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Operating Instructions
Liquistation CSF28

Automatic sampler for liquid media

Endress+Hauser
People for Process Automation

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 Operating Instructions and are available on the product pages on the Internet:

- Brief Operating Instructions Liquistation CSF28, KA01573C
- Guidelines for communication via web server
  Web server (optional), SD01190C
- Special Documentation: Sampler application manual SD01068C
- Documentation on other devices in the Liquiline platform:
  - Liquiline CM44xR (DIN rail device)
  - 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.

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 CSF28 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 Occupational health and 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.

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 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.

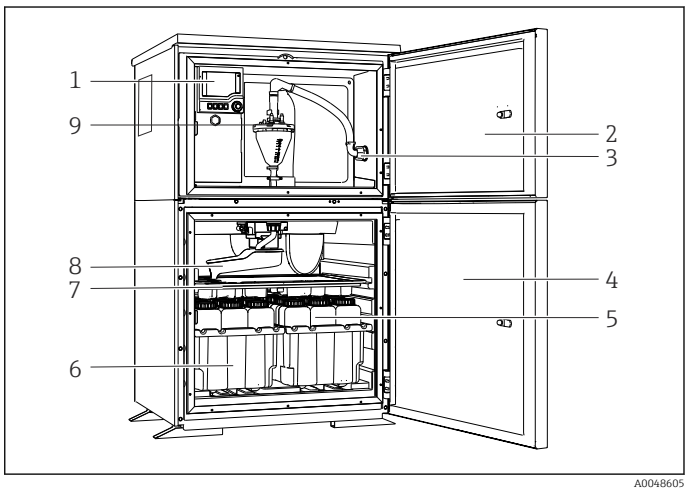
IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

3 Product description

3.1 Product design

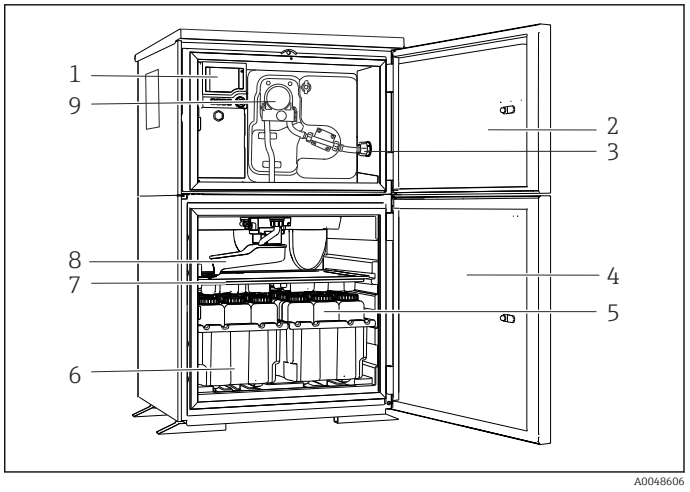
Depending on the version, a complete sampling unit for open channels comprises:

- Controller with display, soft keys and navigator
- Vacuum or peristaltic pump for sampling
- PE sample bottles for sample preservation
- Sampling chamber temperature regulator for safe sample storage
- Suction line with suction head



1 Controller
2 Dosing compartment door
3 Suction line connection
4 Sampling chamber door
5 Sample bottles, e.g. 2 x 12 bottles, PE, 1 liter
6 Bottle trays (depending on sample bottles selected)
7 Distribution plate (depending on sample bottles selected)
8 Distribution arm
9 Vacuum system, e.g. Dosing system with conductive sample sensor

1 Example of a Liquistation, version with vacuum pump



1 Controller
2 Dosing compartment door
3 Suction line connection
4 Sampling chamber door
5 Sample bottles, e.g. 2 x 12 bottles, PE, 1 liter
6 Bottle trays (depending on sample bottles selected)
7 Distribution plate (depending on sample bottles selected)
8 Distribution arm
9 Peristaltic pump

2 Example of a Liquistation, version with peristaltic pump

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)
- On the top housing section

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 Identifying the product

Product page

www.endress.com/CSF28

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's address

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

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:

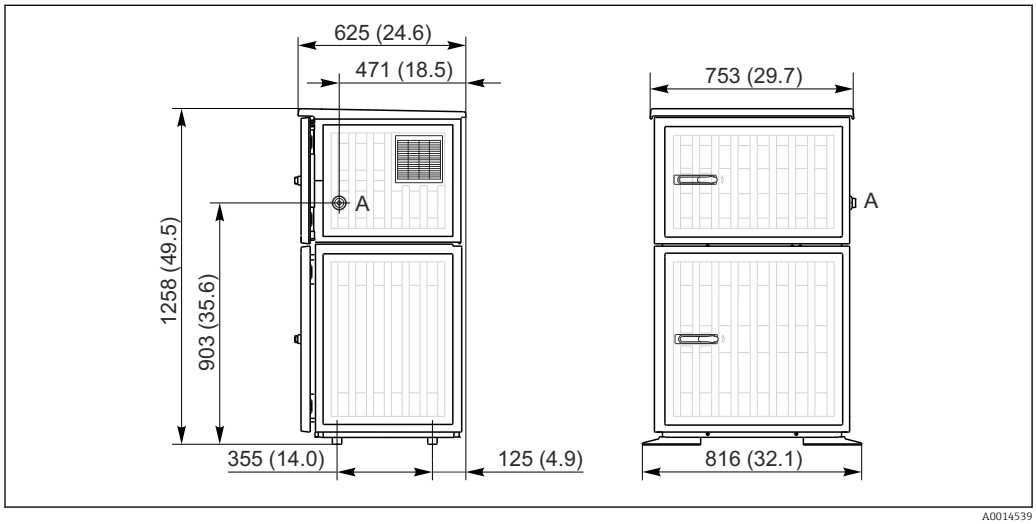
- 1 Liquistation CSF28 with:
  The ordered bottle configuration
- Accessories kit
  For peristaltic or vacuum pump:
  Hose adapter for suction line with various angles (straight, 90°), Allen screw (for version with vacuum pump only)
- 1 printed copy of the Brief Operating Instructions in the language ordered
- Optional accessories

- ▶ If you have any queries:
  Please contact your supplier or local sales center.

5 Installation

5.1 Installation conditions

5.1.1 Dimensions

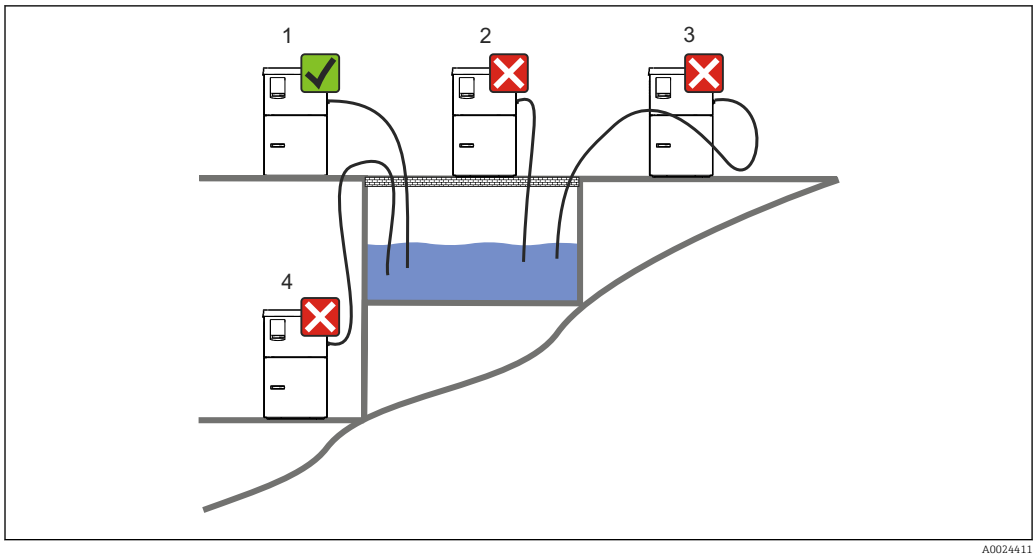


3 *Dimensions of Liquistation, plastic version. Unit of measurement mm (in)*

A Suction line connection

5.1.2 Installation site

For version with sample pump



4 *Liquistation mounting conditions*

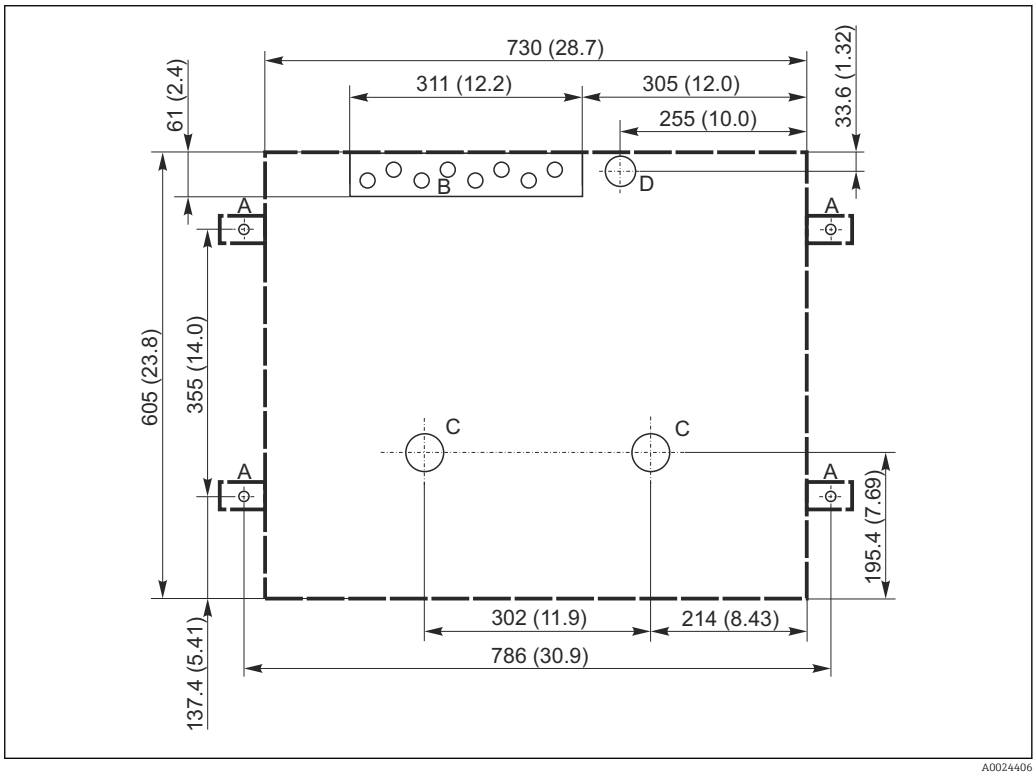
Mounting conditions
Route the suction line with a downward gradient to the sampling point.
Never mount the sampler in a place where it is exposed to aggressive gases.

Mounting conditions
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



5 *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: standard 6 m (20 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) or 13 mm (1/2 in)
  - 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
  > 0.5 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

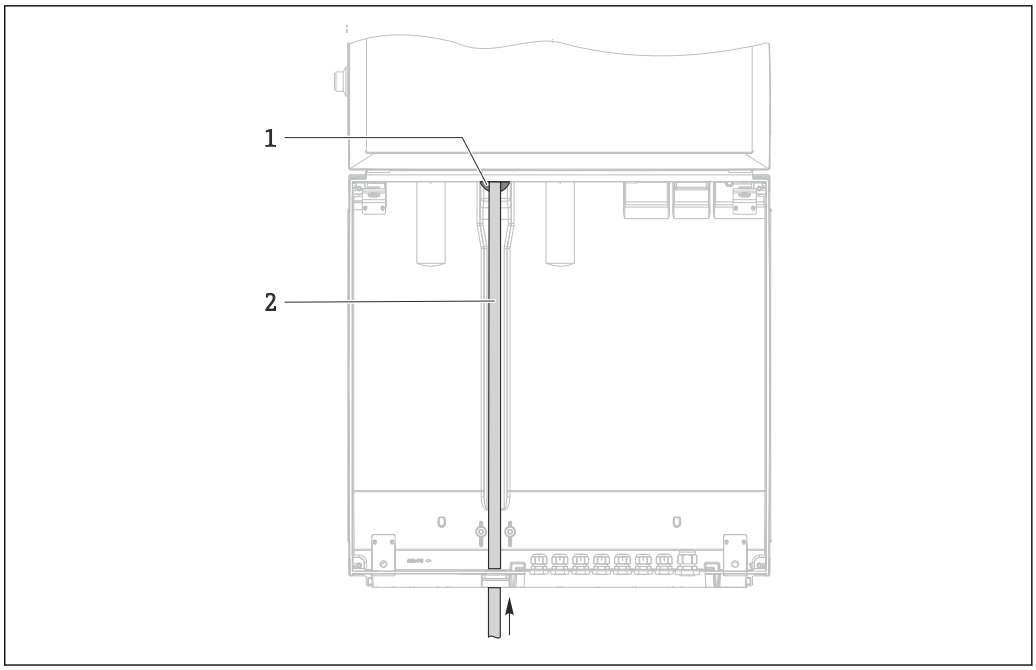
5.2.1 Side connection of suction line

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 Connection of suction line from below

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

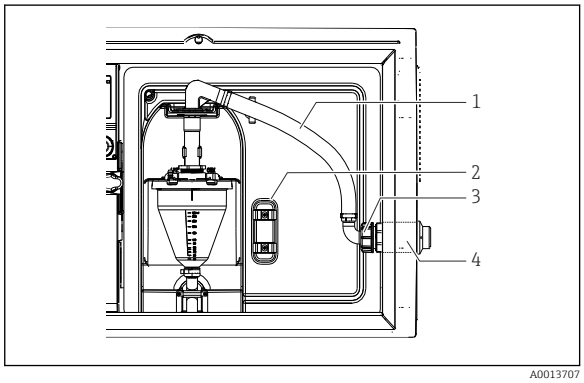
1. Remove the rear panel of the dosing compartment and sample compartment beforehand.
2. Remove the drain plug from the hose gland located at the back of the device base.
3. Guide the suction line upwards and through the opening towards the front, as illustrated.



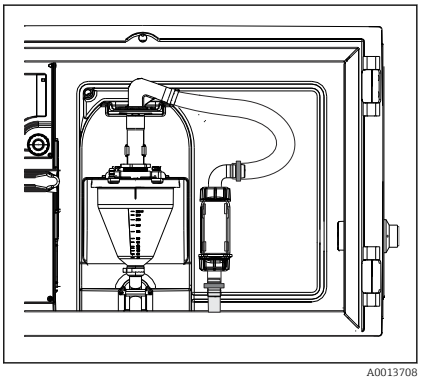
6 *Sample supply from below*

1 *Gland for the suction line*
2 *Suction line*

Connecting the suction line on version with vacuum pump



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



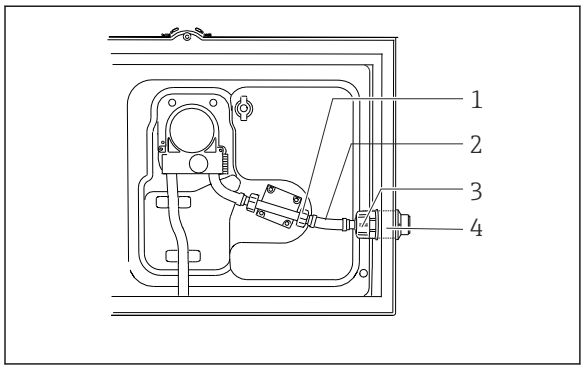
8 *Suction line connected from below*

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

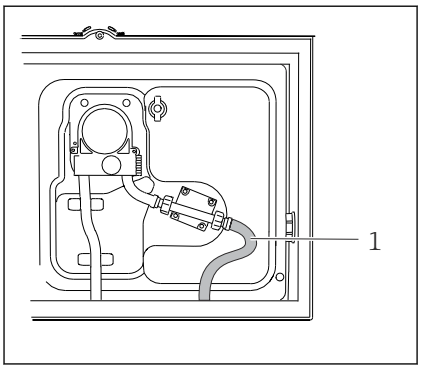
Modification of the suction line from side connection to connection from below

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



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



10 *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 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.
- 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.

NOTICE

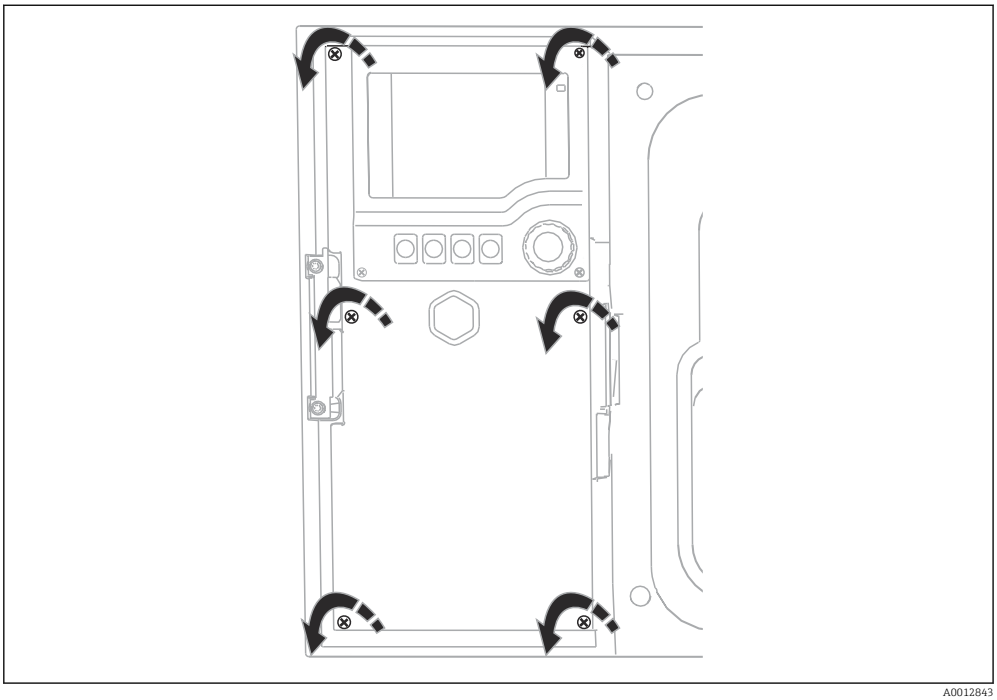
The device does not have a power switch

- The mains switch can be ordered via a TSP modification.
- A fuse with a maximum rating of 10 A must be provided internally when operating with a power cable. The fuse can be mounted under the rear cover.
- The protective ground connection must be established before all other connections. If the protective ground is disconnected, this can be a source of danger.

6.1 Connecting the flowmeter

6.1.1 Wiring the current and binary input

▶



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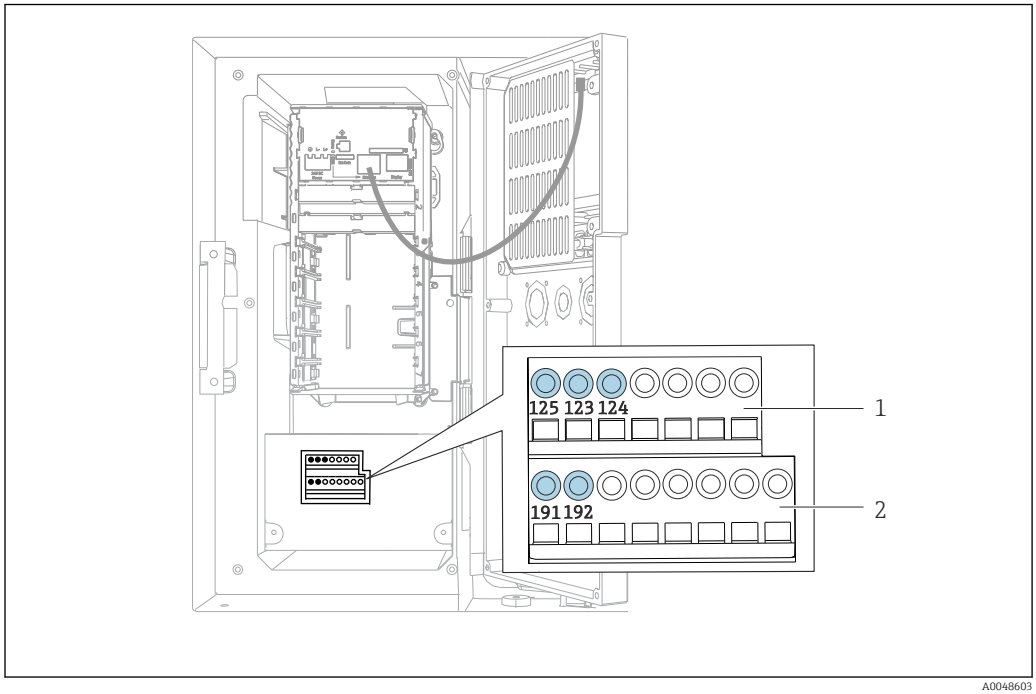
To open the display cover, slacken the 6 cover screws with the Phillips head screwdriver.

↳ The inputs can be found in the bottom section of the housing:



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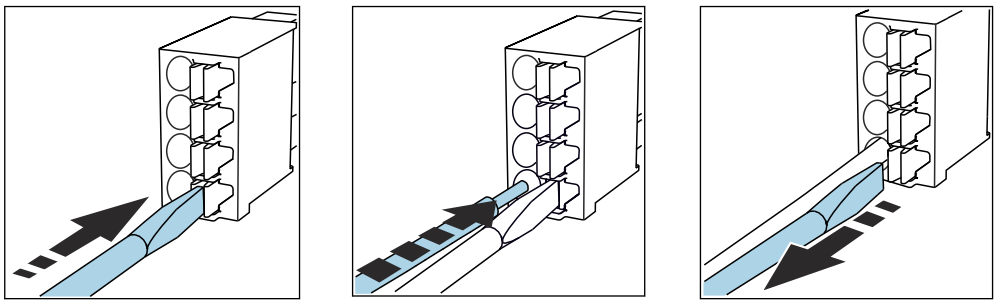
11 *Interior of the controller housing*

1 *Current input*
2 *Binary input*

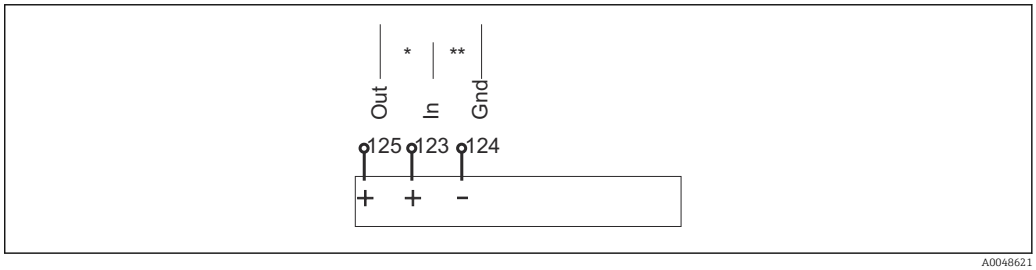
Connecting the plug-in terminals



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

6.1.2 current input

▶ Connect the current input as follows:

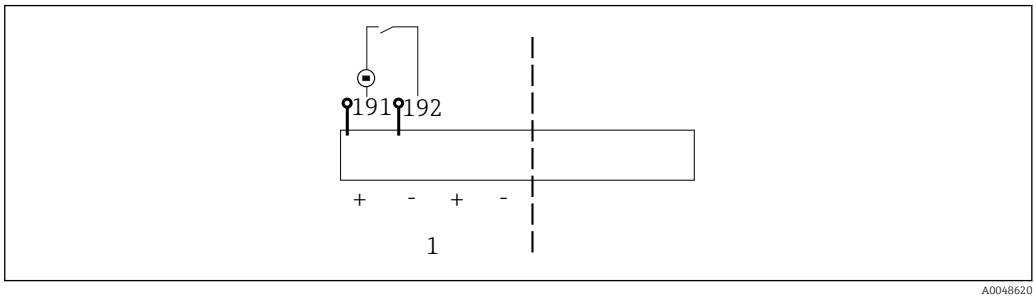


12 *Assignment of the analog input*

* *Current input for passive devices (e.g. flowmeter), Out + In terminals (125/123)*
** *Current input for active devices (e.g. flowmeter), In + Gnd terminals (123/124)*

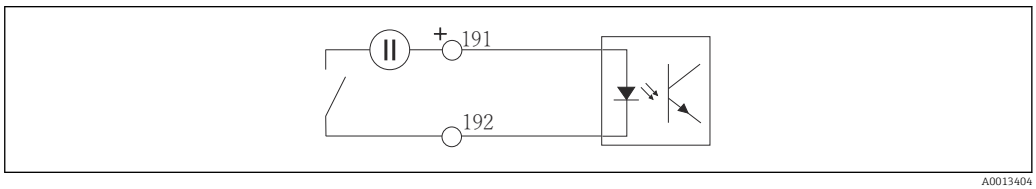
6.1.3 binary input

▶ Connect the binary input as follows:



13 *Assignment of the binary input*

1 *Binary input 1 (191/192)*

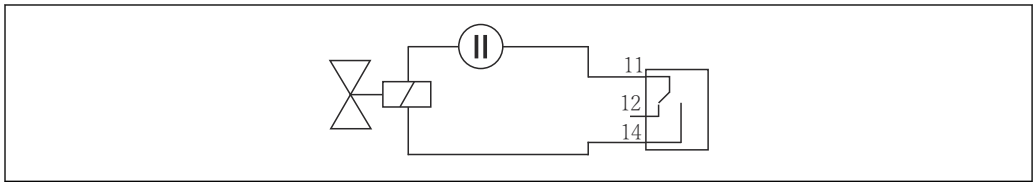


14 *Binary input with external voltage source*

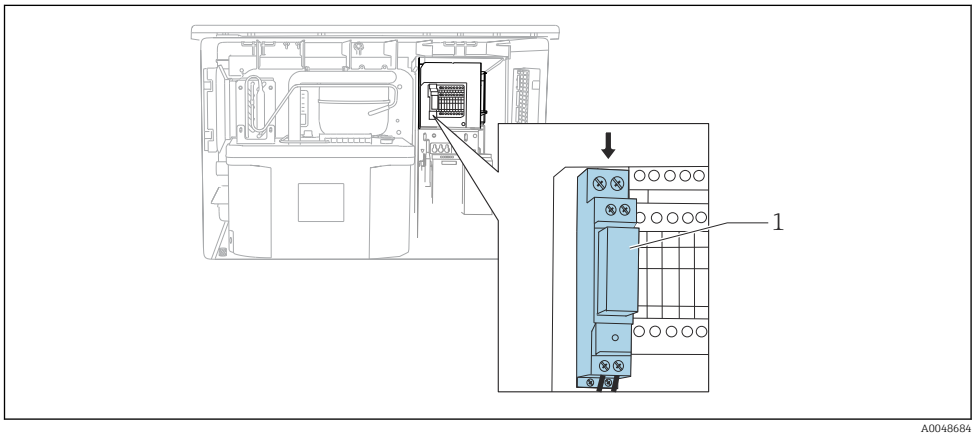
- When connecting to an internal voltage source, use the terminal connection on the rear of the dosing compartment. The connection is located on the lower terminal strip (on the far left, + and -), ()

6.2 Connecting the signal transmitter to the alarm relay

The sampler allows you to connect signal transmitters, such as LED lights. A binary output coupled with a relay is provided on the back of the sampler for this purpose.



15 *Connection example for binary output with relay*

1. Remove the cover on the rear panel.
2. 

16 *Wiring the binary output*

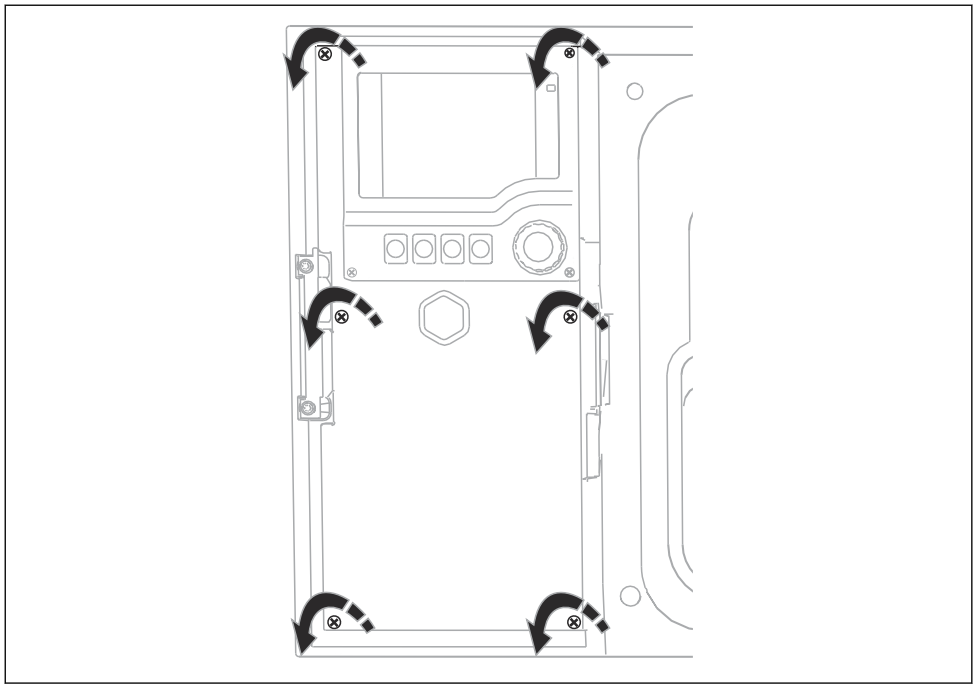
1 Relay (coupled with binary output)

Wire the signal transmitter at the relay at the top.

6.3 Connecting the communication

Communication is connected in the controller housing:

1.



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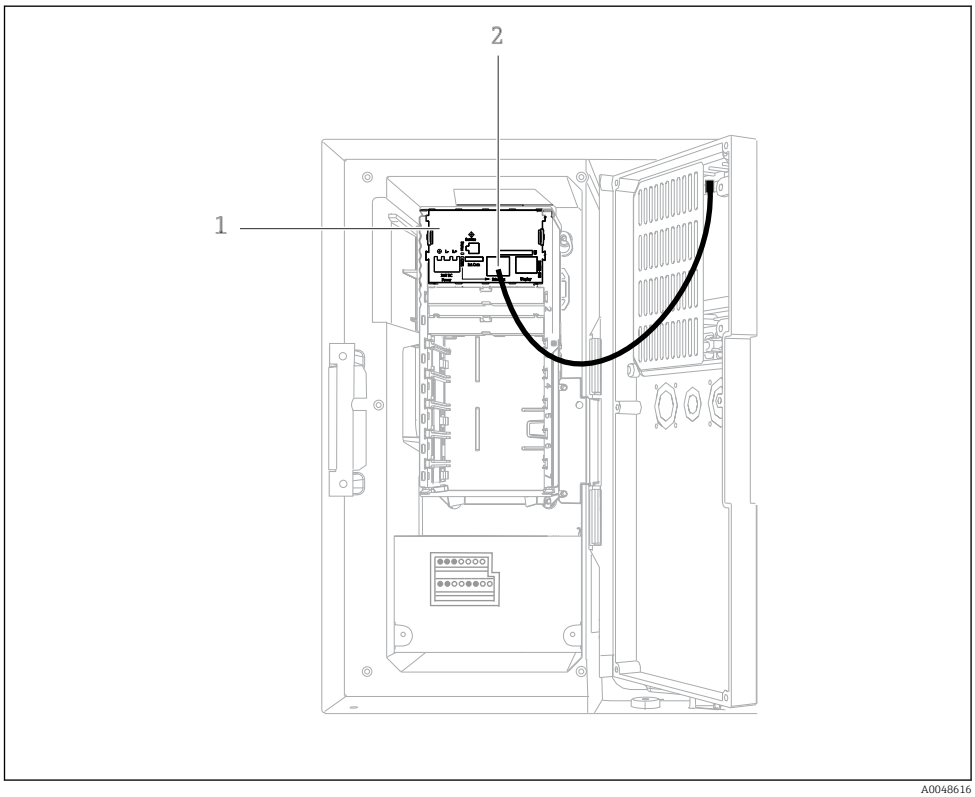
To open the display cover, slacken the 6 cover screws with the Phillips head screwdriver.

↳ You can now see the base module SYS (1) in the housing.

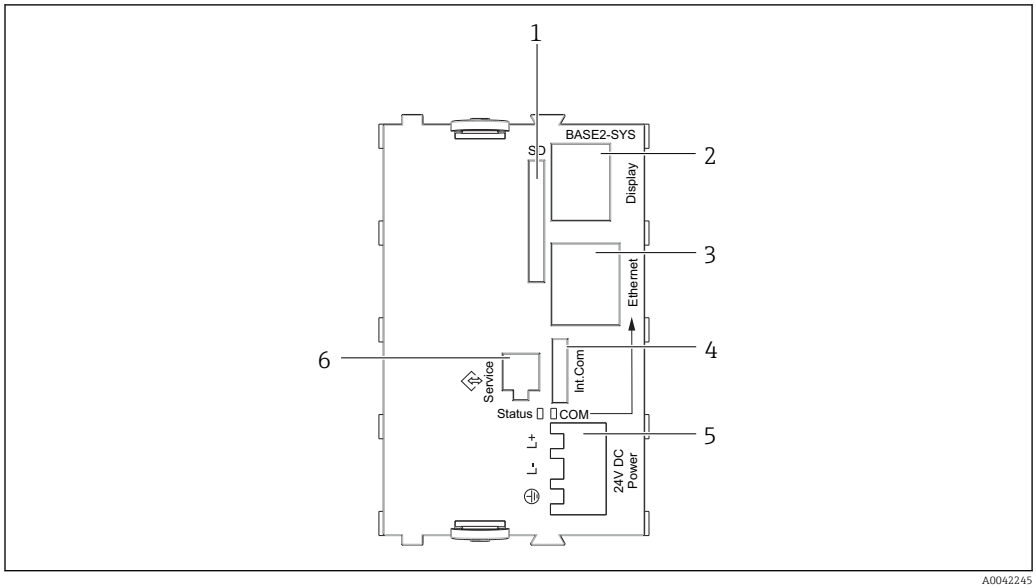
2.



Connect the communication to the web server to the Ethernet interface (2) in the base module SYS (1).

The connection to the service interface is also located on the base module SYS.

6.3.1 Description of base module SYS



17 *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.

6.4 Connecting the supply voltage

6.4.1 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).
- For analyzer stands, the cable length is approx. 1.8 m (5.9 ft) from the foundation.

6.4.2 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

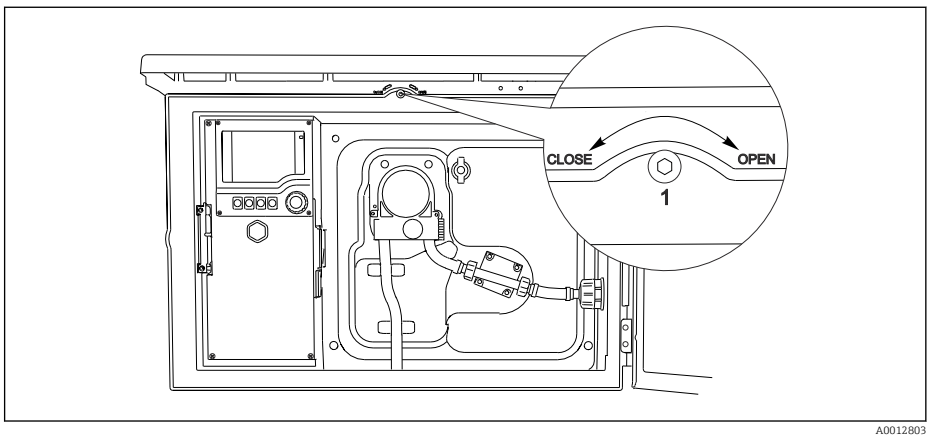
The terminal connection is protected under an additional cover in the top rear section of the device.

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

6.4.3 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.

↳



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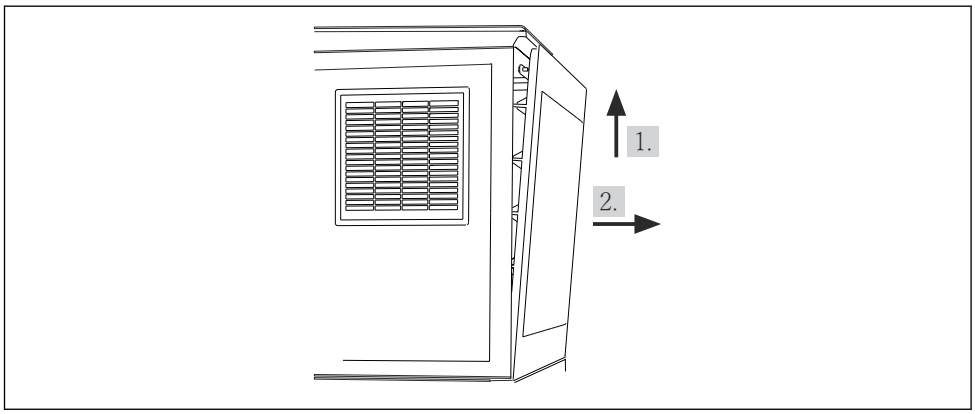
3.



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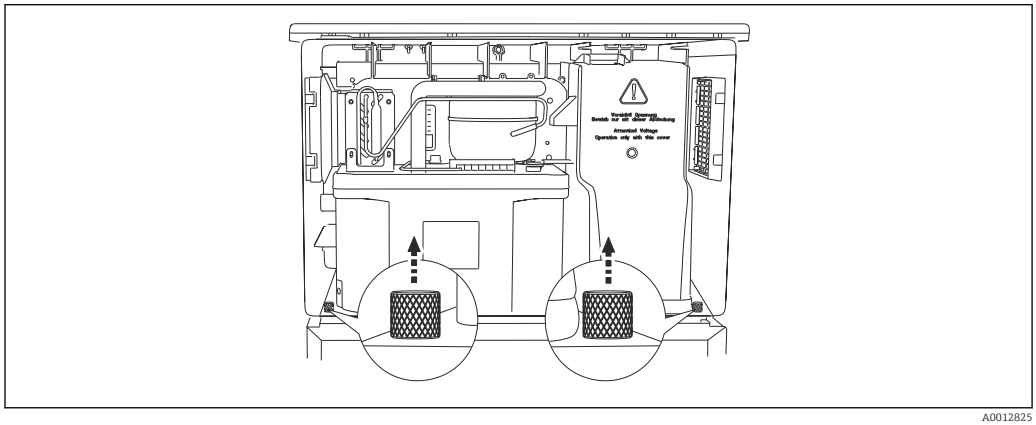
Lift up the upper rear panel and pull it off towards the back.

4. Remove the rear panel.

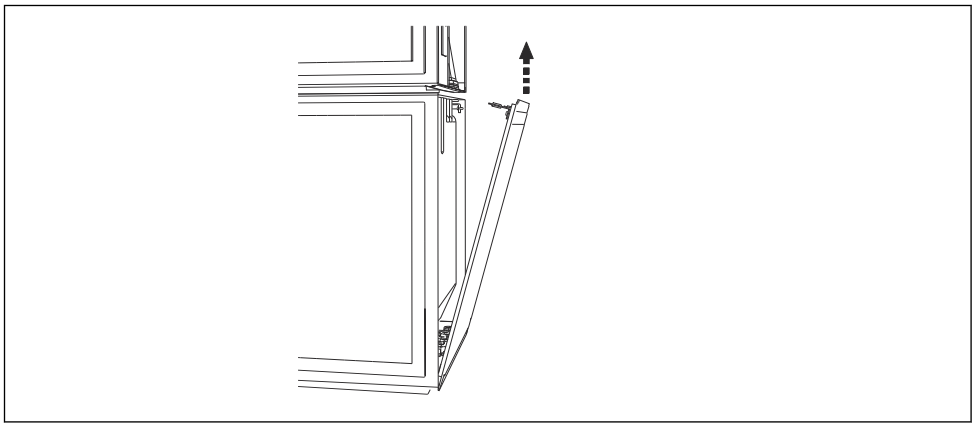
6.4.4 Removing the rear panel of the sampling compartment



A0012825

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

2.



A0012824

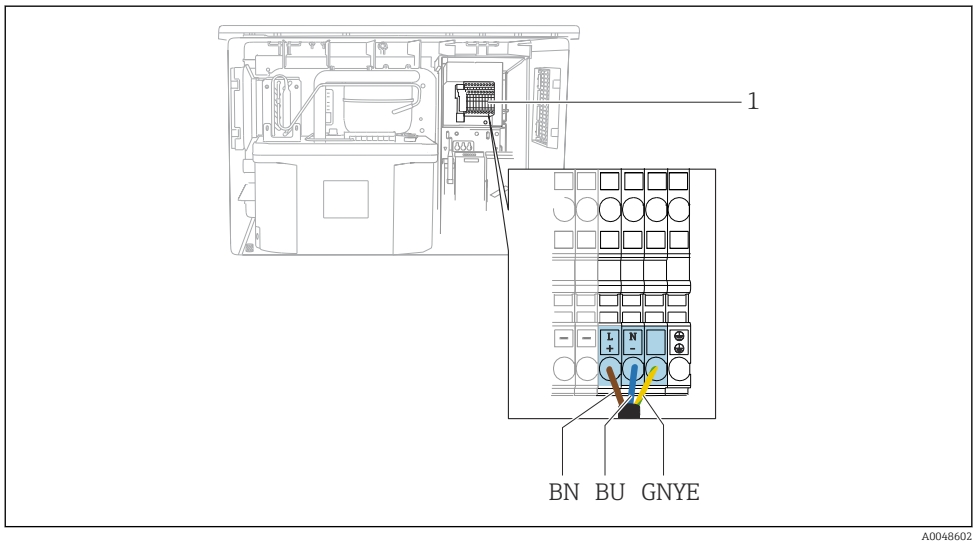
Remove the bolt on the rear panel.

6.4.5 Terminal assignment

The voltage is supplied at the plug-in terminals on the rear of the sampler.

1. Remove the protective cover of the electronics module.

2.



19 *Terminal assignment*

1 Assignment of plug-in terminal with 100 to 120 V/200 to 240 V AC ±10 %
BN Brown cable
BU Blue cable
GNY Ground cable
E

Wire the supply voltage at the terminals provided.

6.5 Special connection instructions

6.5.1 Terminal assignment for input/output signals

Input signals
- 1 analog signal 0/4 to 20 mA
- 1 binary signal coupled with alarm relay

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

The controller must be opened to connect the output and input signals.

6.6 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 (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

6.7 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?

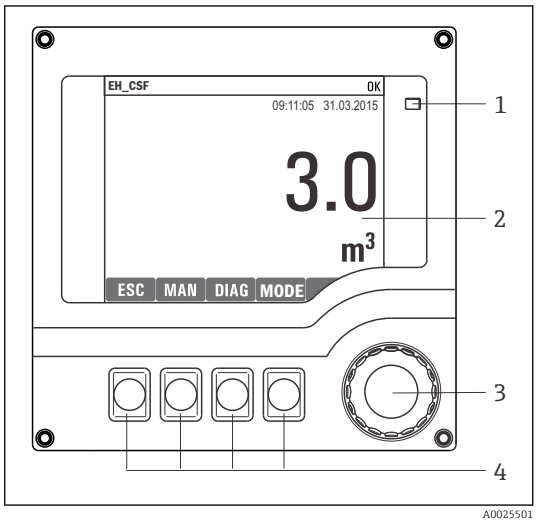
Electrical connection

- ▶ 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 Operating options

7.1 Overview of operating options

7.1.1 Display and operating elements

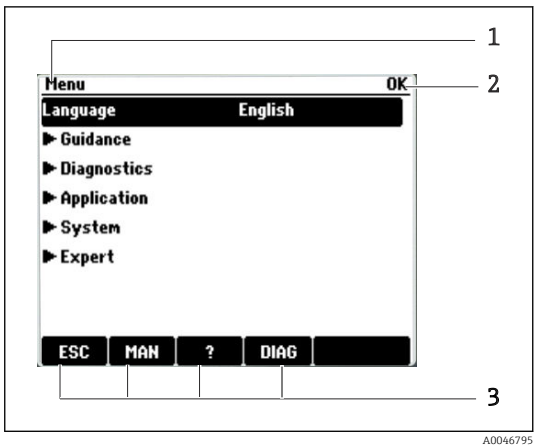


1 LED
2 Display (with red display background in alarm condition)
3 Navigator (jog/shuttle and press/hold function)
4 Soft keys (function depends on menu)

20 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
DIAG: link to Diagnostics menu
(If the program is active: MODE: stop program)

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: ▷
- Examples of typical actions include:
  - Deleting log entries
  - Saving or loading configurations
- Examples of typical actions include:
  - Start a sampling program
  - Start manual sampling
  - Saving or loading configurations
-

User-defined text

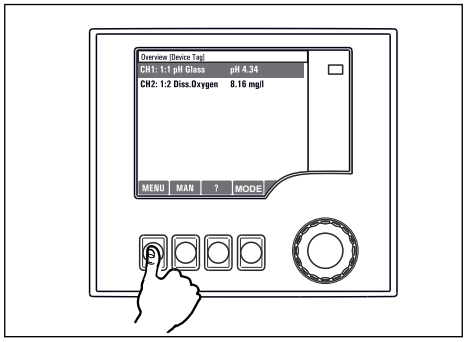
- You are assigning an individual designation.
- Enter a text. You can use the characters in the editor for this purpose (upper-case and lower-case letters, numbers and special characters).
- Using the soft keys, you can:
  - Cancel your entries without saving the data (✗)
  - Delete the character in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

7.3 Access to operating menu via local display

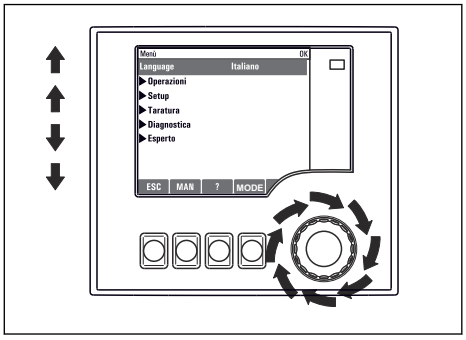
7.3.1 Operating concept

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

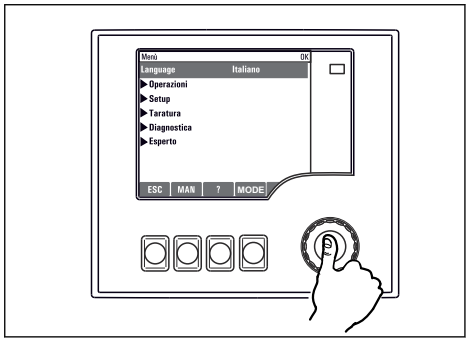
Example:



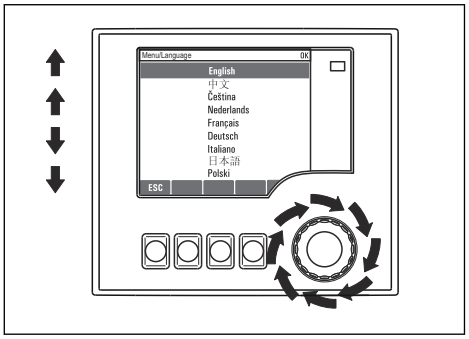
Press the soft key: select the menu directly



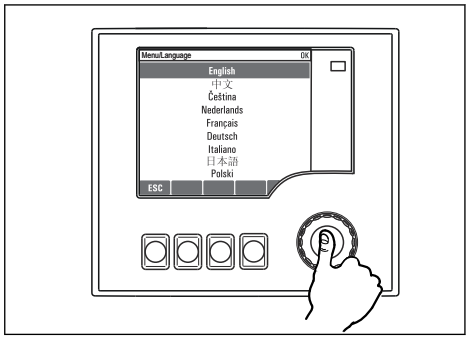
Turn the navigator: move the cursor in the menu



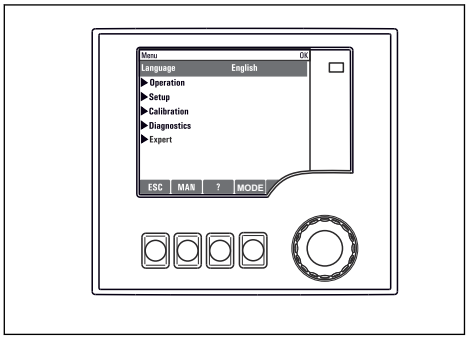
Press the navigator: launch a function



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: **Menu/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.

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

Connecting the web server

- Connect the communication cable of the computer to the Ethernet port of the SYS base module in the controller housing.→ 21

Establishing the data connection

You need an activation code for the web server.

To ensure that your device has a valid IP address, you must disable the **DHCP** parameter in the Ethernet settings.

- Switch off **DHCP** in the **System/Webserver/Ethernet settings** menu.

You can assign the IP address manually in the same menu (for point-to-point connections).

Setting the IP address under Microsoft Windows 10

The IP address and subnet mask of the device can be viewed in the **Diagnostics/System information/Ethernet** menu

1. Start the PC.
2. First, configure a manual IP address in the network connection settings of the operating system.
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 Liquistation: 192.168.1.212 (as configured previously)
   IP address for PC: 192.168.1.213.

Operating Liquistation via the web browser

1. Start the Internet browser.
2. If you use a proxy server to connect to the Internet:
   Disable the proxy (browser settings under "Connections/LAN settings").
3. 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.
4. Enter the following address(es) to download logbooks:
   ↳ 192.168.1.212/logbooks_csv.fhtml (for logbooks in CSV format)

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

8.1.2 Service interface

Connecting the 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.

1. Connect the service connector to the interface on the SYS base module in the controller housing.→ 21
2. Connect the service connector to the Commubox.
3. Connect the Commubox via the USB connection to the computer on which FieldCare is installed.

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 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.

9 Commissioning

9.1 Installation and 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

Setting the language via the menu

The Commissioning Wizard starts when you boot the device for the first time. You can select the language here. Alternatively, the language can also be set in the menu:

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

The Commissioning Wizard starts each time the device is restarted until the user has run through all the steps of the commissioning process once in the Wizard.

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
- MAN
- MEAS
- DIAG

9.3.2 Starting the Commissioning Wizard

Initial commissioning is performed by a Commissioning Wizard.

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

The Commissioning Wizard starts as soon as the device is connected to the electricity supply. At the start, it is executed repeatedly until the user has fully completed all the steps of the commissioning process in the Wizard.

The following settings can be made in the Wizard:

- Selection of language for initial execution
- Date and time
- Sample temperatures
- Bottle distribution
- Information about the flowmeter
  Flowmeter present: if so, settings for the flow input (analog/binary)
- Sampling volume (only for vacuum device)
- Calibration of sampling volume for peristaltic pumps
- Distribution arm calibration
- Switch to Program Wizard
- Create backup copy

▶ In the **Guidance** menu, start the **Commissioning wizard** and follow the instructions.
  ↳ A wizard now guides you through the settings.

9.3.3 Starting the Program Wizard

Creating the sampling program

A Program Wizard is available for the configuration of one or more sampling programs (max. 3).

Some settings can be made for all program types:
- Sampling mode
- Sampling volume (for peristaltic pump)
- Sampling interval (for time- and flow-paced sampling)
- Change times for bottle changes
- Bottle synchronization
- Stop conditions

The following settings can also be made depending on the mode:
- Pulse (binary input)
- Current input

▶ In the **Guidance** menu, start the **Program wizard** and follow the instructions.
  ↳ A wizard now guides you through the settings.

During commissioning, you can call up and run through the Program Wizard directly.

9.3.4 Display behavior

The screen can be adjusted to the working environment with the following settings:
- Contrast
- 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.
  - On
    The backlighting does not switch off automatically.
- Screensaver
- Screen rotation
  If **Automatic** is selected, the single-channel measured value display switches from one channel to the next every second.

▶ Change the screen settings in the **System**/ **Display** menu.

10 Operation

⚠ WARNING

Touching moving parts during operation.
Pinching/crushing or severe injuries to hands and fingers.
- ▶ Stop the program.
- ▶ Disconnect the device from the mains.

10.1 Reading off measured values

Viewing measured values

The following measured values are displayed:
- Temperature
- Flow rate at current or binary input
- Alarm relay

▶ To display the measured values, press the **MEAS** soft key in the start screen.

10.2 Adapting the measuring device to the process conditions

10.2.1 General settings

Configuring the system and communication

Various basic settings for the system, communication and sampling can be made at all times in the sampler:
- Device tag
- Date/Time
- Sampling
- Display
- Device restart
- Factory default
- **Webserver** (optional)
- Firmware update
- Activation codes
- Change key lock password

▶ Select **System** in the main menu.
↳ The aforementioned basic settings for the sampler can now be configured.

Parameter description

Function	Info
System settings	
Device tag	Individual device tag
Date/Time	The device starts with UTC time. 12- or 24-hour display. Seconds can also be displayed with the latter version. The controller adapts the summertime/normal time changeover automatically if you choose European or American daylight saving time. Manual means that you can specify the start and end of daylight saving time yourself. Here, two additional submenus are displayed in which you specify the changeover date and time.

Function	Info
Display	**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.
Device restart	Restart and keep all the settings
Factory default	Restart with factory settings; settings that are not saved are lost.
Firmware update	Current firmware version, installation using SD card.
Activation codes	Activation codes are required for: Additional functionality
Change key lock password	To protect against unauthorized access
Communication settings	
Webserver	Web server settings and manual assignment of the IP address
Settings for the sampling programs	
Sampling	Device-specific settings for sampling that apply for all sampling programs and manual samples.

10.2.2 Current and binary input for flowmeter

Assigning the current input or binary input

The inputs for a flowmeter are assigned using the Commissioning Wizard.

▶ In the **Guidance** menu, start the **Commissioning wizard** and follow the instructions.
  ↳ The current input or binary input can now be selected in the **Commissioning wizard**.

Configuring the current input or binary input

The following configuration options are available for the current input:
- Choice of 4 to 20mA or 0 to 20mA
- Selection of **Unit of flow**
- Value for the end of the measuring range; 20 mA is assigned to this value

The following configuration options are available for the binary input:
- Choice of unit for the volume
- Pulse frequency; what volume does 1 pulse correspond to

The input is only visible in the menu if it was assigned in the Commissioning Wizard. The configuration is primarily performed in the Commissioning Wizard but can also be modified in the menu:

▶ In the **Application**/**Inputs** menu, set the input that is displayed to the desired values.

10.2.3 Sampling settings

Configuring general settings for sampling

A special wizard that guides you through the functions is available for the configuration of a sampling program. A program can only be created with the Program Wizard. Certain parameters can be changed via the menu:
- **Bottle distribution** (read only)
- Bottle volume
- **Dosing volume** (for vacuum pump)

- Dosing chamber
- **Sample temperature** (for vacuum pump)
- Power failure

1. For the settings to take effect, stop all programs on the start screen beforehand with the **MODE** soft key.
2. Select **System/Sampling** in the menu.
   ↳ The aforementioned basic settings can now be configured.

Creating sampling programs using the wizard

A Program Wizard is available for the configuration of one or more sampling programs. The following settings can be made in the Wizard:

- Sampling mode
- Sample volume
- Sampling interval
- Time interval
- Bottle synchronization
- Stop condition

▶ In the **Guidance** menu, start the **Program wizard** and follow the instructions.
   ↳ A wizard now guides you through the settings.

Performing sampling manually

A sample can be taken manually without a program.

1. Make the desired changes in the **Application/Manual sampling** menu or directly with the **MAN** softkey. This pauses any program currently running.
2. Perform manual sampling with **Start sampling**.
   ↳ The current bottle configuration and the current sample volume are displayed. You can select the distributor position. In the case of peristaltic pumps, you can also change the sample volume.
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.

Parameter description

Function	Info
Bottle distribution	Use this function to select the distributor position. Combination of number of bottles and bottle volume, e.g. 1x60 l (15.85 gal), 4x13 l (3.43 gal). Can only be configured with the Commissioning Wizard.
Bottle volume	Here it is possible to set the bottle volume to a lower value than the distribution value set in the Commissioning Wizard, e.g. 4x17 l (4.49 gal) can be reduced to 15 l (4 gal)
Dosing volume (For version with vacuum pump) Sampling volume (for version with peristaltic pump)	The dosing volume can be set in the case of the vacuum pump; in the case of peristaltic pumps, the item is not displayed; the sampling volume is entered directly in the Program Wizard or can be changed directly in the program in the **Application/Program** menu.
Dosing chamber Only for vacuum pump	Dosing with pressure e.g. in conditions with low suction heights and slight counterpressure or low volumes.
Sample temperature	Sample temperature setting

Function	Info
Power failure	Decide how the sampler should react when it is energized after a power failure. **Resume program:** ▪ Time and flow-paced The program calculates the omitted samples and enters them in the logbook as failed. When the program is restarted, it continues where it was interrupted. ▪ Flow-paced No samples are entered in the logbook during the power failure. When the program is restarted, it continues where it was interrupted.
Sample volume	**Time paced CTCV** A constant sampling volume is taken at steady intervals. **Flow paced VTCV** A constant sampling volume is taken at variable intervals. **Time/flow paced CTVV** A variable sampling volume is taken at steady intervals.
Sampling interval	Set the sampling interval. The pulses are scaled at the flowmeter. By multiplying the pulses at the sampling interval, the shortest sampling interval at the maximum pulse frequency can be set. Example: With a maximum flow rate of 600 m^3 (21188ft^3)/h, the pulse frequency at 5 m^3 (176.57 ft^3) is 120 pulses/h or 2 pulses/min. With a sampling interval of 20 m^3 (706 ft^3), a sample is taken after 4 pulses = 2 minutes.
Bottle synchronization	The bottle synchronization setting is possible with all types of program. Bottle synchronization is only possible with a bottle change after a specific time and not with a bottle change after a number of samples. Specific bottles can be assigned specific filling times with the bottle synchronization function. For example, bottle 1 is to be filled from midnight to 2 a.m., bottle 2 from 2 a.m. to 4 a.m. etc.
Stop condition	Use this function to enter the end of the program and to specify continuous operation. End of program: the program stops automatically once it has gone through all the bottles once. Continuous operation: the program runs in a continuous loop. The bottles must be emptied regularly.

11 Diagnosis and troubleshooting

11.1 General troubleshooting

The sampler continuously monitors its functions itself.

The color of the display background changes to red if a diagnostic message for error category "F" occurs.

The LED beside the display flashes red if a diagnostic message for error category "M" occurs.

11.1.1 Troubleshooting

A diagnostic message appears on the display, measured values are not plausible, or you identify a fault.

1. See the Diagnostics menu for details on the diagnostic message.
   ↳ Follow the instructions to rectify the problem.
2. If this does not help, search for the diagnostic message under "Overview of diagnostic information" in these Operating Instructions. Use the message number as a search criterion. Ignore the letters indicating the Namur error category.
   ↳ Follow the troubleshooting instructions provided in the last column of the error tables.
3. Contact the Service Department if you cannot rectify the error yourself, citing only the error number.

11.1.2 Device-specific errors

Problem	Possible cause	Tests and/or remedial measures
Dark display	No supply voltage	▸ Check if supply voltage applied.
	Base module defective	▸ Replace base module
Values appear on display but: ▪ Display does not change and/or ▪ Device cannot be operated	Module not wired correctly	▸ Check modules and wiring.
	Impermissible operating system condition	▸ Switch off device and switch it on again.
Controller signals not accepted or outputs do not switch	Incorrect program setting	▸ Check program setting
	Incorrect wiring	▸ Check wiring
	Electronics failure	▸ Replace base module
Sample not representative	Siphon in sampling hose	▸ Check the sampling hose
	Connection not tight/ sampling hose drawing in air	1. Check hoses/connections 2. Check routing of the sampling hose
	Bottles not filling correctly	Incorrect distribution selected in operation ▸ Calibrate the distribution arm
	Distribution arm stops	Incorrect distribution selected in operation 1. Check configured bottle distribution 2. Check the distribution arm connection 3. Distributor is defective, replace distributor or have repaired by Endress +Hauser Service
	Incorrect bottle filled	Incorrect distribution selected in operation

Problem	Possible cause	Tests and/or remedial measures
	No sample cooling	▶ Check the setting for the sample compartment temperature at the console Refrigeration system defective --> have repaired by Endress+Hauser Service
	Incorrect pump tubing	▶ Only use the original pump tubing
	Sensory mechanism is faulty	▶ Replace sensory mechanism (contact Endress+Hauser Service)
No sampling	Connection not tight	▶ Check tightness of hoses/connections
	Sampling hose drawing in air	▶ Check routing of the sampling hose
	Air Manager defective	Have repaired by Endress+Hauser Service
	Vacuum pump defective	Have repaired by Endress+Hauser Service
	Incorrect pump tubing	▶ Only use the original pump tubing
	Sensory mechanism is faulty	▶ Replace sensory mechanism (contact Endress+Hauser Service)
Load too large		
Shunt/short to ground in current loop		

11.2 Diagnostic information on local display

Up-to-date diagnostic events are displayed along with their status category, diagnostic code and short text. Clicking on the navigator lets you retrieve more information and tips on remedial measures.

11.3 Diagnostic information via web browser

The same diagnostic information that is available for the local display is available via the web server.

11.4 Adapting the diagnostic information

11.4.1 Classification of diagnostic messages

In the **Diagnostics/Diagnostics list** menu, you can find more detailed information on the current diagnostic messages displayed.

In accordance with NAMUR specification NE 107, the diagnostic messages are characterized by:
- Message number
- Error category (letter in front of the message number)
  - **F** = (Failure) a malfunction has been detected
    The cause of the malfunction is to be found in the sampling point/measuring point. Any controller connected should be set to manual mode.
  - **C** = (Function check), (no error)
    Maintenance work is being performed on the device. Wait until the work has been completed.
  - **S** = (Out of specification), the measuring point is being operated outside its specification
    Operation is still possible. However, you run the risk of increased wear, a shorter operating life or lower accuracy levels. The cause of the problem is to be found outside the measuring point.
  - **M** = Maintenance required. Action must be taken as soon as possible
    The device still measures/takes samples correctly. Immediate measures are not necessary. However, proper maintenance efforts would prevent a possible malfunction in the future.
- Message text

11.5 Overview of diagnostic information

11.5.1 Device-specific, general diagnostic messages

No.	Message	Factory settings			Tests or remedial action
		S [1]	D [2]	F [3]	
202	Selftest active	F	On	Off	Wait for self-test to be finished
241	Firmware failure	F	On	On	Internal device error 1. Update the software. 2. Contact Endress+Hauser Service. 3. Replace the backplane (Endress+Hauser Service).
242	Firmware incomp.	F	On	On	
243	Firmware failure	F	On	On	
261	Electronics module	F	On	On	Electronics module defective 1. Replace the module. 2. Contact Endress+Hauser Service.
262	Module connection	F	On	On	Electronics module not communicating 1. Check the cable connection , replace it if necessary. 2. Check the power supply of the sampling control module. 3. Contact Endress+Hauser Service.
263	Incomp. detected	F	On	On	Wrong type of electronics module 1. Replace the module. 2. Contact Endress+Hauser Service.
284	Firmware update	M	On	Off	Update completed successfully

No.	Message	Factory settings			Tests or remedial action
		S [1]	D [2]	F [3]	
285	Update error	F	On	On	Firmware update failed 1. Repeat. 2. SD card error → use another card. 3. Incorrect firmware → repeat with suitable firmware. 4. Contact Endress+Hauser Service.
302	Battery low	M	On	Off	Buffer battery of real time clock is low The date and time are lost if the power is interrupted. ► Contact Endress+Hauser Service (battery replacement).
304	Module data	F	On	On	At least 1 module has incorrect configuration data 1. Check the system information. 2. Contact Endress+Hauser Service.
306	Software error	F	On	On	Internal firmware error ► Contact Endress+Hauser Service.
310	Temperature sensor	F	On	On	Temperature sensor PT1 in the climate control module for sample compartment measurement is defective ▪ No temperature regulation possible for the sample compartment ▪ Unable to cancel the sampling program ► Contact Endress+Hauser Service.
313	Safety sensor	M	On	On	Safety switch LF2 for sample sensor active ▪ Contact electrodes for sample detection are fouled ▪ The sample continues to be taken 1. Clean sample detection sensor LF1 in the dosing glass. 2. Contact Endress+Hauser Service.
314	No sample flow	F	On	On	A vacuum cannot be generated in the peristaltic pump. 1. Check the pump tube for leaks. 2. Immerse the suction line in the medium.
315	Refrigeration	F	On	On	▪ Sample compartment target temperature not reached ▪ Cooling regulation not possible 1. Check the sample compartment door. 2. Perform the module test under **Menu/ Diagnostics/System test/Cooling system/ Check cooling**. 3. Contact Endress+Hauser Service.
316	Heating	F	On	On	▪ Sample compartment target temperature not reached ▪ Heating regulation not possible 1. Check the sample compartment door. 2. Perform the module test under **Menu/ Diagnostics/System test/Cooling system/ Check heating**. 3. Contact Endress+Hauser Service.

No.	Message	Factory settings			Tests or remedial action
		S [1]	D [2]	F [3]	
317	Liquidsensor	M	On	On	▪ Sensor LF1 for sample detection fouled ▪ Five samples still possible ▶ Clean sensor LF1 in the dosing glass.
318	Liquidsensor	F	On	On	▪ Sensor LF1 for sample detection defective ▪ No sampling possible ▶ Contact Endress+Hauser Service.
319	Safety sensor	M	On	On	▪ Safety switch LF2 fouled ▪ Five samples still possible ▶ Clean sensor LF2 in the dosing glass.
320	Safety sensor	F	On	On	▪ Safety switch LF2 defective ▪ No sampling possible ▶ Contact Endress+Hauser Service.
326	Membrane pump	F	On	On	▪ Vacuum pump defective ▪ Motor cable broken ▶ Contact Endress+Hauser Service.
327	Air-Manager	F	On	On	▪ Air Manager for compressed air distribution system defective ▪ Photoelectric barrier defective ▪ Cable defective ▶ Contact Endress+Hauser Service.
328	Distribution arm	F	On	On	Distribution arm zero point not found during reference run 1. Perform the distribution arm test under **Menu/Diagnostics/System test/ Distribution arm**. 2. Contact Endress+Hauser Service.
329	Pump failure	F	On	On	Pump motor is drawing excess current ▶ Contact Endress+Hauser Service.
330	Membrane pump	F	On	On	Vacuum pump control defective ▶ Contact Endress+Hauser Service.
331	Peristaltic pump	F	On	On	▪ Peristaltic pump defective ▪ Motor cable broken ▶ Contact Endress+Hauser Service.
332	Peristaltic pump	F	On	On	Control of peristaltic pump defective ▶ Contact Endress+Hauser Service.
333	Pressure sensor	F	On	On	Medium detection not possible, sampling not possible ▪ Suction line not drained before sampling ▪ Pressure sensor defective 1. Check the suction line, if necessary use the pump test under **Menu/Diagnostics/ System test/Pump purge**. 2. Contact Endress+Hauser Service.
334	Cooling system	F	On	On	Climate control module defective 1. Replace the climate control module. 2. Contact Endress+Hauser Service.
335	Fan	F	On	On	Fan defective 1. Replace the fan. 2. Contact Endress+Hauser Service.

No.	Message	Factory settings			Tests or remedial action
		S [1]	D [2]	F [3]	
337	Pump hose warning	M	On	Off	End of pump tube service life will be reached shortly Display under **Menu/Diagnostics/Operating time information/Pump tube life** 1. Schedule replacement. 2. After replacing, reset the operating time under **Menu/Diagnostics/Operating time information**.
338	Pump hose alarm	M	On	Off	End of pump tube service life reached Display under **Menu/Diagnostics/Operating time information/Pump tube life**. 1. Replace the pump tube. 2. After replacing, reset the operating time under **Menu/Diagnostics/Operating time information**.
339	Liquidsensor	M	On	Off	Sensor LF1 fouled 1. Clean the sensor soon. 2.
340	Liquidsensor	M	On	Off	Sensor LF1 fouled 1. Clean the sensor. 2.
345	Time changeover	M	On	Off	Daylight saving time/winter time setting Normal time (winter time) active
346	Time changeover	M	On	Off	Daylight saving time/winter time setting Daylight saving time active
347	No sample confirm.	F	On	On	Sampling command has not been processed 1. Check the internal cable to 1IF. 2. Perform a software reset.
348	Read program	F	On	On	Selected program cannot be read from the program memory ► Create a new program.
349	Read program	F	On	On	Program created cannot be saved Hardware error has occurred ► Contact Endress+Hauser Service.
351	Delete program	F	On	On	Selected program cannot be deleted from the program memory ► Perform a software reset.
353	Overfill check	F	On	Off	Total capacity of bottle reached No further sampling to current bottle is triggered ► If desired: Make changes to the sampling program under **Select sampling program**.
357	Sampling faulted	M	On	Off	▪ Sample discarded ▪ There are too many sampling requests pending ► Make changes to the sampling program under **Select sampling program**.
370	Internal voltage	F	On	On	Internal voltage outside the valid range 1. Check supply voltage. 2. Check inputs and outputs for short-circuiting.

No.	Message	Factory settings			Tests or remedial action
		S [1]	D [2]	F [3]	
373	Electronictemp. high	M	On	Off	High electronics temperature ▶ Check ambient temperature and energy consumption.
405	Service IP active	C	Off	Off	Endress+Hauser Service switch is switched on The device can be addressed at 192.168.1.212. ▶ Switch off the service switch to change to the saved IP settings.
413	Reading backup	F	On	Off	▶ Wait.
502	No text catalog	F	On	On	▶ Contact Endress+Hauser Service.
503	Language change	M	On	Off	Language change failed ▶ Contact Endress+Hauser Service.
530	Logbook at 80%	M	On	Off	1. Save the logbook to the SD card and then delete the logbook in the device. 2. Set memory to circular buffer. 3. Deactivate logbook.
531	Logbook full	M	On	Off	
536	**SD card** (80%)	M	On	Off	SD card 80% full 1. Replace SD card with empty card. 2. Clear SD card. 3. Set logbook properties to ring buffer under **Logbooks**.
537	**SD card** (100%)	M	On	Off	SD card 100% full. No longer possible to write to the card. 1. Replace SD card with empty card. 2. Clear SD card. 3. Set logbook properties to ring buffer under **Logbooks**.
538	SD card removed	M	On	Off	SD card not plugged in 1. Check SD card. 2. Replace SD card. 3. Disable logging.
540	Parameter save fail	M	On	Off	Storage of configuration has failed ▶ Repeat.
541	Parameter load ok	M	On	Off	Configuration successfully loaded
542	Parameter load fail	M	On	Off	Loading of configuration has failed ▶ Repeat.
543	Parameter load abort	M	On	Off	Configuration loading aborted
544	Parameter reset ok	M	On	Off	Factory default successful
545	Parameter reset fail	M	On	Off	Setting of device configuration to factory setting has failed
903	Minimum flow	F	On	On	The flow is too low for flow-proportional sampling 1. Check the medium flow. 2. Check the flowmeter. 3. 4. Check the configuration of the input used.

No.	Message	Factory settings			Tests or remedial action
		S [1]	D [2]	F [3]	
920	No sample	F	On	On	No inflow during dosing process ▪ Suction line blocked or leaking ▪ No inflow of sample 1. Check suction line and suction strainer 2. Check inflow of sample.
928	No sample	F	On	On	Sample intake not possible ▪ Suction line clogged ▪ Suction height too high 1. Check the suction line and suction strainer. 2. Ensure suitable suction height (< 8 m).
930	No sample	F	On	On	Sample flow interrupted during intake ▪ Suction line blocked or leaking ▪ No inflow of sample 1. Check the suction line and suction strainer. 2. Check inflow of sample.
970	Curr. input overload	S	On	On	Current input overloaded The current input is switched off at 23 mA and above due to overload and reactivated automatically when a normal load is present.
971	Current Input low	S	On	On	Current input too low At 4 to 20 mA, the input current is less than the lower fault current. ► Check the input for short-circuit.
972	Curr. input > 20 mA	S	On	On	Output current above current output range
973	Current Input < 4 mA	S	On	On	Output current below current output range
974	Diagnostics confirm.	C	Off	Off	User has acknowledged the message displayed in the measuring menu.
975	Device restart	C	Off	Off	Device reset

1) **Status signal**
2) **Diagnostic message**
3) **Failure current**

11.6 Pending diagnostic messages

The Diagnostics menu contains all the information on the device status.

Furthermore, various service functions are available.

The following messages are directly displayed every time you enter the menu:
- **Most important message**
  Diagnostic message recorded with the highest criticality level
- **Past message**
  Diagnostic message whose cause is no longer present.

All the other functions in the Diagnostics menu are described in the following chapters.

Diagnostic messages associated with sampling are deleted under the following conditions:
- Diagnostic messages caused by sampling are deleted automatically with the next successful sampling.
- Diagnostic messages caused by the level of medium in the bottle are deleted the next time the bottle is changed.

If the diagnostic message "M313 liquid sensor" appears 5 times in succession when executing a program, the active program is aborted for reasons of safety.

11.7 Diagnostics list

All the current diagnostic messages are listed under the **Diagnostics/Diagnostics list** menu

11.8 Event logbook

11.8.1 Available logbooks

Types of logbooks
- Logbooks physically available (all apart from the overall logbook)
- Database view of all logbooks (= overall logbook)

Logbook	Visible in	Max. entries	Can be disabled [1])	Logbook can be deleted	Entries can be deleted	Can be exported
Overall logbook	All events	20000	Yes	No	Yes	No
Calibration logbook	Calibration events	75	(Yes)	No	Yes	Yes
Operation logbook	Configuration events	250	(Yes)	No	Yes	Yes
Diagnostics logbook	Diagnostic events	10000	(Yes)	No	Yes	Yes
Program logbook	Program logbook	5000	Yes	No	Yes	Yes
Version logbook	All events	50	No	No	No	Yes
Hardware version logbook	All events	125	No	No	No	Yes
Data logbook for sensors (optional)	Data logbooks	150 000	Yes	Yes	Yes	Yes
Debugging logbook	Debug events (only accessible by entering the special service activation code)	1000	Yes	No	Yes	Yes

1) Data in brackets means this depends on the overall logbook

11.8.2 Logbooks menu

Chronological list of all the logbook entries, with information on the type of event.

The logbooks can be found at **Diagnostics/Logbooks**.

Parameter description

Function	Info
Show	Select a particular event to display more detailed information.
Go to date	Use this function to go directly to a specific time in the list. In this way, you avoid having to scroll through all the information. The complete list is always visible, however.

11.8.3 Data logbook

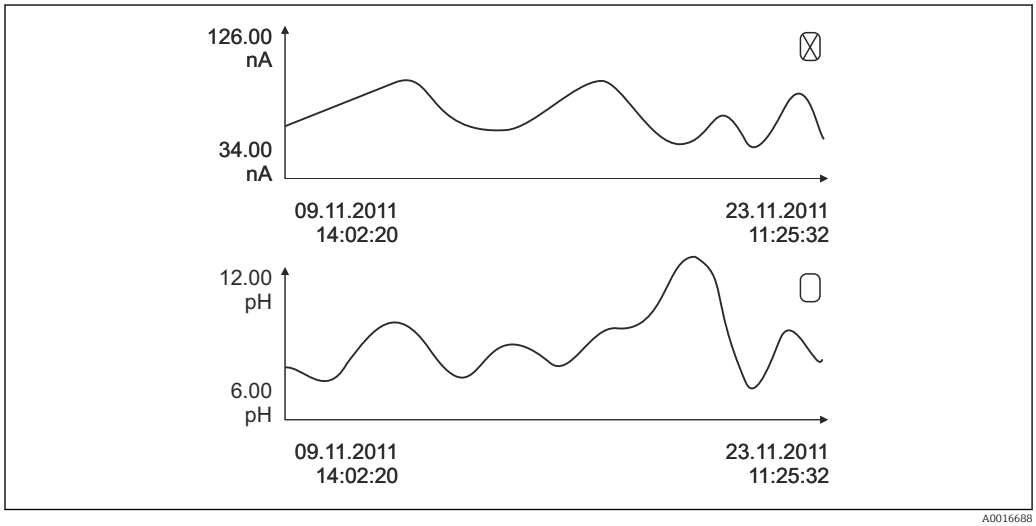
Chronological record of all the sampling events.

▶ The individual logbooks are created in the **Diagnostics/Logbooks/** menu.

If you run the Commissioning Wizard, it automatically creates a data logbook for sample temperature regulation.

You can also view your data logbook entries graphically on the display (under **Show plot**).

You can also adapt the display to suit your individual requirements:
- Press the navigator button in the graphic display: you are given additional options such as the zoom function and x/y movement of the graph.
- Define the cursor: if you select this option, you can move along the graph with the navigator and view the logbook entry (data stamp/measured value) in text form for every point in the graph.
- Simultaneous display of two logbooks: **Select 2nd plot** and **Show plot**
  - A small cross marks the currently selected graph for which the zoom can be changed or a cursor used, for example.
  - In the context menu (press the navigator button), you can select the other graph. You can then apply the zoom function, a movement or a cursor to this graph.
  - Using the context menu, you can also select both graphs simultaneously. This enables you to use the zoom function on both graphs simultaneously, for example.



21 Simultaneous display of two graphs, the top one is selected

Parameter description

Function	Info
Logbook name	Customized text, 20 characters
Source of data	Display the input (current or binary input)
Log time left	Display of days, hours and minutes until logbook is full.
Show	Select a particular event to display more detailed information.
Go to date	Use this function to go directly to a specific time in the list. In this way, you avoid having to scroll through all the information. The complete list is always visible, however.
Show plot	The display is according to your settings in the **General settings/Logbooks** menu.
Select 2nd plot	You can view a second logbook at the same time as the current one.
Scan time	Minimum time interval between two entries Format: H:MM:SS
Line plotter	Menu to define the graphic display

11.8.4 Program logbook

Chronological record of all the sampling events with an overview of the inputs.

▶ Select **Diagnostics/Logbooks/Logbook program** in the menu.

Parameter description

Function	Info
Show	Select a particular event to display more detailed information.
Go to date	Use this function to go directly to a specific time in the list. In this way, you avoid having to scroll through all the information. The complete list is always visible, however.
Show summary of inputs	The configured counters of the current or binary input are displayed. Max. 8 lines

11.8.5 Bottle filling

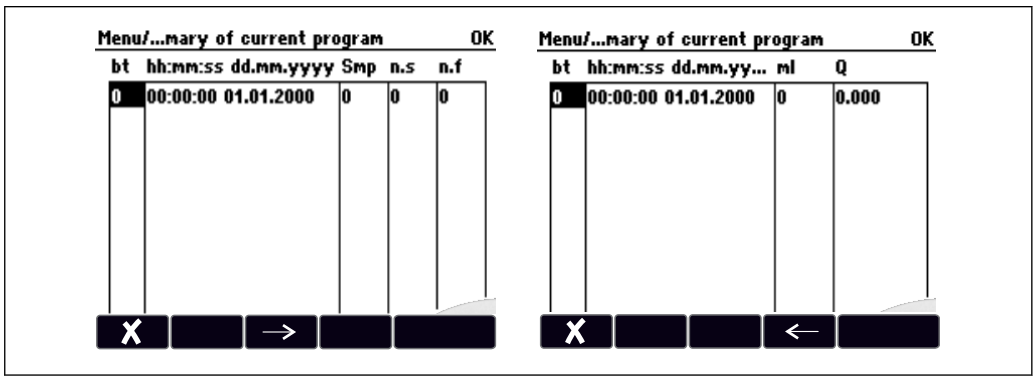
Display shows the bottle filling of the sampler:

- In **Menu/Diagnostics** select the **Show summary of current program** item or select the MEAS soft key; works both when the program is active and when it has stopped.
  - ↳ an overview of bottle filling appears for each individual bottle when the program is started. This gives you detailed feedback on the last sampling operations.

The bottle filling is deleted when the following event occurs:
Program start

The bottle filling is selectively overwritten when the following event occurs:
When the first bottle is reached in situations where "Continuous operation" is configured as the end of the program in the program settings

The bottle filling is displayed as follows:



Display	Info
bt	The bottle number is displayed.
hh:mm	The time the first sample was transferred to the bottle is displayed.
DD-hh:mm	The time the first sample was transferred to the bottle is displayed.
Smp	Displays how often sampling was triggered per bottle.
n.s	Indicates the number of times a sample was not taken even though sampling was triggered. This can occur if the maximum permissible fill volume for the bottle has been reached but the system is still supposed to transfer samples to the bottle. The "Overfill sensor" message is displayed while the program is active.
n.f	The value indicates how often sampling was canceled because it was not possible to draw in any or enough medium into the dosing glass to cover the LF1 probe.
ml	The sampling volume collected per bottle is displayed.
Q	The total flow for every bottle is displayed (only if flow measurement is connected).

11.9 Device information

11.9.1 System information

Calling up system information

Information about the system and its modules - such as the serial numbers, versions or order codes - is available under system information.

▶ Select **Diagnostics/System information** in the menu.

Parameter description

Function	Info
Device tag	Individual device tag
Order code	You can order identical hardware with this code. This code changes on account of changes to the hardware and you can enter the new code you received from the manufacturer here [1)]
Orig. order code ext.	Complete order code for the original device, resulting from the product structure.
Current order code ext.	Current code, taking into account changes to the hardware. You must enter this code yourself.
Serial number	You can access device data and documentation on the Internet with the serial number: www.endress.com/device-viewer
Software version	Display of the current version
Sw version FMSY1	Display of the current version
FMSY1 proj. version	Display of the current version
SD card	Information about the total size and available memory.
Backplane	Information regarding every available electronics module. Specify the serial numbers and order codes when servicing, for example.
Base	
Display module	
Save to SD card	The information is saved on the SD card in a "sysinfo" subfolder. The csv file can be read and edited in MS Excel, for example. This file can be used when servicing the device. **Guidance/Import/Export/Save system information**

1) Provided you give the manufacturer all the information about changes to the hardware.

To discover the version of your device, enter the order code into the search screen at the following address: www.endress.com/order-ident

11.9.2 Device test

Testing the device

It is possible to test or check the individual functions the device offers here. Including:
- The **Power supply**
- Cooling and heating test
- Incremental vacuum sampling
- The **Peristaltic pump** or **Vacuum pump**

▶ Select **Menu/ Diagnostics/System test**.

Parameter description

Function	Info
Cooling system	**Check cooling** and **Check heating** **Power supply** ▪ The current supply voltage is displayed. ▪ With AC power supply: 24 V ±0.5 V **Overcurrent** ▪ No: no error ▪ Yes: the fan or heater in the climate control module is defective ▪ -> Contact the Service Department **Sample compartment** ▪ The current temperature of the sample compartment is displayed. ▪ When you start the cooling or heating test, the temperature at the starting time is displayed **Cooling test off/Heating test off or Cooling test on/ Heating test on** Progress is displayed **Start Test and Stop test** Start or stop the cooling or heating test.
Peristaltic pump (only for version with peristaltic pump)	**Pump purge** and **Pump suction** **Pump purge, to stop press ESC** and **Pump suction, to stop press ESC** Current pump operating time **Power supply** ▪ The current supply voltage is displayed. ▪ With AC power supply: 24 V ±0.5 V **Vacuum** ▪ The vacuum provides information about the suction height. ▪ -> 100 mbar corresponds to approx. 1 m suction height **Motor current** The current consumption of the pump is displayed.
Vacuum pump (only for version with vacuum pump)	Bottle configuration Bottle volume Distributor position Select which bottle should be filled with the sample. Sample volume The sample volume is preset with the value from commissioning.
Start sampling	Perform sampling manually. **Progress** The progress of the sampling operation is displayed. **Power supply** ▪ The current supply voltage is displayed. ▪ With AC power supply: 24 V ±0.5 V **Motor current** The current consumption of the pump is displayed. **Medium LF1 and Medium LF2** ▪ Medium detection LF1 switchoff ▪ Medium detection LF2 disconnection from protective circuit

Function	Info
Distribution arm	Only for bottle configurations with more than one bottle. Test distribution arm When the menu item is activated, the distribution arm undergoes a test run. Afterwards, the system moves to each position in succession and the position is displayed. In the case of plate distribution, the arm moves left and right to ensure the bottles are numbered consecutively. Calibrate the distribution arm if the arm is not positioned precisely over the bottles. Detailed list of power supply to instrument. The actual values can vary without a malfunction having occurred.
Incremental vacuum sampling	Incremental vacuum sampling helps you troubleshoot the problem. The individual steps of vacuum sampling can be started one after another and therefore each individual step can be checked. A read-only menu apart from: Distributor position Select which bottle should be filled with the sample.

11.10 Reset device

▶ Select a device restart or the factory default setting under **Menu**/**System**/**Device restart** or **Factory default**.

Parameter description

Function	Info
Device restart	Restart and keep all the settings
Factory default	Restart with factory settings. Settings that have not been saved are lost.

11.10.1 Operating time information

The following information is displayed:
- **Operating hours device**:
  Displays the total operating hours of the device in days, hours and minutes
- **Operating hours cooling**:
  Displays the total operating hours of the compressor in days, hours and minutes
- **Overfill sensor** (for version with vacuum pump):
  Number of times a safety switchoff has been caused by LF2
- **Dosing valve** (for version with vacuum pump):
  Number of times the dosing valve is actuated; -> corresponds to the number of samples taken
- **Vacuum pump** (for version with vacuum pump):
  Displays the pump operating time in hours and minutes
- **Sample totalizer** (for version with peristaltic pump):
  Number of all samples taken and sample errors
- **Pump tube life** (for version with peristaltic pump):
  Displays how old the tube is in days, hours and minutes
- **Peristaltic pump** (for version with peristaltic pump):
  Displays the pump operating time in hours and minutes

This counter must be reset when a tube is replaced.

With **Reset**, you reset the counter to zero.

11.10.2 Status of inputs/outputs

Path: **MEAS**/**Measurement**

The following measured values are listed (read only):
- Temperature
- Binary input
  Current total capacity state
- Current input
  Current flow
- Alarm relay
  Current function state: low /high

11.11 Firmware history

Date	Version	Changes to firmware	Documentation
04/2022	01.12.01	Original firmware	BA02242/07/EN/01.22

12 Maintenance

⚠ WARNING

Touching moving parts during operation.
Pinching/crushing or severe injuries to hands and fingers.
- ▶ Stop the program.
- ▶ Disconnect the device from the mains.

Effects on process and process control
- ▶ Take all the necessary precautions in time to ensure the operational safety and reliability of the entire measuring point.

⚠ WARNING

Process pressure and temperature, contamination, electrical voltage
Risk of serious or fatal injury
- ▶ Avoid hazards posed by pressure, temperature and contamination.
- ▶ Make sure the device is de-energized before you open it.
- ▶ Power can be supplied to switching contacts from separate circuits. De-energize these circuits before working on the terminals.

NOTICE

Electrostatic discharge (ESD)
Risk of damaging the electronic components
- ▶ Take personal protective measures to avoid ESD, such as discharging beforehand at PE or permanent grounding with a wrist strap.
- ▶ For your own safety, use only genuine spare parts. With genuine parts, the function, accuracy and reliability are also ensured after maintenance work.

⚠ CAUTION

Possibility of microbiological contamination of content of sample bottles.
Minor to medium injury possible.
- ▶ Wear suitable protective clothing.

12.1 Maintenance work

12.1.1 Recommended maintenance

Maintenance work has to be carried out at regular intervals to ensure the efficient operation of the sampler.

The maintenance work comprises:
- Replacing the wear parts
- Cleaning the device

The cleaning intervals depend heavily on:
- The medium
- The ambient conditions of the sampler (dust etc.)
- The programming intervals

For this reason, adapt the cleaning intervals to your specific requirements but always ensure that these cleaning tasks are performed regularly.

Replacing wear parts

Wear parts are replaced by Endress+Hauser Service at one- and two-year intervals. Please contact your local sales center in this regard.

Endress+Hauser offers its customers a maintenance contract. A maintenance contract increases the operational safety of your device and reduces your staff's workload. Ask your Endress+Hauser Service Organization for detailed information on maintenance contracts.

12.1.2 Calibration

Distribution arm

The position of the distribution arm is set at the factory. It is only possible to calibrate the distribution arm in the version with multiple bottles.

The distribution arm must be calibrated if:
- The distribution arm motor has been replaced
- Error message "F328 Distribution arm" appears on the display

Proceed as follows to calibrate the distribution arm:

1. Under menu **Application/Calibration/Distribution arm/Go to ref. point**
   ↳ The reference run is started. The reference point is in the middle at the front. For the version with a distributor plate, the reference point is at the arrow in the middle of the plate.

With **Adjust**, you can correct the distribution arm if the unit does not move to the reference point correctly. Use the two arrow keys to correct the position.

2.

Sample volume or vacuum pump

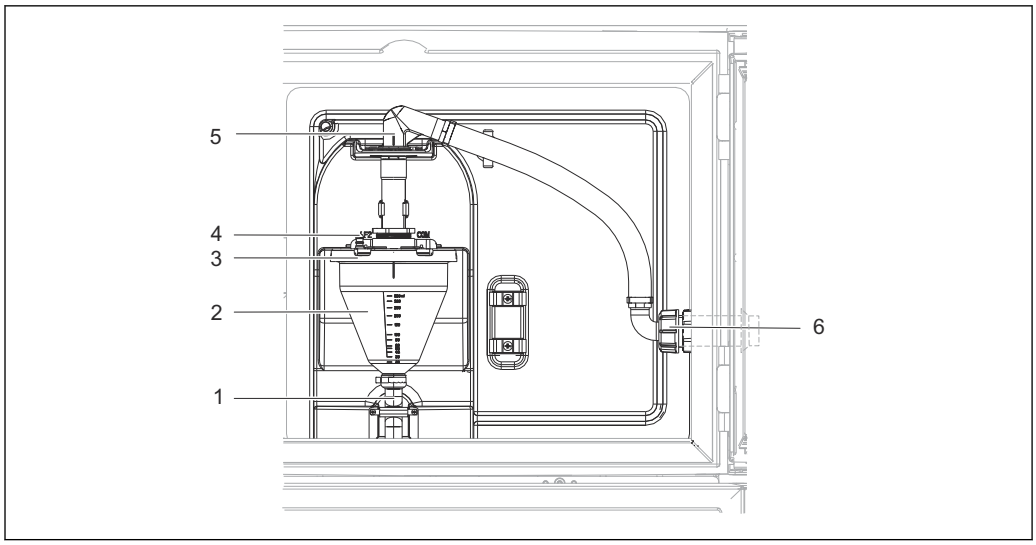
The dosing volume of the vacuum pump is set to 200 ml (6.76 oz) at the factory. The required sample volume is set by moving the dosing pipe manually.

NOTICE

Calibration not possible during operation.
The sample volume cannot be determined.
▶ Stop the sampling program before calibrating the sample volume.

Sampling volume calibration

Proceed as follows to calibrate the sample volume:

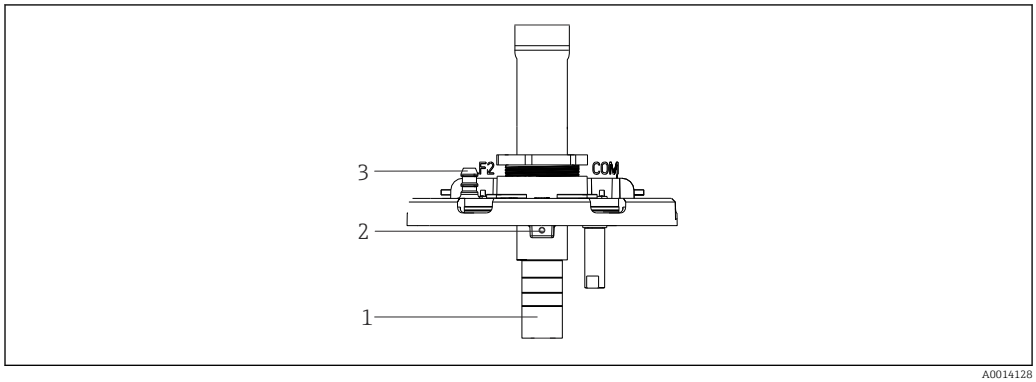


22 Vacuum pump

1 Outflow hose
2 Dosing glass
3 Dosing glass cover
4 Air hose connection
5 Lock for intake hose
6 Thread adapter nut for intake hose

1. Check the sample volume set in the **System/Sampling** menu. The volume can only be changed in the Commissioning Wizard.
2. Slacken the thread adapter nut on the intake hose (item 6).
3. Turn the intake hose at the lock (item 5) to the "open" position and pull the hose upwards to disconnect it.
4. Release the air hose (item 4) and remove the dosing glass (item 2) along with the outflow hose (item 1) from the front.
5. Open the bayonet lock (item 3) and open the dosing glass.

Dosing



23 Vacuum pump

1 Dosing tube
2 Allen screw
3 Air hose connection

1. Release the 2 mm (0.08 in) Allen screw with the key provided.
2. Set the sample volume by adjusting the dosing tube. Secure the dosing tube with the screw.
3. Use the white scale (A) to dose without pressure and the blue scale (B) to dose with pressure.

4. Reinstall the parts in reverse order. Make sure that the contacts of the conductivity sensors are in the correct position.
5. Check that the dosing tube is set correctly by performing manual sampling.

Peristaltic pump sample volume

The sample volume of the peristaltic pump is calibrated at the factory.

In order to calibrate the sample volume, a graduated beaker with a volume of at least 200 ml (6.76 oz) is required.

1. In the menu select **Application/Calibration**.
2. Enter the desired volume under **Sample volume**.
3. Start sampling.

12.1.3 Replacing the pump tube

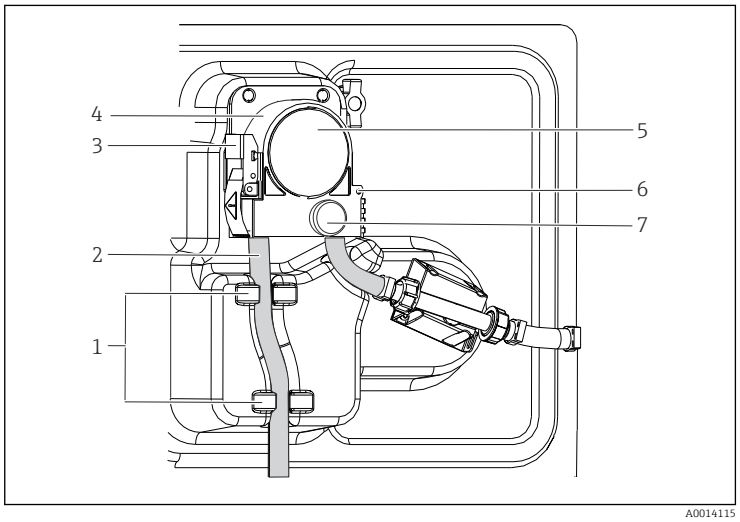
WARNING

Rotating parts

Minor to medium injury possible.

- Take the sampler out of service before opening the peristaltic pump.
- Secure the sampler against unintentional start-up while you work on the opened hose pump.

Opening the peristaltic pump

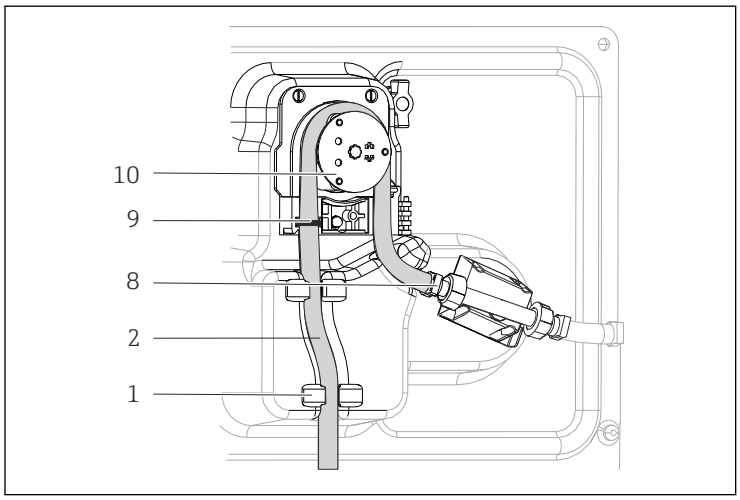


1 *Retainer*
2 *Pump tube*
3 *Fastening clip*
4 *Pump bracket*
5 *Pump head cover*
6 *Positioning pin*
7 *Knurled head screw*

24 *Opening the peristaltic pump*

1. Take the sampler out of service by pausing a program that is currently running.
2. Open the fastening clip (item 3) and push up the pump bracket (item 4).
3. Remove the knurled head screw (item 7) and open the pump head cover (item 5) to the right.

Replacing the pump tube



1 *Retainer*
2 *Pump tube*
8 *Clamp*
9 *Marking ring*
10 *Roller*

25 Replacing the pump tube

1. Remove the clamp (item 8) and remove the pump tube (item 2) from the pump.
2. Remove any silicone deposits on the roller (item 10) and the flexible pump bracket.
3. Make sure the roller and the individual rolls turn smoothly and evenly.
4. Apply some lubricant to the roller and to the inside of the pump bracket.
5. Secure the new pump tube to the pressure sensor with the clamp (item 8).
6. Guide the pump tube around the roller and introduce the marking ring into the groove (item 9).
7. Close the pump head cover and screw it tight.
8. Close the pump bracket.
9. To avoid incorrect metering, reset the tube life to zero under **Menu/Diagnostics/Operating time information/Pump tube life** using the "**Reset**" function.
10. Calibrate the sample volume each time you replace a pump tube.

12.1.4 Cleaning

Housing

NOTICE

Cleaning agents not permitted

Damage to the housing surface or housing seal

- ▶ Never use concentrated mineral acids or alkaline solutions for cleaning.
- ▶ Never use organic cleaners such as acetone, benzyl alcohol, methanol, methylene chloride, xylene or concentrated glycerol cleaner.
- ▶ Never use high-pressure steam for cleaning.

- ▶ Clean the front of the housing using commercially available cleaning agents only.

The front of the housing is resistant to the following in accordance with DIN 42 115:

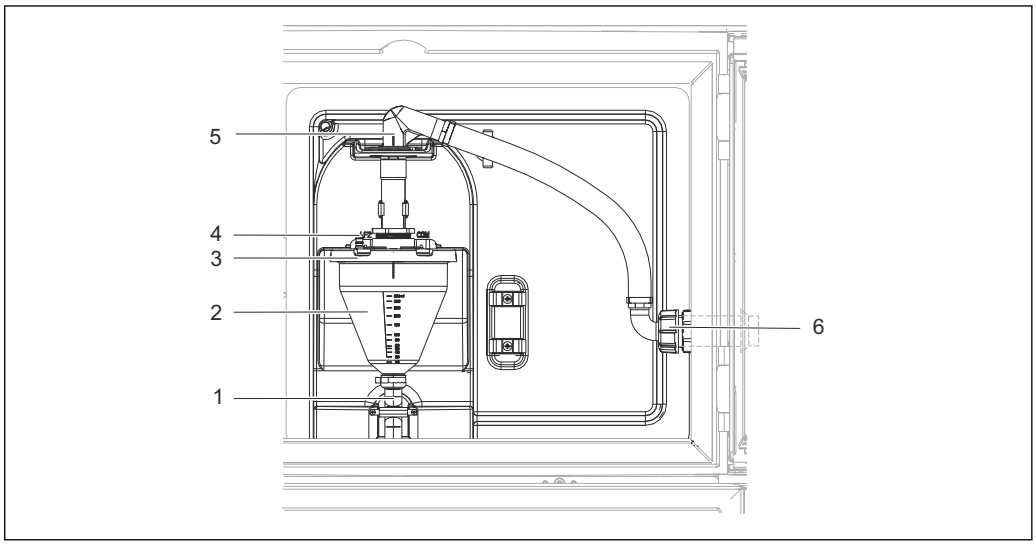
- Ethanol (for a short time)
- Diluted acids (max. 2% HCl)
- Diluted bases (max. 3% NaOH)
- Soap-based household cleaning agents

Parts that come into contact with media

- After cleaning, rinse all wetted parts thoroughly with clear water to ensure that all cleaning agent residue has been removed so it cannot affect subsequent medium samples.

Version with vacuum pump

Clean the wetted parts as follows:



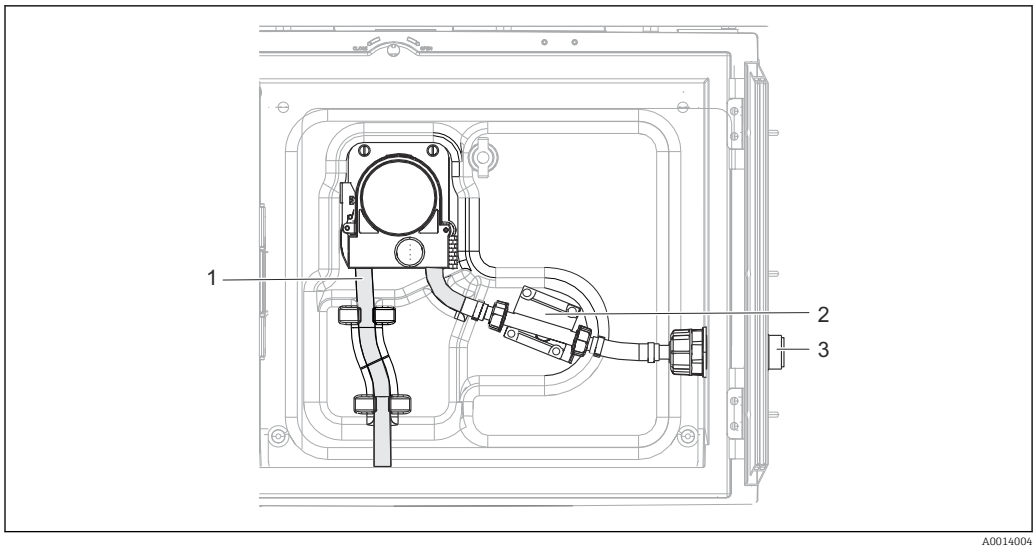
26 *Vacuum pump*

1 Outflow hose
2 Dosing glass
3 Dosing glass cover
4 Air hose connection
5 Lock for intake hose
6 Thread adapter nut for intake hose

1. Slacken the thread adapter nut on the intake hose (item 6).
2. Turn the intake hose at the lock (item 5) to the "open" position and pull the hose upwards to disconnect it.
3. Release the air hose (item 4) and remove the dosing glass (item 2) along with the outflow hose (item 1) from the front.
4. Open the bayonet lock (item 3) and open the dosing glass.
5. Clean the parts (hoses, dosing glass etc.) with water or soapsuds. Use a bottle brush if necessary.
   ↳ You can wash the dosing glass and dosing glass cover in a dishwasher at 60 °C.
6. Check that the dosing tube is set correctly and set the old value if necessary.
7. Reinstall the cleaned parts in reverse order.

Version with peristaltic pump

Clean the wetted parts as follows:



27 *Version with peristaltic pump*

1 Pump tube
2 Pressure sensor
3 Hose connection

1. Release the sample supply at the tube connection (item 3).
2. Connect a vessel containing clear water to the tube connection.
3. Remove the bottles from the sample compartment.
4. Rinse the wetted parts with clear water by taking a manual sample or by performing a pump test (under **Menu/Diagnostics/System test/** -> **Peristaltic pump/Pump purge/Pump suction**
5. Release the couplings to the left and right of the pressure sensor (item 2). Clean the tube piece carefully with a bottle brush and rinse it with clear water.
6. Reconnect the sample supply to the tube connection and put the bottles back in the sample compartment.

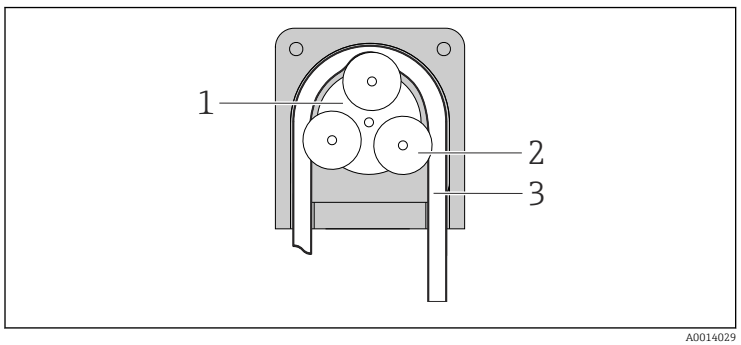
⚠ WARNING

Rotating parts

Minor to medium injury possible.

- ▶ Do not open the cover of the peristaltic pump while the pump is operating.
- ▶ Secure the sampler against unintentional start-up whilst you work on the opened hose pump.

Interior of peristaltic pump



1 Pump rotor
2 Roller
3 Pump tube

28 *Interior view of the peristaltic pump*

1. Take the sampler out of service by pausing a program that is currently running.
2. Open the peristaltic pump as described in → 57.

3. Remove the pump tube.
4. Remove any silicone deposits on the roller and on the flexible pump bracket.
5. Make sure the roller turns smoothly and evenly.

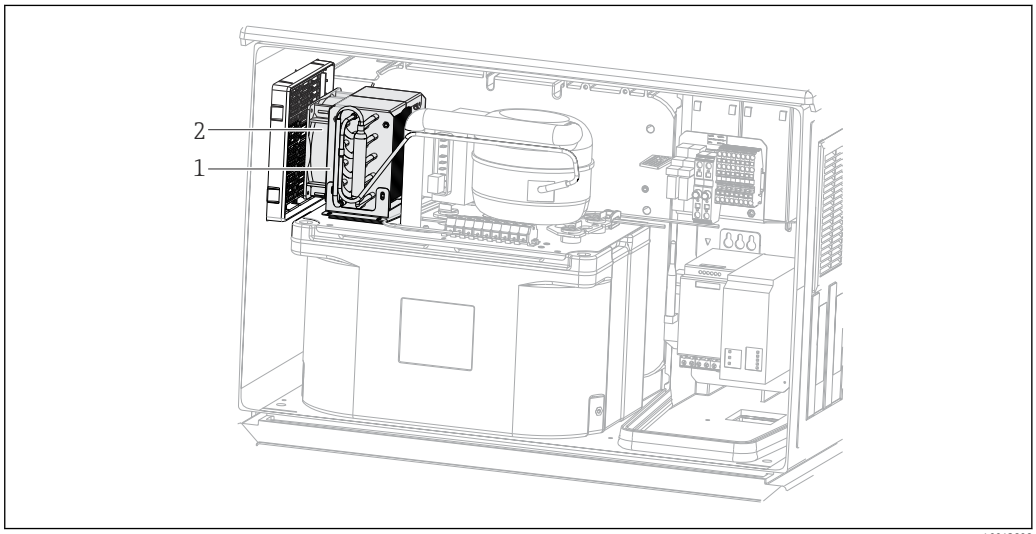
Sample compartment

The sample compartment has a continuous inner plastic lining.

1. Remove the bottle trays or the individual bottles and the distribution pan.
2. Remove the distribution arm.
3. Spray-clean the sample compartment with a water hose.

You can wash the PE and glass bottles in a dishwasher at 60 °C.

Ventilator and liquefier



29 Cleaning the climate control module

1 Liquefier
2 Ventilator

▶ Clean the liquefier and ventilator with compressed air.

12.1.5 Technical support

We recommend the purchase and use of an SD card (see accessories). You can save the entire sampler configuration on the SD card and make the data available to the service team should you require technical assistance.

13 Repair

13.1 Spare parts

The repair and conversion concept provides for the following:
- The product has a modular design
- Spare parts are grouped into kits which include the associated kit instructions
- Only use original spare parts from the manufacturer
- Repairs are carried out by the manufacturer's Service Department or by trained users
- Certified devices can only be converted to other certified device versions by the manufacturer's Service Department or at the factory
- Observe applicable standards, national regulations, Ex documentation (XA) and certificates

1. Carry out the repair according to the kit instructions.
2. Document the repair and conversion and enter, or have entered, in the Life Cycle Management tool (W@M).

Device spare parts that are currently available for delivery can be found on the website:

https://portal.endress.com/webapp/SparePartFinder

▶ Quote the serial number of the device when ordering spare parts.

13.2 Return

The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.

To ensure the swift, safe and professional return of the device:

▶ Refer to the website www.endress.com/support/return-material for information on the procedure and conditions for returning devices.

13.3 Disposal

If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

The device contains electronic components. The product must be disposed of as electronic waste.

▶ Observe the local regulations.

Dispose of batteries correctly

▶ Always dispose of batteries in accordance with local regulations on battery disposal.

14 Accessories

The following are the most important accessories available at the time this documentation was issued.

Listed accessories are technically compatible with the product in the instructions.

1. Application-specific restrictions of the product combination are possible.
   Ensure conformity of the measuring point to the application. This is the responsibility of the operator of the measuring point.
2. Pay attention to the information in the instructions for all products, particularly the technical data.
3. For accessories not listed here, please contact your Service or Sales Center.

14.1 Device-specific accessories

Order no.	Bottle tray + bottles + cover
71111152	Bottle tray + 6 x 3 liter (0.79 US gal.) PE+ cover
71111154	Bottle tray + 12 x 1 liter (0.26 US gal.) PE + cover

Order no.	Distributor plate; centering plate
71111158	Distributor plate for 2 x 6 bottles
71111159	Distributor plate for 2 x 12 bottles

Order no.	Bottles + covers
71111164	1 liter (0.26 US gal.) PE + cover, 24 pcs
71111167	3 liter (0.79 US gal.) PE + cover, 12 pcs
71111169	13 liter (3.43 US gal.) PE + cover, 1 pc
71111172	30 liter (7.92 US gal.) PE + cover, 1 pc
71111173	60 liter (15.8 US gal.) PE + cover, 1 pc
71146645	17 liter (4.49 US gal.) PE, 1 pc

Order no.	Complete suction line
71111233	Suction line ID 10 mm (3/8"), PVC, reinforced fabric, length 10 m (33 ft), suction head V4A
71111234	Suction line ID 10 mm (3/8"), EPDM, length 10 m (33 ft), suction head V4A
71111235	Suction line ID 13 mm (1/2"), PVC, reinforced spiral wire, length 10 m (33 ft), suction head V4A
71111236	Suction line ID 13 mm (1/2"), EPDM, length 10 m (33 ft), suction head V4A

Order no.	Terminated hose: vacuum pump
71111188	Dosing hose to distributor, 2 pcs, material: silicon
71111189	Dosing hose to distributor, 25 pcs, material: silicon

Order no.	Terminated hose: peristaltic pump
71111191	Pump tubing, 2 pcs; material: silicon
71111192	Pump tubing, 25 pcs; material: silicon

Order no.	Retrofit kits
71111195	Kit CSF48: Retrofit kit distribution assembly (distribution arm, distribution arm drive)
71111196	Kit CSF48: Retrofit kit casters
71111197	Kit CSF48: Retrofit kit stand, V2A; 304(x)
71111198	Kit CSF48: Retrofit kit stand, V4A; 316(x)
71111199	Kit CSF48: Retrofit kit for flow assembly, without stand; with stand cover V2A; 304(x)
71136999	Kit CSF48: Retrofit kit service interface (CDI flange connector, counter nut)
71136101	Kit CSF48: Retrofit kit door stop (2x)

Order no.	Suction head
71111184	Suction head V4A for ID 10 mm (3/8"), 1 pc
71111185	Suction head V4A for ID 13 mm (1/2"), 1 pc

Order no.	Communication; software
71110815	SD card, 1 GB, Industrial Flash Drive
51516983	Commubox FXA291 + FieldCare Device Setup
71127100	SD card with Liquiline Firmware, 1 GB, Industrial Flash Drive

15 Technical data

15.1 Input

Measuring ranges	→ Documentation of the connected sensor
Types of input	1 analog input 1 binary input
Binary input, passive	**Span** 12 to 30 V, galvanically isolated **Signal characteristics** Minimum pulse width: 100 ms **Signal edge** Low-high
Temperature input	**Measurement range** -30 to 70 °C (-20 to 160 °F) **Accuracy** ± 0.5 K **Type of input** Pt1000
Analog input, passive/ active	**Span** 0/4 to 20 mA, galvanically isolated **Accuracy** ±0.5 % of measuring range

15.2 Output

Communication	▪ 1 service interface ▪ Commubox FXA291 (accessory) required for communication with the PC

Relay output

Electrical specification

Relay type
1x changeover contact, coupled with binary output

Maximum load
Alarm relay: 2.0 A

Relay switching capacity

Relay coupled with binary output

Switching voltage	Load (max.)	Switching cycles (min.)
230 V AC, cosΦ = 0.8 to 1	5 A	100,000
24 V DC, L/R = 0 to 1 ms	5 A	100,000

Minimum load (typical)
- min. 100 mA at 5 V DC
- min. 1 mA at 24 V DC
- min. 5 mA at 24 V AC
- min. 1 mA at 230 V AC

15.3 Protocol-specific data

Web server

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

TCP port	80
Supported features	▪ Remote-controlled device configuration ▪ Save/restore device configuration (via SD card) ▪ Logbook export (file format: CSV) ▪ Access to web server via DTM or Internet Explorer

15.4 Power supply

Supply voltage

100 to 120/200 to 240 V AC ±10 %, 50/60 Hz

Power consumption

- Version with vacuum pump: 290 VA
- Version with peristaltic pump: 290 VA

Electrical connection

See the "Electrical connection" section ()

Cable entries

1 x M25, 1 x M20 cable gland

Permitted cable diameter:
- M20x1.5 mm: 7 to 13 mm (0.28 to 0.51")
- M25x1.5 mm: 9 to 17 mm (0.20 to 0.67")

Mains fuse

T3.15A (for 230V power supply)

15.5 Performance characteristics

Sampling methods	**Vacuum pump:** ▪ Time-paced ▪ Flow-paced **Peristaltic pump:** ▪ Time-paced ▪ Flow-paced ▪ Flow proportional sampling/time override (CTVV)
Dosing volume	**Vacuum pump:** 20 to 350 ml (0.7 to 12 fl.oz.) **Peristaltic pump:** 10 to 10000 ml (0.3 to 340 fl.oz.) The dosing accuracy and the repeatability of a sample volume < 20 ml (0.7 fl.oz) can vary, depending on the specific application.
Dosing accuracy	▪ **Vacuum pump:** ± 5 ml (0.17 fl.oz.) or 5 % of the set volume ▪ **Peristaltic pump:** ± 5 ml (0.17 fl.oz.) or 5 % of the set volume
Repeatability	5 %
Intake speed	> 0.5 m/s (> 1.6 ft/s) for ≤ 13 mm (1/2 in) ID, as per EN 25667, ISO 5667, CEN 16479-1 > 0.6 m/s (> 1.9 ft/s) for 10 mm (3/8 in) ID, as per Ö 5893; US EPA
Suction height	▪ **Vacuum pump:** Max. 6 m (20 ft) ▪ **Peristaltic pump:** Max. 8 m (26 ft)
Hose length	Max. 30 m (98 ft)
Temperature control	**Temperature sensors:** Sampling compartment temperature **Cooling module:** ▪ Sample temperature range: 2 to 20 °C (36 to 68 °F) Factory setting: 4 °C (39 °F) ▪ Automatic defrost system ▪ Cooling rate in accordance with Ö 5893 (Austrian standard): 4 liters of water at 20 °C (68 °F) cool down to 4 °C (39 °F) in less than 210 minutes ▪ Temperature constancy of sample at 4 °C (39 °F) at an operating temperature range of -15 to 40 °C (5 to 105 °F)

15.6 Environment

Ambient temperature range	With cooling module:	-20 to 40 °C (0 to 104 °F)
Storage temperature	−20 to 60 °C (−4 to 140 °F)	
Electrical safety	In accordance with EN 61010-1, protection class I, environment ≤ 2000 m (6500 ft) above MSL. The device is designed for pollution degree 2.	
Relative humidity	10 to 95%, not condensing	
Degree of protection	▪ Front dosing compartment: IP 54 ▪ Rear dosing compartment: IP 33 ▪ Front panel with display (internal): IP 65 ▪ Sample compartment: IP 54 The IP protection ratings listed above apply for individual sections of the overall device. The resulting degree of protection for the overall device is IP33.	
Electromagnetic compatibility (EMC)	Interference emission and interference immunity as per EN 61326-1:2013, Class A for Industry	

15.7 Process

Medium temperature range	2 to 50 °C (36 to 122 °F)
Process pressure range	Unpressurized, open channel (unpressurized sampling)
Medium properties	**Vacuum pump** Sample media has to be free of abrasive substances. **Peristaltic pump** Sample media has to be free of abrasive substances. Pay attention to the material compatibility of the wetted parts.
Process connection	▪ **Vacuum pump:** Intake hose ID 10 mm (3/8 in) and 13 mm (1/2 in) ▪ **Peristaltic pump:** Intake hose ID 10 mm (3/8 in)

15.8 Mechanical construction

Dimensions	See the "Installation" section → 12

Weight

Sampler version	Weight
Plastic version with refrigeration	101 kg (223 lbs)

Materials

Non-wetted parts	
Cabinet housing	**Plastic ASA+PC V0** For industrial wastewater treatment plants with an aggressive atmosphere
Sample compartment inner lining	Plastic PP
Insulation	Plastic EPS "Neopor®"

Wetted parts	Vacuum pump	Peristaltic pump
Dosing tube	Plastic PP	-
Measuring jug cover	Plastic PP	-
Conductivity sensors	Stainless steel V4A (1.4404)	-
Measuring jug	PMMA	-
Dosing system outflow hose	Silicone	-
Pump tube	-	Silicone
Distribution arm	Plastic PP	
Distribution arm cover	Plastic PE	
Distribution plate	Plastic PS	
Composite container/bottles	Plastic PE	
Intake hose	Plastic PVC, EPDM (depending on version)	
Hose connection	Plastic PP	

Choose process seal depending on the application. Viton is recommended for standard applications involving watery samples.

Vacuum pump only	
Pneumatic hoses	Silicone
Air Manager housing	PC
Air Manager sealing plate	Silicone
Pump head	Aluminum, anodized
Pump membrane	EPDM

Process connections

- Vacuum pump:
  Intake hose ID 10 mm (3/8") and 13 mm (1/2")
- Peristaltic pump:
  Intake hose ID 10 mm (3/8")

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