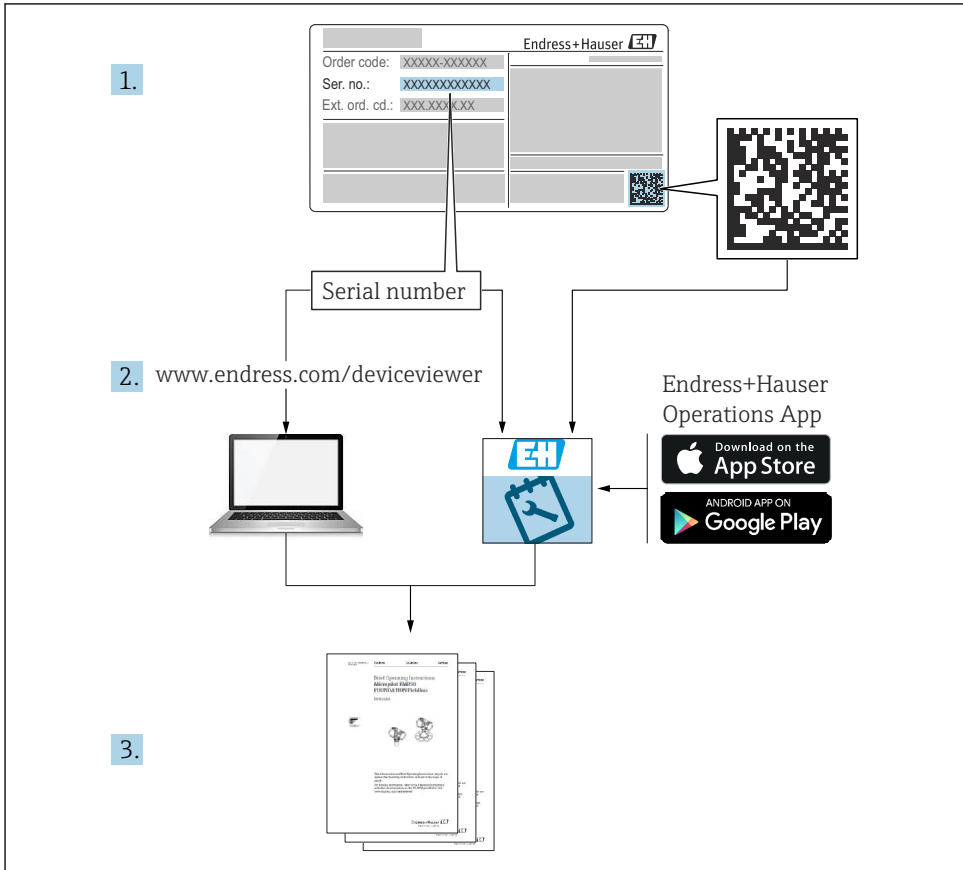# Brief Operating Instructions
Liquistation CSF34

Automatic sampler for liquid media

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

Endress+Hauser [EH]

People for Process Automation

Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXXX
Ext. ord. cd.: XXX.XXXX.XX

Endress+Hauser

1.

Serial number

2. www.endress.com/deviceviewer

Endress+Hauser
Operations App

Download on the
App Store

ANDROID APP ON
Google Play

3.

A0040778

Table of contents

1   About this document

1.1   Warnings

Structure of information	Meaning
⚠ DANGER **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.
⚠ WARNING **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.
⚠ CAUTION **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.
NOTICE **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

🛈	Additional information, tips
☑	Permitted
☑☑	Recommended
☒	Forbidden or not recommended
📖	Reference to device documentation
📄	Reference to page
🖾	Reference to graphic
↳	Result of a step

1.3   Symbols on the device

⚠–📖	Reference to device documentation
🗷	Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

1.4   Documentation

The following manuals complement these Brief Operating Instructions and are available on the product pages on the Internet:
- Operating Instructions Liquistation CSF34, BA00478C
  - Device description
  - Commissioning
  - Operation
  - Software description (excluding 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 for 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
  - Web server (optional), SD01190C
  - EtherNet/IP, SD01293C
- Special Documentation: Sampler application manual SD01068C
- Documentation on other devices in the Liquiline platform:
  - Liquiline CM44xR (DIN rail device)
  - Liquiline System CA80 (analyzer)
  - Liquiline System CAT8x0 (sample preparation)
  - Liquistation CSFxx (sampler)
  - Liquiport CSP44 (sampler)

2   Basic safety instructions

2.1   Requirements for the 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.

ℹ️ 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   Intended use

Liquistation CSF34 is a stationary sampler for liquid media. The samples are taken discontinuously using a vacuum pump or peristaltic pump and are then distributed into sampling containers and refrigerated.

The sampler is designed for use in the following applications:
- Communal and industrial wastewater treatment plants
- Laboratories and water management offices
- Monitoring of liquid media in industrial processes

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-intended use.

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 international 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

Programs not switched off during maintenance activities.
Risk of injury due to medium or cleaning agent!
▶ Quit any programs that are active.
▶ Switch to the service mode.
▶ If testing the cleaning function while cleaning is in progress, wear protective clothing, goggles and gloves or take other suitable measures to protect yourself.

2.5 Product safety

2.5.1 State-of-the-art technology

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 international standards have been observed.

Devices connected to the sampler must comply with the applicable safety standards.

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   Product description

3.1   Product design

A complete sampling unit comprises:

- Controller with display, soft keys and navigator
- Vacuum or peristaltic pump for sampling
- PE or glass sample bottles for sample preservation
- Sampling chamber temperature regulator (optional) for safe sample storage
- Suction line with suction head
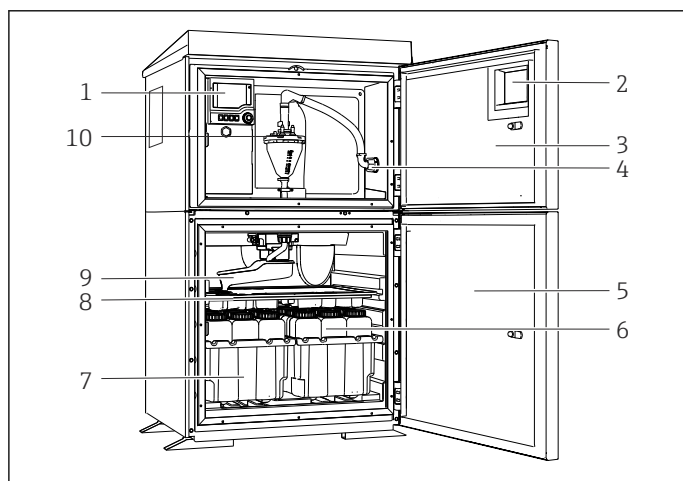
1	Controller
2	Window (optional)
3	Dosing compartment door
4	Suction line connection
5	Sampling chamber door
6	Sample bottles, e.g. 2 x 12 bottles, PE, 1 liter
7	Bottle trays (depending on sample bottles selected)
8	Distribution plate (depending on sample bottles selected)
9	Distribution arm
10	Vacuum system, e.g. Dosing system with conductive sample sensor

🔲 *1   Example of a Liquistation, version with vacuum pump*
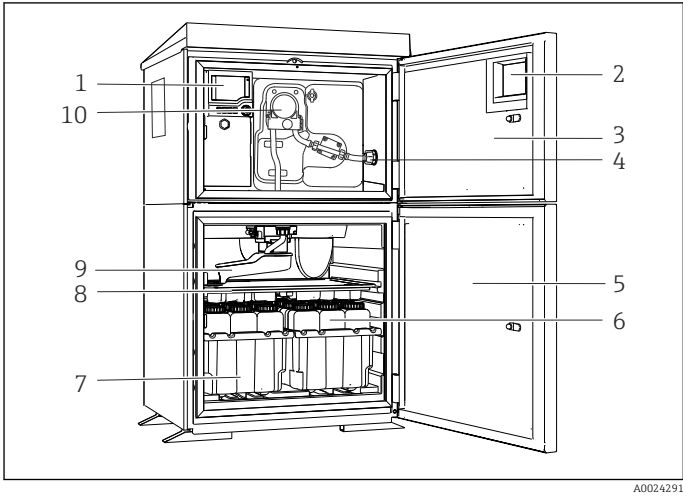
1   Controller
2   Window (optional)
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5   Sampling chamber door
6   Sample bottles, e.g. 2 x 12 bottles, PE, 1 liter
7   Bottle trays (depending on sample bottles selected)
8   Distribution plate (depending on sample bottles selected)
9   Distribution arm
10 Peristaltic pump
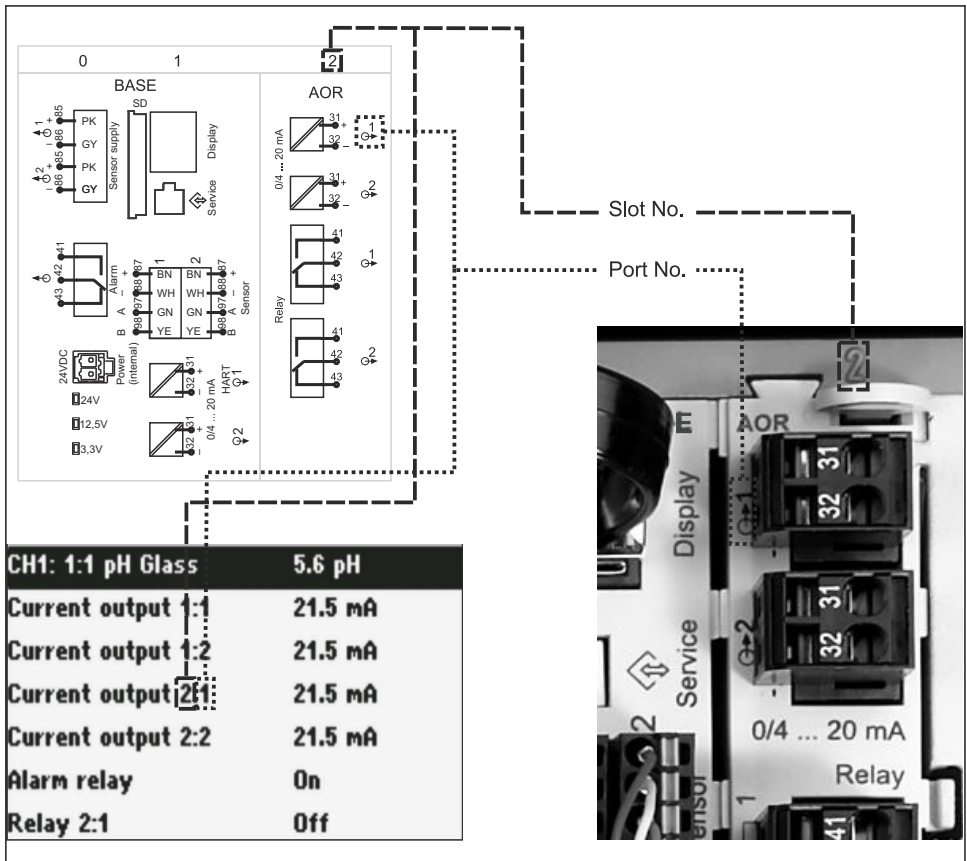
A0024291

🔲 2   *Example of a Liquistation, version with peristaltic pump*

3.2   Equipment architecture

3.2.1   Slot and port assignment

A0045689

⊞ *3*   *Slot and port assignment of hardware and presentation on the display*

The electronics configuration follows a modular concept:
• There are several slots for electronics modules. These are referred to as "slots".
• These slots are numbered consecutively in the housing. Slots 0 and 1 are always reserved for the base module.
• In addition there are also inputs and outputs for the control module. These slots are labeled "S".
• Each electronics module has one or more inputs and outputs or relays. Here they are all collectively known as "ports".

- Ports are consecutively numbered per electronics module and are recognized automatically by the software.
- Outputs and relays are named according to their function, e.g. "current output", and are displayed in ascending order with the slot and port numbers.
  Example:
  "Current output 2:1" shown on the display means: slot 2 (e.g. AOR module) : port 1 (current output 1 of the AOR module)
- Inputs are assigned to measuring channels in the ascending order of "slot:port number"
  Example:
  "CH1: 1:1" shown on the display means:
  Slot 1 (base module) : port 1 (input 1) is channel 1 (CH1).

3.3   Terminal diagram

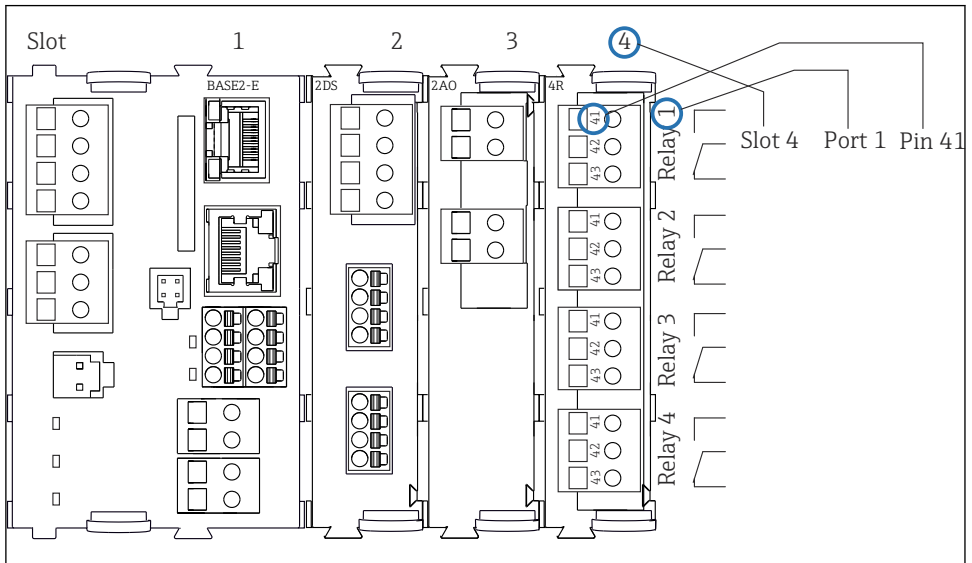The unique terminal name is derived from:

Slot no. : Port no. : Terminal

Example, NO contact of a relay
Device with inputs for digital sensors, 4 current outputs and 4 relays
- Base module BASE2-E (contains 2 sensor inputs, 2 current outputs)
- 2AO module (2 current outputs)
- 4R module (4 relays)

A0039621

⊡ 4   *Creating a terminal diagram using the example of the NO contact (terminal 41) of a relay*

4   Incoming acceptance and product identification

4.1   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.

4.2   Product identification

Nameplates can be found:
- On the inside of the door
- On the packaging (adhesive label, portrait format)

4.2.1   Nameplate

The nameplate provides you with the following information on your device:
- Manufacturer identification
- Order code
- Extended order code
- Serial number
- Firmware version
- Ambient and process conditions
- Input and output values
- Activation codes
- Safety information and warnings

▶ Compare the information on the nameplate with the order.

4.2.2   Product identification

Product page

www.endress.com/CSF34

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. Go to www.endress.com.

2. Page search (magnifying glass symbol): Enter valid serial number.

3. Search (magnifying glass).
    ↪ The product structure is displayed in a popup window.

4. Click the product overview.
    ↪ A new window opens. Here you fill information pertaining to your device, including the product documentation.

4.2.3   Manufacturer address

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

4.3   Storage and transport

NOTICE

Damage to the sampler

If transported incorrectly, the roof may become damaged or tear off.

▶ Transport the sampler using a lifting truck or forklift. Do not lift the sampler by the roof. Lift it in the middle between the top and bottom sections.

4.4   Scope of delivery

The scope of delivery comprises:
• 1 Liquistation CSF34 with:
    • The ordered bottle configuration
    • Optional hardware
• Accessories kit
  For peristaltic or vacuum pump:
  Hose adapter for suction line with various angles (straight, 90°), Allen screw (for version with vacuum pump only)
• 1 printed copy of the Brief Operating Instructions in the language ordered
• Optional accessories

▶ If you have any queries:

    Please contact your supplier or local sales center.

5 Mounting

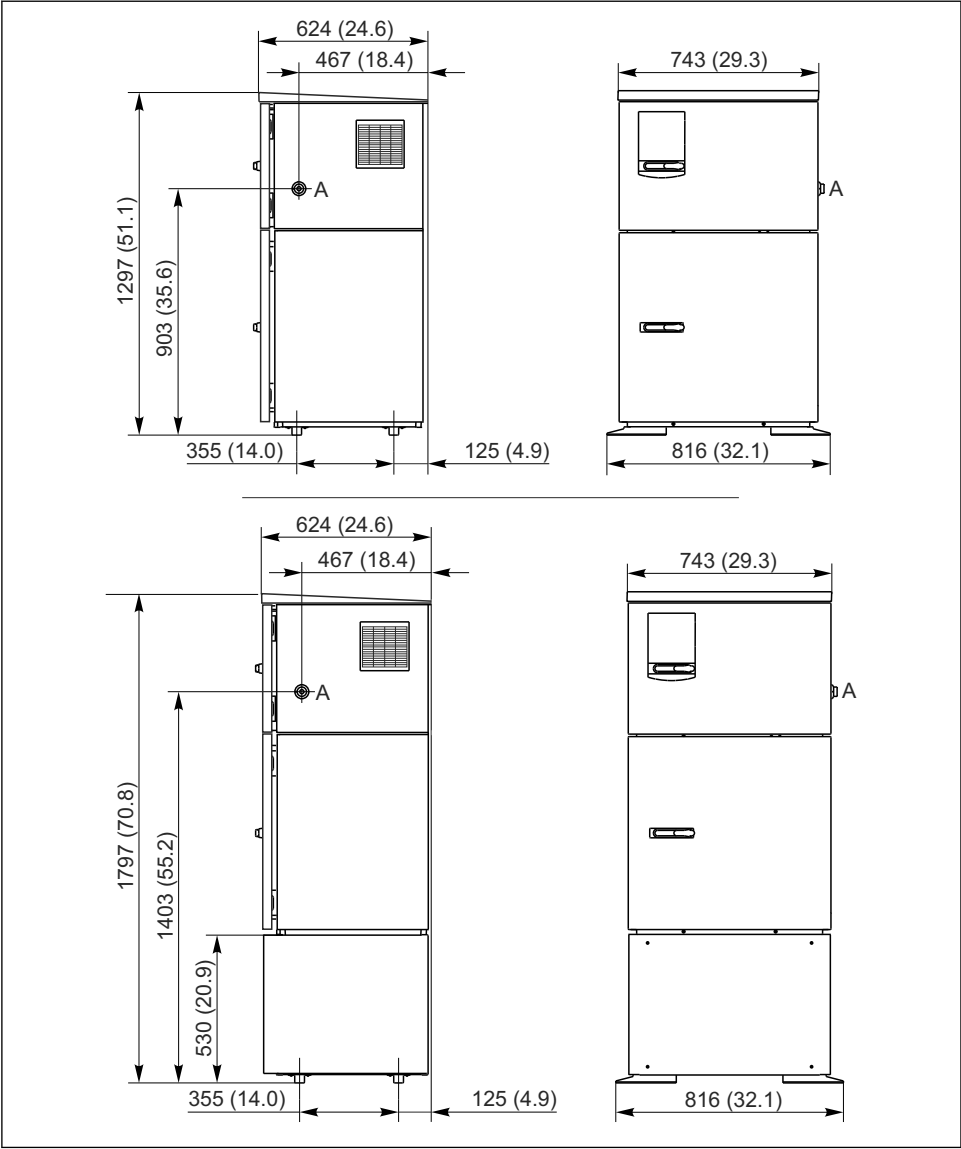## 5.1 Mounting requirements

5.1.1 Dimensions
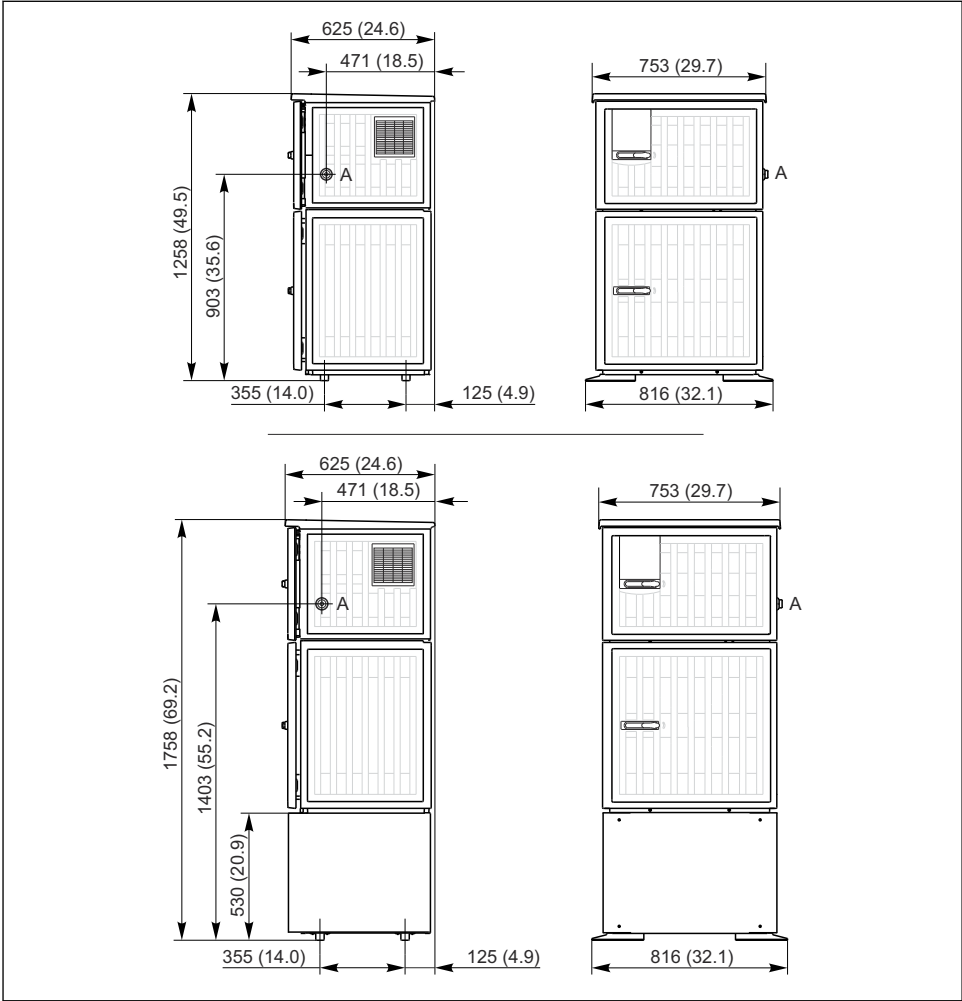
A0025857

⊡ 5   *Dimensions of Liquistation, plastic version, without/with stand. Unit of measurement mm (in)*
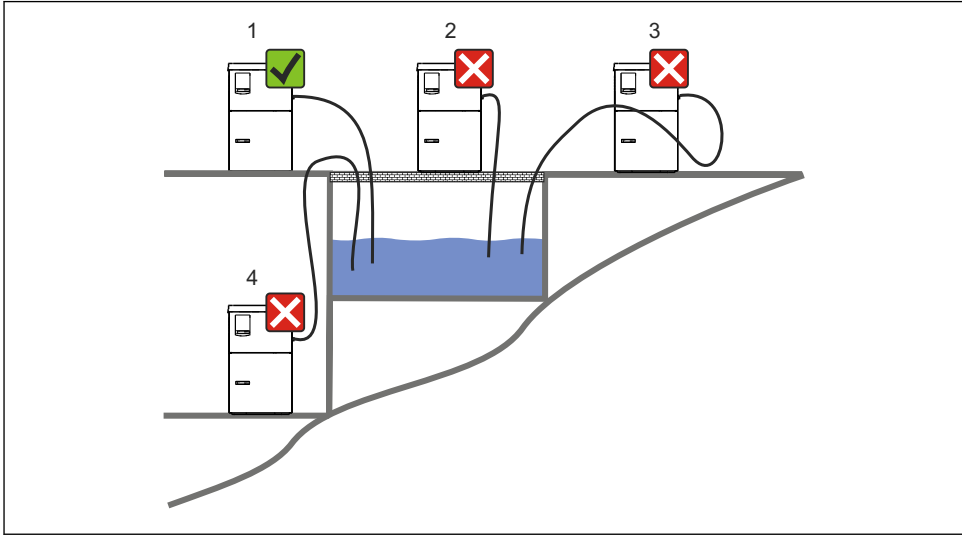
A   Suction line connection

⬚ 6 *Dimensions of Liquistation, stainless steel version, without/with stand. Unit of measurement mm (in)*

A   Suction line connection

5.1.2   Installation site

For version with sample pump

A0024411

⊡ *7   Liquistation mounting conditions*

Mounting conditions
Route the suction line with a downward gradient to the sampling point.
Never mount the sampler in a place where it is exposed to aggressive gases.
Avoid siphoning effects in the suction line.
Do not route the suction line with an upward gradient to the sampling point.

Note the following when erecting the device:
• Erect the device on a level surface.
• Connect the device securely to the surface at the fastening points.
• Protect the device against additional heating (e.g. heaters or direct sunlight).
• Protect the device against mechanical vibrations.
• Protect the device against strong magnetic fields.
• Make sure air can circulate freely at the side panels of the cabinet. Do not mount the device directly against a wall. Allow at least 150 mm (5.9 in.) from the wall to the left and right.
• Do not erect the device directly above the inlet channel of a wastewater treatment plant.

5.1.3   Mechanical connection

Foundation plan
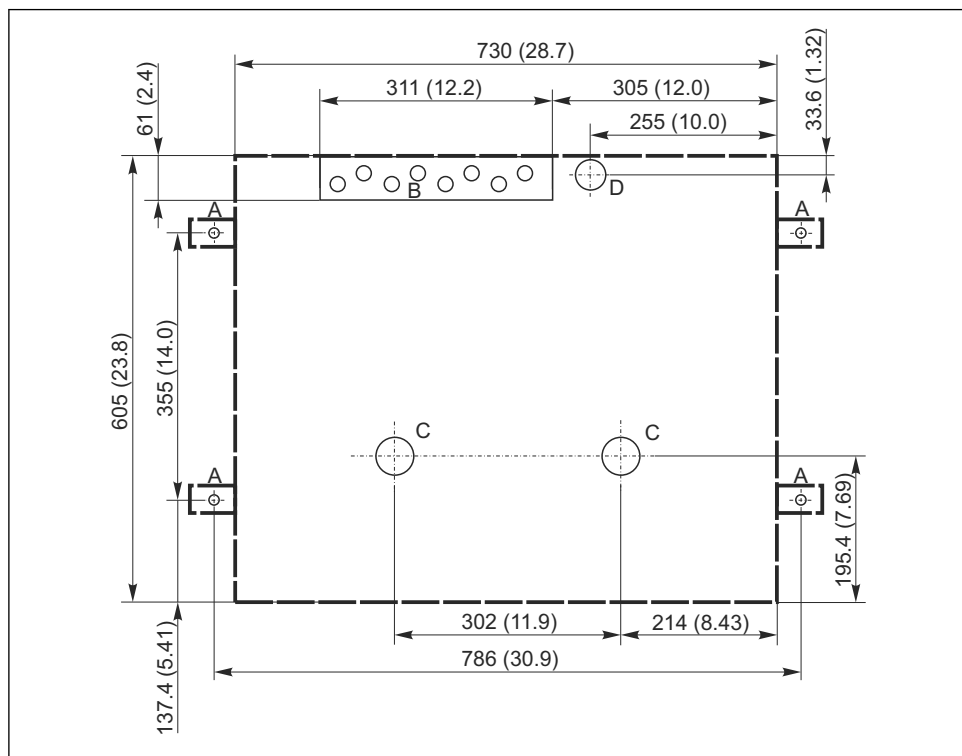
A0024406

⊞ *8   Foundation plan. Unit of measurement mm (in)*

A   Fasteners (4 x M10)
B   Cable inlet
C   Outlet for condensate and overflow > DN 50
D   Sample supply from below > DN 80
---   Dimensions of Liquistation

5.1.4   Connection for sample intake and for version with sample pump

- Maximum suction height:
  - Vacuum pump: option 8 m (26 ft)
  - Peristaltic pump: standard 8 m (26 ft)
- Maximum hose length: 30 m (98 ft)
- Hose connection diameter
  - Vacuum pump: 10 mm (3/8 in) 13 mm (1/2 in) , 16 mm (5/8 in) or 19 mm (3/4 in) internal diameter
  - Peristaltic pump: 10 mm (3/8 in) internal diameter
- Intake speed:
  > 0.6 m/s (> 1.9 ft/s) for 10 mm (3/8 in) ID, as per Ö 5893, US EPA
  > 0.6 m/s (> 1.9 ft/s) for ≤ 13 mm (1/2") ID, as per EN 25667, ISO 5667
  > 0.5 m/s (> 1.6 ft/s) for ≤ 13 mm (1/2") ID, in accordance with EN 25667, ISO 5667

Note the following when erecting the device:
- Always lay the suction line so that it slopes upwards from the sampling point to the sampler.
- The sampler must be located above the sampling point.
- Avoid siphoning effects in the suction line.

Requirements for the sampling point:
- Do not connect the suction line to pressurized systems.
- Use the suction filter to impede coarse and abrasive solids and solids which can cause clogging.
- Immerse the suction line in the direction of flow.
- Take the sample at a representative point (turbulent flow, not directly at the bottom of the channel).

Useful sampling accessories
Suction filter:
Impedes coarser solids and solids which can cause clogging.

5.2   Setting up the device

5.2.1   Connecting the suction line at the side on version with pump

1. When setting up the device, take the installation conditions into account.
2. Route the suction line from the sampling point to the device.
3. Fit a hose adapter on the hose.
4. Secure the hose adapter with a worm drive hose clip.
5. Screw the suction line onto the device's hose connection.

5.2.2   Connecting the suction line from below on version with pump

If the suction line is connected from below, the suction line is routed upwards behind the rear panel of the sample compartment.

1. Remove the rear panel of the dosing compartment and sample compartment beforehand.

2. Remove the drain plug from the hose gland located at the back of the device base.

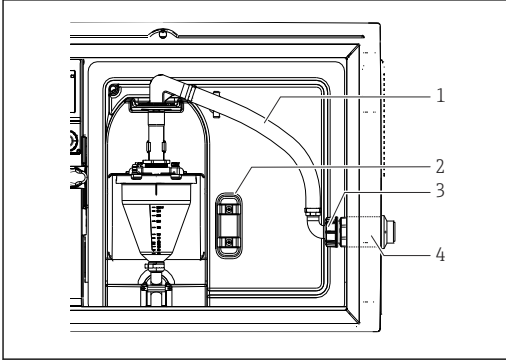3. Guide the suction line upwards and through the opening towards the front, as illustrated.
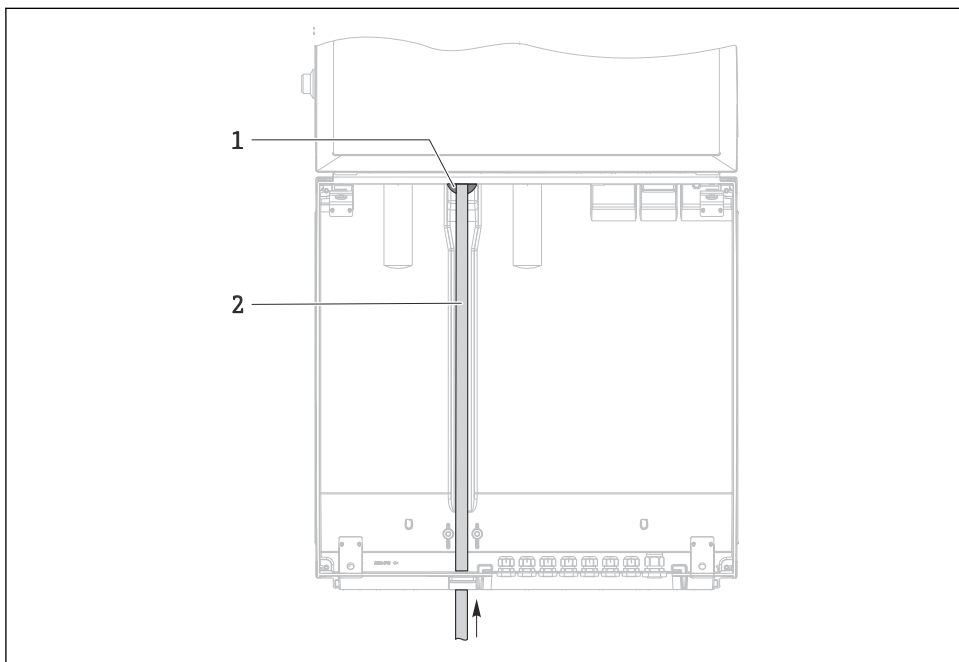
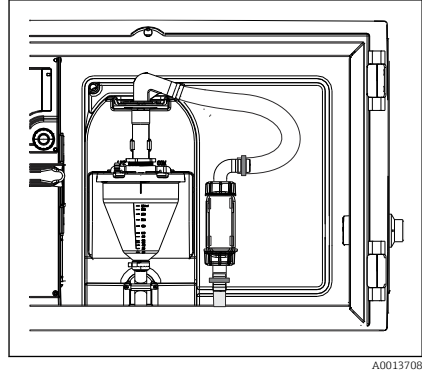A0013704

 ⊡ *9   Sample supply from below*

1   Gland for the suction line
2   Suction line

Connecting the suction line on version with vacuum pump

☒ 10   *Connecting the suction line from the side (as-delivered state)*

☒ 11   *Suction line connected from below*

1   Hose
2   Fixing clip for hose gland
3   Thread adapter nut
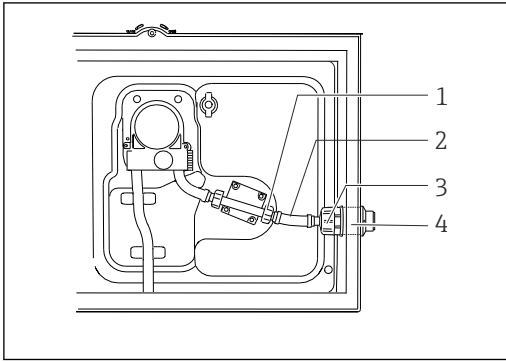*4   Hose gland*

Modification of the suction line from side connection to connection from below

1. Unscrew the thread adapter nut (item 3).

2. Unscrew the hose gland (item 4) from the side panel.

3. Fit the hose gland in the fixing clamp (item 2) as illustrated.

4. Screw the hose tight from above.

5. Attach the hose adapter supplied to the suction line and screw it onto the hose gland from below.
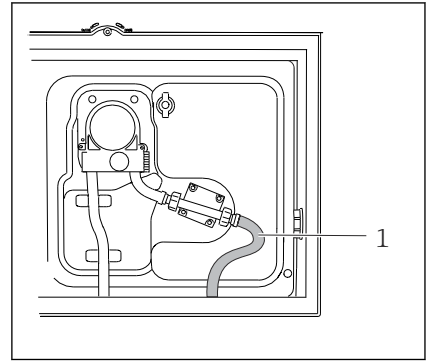
6. Insert the dummy plugs supplied.

Connecting the suction line on version with peristaltic pump

🖾 *12   Connecting the suction line from the side (as-delivered state)*

🖾 *13   Suction line connected from below*

1   Small thread adapter nut
2   Hose
3   Thread adapter nut
4   Hose gland

Modification of the suction line from side connection to connection from below

1. Unscrew the thread adapter nut (item 3) and the hose gland (item 4) from the side panel.

2. Unscrew the small thread adapter nut (item 1) and remove the hose.

3. Fit a hose adapter on the hose.

4. Secure the hose adapter with a worm drive hose clip.

5. Connect the suction line from below as illustrated.

6. Insert the dummy plugs supplied.

5.3   Sampling with a flow assembly

The sample is extracted either directly from the flow assembly which is installed in the base or from an external flow assembly.

The flow assembly is used for sampling in pressurized systems e.g.:
• Tanks positioned at a height
• Pressure piping
• Conveyance using external pumps

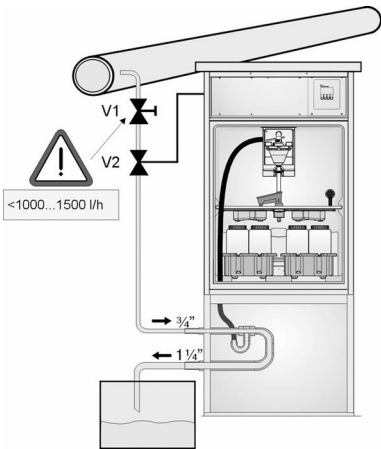The max. flow rate should be 1000 to 1500 l/h.
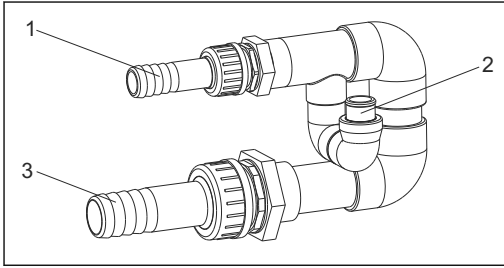
1   Flow assembly inflow: ¾"
2   Sampling connection
3   Flow assembly outflow: 1¼"

⊡ *14   Connections on flow assembly 71119408*

ℹ️ The outlet of the flow assembly must be unpressurized (e.g. drain, open channel).

Application example: Taking samples from pressure piping

Use diaphragm valve 1 to set the flow rate to a maximum of 1000 l/h to 1500 l/h. When the sampling cycle begins, one of the relay outputs can be used to control and open ball valve 2. The medium flows through the pipe and the flow assembly and into the outflow. Once an adjustable delay time has elapsed, the sample is taken directly from the flow assembly. Ball valve 2 is closed again once the sample has been taken.

ℹ️ The ball valve and the diaphragm valve are not included in the scope of supply. If necessary, please request a quote from your Endress+Hauser sales center.

⊡ *15   Taking samples from pressure piping*

V1   Diaphragm valve
V2   Ball valve
3   Flow assembly

5.4   Post-installation check

1. Verify that the suction line is securely connected to the device.

2. Visually check that the suction line is installed correctly from the sampling point to the device.

3. Verify that the distribution arm is correctly engaged.

4. Allow the sampler to rest for at least 12 hours after setup and before switching it on. Otherwise you may cause damage to the climate control module.

6 Electrical connection

⚠ 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

▶ A fuse with a maximum rating of 10 A must be provided by the customer. Observe the local regulations for installation.
▶ Use a HBC fuse with 10 A, 250 V AC for samplers with a CSA approval
▶ The circuit breaker must be a switch or power switch, and you must label it as the circuit breaker for the device.
▶ The protective ground connection must be established before all other connections. If the protective ground is disconnected, this can be a source of danger.
▶ A circuit breaker must be located near the device.
▶ For 24V versions, the power supply at the voltage source must be isolated from cables carrying low voltage (110/230V AC) by double or reinforced insulation.
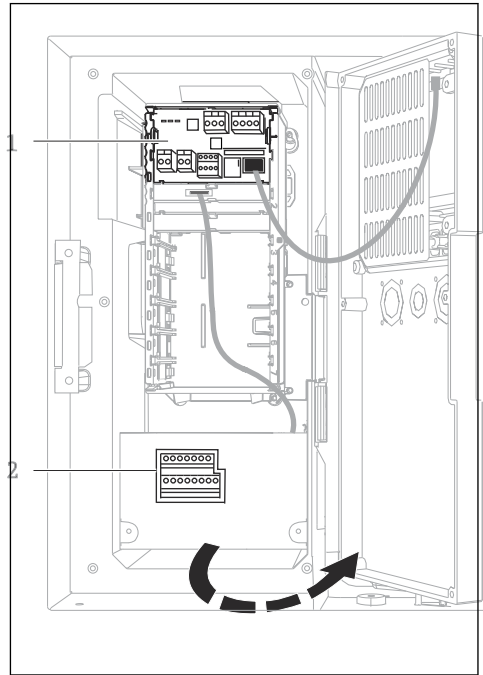
Operation with non-stationary mains cable connection to sampler (optional)

6.1   Connecting the sensors

6.1.1   Connection compartment in the controller housing
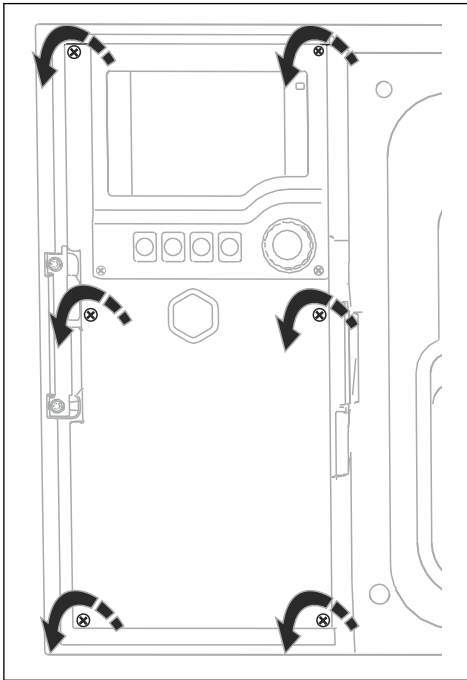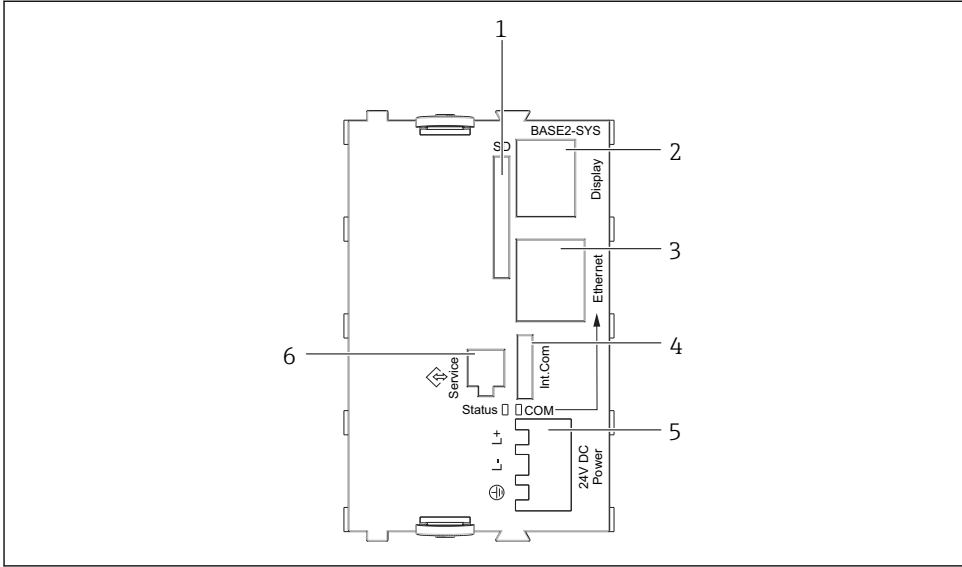

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A0042244

1   1 E base module
2   Sampler controller

Display cover open, version with base module E

The controller housing has a separate connection compartment. Release the six cover screws to open the connection compartment:

▶   Release 6 cover screws with a Phillips screwdriver to open the display cover.

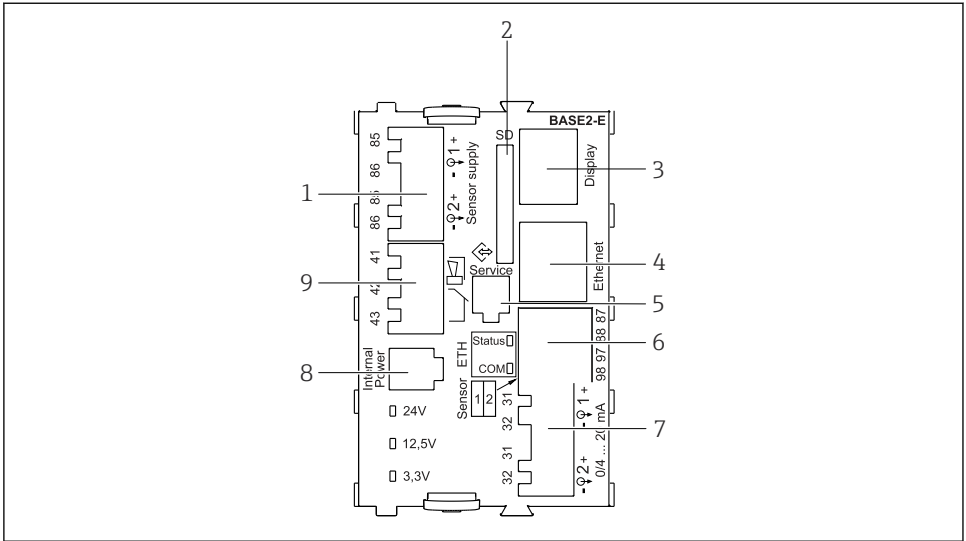## 6.1.2   Description of base module SYS

A0042245

⊡ *16   Base module SYS (BASE2-SYS)*

1   SD card slot
2   Slot for display cable[1]
3   Ethernet interface
4   Connecting cable to sampler controller[1]
5   Voltage connection[1]
6   Service interface[1]

[1]Internal device connection, do not disconnect the plug.

6.1.3   Description of base module E

⊠ *17   BASE2-E*

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

[1] Internal device connection. Do not disconnect the plug!

## 6.1.4   Sensor types with Memosens protocol

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

6.1.5   Connecting sensors with Memosens protocol

In the case of a single-cannel device:
The left-hand Memosens input on basic module must be used!

6.1.6   Sensor connection

▶ Guide the sensor cable via the rear panel to the controller housing towards the front.
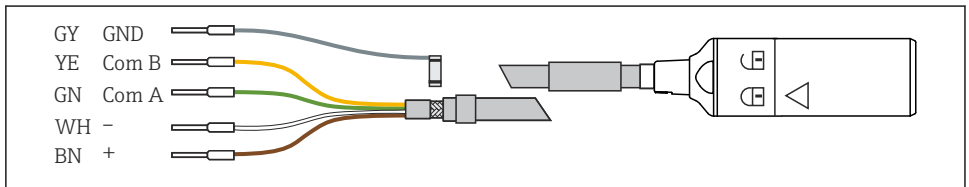 → 🖼 46 and → 🖼 47

↳
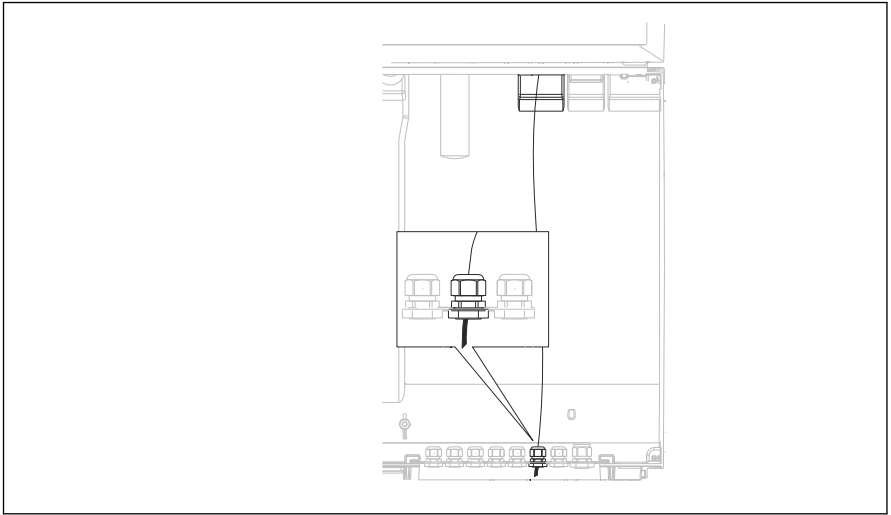
A0016360

🖼 *18   Gland to the controller*

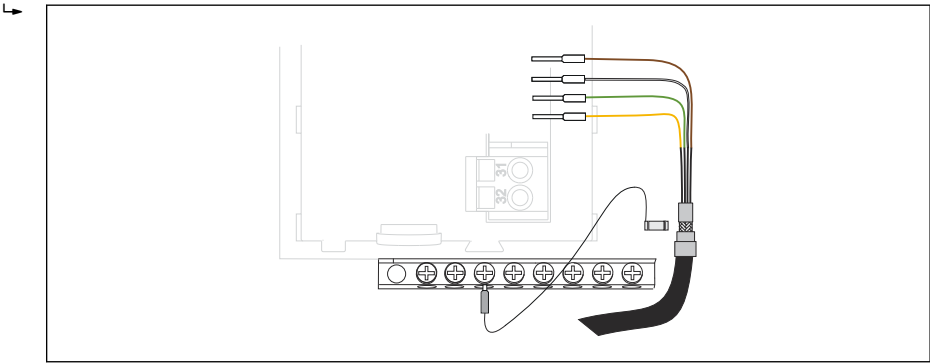ℹ   Only use terminated original cables where possible.

A0024019

🖼 *19   Example of a Memosens CYK10 data cable*

Connecting the ferrules of the sensor cable to the base module E

▶ Ground the outer shield of the cable via the metal gland to the left of the base module E.
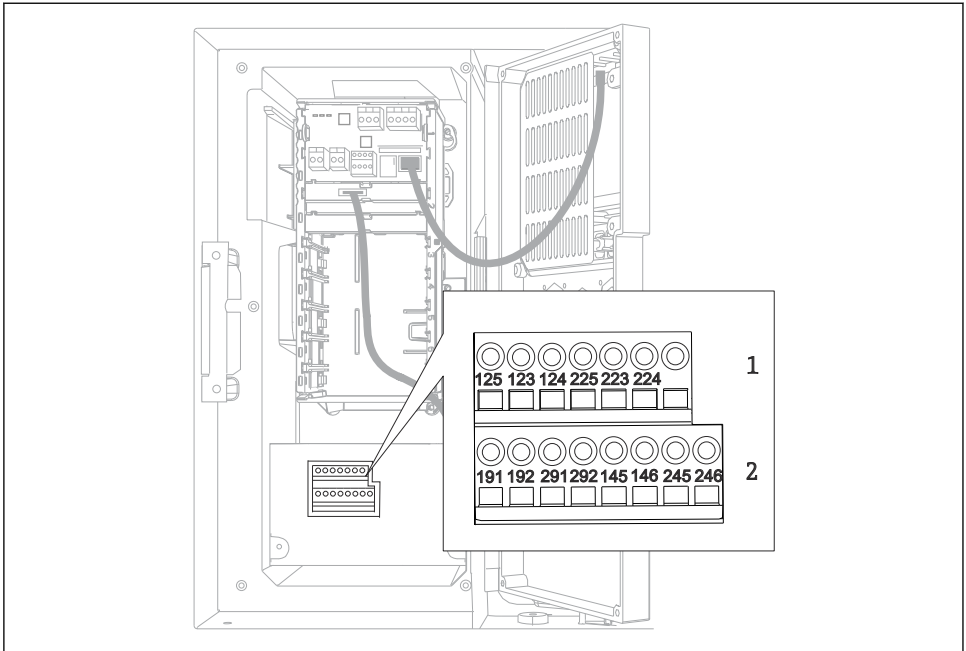

A0028930

⊠ 20   Terminal strip

6.2   Connecting the sampler controller

The connections for the sampler controller are located in the controller housing (→ ▤ 27).

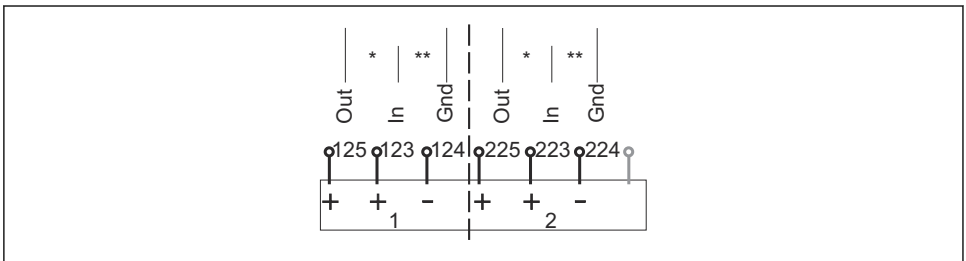## 6.2.1 Wiring the analog inputs and binary inputs/outputs

A0042282

⊠ *21   Position of the terminals*

1   Analog inputs 1 and 2
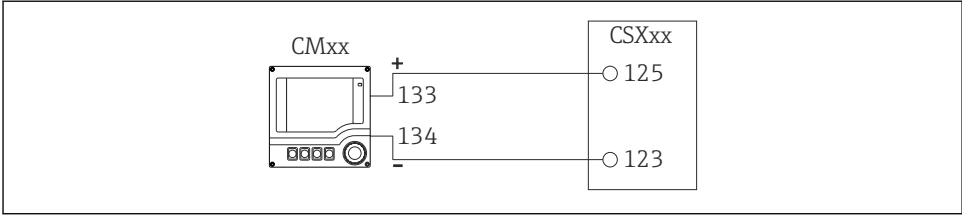*2   Binary inputs/outputs*

6.2.2 Analog inputs
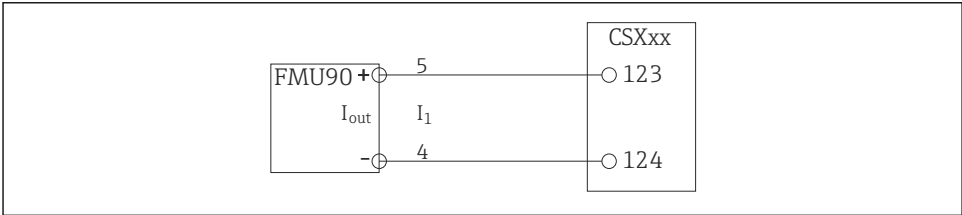

A0012989

⊠ *22   Assignment of analog inputs 1 and 2*

*   Analog input for passive devices (two-wire transmitter), Out + In terminals (125/123 or 225/223)
**   Analog input for active devices (four-wire transmitter), In + Gnd terminals (123/124 or 223/224)

A0028652

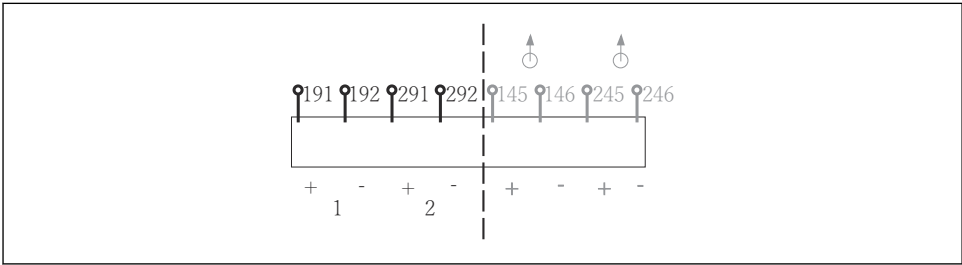🖼 23   *With two-wire transmitter, e.g. Liquiline M CM42*

A0028653

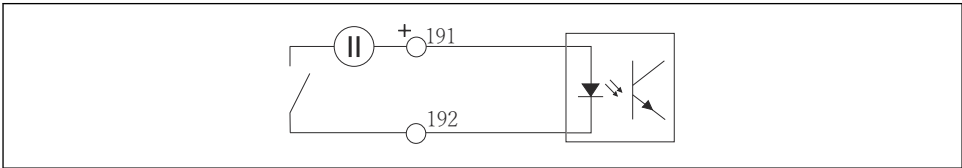🖼 24   *With four-wire transmitter, e.g. Prosonic S FMU90*

6.2.3   Binary inputs

A0013381

🖼 25   *Assignment of binary inputs 1 and 2*

1   Binary input 1 (191/192)
2   Binary input 2 (291/292)

A0013404

🖼 26   *Binary input with external voltage source*

When connecting to an internal voltage source, use the terminal connection on the rear of the dosing compartment. The connection is located on the lower terminal strip (on the far left, + and -), (→ 🖺 48)

6.2.4   Binary outputs

A0013382

🖻 *27   Assignment of binary outputs 1 and 2*

1   Binary output 1 (145/146)
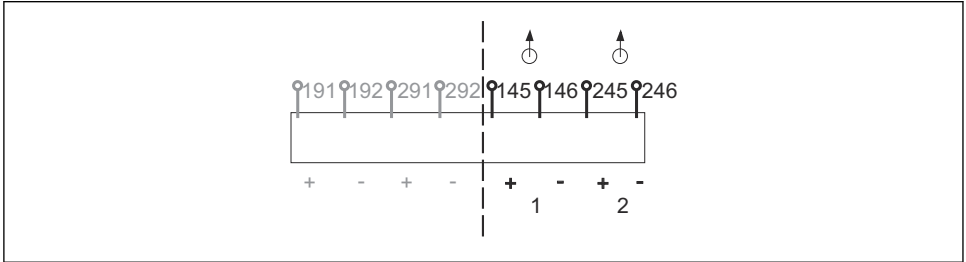*1   Binary output 2 (245/246)*
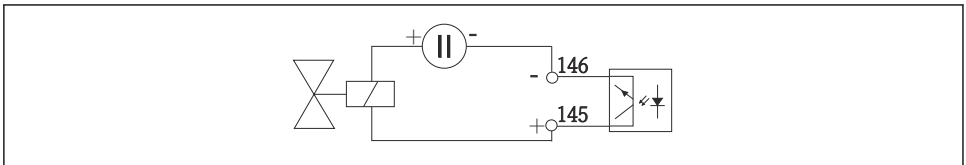
A0013407

🖻 *28   Binary output with external voltage source*

When connecting to an internal voltage source, use the terminal connection on the rear of the dosing compartment. The connection is located on the lower terminal strip (on the far left, + and -) (→ 🖺 48)

6.3 Connecting the signal transmitter to the alarm relay
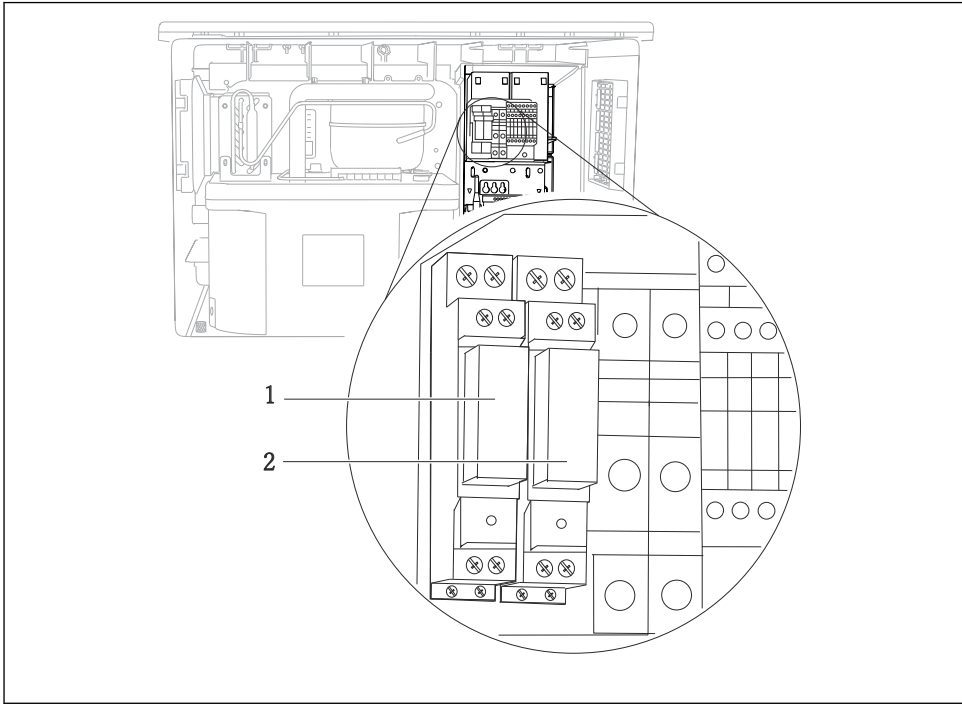
A0016343

🖼 *29   Relay*

1   Binary output 1
2   Binary output 2

The left relay is activated with binary output 1, while the right relay is activated by binary output 2.

A0016348

🖼 *30   Connection example for binary output with relay*

6.4   Connecting the communication

6.4.1   Wiring cables at cable terminals

Plug-in terminals for Memosens and PROFIBUS/RS485 connections
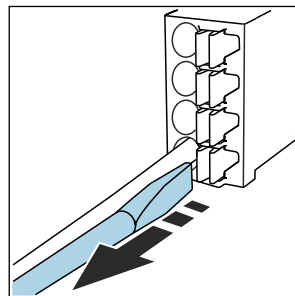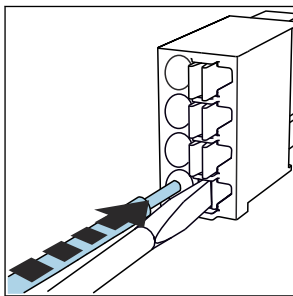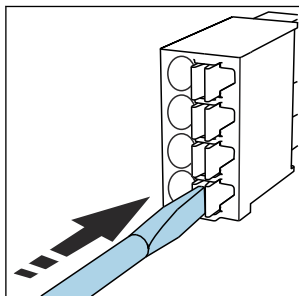
▸ Press the screwdriver against the clip (opens the terminal).

▸ Insert the cable until the limit stop.

▸ Remove the screwdriver (closes the terminal).

> ℹ️ 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.
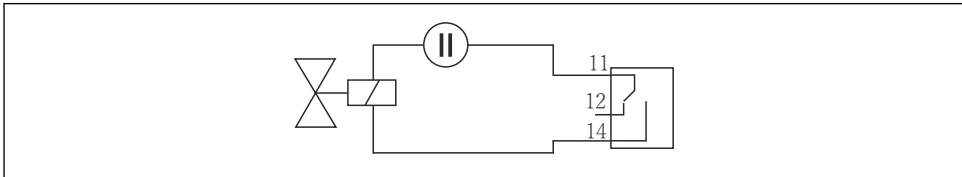
All other plug-in terminals
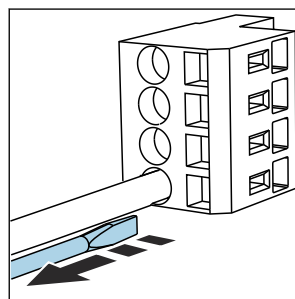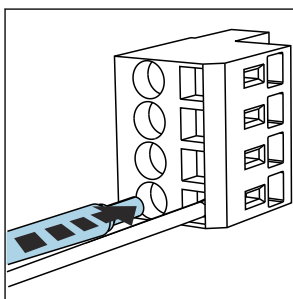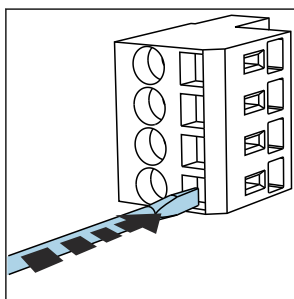
▸ Press the screwdriver against the clip (opens the terminal).

▸ Insert the cable until the limit stop.

▸ Remove the screwdriver (closes the terminal).

> ℹ️ 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.
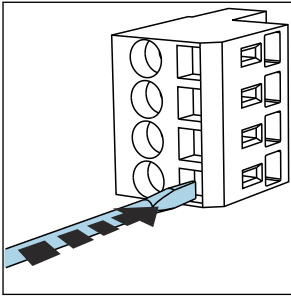
🖼 *31   Press the screwdriver against the clip (opens the terminal)*
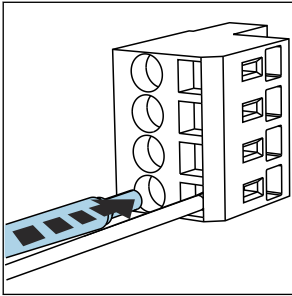
🖼 *32   Insert the cable until the limit stop*
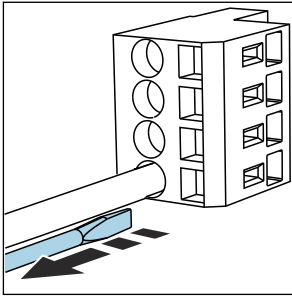
🖼 *33   Remove the screwdriver (closes the terminal)*

6.4.2   Module 485DP

🖼 *34   Module*

🖼 *35   Wiring diagram*
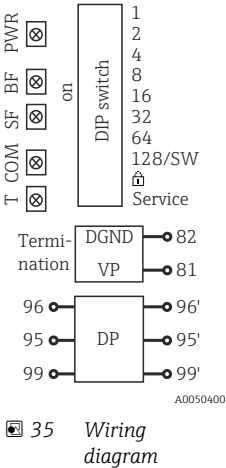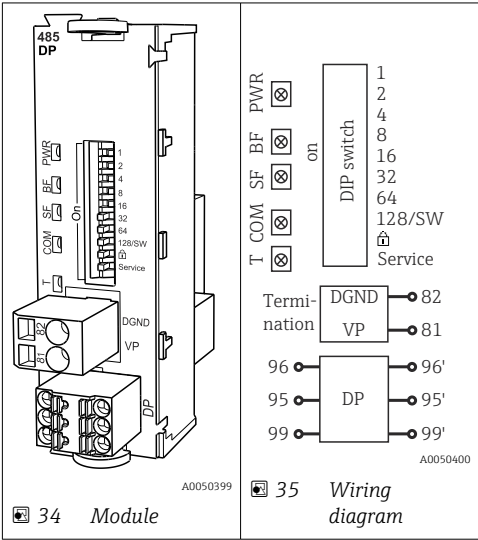
Terminal	PROFIBUS DP
95	A
96	B
99	Not connected
82	DGND
81	VP

LEDs on front of module

LED	Designation	Color	Description
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	PROFIBUS 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	The switch has no function

6.4.3   Module 485MB

🖼 *36   Module*

🖼 *37   Wiring diagram*
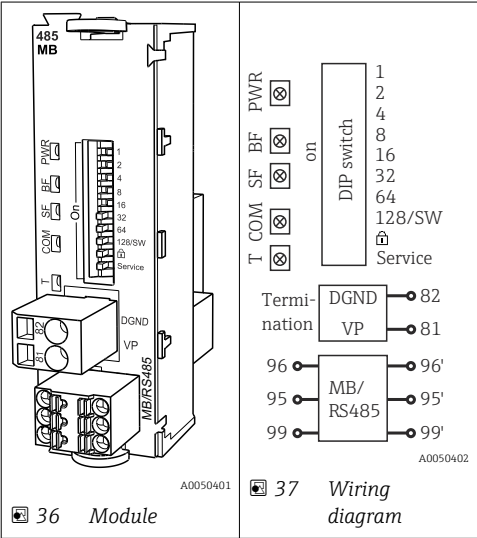
Terminal	Modbus RS485
95	B
96	A

Terminal	Modbus RS485
99	C
82	DGND
81	VP

LEDs on front of module

LED	Designation	Color	Description
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	The switch has no function

6.4.4 Module ETH

🖼 38   *Module*   🖼 39   *Wiring diagram*
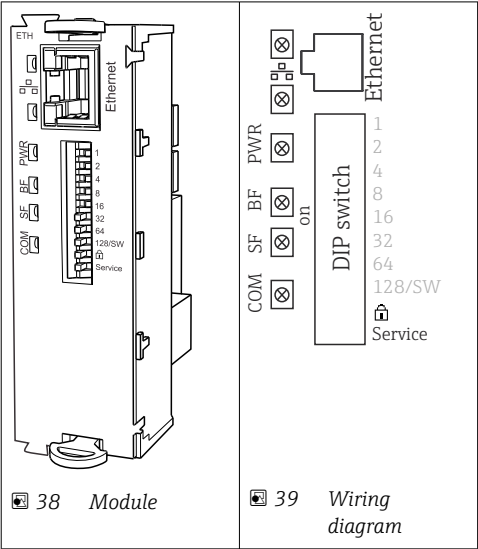
LEDs on front of module

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.

6.4.5   Bus termination

There are 2 ways to terminate the bus:

1. Internal termination (via DIP switch on module board)
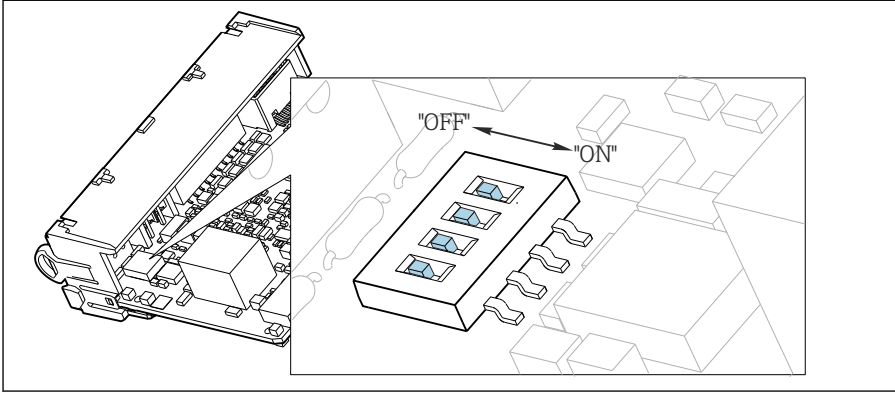
🖼 *40   DIP switch for internal termination*

▶ Using a suitable tool such as a tweezer, move all four DIP switches to the "ON" position.
↳   The internal termination is used.
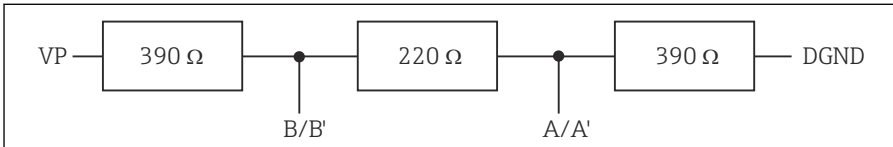
🖼 *41   Structure of internal termination*

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 485DP or 485MB for 5-V power supply.
↳   The external termination is used.

6.5 Connecting additional inputs, outputs or relays

⚠️ **WARNING**

Module not covered

No shock protection. Danger of electric shock!
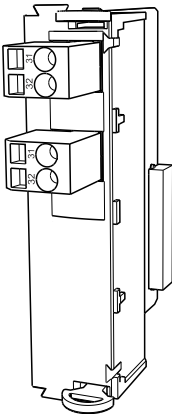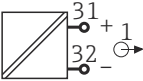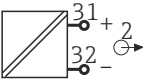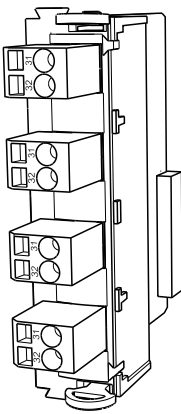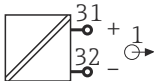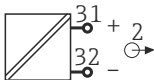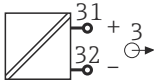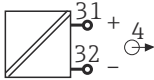
▸ Change or extend the hardware for the **non-hazardous area**: always fill the slots from top to bottom. Do not leave any gaps.

▸ If all of the slots are not occupied in the case of devices for the **non-hazardous area**: always insert a dummy cover or end cover in the slot below 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).

▸ Hardware for the **hazardous area** may not be modified. Only the Manufacturer's Service Team may convert a certified device to another certified device version. This includes all modules of the transmitter with an integrated 2DS Ex-i module, as well as changes that concern non-intrinsically safe modules.

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

6.5.1 Digital inputs and outputs

DIO module

🖼 42   *Module*   🖼 43   *Wiring diagram*
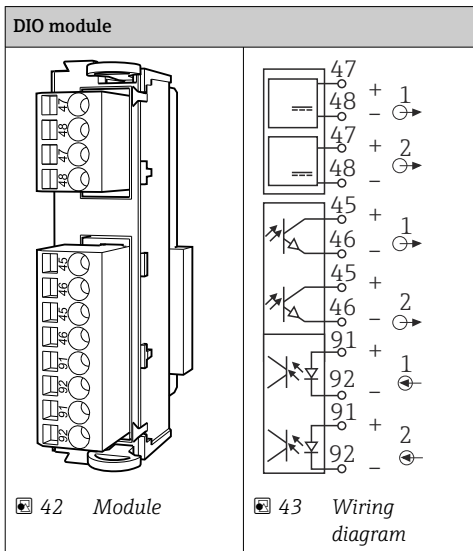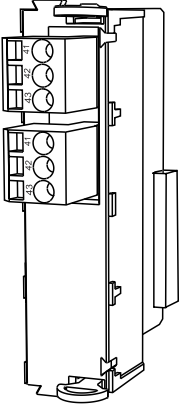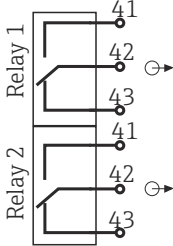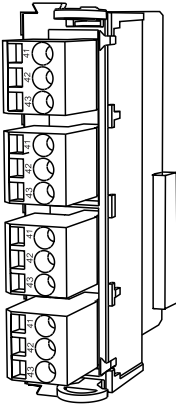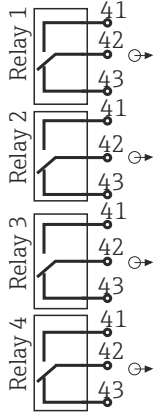
ℹ️ A maximum of 2 optional DIO modules are supported

6.5.2　Current outputs

2AO		4AO	
⊠ 44　*Module*	⊠ 45　*Wiring diagram*	⊠ 46　*Module*	⊠ 47　*Wiring diagram*

A maximum of 6 current outputs are supported.

6.5.3   Relays

Module 2R		Module 4R	
⊡ 48 Module	⊡ 49 Wiring diagram	⊡ 50 Module	⊡ 51 Wiring diagram

ℹ️   A maximum of 4 relay outputs are supported.

6.6   Connecting the supply voltage

6.6.1   Laying the cable

▶ Lay the cables so that they are protected behind the rear panel of the device.

• Cable glands (up to 8 depending on the version) are available for the cable entry.
• The cable length from the foundation to the terminal connection is approx. 1.7 m (5.6 ft).

6.6.2   Cable types

• Power supply: e.g. NYY-J; 3-wire; min. 2.5 mm^2
• Analog, signal and transmission cables: e.g. LiYY 10 x 0.34 mm^2

The terminal connection is protected under an additional cover in the top rear section of the device.

▶ Therefore remove the rear panel of the device to connect the power supply before commissioning.

The terminal cross-section must be at least 2.5 mm^2 for devices with 24V power supply. With 24V power supply, a current of up to 10A can flow. For this reason pay attention to the voltage drop on the supply line. The voltage at the device terminals must be within the specified range (→ 🕮 49) .

6.6.3   Removing the rear panel of the dosing compartment

1. Open the dosing compartment door.

2. Using an 5 mm (0.17 in) Allen key, release the rear panel by turning the lock clockwise.
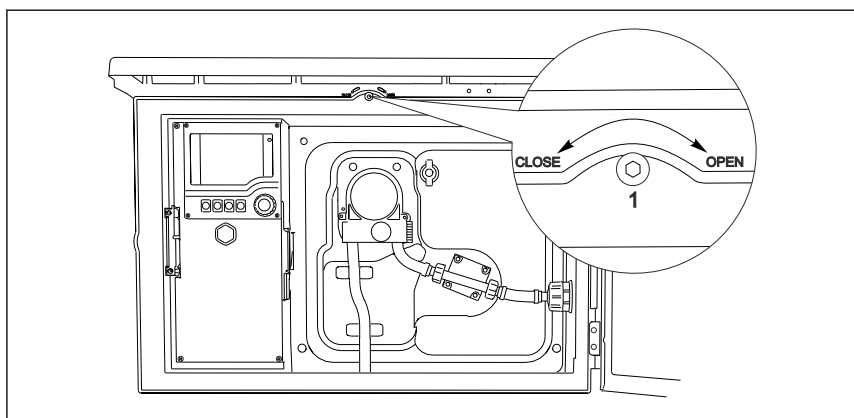
A0012803

3.
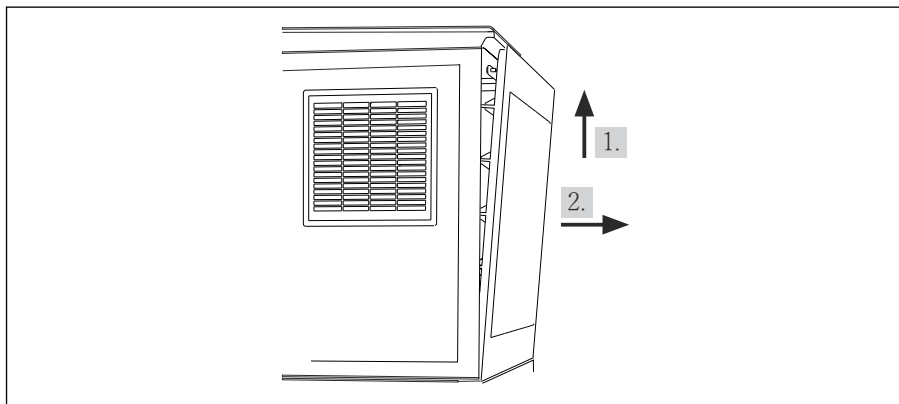
A0012826

 52

Lift up the upper rear panel and pull it off towards the back.

4. Remove the rear panel.

6.6.4 Removing the rear panel of the sampling compartment
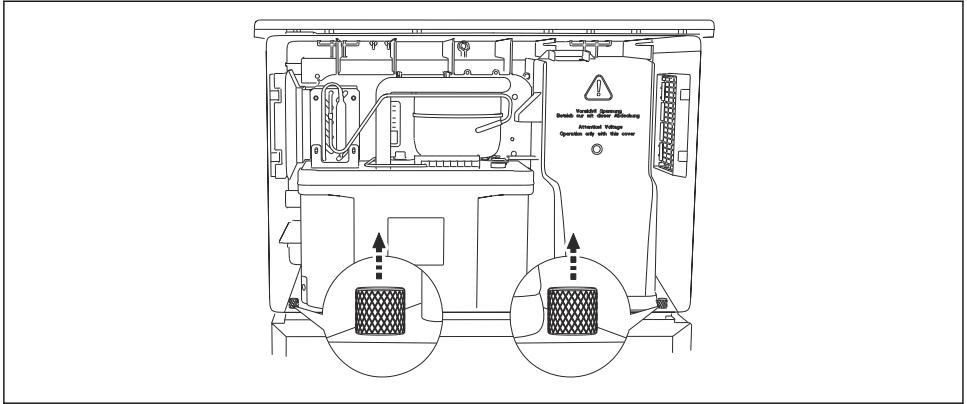
A0012825

1. Remove the bolt on the rear of the dosing compartment.

2.
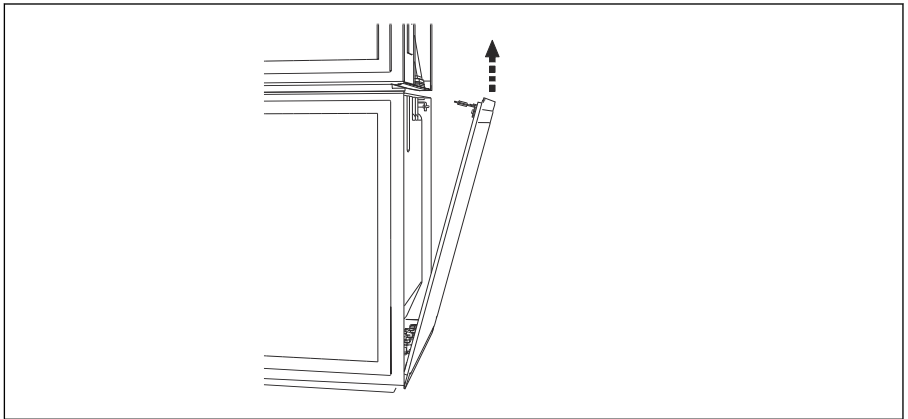
A0012824

Remove the bolt on the rear panel.

6.6.5 Removing the cover

⚠ **WARNING**

The device is live!
Incorrect connection may result in injury or death
▶ De-energize the device before you remove the cover of the power unit.
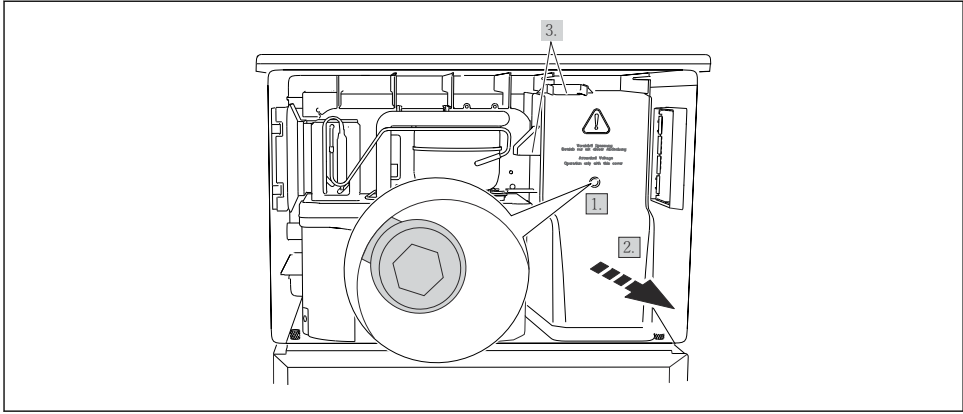
A0012831

1. Release the screw with an Allen key (5 mm).

2. Remove the cover of the power unit from the front.

3. When reassembling make sure that the seals are seated correctly.

6.6.6   Terminal assignment

The power supply is connected via plug-in terminals.

▸ Connect the ground to one of the ground connections.

ℹ️ Batteries and fuses are optionally available.

Only use rechargeable batteries.
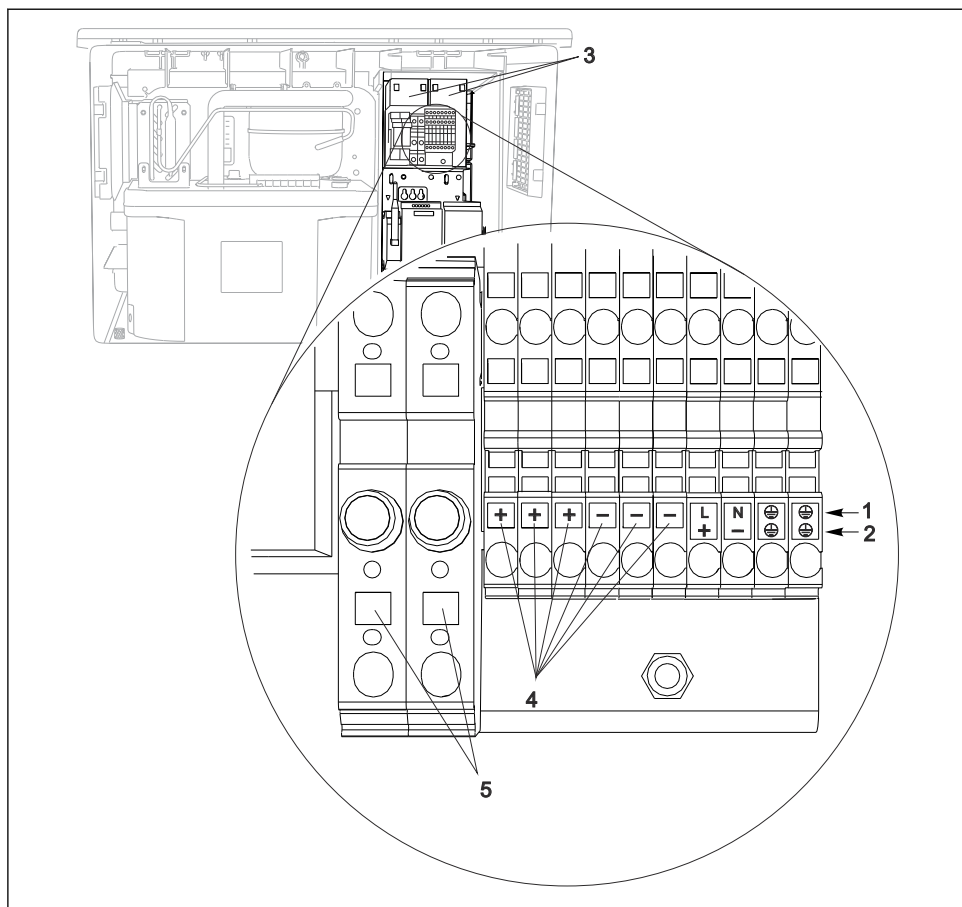
A0013237

⊠ 53   *Terminal assignment*

1   Assignment: 100 to 120 V/200 to 240 V AC ±10 %
2   Assignment: 24 V DC +15/-9 %
3   Rechargeable batteries (optional)
4   Internal 24 V voltage
5   Fuses (only for batteries)

6.7   Special connection instructions

6.7.1   Terminal assignment for input/output signals

Input signals
- 2 analog signals 0/4 to 20 mA
- 2 binary signals > 100 ms pulse width or edge
  Signals of digital sensors with Memosens protocol (optional)

Output signals
2 binary signals > 1 s pulse width or edge

6.8   Hardware settings

Setting the bus address

1. Open the housing.

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

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.
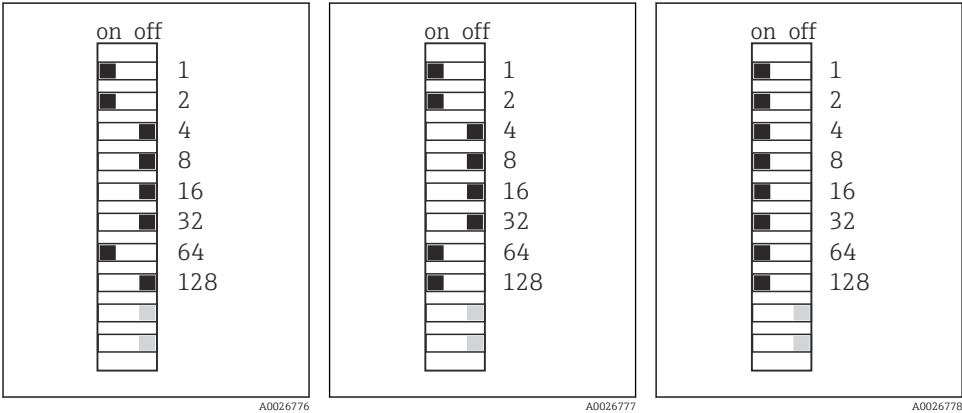
⊠ 54	*Valid PROFIBUS address 67*	A0026776
⊠ 55	*Valid Modbus address 195*	A0026777
⊠ 56	*Invalid address 255 [1]*	A0026778

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

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

6.9   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 (impermeability (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 (1.5 lbf ft) for the permitted 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

6.10   Post-connection check

⚠ WARNING

Connection errors
The safety of people and of the measuring point is at risk! 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.

Device condition and specifications
▶ Are the device and all the cables free from damage on the outside?

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?
▶ Are all plug-in terminals securely engaged?
▶ Are all the connection wires securely positioned in the cable terminals?

7   Operation options

7.1   Overview of operation options

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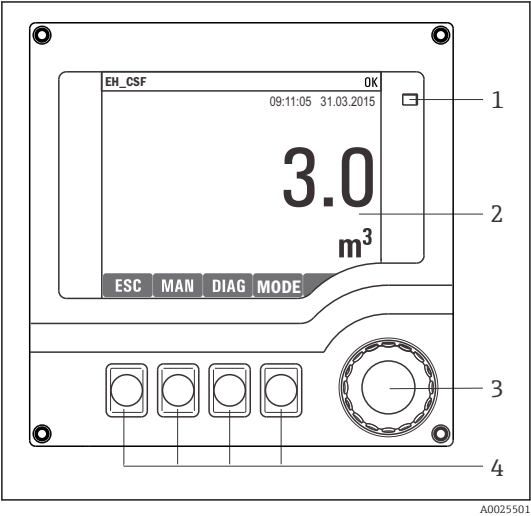
1   LED
2   Display (with red display background in alarm
3   condition)
4   Navigator (jog/shuttle and press/hold
     function)
     Soft keys (function depends on menu)

⊞ *57   Overview of operation*

7.2   Structure and function of the operating menu

7.2.1   Display
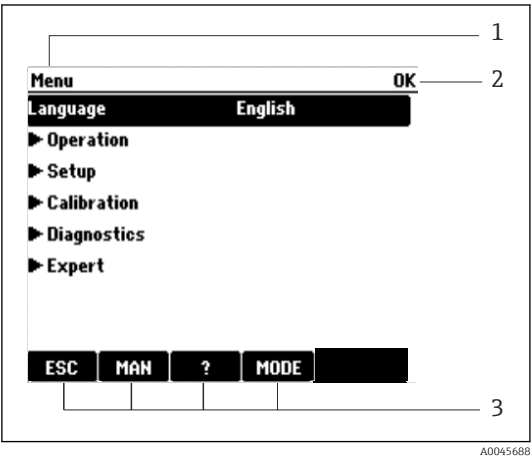
1   Menu path and/or device designation
2   Status indicator
3   Assignment of soft keys, e.g.:
     ESC: escape or abortion of a sampling process
     MAN: manual sample
     ?: Help, if available
     MODE: switch the device to standby or cancel
     the program

⊞ *58   Display (example)*

7.2.2   Configuration options

Display only

- You can only read the values but cannot change them.
- Typical read-only values are: sensor data and system information

Picklists

- You receive a list of options. In a few cases, these also appear in the form of multiple choice boxes.
- Usually you just select one option; in rare instances you select one or more options.

Numerical values

- You are changing a variable.
- The maximum and minimum values for this variable are shown on the display.
- Configure a value within these limits.

Actions

- You trigger an action with the appropriate function.
- You know that the item in question is an action if it is preceded by the following symbol: $\triangleright$
- Examples of typical actions include:
  - Deleting log entries
  - Saving or loading configurations
  - Triggering cleaning programs
- Examples of typical actions include:
  - Start a sampling program
  - Start manual sampling
  - Saving or loading configurations
-

User-defined text

- You are assigning an individual designation.
- Enter a text. You can use the characters in the editor for this purpose (upper-case and lower-case letters, numbers and special characters).
- Using the soft keys, you can:
  - Cancel your entries without saving the data (✗)
  - Delete the character in front of the cursor (✗)
  - Move the cursor back one position (←)
  - Finish your entries and save (✔)

Tables

- Tables are needed to map mathematical functions or to enter irregular interval samples.
- You edit a table by navigating through rows and columns with the navigator and changing the values of the cells.
- You only edit the numerical values. The controller automatically takes care of the engineering units.
- You can add rows to the table (**INSERT** soft key) or delete them (**DEL** soft key).
- Afterwards, you save the table (**SAVE** soft key).
- You can also cancel your entries any time using the ✗ soft key.
- Example: **Menu**/**Setup**/**Inputs**/pH/**Medium comp.**

Menu.../Inputs/pH/Medium comp.		OK
	Temperature	**pH**
1	**20.0 °C**	**pH 6.90**
2	**25.0 °C**	**pH 7.00**
3	**30.0 °C**	**pH 7.10**
	INSERT	**DEL**	**SAVE**

7.3   Access to the operating menu via the local display

7.3.1   Operating concept

The device is operated by:
- Pressing the soft key: select the menu directly
- Turning the navigator: move the cursor in the menu
- Pressing the navigator: launch a function
- Turning the navigator: select a value (e.g. from a list)
- Pressing the navigator: accept the new value

Example:
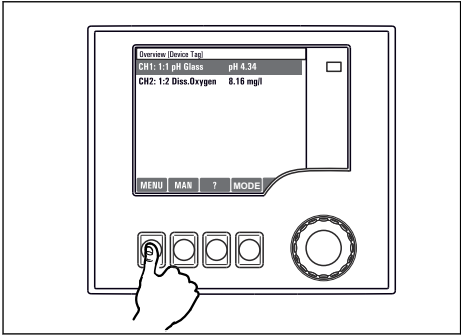
Press the soft key: select the menu directly
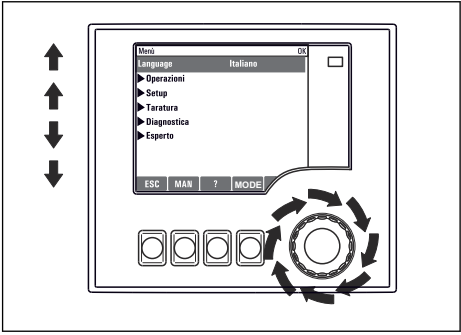
Turn the navigator: move the cursor in the menu
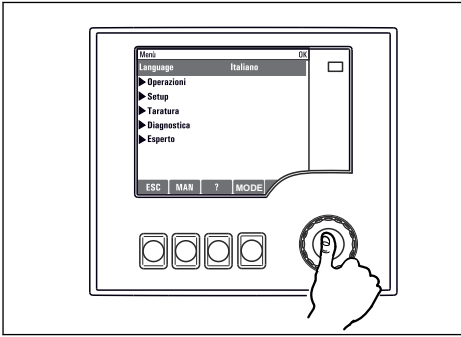
Press the navigator: launch a function
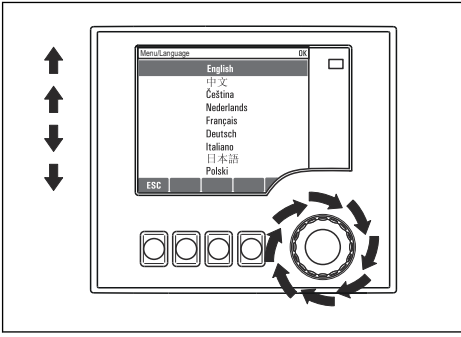
Turn the navigator: select a value (e.g. from a list)
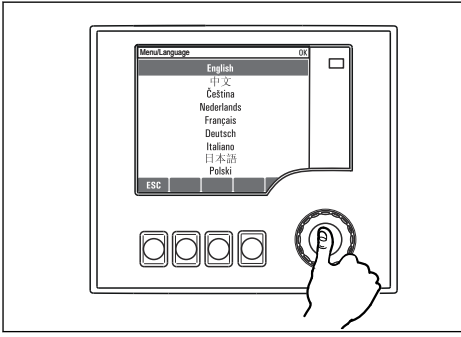
Press the navigator: accept the new value
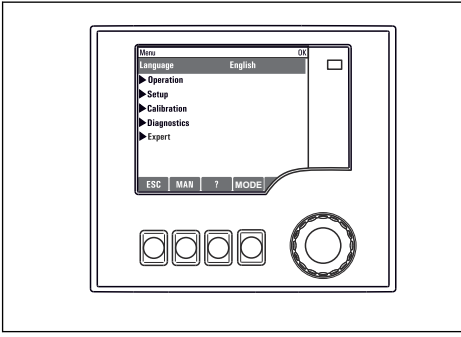
↳ *New setting is accepted*

7.3.2 Locking or unlocking operating keys

Locking operating keys

▶ Press the navigator for longer than 2 seconds
  ↳ 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 the password here: **MenuSetup/General settings/Extended setup/Data management/Change key lock password**

▶ Select whether to lock keys with or without a password.
  ↳ The keys are locked. No more entries can be made. You will can see the ⊞ symbol in the softkey bar.

ℹ️ 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 seconds
   ↳ A context menu for unlocking the operating keys is displayed.

2. Select the **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.

8   System integration

8.1   Integrating the sampler in the system

8.1.1   Web server

ℹ️   Versions without fieldbus: An activation code is required for the web server.

Connecting the web server

▸ Connect the communication cable of the computer to the Ethernet port of the BASE2 module.

Base2

Web Browser
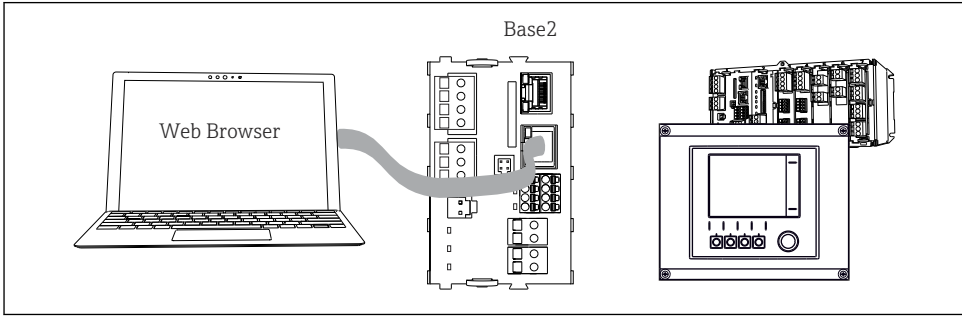
A0039619

 🖼 *59   Web server/Ethernet connection*

Establishing the data connection

All versions with the exception of PROFINET:
To ensure that your device has a valid IP address, you must disable the **DHCP** parameter in the Ethernet settings. (**Menu/Setup/General settings/Extended setup/Ethernet/Settings**)
You can assign the IP address manually in the same menu (for point-to-point connections).

All versions including PROFINET:
You will find the IP address and subnet mask of the device under: **DIAG/System information/Ethernet**.

1. Start your PC.
2. First, configure a manual IP address in the network connection settings of the operating system.

Example: Microsoft Windows 10

3. Open Network and Sharing Center.
   ↳ Apart from your standard network, you should see an additional Ethernet connection (e.g. as an "unidentified network").
4. Select the link to this Ethernet connection.
5. In the pop-up window select the "Properties" button.

6. Double-click "Internet Protocol Version 4 (TCP/IPv4)".

7. Select "Use the following IP Address".

8. Enter the desired IP address. This address must be in the same subnet as the IP address of the device, e.g.:
   ↳ IP address for Liquiline: 192.168.1.212 (as configured previously)
      IP address for PC: 192.168.1.213.

9. Start the Internet browser.

10. If you use a proxy server to connect to the Internet:
    Disable the proxy (browser settings under "Connections/LAN settings").

11. Enter the IP address of your device in the address bar (192.168.1.212 in the example).
    ↳ The system takes a few moments to establish the connection and then the CM44 web server starts. You might be asked for a password. The factory setting is "admin" for the user name and "admin" for the password.

12. Enter the following address(es) to download logbooks:
    ↳ 192.168.1.212/logbooks_csv.fhtml (for logbooks in CSV format)
       192.168.1.212/logbooks_fdm.fhtml (for logbooks in FDM format)

ℹ Downloads in FDM format can be securely transmitted, saved and visualized with Endress+Hauser's "Field Data Manager Software".

> (→ www.endress.com/ms20)

The menu structure of the web server corresponds to the onsite operation.

⊠ 60   Example of web server (menu/language=English)

Operation
- Clicking a menu name or a function corresponds to pressing the navigator.
- You can make your settings conveniently via the computer keyboard.

🛈 Instead of using an Internet browser, you can also use FieldCare for configuration via Ethernet. The Ethernet DTM required for this is an integral part of the "Endress+Hauser Interface Device DTM Library".

Heartbeat verification

You can also start Heartbeat verification via the web server. This has the advantage that you can view the results directly in the browser and can avoid using an SD card.

1. Open the menu: **Diagnostics**/**System test**/**Heartbeat**.

2. ▷**Perform verification**.

3. Either ▶**Verification results** (quick display and export to SD card) or **Additional Functions** (additional menu below the limit line).

4. **Additional Functions**/**Heartbeat**: Select the language of the pdf file.
   ↳ The verification report is displayed in the browser and can be printed out, saved as a pdf file, etc.

8.1.2 Service interface

You can connect the device to a computer via the service interface and configure it using "FieldCare" . Furthermore, configurations can also be saved, transferred and documented.

Connection

1. Connect the service connector to the interface on the Liquiline base module and connect it to the Commubox.

2. Connect the Commubox via the USB connection to the computer on which FieldCare is installed.
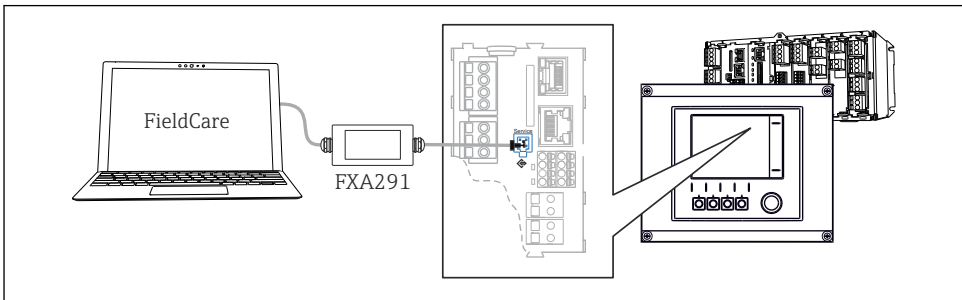
⊞ *61 Connection overview*

Establishing the data connection

1. Start FieldCare.

2. Establish a connection to the Commubox. To do so, select the "CDI Communication FXA291" ComDTM.

3. Then select the "Liquiline CM44x" DTM and start configuration.

You can now start online configuration via the DTM.

Online configuration competes with onsite operation, i.e. each of the two options blocks the other one. On both sides it is possible to take away access from the other side.

Operation
- In the DTM the menu structure corresponds to the onsite operation. The functions of the Liquiline soft keys are found in the main window on the left.
- Clicking a menu name or a function corresponds to pressing the navigator.
- You can make your settings conveniently via the computer keyboard.
- You can use FieldCare to save logbooks, make backups of configurations and transfer configurations to other devices.
- You can also print out configurations or save them as PDFs.

8.1.3   Fieldbus systems

HART

You can communicate using the HART protocol via current output 1.

1. Connect the HART modem or HART handheld terminal to current output 1 (communication load 250 - 500 Ohm).

2. Establish a connection via your HART device.

3. Operate the Liquiline via the HART device. To do so, follow the instructions in the manual.

More detailed information on HART communication is provided on the product pages on the Internet (→ BA00486C).

PROFIBUS DP

With the Modbus modules 485DP or 485MB and the appropriate device version, you can communicate via PROFIBUS DP.

▶ Connect the PROFIBUS data cable to the terminals of the fieldbus module as described .

For detailed information on "PROFIBUS communication", see the product pages on the Internet (→ SD01188C).

Modbus

With the Modbus modules 485DP or 485MB and the appropriate device version, you can communicate via Modbus RS485.

You use the BASE2 module for Modbus TCP.

The RTU and ASCII protocols are available when connecting via Modbus RS485. You can switch to ASCII on the device.

▶ Connect the Modbus data cable to the terminals of the fieldbus module (RS 485) or to the RJ45 socket of the BASE2 module (TCP) as described.

For detailed information on "Modbus communication", see the product pages on the Internet (→ SD01189C).

EtherNet/IP

With the BASE2 module and the appropriate device version, you can communicate via EtherNet/IP.

▶ Connect the EtherNet/IP data cable to the RJ45 socket of the BASE2 module.

For detailed information on "Ethernet/IP communication", see the product pages on the Internet (→ SD01293C).

PROFINET

With the BASE2 module and the appropriate device version, you can communicate via PROFINET.

▶ Connect the PROFINET data cable to the RJ45 socket of the BASE2 module.

For detailed information on "PROFINET communication", see the product pages on the internet (→ SD02490C).

9   Commissioning

9.1   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.

🛈   Saving displays as a screenshot

   Via the local display, you can take screenshots at any time and save them to an SD card.

1.   Insert an SD card into the SD card slot in the base module.

2.   Press the navigator button for at least 3 seconds.

3.   Select the "Screenshot" item in the context menu.
     ↳   The current screen is saved as a bitmap file to the SD card in the "Screenshots" folder.

9.2   Configuring 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**.

3.   Set your language in the top menu item.
     ↳   The device can now be operated in your chosen language.

9.3   Configuring the measuring device

9.3.1   Start screen

You can find the following menu items and soft keys on the initial screen:
• Select sampling program
• Edit program %0V [1]
• **Start program %0V**[1]
• MENU

---

[1]   "%0V" here stands for context-dependent text, which is automatically generated by the software and is used instead of %0V.

- MAN
- MEAS
- MODE

9.3.2   Display settings

Function	Options	Info
Menu/Operation/Display		
Contrast	5 to 95 % **Factory setting** 50 %	Adjust the screen settings to suit your working environment. **Backlight = Automatic** The backlighting is switched off automatically after a short time if a button is not pressed. It switches back on again as soon as you press the navigator button. **Backlight = On** The backlighting does not switch off automatically.
Backlight	**Selection** • On • Off • Automatic **Factory setting** Automatic	
Screen rotation	**Selection** • Manual • Automatic **Factory setting** Manual	If **Automatic** is selected, the single-channel measured value display switches from one channel to the next every second.
Current program:	Read only	The name of the sampling program currently selected is displayed.
Status	Read only	Active The sampling program has been started and the device takes a sample as per the set parameters. Inactive No sampling program has been started, or a program that was running has been stopped.
▷ Start	Action	The selected sampling program is started.
▲ Measurement		Current measured values at the inputs are displayed. Analog and binary inputs cannot be modified here.
▲ Show summary of current program		The bottle statistics for the sampler are displayed. The statistics appear for each individual bottle after the start of the program. You can find more information in the Chap. "Bottle statistics".
▲ Show summary of inputs		The configured counters of the analog and binary input are displayed. Max. 8 lines

9.3.3   User definable screens

Menu/Operation/User definable screens		
Function	Options	Info
▶ Meas. screen 1 ... 6		You can create 6 measuring screens of your own and give them a name. The functions are identical for all 6 measuring screens.
Meas. screen	**Selection** • On • Off **Factory setting** Off	Once you have defined your own measuring screen, you can switch it on here. You can find the new screen under **User definable screens**.
Label	Customized text, 20 characters	Name of the measuring screen Appears in the status bar of the display.
Number of lines	1 to 8 **Factory setting** 8	Specify the number of measured values displayed.
▶ Line 1 ... 8	**User interface** Label	Specify the content of **Label** in the submenu of each line.
Source of data	**Selection** • None • See list in "Info" column **Factory setting** None	▶ Select a source of data. You can choose from the following: • Sensor inputs • Heartbeat diagnostics of sensor inputs • Binary inputs • Current inputs • Temperature • Memosens sensor input (optional) • Fieldbus signals • Mathematical functions • Binary inputs and outputs • Current outputs • Relay • Measuring range switching
Measured value **Source of data** *is an input*	**Selection** Depends on the input **Factory setting** None	You can display different main, secondary and raw measured values depending on the type of input. No options can be selected for outputs here.
Label	Customized text, 20 characters	User-defined name for the parameter to be displayed
▷ Set label to "%0V" [1]	Action	If you perform this action you accept the parameter name that is automatically suggested. Your own parameter name (**Label**) is lost!

1)   "%0V" here stands for text that depends on the context. This text is generated automatically by the software and inserted in place of %0V. In the simplest situations, the generated text could be the name of the measuring channel, for example.

9.3.4 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.

5. **Number of bottles**: Correct the set number of bottles if necessary.

6. **Bottle volume**: Correct the set bottle volume if necessary.
   ↳ For quick commissioning, you can ignore the additional settings for outputs etc. You can make these settings later in the specific menus.

7. To return to the display overview: press the soft key for **ESC** for at least one second.
   ↳ Your sampler 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 inputs, relays, limit switches, cleaning cycles and device diagnostics with the following submenus.

9.3.5 Sampling programs

Difference between program types

The following box provides an overview of the differences between the Basic, Standard and Advanced program types.

Basic (1 sampling program)		
Start condition: • Immediate • Date/time	• Immediate activation • Time-paced, volume-paced or flow-paced (CTCV, VTCV, CTVV), external signal, • Bottle change after time or number of samples, external signal • Bottle synchronization • Multiple bottles	**Stop condition:** • Program end • Continuous operation
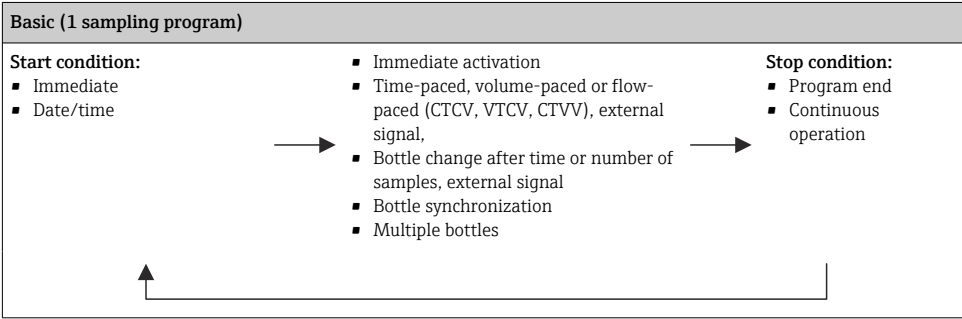
Standard (1 sampling program with 1-5 sub-programs)		
Start condition: • Immediate • Date/time • Volume	• Immediate activation, individual times, multiple times, interval, deactivation of sub-program 1 • Time-paced, volume-paced or flow-paced (CTCV, VTCV, CTVV), external signal • Bottle change after time or number of samples, external signal • Bottle synchronization • Multiple bottles	**Stop condition:** • Program end • Continuous operation • Date/time

Advanced (1 sampling program with 1-24 sub-programs)		
Start condition: • Immediate • Date/time • Volume • External signal • Fieldbus	• Immediate activation, individual times, multiple times, interval, event, external start, deactivation of sub-program 1, fieldbus • Time-paced, volume-paced or flow-paced (CTCV, VTCV, CTVV), single sample, sample table, external signal, fieldbus • Bottle change after time or number of samples, external signal, fieldbus • Sample synchronization • Bottle synchronization • Multiple bottles	**Stop condition:** • Program end • Continuous operation • Date/time • Fieldbus

Manual sampling

1. Trigger manual sampling with the **MAN** soft key. This pauses any program currently running.
   ↳ The current bottle configuration and the current sample volume are displayed. You can select the distributor position. In the case of peristaltic systems, you can also change the sample volume.
   In the case of vacuum systems, a multiple of a single manual sample can be taken under **Multiplier**. Specify the **Multiplier** range from 1 to 50.

2. Select **Start sampling**.
   ↳ A new screen is displayed indicating the progress of the sampling process.

3. After a manual sampling has been performed, press **ESC** to display and resume an active program.
   ↳ The sample volume for "Manual sampling" is not taken into account in the calculated bottle volumes.

Programming for automatic sampling

In the overview screen, create a simple sampling program under **Select sampling program/ New/Basic** or under **Menu/Setup/Sampling programs/Setup program/New/Basic**:

1. Enter the "Program name".
2. The settings from the **Basic setup** for the bottle configuration and bottle volume are displayed.
3. **Sampling mode**=**Time paced CTCV** is preset.
4. Enter the **Sampling interval**.
5. Enter the **Sampling volume** per sample. (For version with vacuum pump, configure under **Menu/Setup/General settings/Sampling**.)
6. Select the **Bottle change mode** after number of samples or time for average samples.

 With the option "Bottle change after a time", you can enter the change time and bottle synchronization (None, 1st bottle change time, 1st time of change + bottle number). The description for this can be found in the "Bottle synchronization" section.

 With the option "Bottle change after a time", you can choose the bottle synchronization before the start condition (None, 1st bottle change time, 1st time of change + bottle number). The description for this can be found in the "Bottle synchronization" section.

1. For **Multiple bottles** enter the number of bottles the sample should be distributed over.
2. **Start condition**: immediately or after date/time
3. **Stop condition**: after program end or continuous operation.
4. Pressing **SAVE** saves the program and ends data entry.

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