground/ground cable with end sleeve or open cable lug

The cable can become loose. Loss of the protective function!

- ▶ To connect the protective ground or ground cable to the threaded bolt, only use a cable with a closed cable lug as per DIN 46211, 46225, form A.
- ▶ Never connect the protective ground or ground cable to the threaded bolt with an end sleeve or an open cable lug!

NOTICE

Incorrect connection and cable run not separate

Interference on signal or display cable, incorrect measured values or failure of display may occur!

- ▶ Do not connect the cable shield of the display cable to PE (terminal strip of device)!
- ▶ Run the signal/display cable in the control cabinet separately from live (current-carrying) cables.

5.2 Connecting the sensors

5.2.1 Sensor types

Photometer sensors

Sensor types	Sensor cable	Sensors
Analog photometer sensors without additional internal power supply	CUK80	▪ OUSAF12 ▪ OUSAF21 ▪ OUSAF22 ▪ OUSAF44 ▪ OUSAF46 ▪ OUSTF10 ▪ OUSBT66
	Fixed cable	OUSAF11

Sensors with Memosens protocol

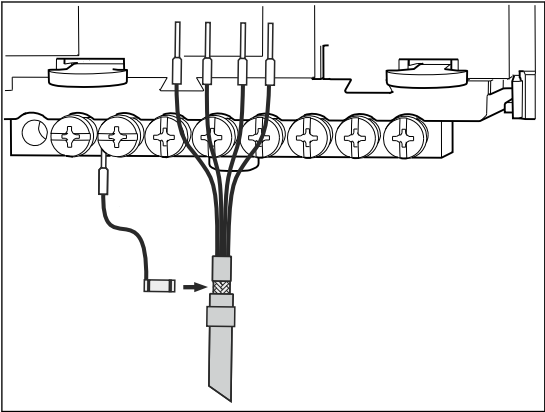
Sensor types	Sensor cable	Sensors
Digital sensors without additional internal power supply	With plug-in connection and inductive signal transmission	■ pH sensors ■ ORP sensors ■ Combined sensors ■ Oxygen sensors (amperometric and optical) ■ Conductivity sensors with conductive measurement of conductivity ■ Chlorine sensors (disinfection)
	Fixed cable	Conductivity sensors with inductive measurement of conductivity
Digital sensors with additional internal power supply	Fixed cable	■ 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:

- The maximum number of Memosens inputs is limited to two.
- Any combination of CUS71D or other sensors is possible.

5.2.2 Connecting the functional ground (cabinet device)

You must always connect the terminal strip with PE from the central node in the cabinet. Use the conductor with cable clamp that is included with the Memosens cable to connect the functional earth to the terminal strip of the device.



27 Functional earth connection

i You must only ever connect one functional earth to each screw in the terminal strip. Otherwise, shielding is not guaranteed.

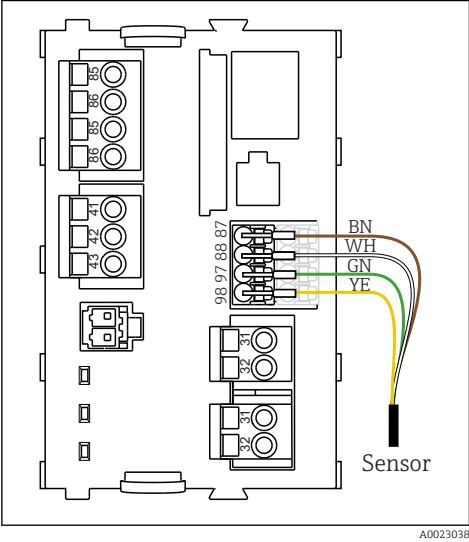
5.2.3 Connecting the sensors

Types of connection

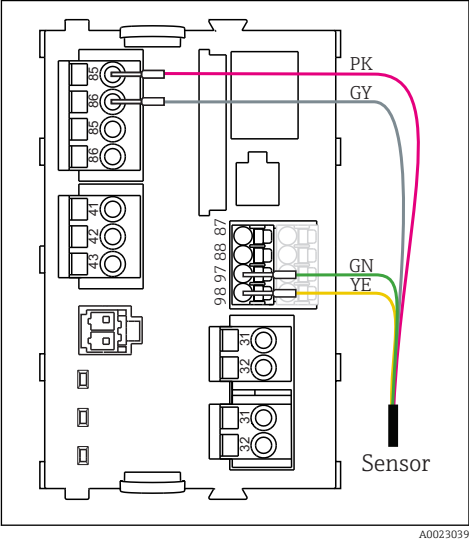
- Direct connection of sensor cable to terminal connector of the sensor module PEM and of Memosens module 2DS or of base module E (→  28 ff.)(Memosens sensors only)
- Optional for Memosens sensors: Sensor cable plug connected to the M12 sensor socket on the underside of the device (field device)

With this type of connection, the device is already wired at the factory (→  32).

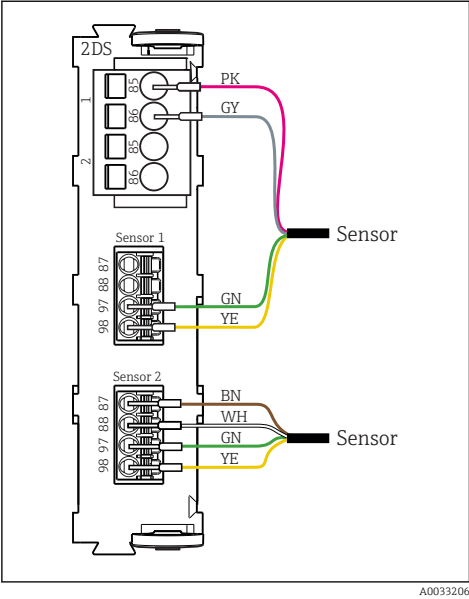
Sensor cable connected directly



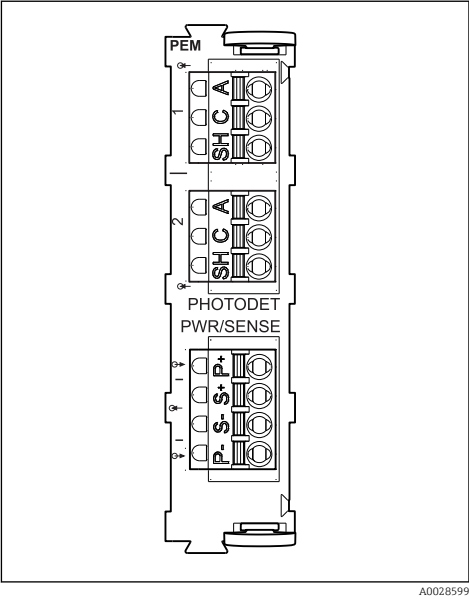
28 Memosens sensors without additional supply voltage



29 Memosens sensors with additional supply voltage



30 Memosens sensors with and without additional supply voltage at sensor module 2DS



31 PEM module

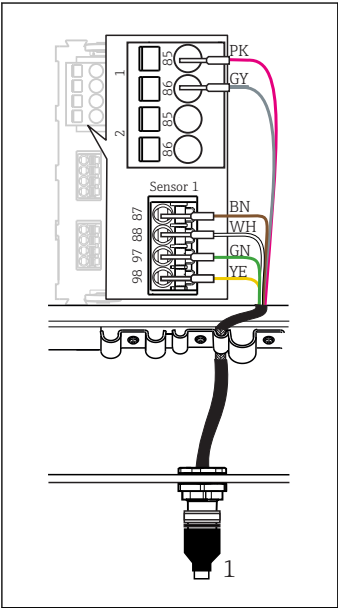
Connecting photometer sensors to PEM module

Sensor	Cable color	PEM terminal	Assignment
OUSAF11 OUSAF12	YE (thick)	P+	Lamp voltage +
	YE (thin)	S+	Recording lamp voltage +
	BK (thin)	S-	Recording lamp voltage -
	BK (thick)	P-	Lamp voltage -
	RD	A (1)	Sensor +
	BK ¹⁾ / WH ²⁾	C(1)	Sensor -
	GY	SH (1)	Shield
OUSAF21 OUSAF22 OUSTF10 OUSAF44	YE (thick)	P+	Lamp voltage +
	YE (thin)	S+	Recording lamp voltage +
	BK (thin)	S-	Recording lamp voltage -
	BK (thick)	P-	Lamp voltage -
	RD	A (1)	Measuring detector sensor +
	BK	C(1)	Measuring detector sensor -
	GY	SH (1)	Measuring detector screening
	WH	A (2)	Sensor reference +
	GN	C(2)	Sensor reference -
	GY	SH (2)	Reference screening
 2 PEM modules necessary	PEM module 1		
	YE (thick)	P+	Lamp voltage +
	YE (thin)	S+	Recording lamp voltage +
	BK (thin)	S-	Recording lamp voltage -
	BK (thick)	P-	Lamp voltage -
	RD	A (1)	Measuring detector sensor +
	BK	C(1)	Measuring detector sensor -
	GY	SH (1)	Measuring detector screening
	RD (lamp)	A (2)	Sensor reference +
	BK (lamp)	C(2)	Sensor reference -
	GY (lamp)	SH (2)	Reference screening
	PEM module 2		
	WH	A (1)	Measuring detector sensor +
	GN	C(1)	Measuring detector sensor -
	GY	SH (1)	Measuring detector screening

Sensor	Cable color	PEM terminal	Assignment
	WH (lamp)	A (2)	Sensor reference +
	GN (lamp)	C(2)	Sensor reference -
	GY (lamp)	SH (2)	Reference screening
OUSBT66	BN	P+	Lamp voltage +
	BN	S+	Recording lamp voltage +
	BK	P-	Lamp voltage -
	BK	S-	Recording lamp voltage -
	RD	A (1)	Sensor +
	OG	C(1)	Sensor -
	TP	SH (1)	Shield

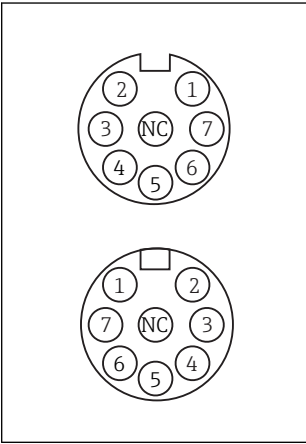
- 1) OUSAF12
2) OUSAF11

Memosens connection via M12 plug-in connection



32 M12 plug-in connection (e.g. at sensor module)

- 1 Sensor cable with M12 connector



33 M12 assignment Top: socket Bottom: connector (top view in each case)

- 1 PK (24 V)
2 GY (Ground 24 V)
3 BN (3 V)
4 WH (Ground 3 V)
5 GN (Memosens)
6 YE (Memosens)
7, Not connected
NC

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

Version without a pre-installed M12 socket

1. Insert an M12 socket (accessory) into a suitable opening in the base of the housing.
2. Connect the cable to a Memosens terminal as per the wiring diagram.

Connecting the sensor

- Plug the connector of the sensor cable (→ 32item 1) directly into the M12 socket.

Please note the following:

- The internal device wiring is always the same regardless of what kind of sensor you connect to the M12 socket (plug&play).
- The signal or power supply cables are assigned in the sensor 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).

5.3 Connecting additional inputs, outputs or relays

⚠ WARNING

Module not covered

No shock protection. Danger of electric shock!

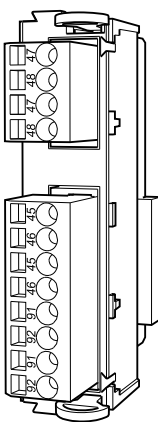
- ▶ Change or extend the hardware: always fill the slots from left to right. Do not leave any gaps.
- ▶ If all of the slots are not occupied: always insert a dummy cover or end cover in the slot to the right of the last module. This ensures that the unit is shock-protected.
- ▶ Always ensure shock protection is guaranteed particularly in the case of relay modules (2R, 4R, AOR).

i The terminal strip (cabinet unit) is used to connect the cable shields.

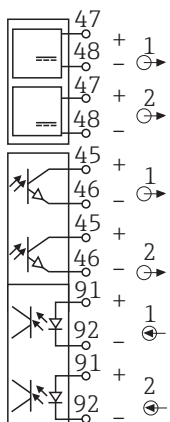
- ▶ If additional shields are required, connect them with PE centrally in the control cabinet via terminal blocks supplied by the customer.

5.3.1 Digital inputs and outputs

DIO module

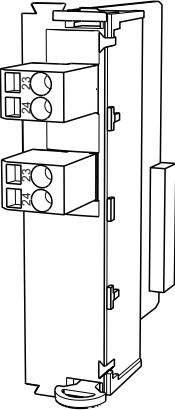
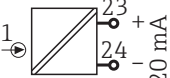
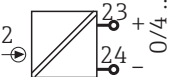


34 *Module*

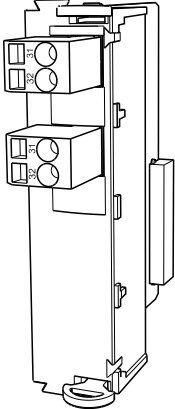
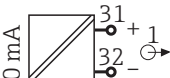
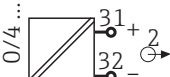
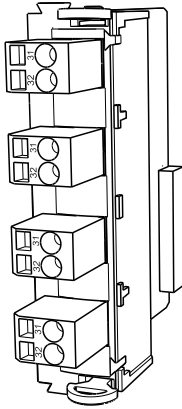
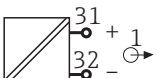
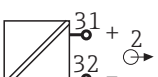
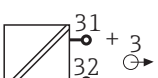
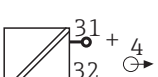


35 *Wiring diagram*

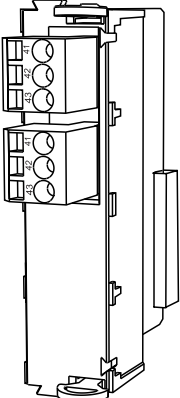
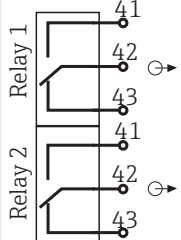
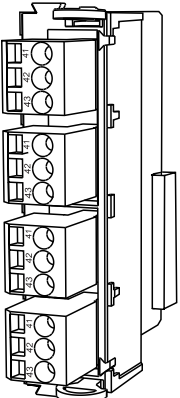
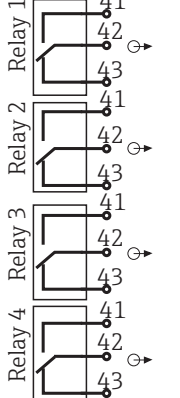
5.3.2 Current inputs

Module 2AI	
	 1  2 0/4 ... 20 mA
 36 Module	 37 Wiring diagram

5.3.3 Current outputs

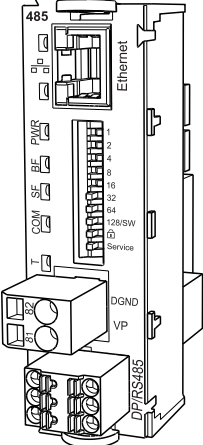
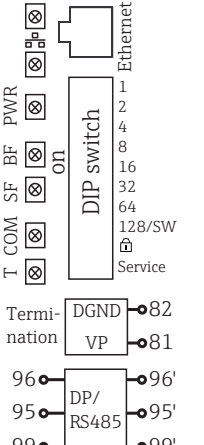
2AO		4AO	
	 0/4 ... 20 mA  0/4 ... 20 mA		 0/4 ... 20 mA  0/4 ... 20 mA  0/4 ... 20 mA  0/4 ... 20 mA
 38 Module	 39 Wiring diagram	 40 Module	 41 Wiring diagram

5.3.4 Relay

Module 2R		Module 4R	
			
 42 Module	 43 Wiring diagram	 44 Module	 45 Wiring diagram

5.4 Connecting digital communication

5.4.1 Module 485

	
 46 Module	 47 Wiring diagram

Terminal	PROFIBUS DP	Modbus RS485
95	A	B
96	B	A
99	Not connected	C
82	DGND	DGND
81	VP	VP

LEDs on front of module

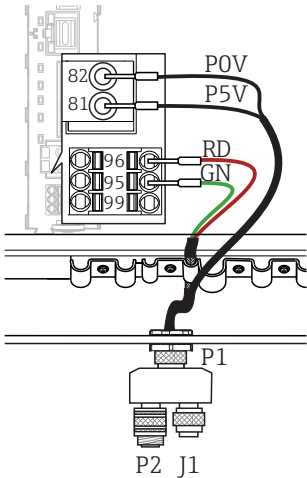
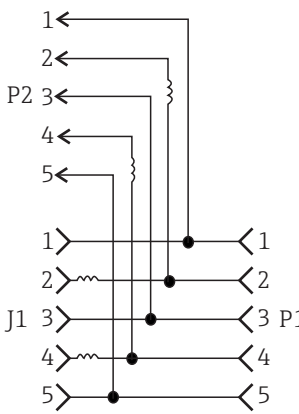
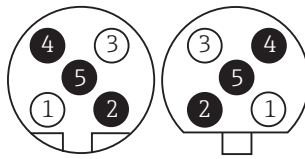
LED	Designation	Color	Description
RJ45	LNK/ACT	GN	- Off = Connection is not active - On = Connection is active - Flashing = Data transmission
RJ45	10/100	YE	- Off = Transmission rate 10 MBit/s - On = Transmission rate 100 MBit/s
PWR	Power	GN	Supply voltage is applied and module is initialized
BF	Bus failure	RD	Bus failure
SF	System failure	RD	Device error
COM	Communication	YE	Modbus message sent or received
T	Bus termination	YE	- Off = No termination - On = Termination is used

DIP switches on front of module

DIP	Factory setting	Assignment
1-128	ON	Bus address (→ "Commissioning/communication")
	OFF	Write protection: "ON" = configuration not possible via the bus, only via local operation
Service	OFF	If the switch is set to "ON", the user settings for Ethernet addressing are saved and connection settings programmed into the device at the factory are activated: IP address=192.168.1.212, Subnet mask=255.255.255.0, Gateway=0.0.0.0, DHCP=Off. If the switch is set to "OFF", the saved user settings are reactivated.

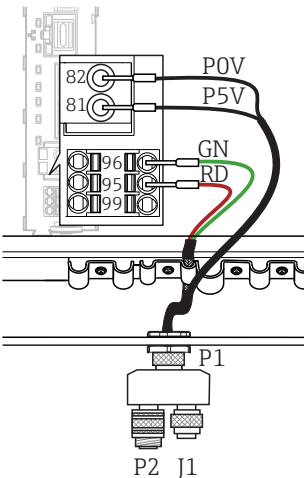
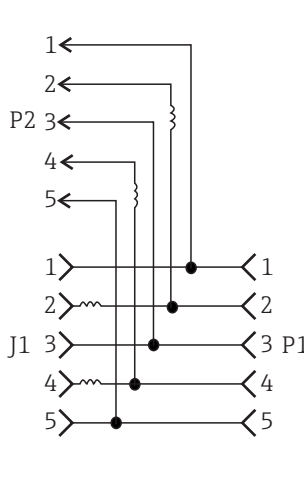
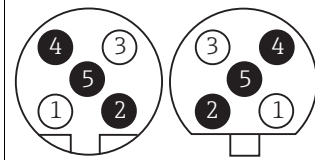
5.4.2 Connection via M12 connector (field device only)

PROFIBUS DP

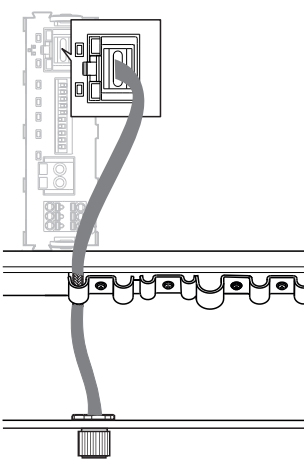
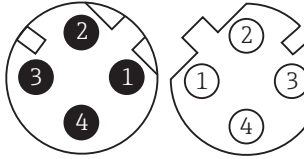
M12 Y-section	Wiring in M12 Y section	Pin assignment in connector and socket
 Diagram showing the M12 Y-section connection. The terminal block has pins 81, 82, 95, 96, and 99. Wires are connected to P0V, P5V, RD, GN, P1, P2, and J1.	 Wiring diagram in the M12 Y section. It shows connections between pins 1-5 and P1, P2, and J1. Pin 1 is connected to P1, pin 2 to P2, pin 3 to J1, pin 4 to P1, and pin 5 to P2.	 Pin assignment diagrams for the connector (left) and socket (right). The connector has pins 1, 2, 3, 4, 5. The socket has pins 1, 2, 3, 4, 5. 50 Connector (left) and socket (right) 1 P5V, 5 V power supply for external terminating resistor 2 A 3 P0V, reference potential for P5V 4 B 5 n.c., not connected * Shielding

i When using the M12 Y-section, the maximum data transfer rate is limited to 1.5 MBit/s. For direct wiring, the maximum data transfer rate is 12 MBit/s.

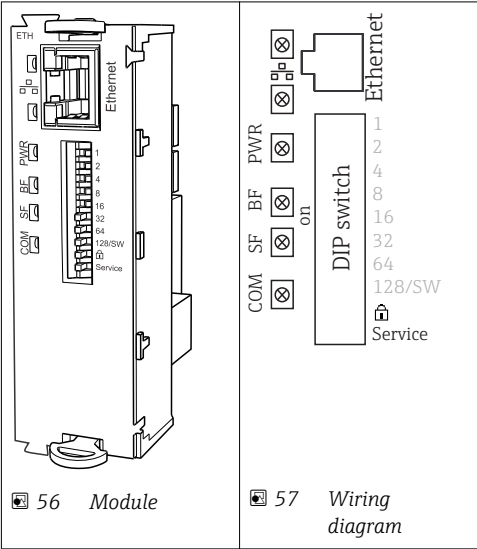
Modbus RS485

M12 Y-section	Wiring in M12 Y section	Pin assignment in connector and socket
 51 M12 connection	 52 Wiring	 53 Connector (left) and socket (right) 1 P5V, 5 V power supply for external terminating resistor 2 A 3 P0V, reference potential for P5V 4 B 5 n.c., not connected * Shielding

Ethernet, Web server

Internal connection	Pin assignment in connector and socket
 54 Ethernet socket	 55 Connector (left) and socket (right) 1 Tx+ 2 Rx+ 3 Tx- 4 Rx- Shielding (thread)

5.4.3 ETH module



LEDs on front of module

LED	Designation	Color	Description
RJ45	LNK/ACT	GN	- Off = Connection is not active - On = Connection is active - Flashing = Data transmission
RJ45	10/100	YE	- Off = Transmission rate 10 MBit/s - On = Transmission rate 100 MBit/s
PWR	Power	GN	Supply voltage is applied and module is initialized
BF	Bus failure	RD	Not used
SF	System failure	RD	Device error
COM	Communication	YE	Modbus message sent or received

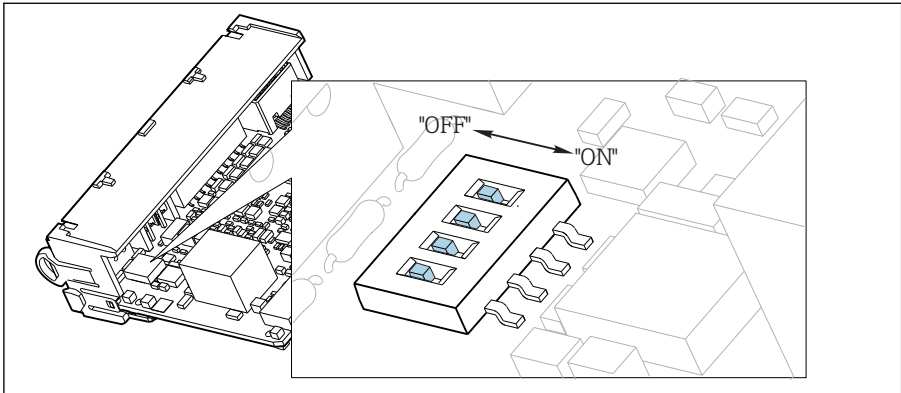
DIP switches on front of module

DIP	Factory setting	Assignment
1-128	ON	Bus address (→ "Commissioning/communication")
	OFF	Write protection: "ON" = configuration not possible via the bus, only via local operation
Service	OFF	If the switch is set to "ON" , the user settings for Ethernet addressing are saved and connection settings programmed into the device at the factory are activated: IP address=192.168.1.212, Subnet mask=255.255.255.0, Gateway=0.0.0.0, DHCP=Off. If the switch is set to "OFF" , the saved user settings are reactivated.

5.4.4 Bus termination

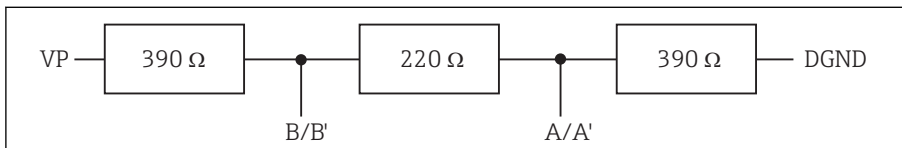
There are 2 ways to terminate the bus:

1. Internal termination (via DIP switch on module board)



58 DIP switch for internal termination

- Using a suitable tool such as a tweezer, move all four DIP switches to the "ON" position.
 - ↳ The internal termination is used.



59 Structure of internal termination

2. External termination

Leave the DIP switches on the module board in the "OFF" position (factory setting).

- Connect the external termination to terminals 81 and 82 on the front of module 485 for 5-V power supply.
 - ↳ The external termination is used.

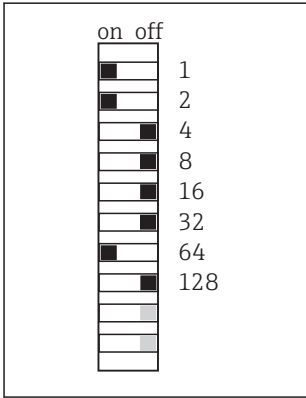
5.5 Hardware settings

Setting the bus address

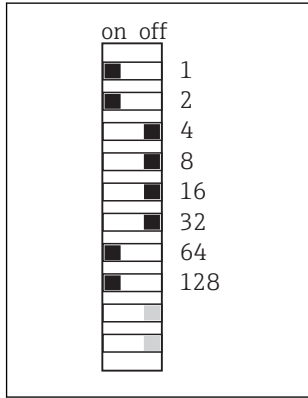
1. Open the housing.

2. Set the desired bus address via the DIP switches of module 485.

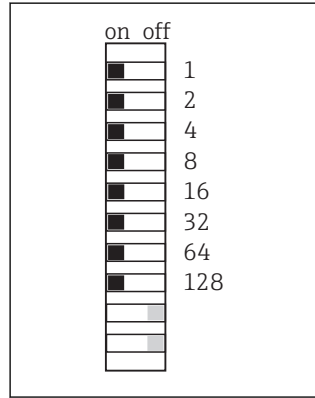
i For PROFIBUS DP, valid bus addresses are anything between 1 and 126, and anything between 1 and 247 for Modbus. If you configure an invalid address, software addressing is automatically enabled via the local configuration or via the fieldbus.



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- 60** Valid PROFIBUS address 67 **61** Valid Modbus address 195 **62** Invalid address 255 ¹⁾

¹⁾ Order configuration, software addressing is active, software address configured at the factory: PROFIBUS 126, Modbus 247

i For detailed information on "Setting the address via software", see the Operating Instructions →

5.6 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions and which are necessary for the required, designated use, may be carried out on the device delivered.

- Exercise care when carrying out the work.

Individual types of protection permitted for this product (integrity (IP), electrical safety, EMC interference immunity) can no longer be guaranteed if, for example:

- Covers are left off
- Different power units to the ones supplied are used
- Cable glands are not sufficiently tightened (must be tightened with 2 Nm for the confirmed level of IP protection)
- Unsuitable cable diameters are used for the cable glands
- Modules are not fully secured
- The display is not fully secured (risk of moisture entering due to inadequate sealing)
- Loose or insufficiently tightened cables/cable ends
- Conductive cable strands are left in the device

5.7 Post-connection check

WARNING

Connection errors

The safety of people and of the measuring point is under threat. The manufacturer does not accept any responsibility for errors that result from failure to comply with the instructions in this manual.

- ▶ Put the device into operation only if you can answer **yes** to **all** the following questions.

Instrument status and specifications

- ▶ Is there any external damage to the device and cables?

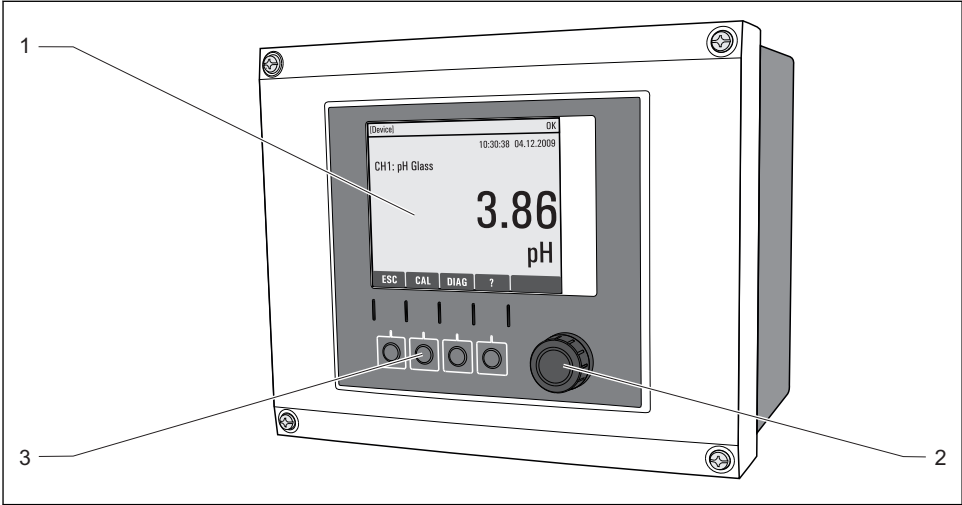
Electrical connection

- ▶ Are the mounted cables strain-relieved?
- ▶ Are the cables routed without loops and cross-overs?
- ▶ Are the signal cables correctly connected as per the wiring diagram?
- ▶ Have all the other connections been established correctly?
- ▶ Have you connected unused connection wires to the protective ground connection?
- ▶ Are all plug-in terminals securely engaged?
- ▶ Are all the connection wires securely positioned in the cable terminals?
- ▶ Are all cable entries mounted, tightened and leak-tight?
- ▶ Does the supply voltage match the voltage indicated on the nameplate?

6 Operation options

6.1 Overview

6.1.1 Display and operating elements

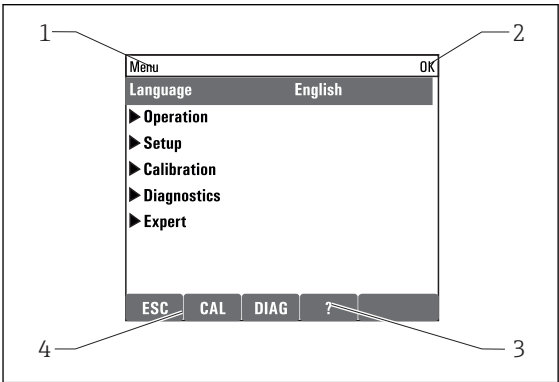


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 63 Overview of operation (using the example of the field device)

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

6.1.2 Display

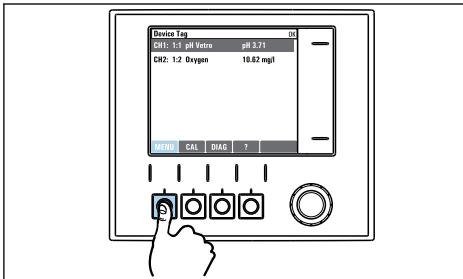


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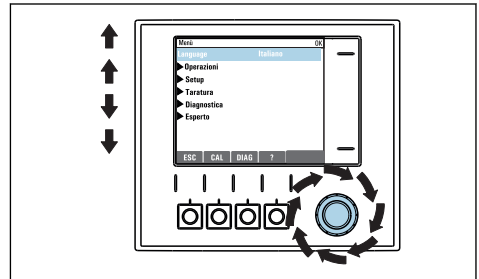
- 1 Menu path and/or device designation
- 2 Status display
- 3 Help if available
- 4 Assignment of the soft keys

6.2 Access to the operating menu via the local display

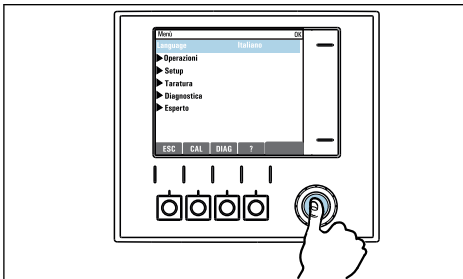
6.2.1 Operating concept



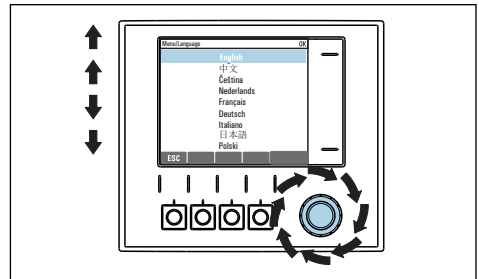
- ▶ Pressing the soft key: selecting the menu directly



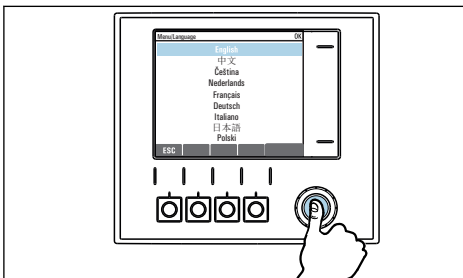
- ▶ Turning the navigator: moving the cursor in the menu



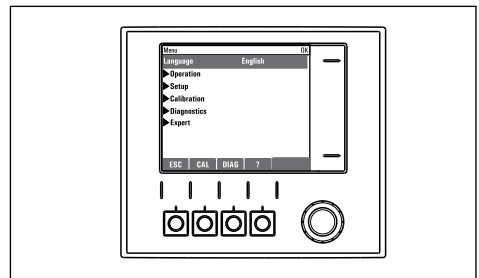
- ▶ Pressing the navigator: launching a function



- ▶ Turning the navigator: selecting a value (e.g. from a list)



- ▶ Pressing the navigator: accepting the new value



- ↳ New setting is accepted

6.2.2 Locking or unlocking operating keys

Locking operating keys

1. Press the navigator for longer than 2 s.
 - ↳ A context menu for locking the operating keys is displayed. You have the choice of locking the keys with or without password protection. "With password" means that you can only unlock the keys again by entering the correct password. Set this password here: **Menu/Setup/General settings/Extended setup/Data management/Change lock password.**
2. Select whether to lock keys with or without a password.
 - ↳ The keys are locked. No more entries can be made. In the soft key bar, you will see the  symbol.

 The password is 0000 when the device is delivered from the factory. **Make sure to note down any changes to the password**, as otherwise you will not be able to unlock the keypad yourself.

Unlocking operating keys

1. Press the navigator for longer than 2 s.
 - ↳ A context menu for unlocking the operating keys is displayed.
2. **Key unlock .**
 - ↳ The keys are unlocked immediately if you did not choose to lock with a password. Otherwise you are asked to enter your password.
3. Only if keypad is password-protected: enter the right password.
 - ↳ The keys are unlocked. It is possible to access the entire onsite operation again. The  symbol is no longer visible on the display.

7 Commissioning

7.1 Function check

WARNING

Incorrect connection, incorrect supply voltage

Safety risks for staff and device malfunctions!

- ▶ Check that all connections have been established correctly in accordance with the wiring diagram.
- ▶ Ensure that the supply voltage matches the voltage indicated on the nameplate.

7.2 Switching on

 During the device startup phase, the relays and current outputs have an undefined status for a few seconds prior to initialization. Watch out for possible effects on any actuators which may be connected.

7.2.1 Setting the operating language

Configuring the language

If you have not already done so, close the housing cover and screw the device closed.

1. Switch on the supply voltage.
 - ↳ Wait for the initialization to finish.
2. Press the soft key **MENU** . Set your language in the top menu item.
 - ↳ The device can now be operated in your chosen language.

7.3 Basic setup

Making basic settings

1. Switch to the **Setup/Basic setup** menu.
 - ↳ Make the following settings.
2. **Device tag**: Give your device any name of your choice (max. 32 characters).
3. **Set date**: Correct the set date if necessary.
4. **Set time**: Correct the set time if necessary.
 - ↳ For quick commissioning, you can ignore the additional settings for outputs, relays etc. You can make these settings later in the specific menus.
5. To return to the measuring mode: press the soft key for **ESC** for at least one second.
 - ↳ Your controller now works with your basic settings. The sensors connected use the factory settings of the sensor type in question and the individual calibration settings that were last saved.

If you wish to configure your most important input and output parameters in the **Basic setup** :

- ▶ Configure the current outputs, relays, limit switches, controllers, device diagnostics and cleaning cycles with the submenus which follow the time setting.



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