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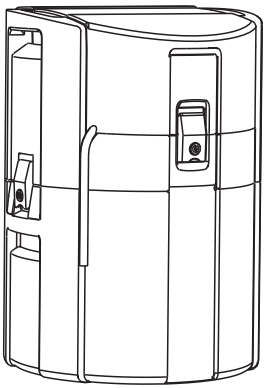
Operating Instructions
Liquiport 2010 CSP44

Automatic sampler for liquid media



Endress+Hauser
People for Process Automation

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1 Document information

1.1 Warnings

The structure, signal words and safety colors of the signs comply with the specifications of ANSI Z535.6 ("Product safety information in product manuals, instructions and other collateral materials").

Safety message structure	Meaning
⚠ DANGER **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **will** result in a fatal or serious injury.
⚠ WARNING **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid the situation **can** result in a fatal or serious injury.
⚠ CAUTION **Cause (/consequences)** Consequences if safety message is not heeded ▶ Corrective action	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE **Cause/situation** Consequences if safety message is not heeded ▶ Action/note	This symbol alerts you to situations that can result in damage to property and equipment.

1.2 Symbols used

Additional information, tips

Permitted or recommended

Forbidden or not recommended

1.3 Documentation

The following manuals complement these Operating Instructions and are available on the CD-ROM:

- Brief Operating Instructions Liquiport CSP44
- Operating Instructions Memosens, BA01245C
  - Software description for Memosens inputs
  - Calibration of Memosens sensors
  - Sensor-specific diagnostics and troubleshooting

The CD also contains:

- Technical Information Liquiport CSP44
- Special Documentation: Sampler application manual SD01068C
- Documentation for other devices in the Liquiline family:
  - Liquiline CM44x (field device)
  - Liquiline CM44xR (DIN rail device)
  - Liquistation CSFxx
- Simulation software

2 Basic safety instructions

2.1 Requirements for personnel

- Installation, commissioning, operation and maintenance of the measuring system must only be carried out by specially trained technical personnel.
- The technical personnel must be authorized by the system operator to perform the specified tasks.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must comply with them.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.

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

2.2 Designated use

The Liquiport 2010 CSP44 is a portable sampler for liquid media for operation in non-hazardous areas. The samples are taken discontinuously using a peristaltic pump and are then distributed into sampling containers.

The sampler is designed for use in the following applications:
- Municipal and industrial wastewater treatment plants
- Laboratories and Water Conservancy Boards
- Monitoring of liquid media in industrial processes

Any other use than the one described here compromises the safety of persons and of the entire measuring system and is therefore not permitted.
The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Occupational safety

As the user, you are responsible for observing the following safety regulations:
- Installation guidelines
- Local standards and regulations

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

2.4 Operational safety

- Before commissioning the entire measuring point, ensure that all the connections are correct. Ensure that electric cables and hose connections are not damaged.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as defective.
- If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.

⚠ CAUTION

The cleaning system is not switched off during calibration or maintenance activities

Risk of injury due to medium or cleaning agent

- If a cleaning system is connected, switch it off before removing a sensor from the medium.
- If you are not switching off the cleaning system because you wish to test the cleaning function, wear protective clothing, goggles and gloves or take other appropriate measures.

2.5 Product safety

2.5.1 State of the art

The product is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate.
Relevant regulations and European standards have been observed.
Connected equipment to the sampler shall be in compliance with the relevant safety standard.

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.
Support in the performance of this task can be requested from Endress+Hauser.

3 Device description

A complete sampling unit comprises:

Sampler with:
- Controller with display, soft keys and navigator
- Peristaltic pump for sampling
- Plastic (PE) or glass sample bottles for sample preservation
- Sample compartment temperature control (optional) for safe sample storage
- Suction line with suction strainer

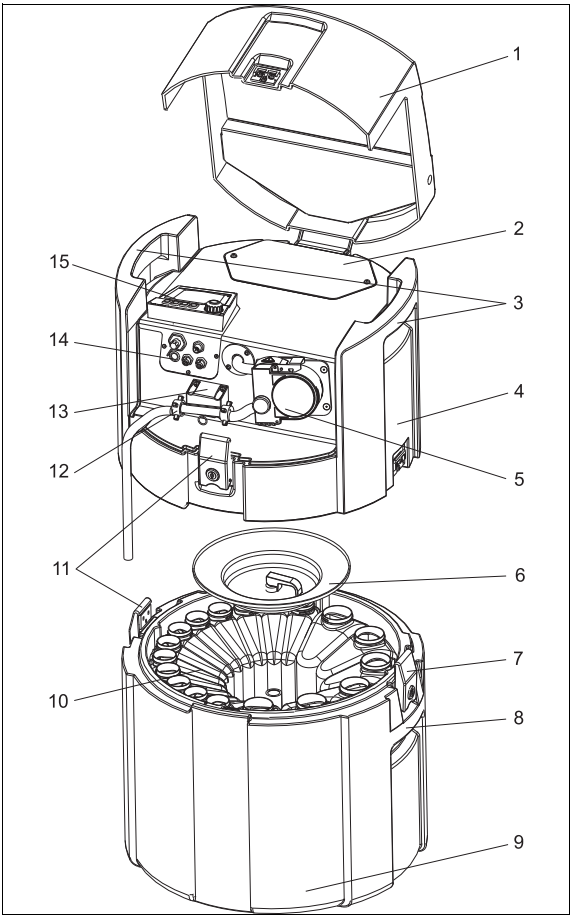

Fig. 1: Example of Liquiport 2010 CSP44

1	*Controller cover*
2	*Cover of battery compartment*
3	*Upper carrying handles*
4	*Unit upper compartment*
5	*Peristaltic pump with pump tubing*
6	*Bottle retaining cover*
7	*Lockable latches*
8	*Lower carrying handles*
9	*Unit lower compartment*
10	*Bottle distribution*
11	*Lockable latches*
12	*Suction line connection*
13	*Medium detection*
14	*Electrical connections*
15	*Controller*

⚠ WARNING

Danger of injury due to rotating parts

- 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.

4 Incoming acceptance and product identification

4.1 Incoming acceptance

1. Make sure the packaging is undamaged.
   ↳ Inform your supplier of any damage to the packaging.
   Keep the damaged packaging until any issues have been resolved.
2. Make sure the contents are undamaged.
   ↳ Inform your supplier of any damage to the contents.
   Please keep the damaged goods until any issues have been resolved.
3. Check that the delivery is complete and nothing is missing.
   ↳ Compare the scope of delivery against the delivery papers and your order.
4. Pack the product in such a way as to protect it reliably against impact and moisture for storage and transportation.
   ↳ The original packaging offers the best protection.
   Keep to the approved ambient conditions (see "Technical data").

If you have any questions, contact your supplier or your local sales center.

4.2 Product identification

4.2.1 Nameplate

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

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

Compare the data on the nameplate with your order.

4.2.2 Identifying the product

The order code and serial number of your device can be found in the following locations:
- On the nameplate
- In the delivery papers

To find out the version of your device, enterthe order code indicated on the nameplate into the search screen at the following address:
www.products.endress.com/order-ident

4.3 Scope of delivery

The scope of delivery comprises:
- 1 Liquiport 2010 CSP44 with:
  - The ordered bottle configuration
  - Optional hardware
- 1 set of Brief Operating Instructions
  (In the preferred language if the "Default operating language" order option is selected. Otherwise, the Brief Operating Instructions are supplied in English.)
- 1 CD-ROM with Operating Instructions in all the languages available, an application manual and the simulation software
- Optional accessories

4.4 Certificates and approvals

Declaration of Conformity
The product meets the requirements of the harmonized European standards.
As such, it complies with the legal specifications of the EC directives.
The manufacturer confirms successful testing of the product by affixing to it the CE mark.

MCERTS
The product has been assessed by Sira Certification Service and complies with "MCERTS Performance Standards for Water Monitoring Equipment Part 1, Version 2.1 dated November 2009";
Certificate no.: Sira MC100176/00.

cCSAus General purpose
The product meets the requirements of "Class 8721 05, laboratory equipment, electrical; Class872185, laboratory equipment, electrical, certified to US standards".

5 Installation

5.1 Installation conditions

5.1.1 Dimensions

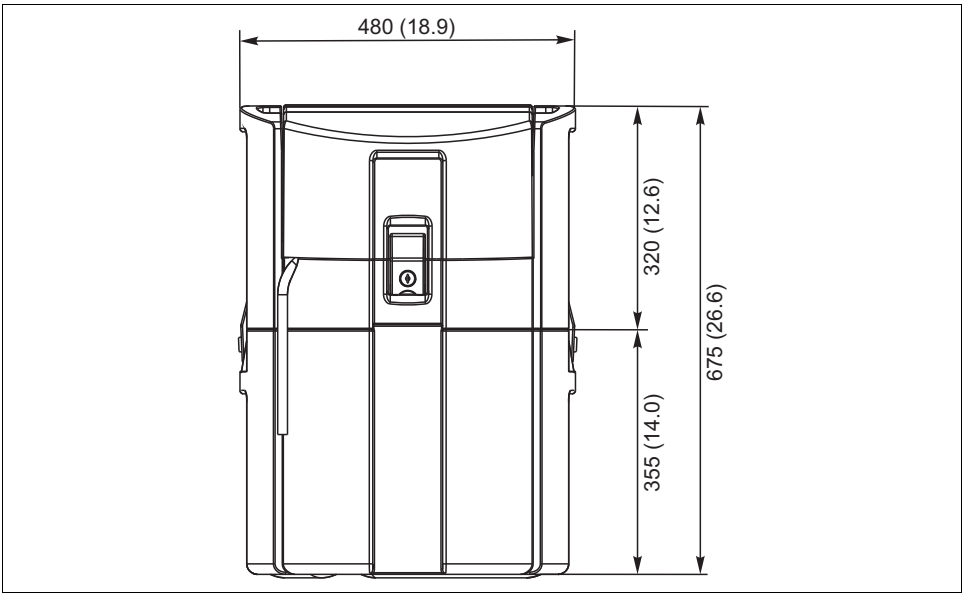

Fig. 2: Standard version. Engineering unit mm (in).

5.1.2 Mounting location

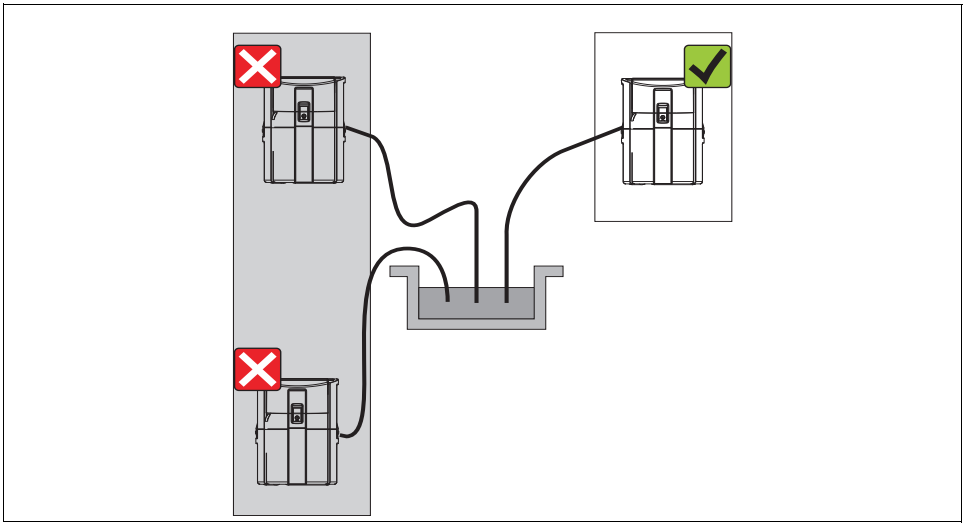

Fig. 3: Mounting location Liquiport 2010 CSP44

The suction line must be routed with a downward slope to the sampling point. Avoid siphoning!

Note the following when mounting the sampler:
- Place the device on a level surface.
- Protect the sampler from additional heating (e.g. from heaters).
- Protect the sampler from mechanical vibrations.
- Protect the sampler from strong magnetic fields.

5.1.3 Connection for sampling

- Maximum suction height: 8 m (26 ft)
- Maximum hose length: 30 m (98 ft)
- Hose connection diameter:
  10 mm (3/8") internal diameter
- Intake speed:
  > 0.5 m/s (> 1.6 ft/s) in accordance with EN 25667, ISO 5667
  > 0.6 m/s (> 1.9 ft/s) in accordance with Ö 5893, US EPA

Note the following when mounting the sampler:
- Always route the suction line with an upward slope from the sampling point to the sampler
- The sampler should always be located above the sampling point
- Avoid siphoning effects in the suction line

The following conditions must be met at the sampling point:
- Do not connect the suction line to pressurized systems.
- Use a suction strainer to catch bigger, abrasive solids that could clog the system
- Immerse the intake hose in the direction of flow
- Take the sample at a representative point (turbulent flow, not directly at the base of the channel).

Useful sampling accessories
- Suction strainer:
  Catches bigger, abrasive solids that could clog the system.
- Immersion assembly:
  The adjustable immersion assembly fixes the suction line to the sampling point.

5.2 Connecting the suction line

1. Observe the installation conditions when installing the device.
2. Open the unit cover by releasing the front latch.
3. Route the suction line from the sampling point to the sampler.
4. Screw the suction line onto the suction line connection of the sampler.

5.3 Post-installation check

- Make sure the suction line is securely fitted to the sampler.
- Perform a visual inspection to ensure the suction line is routed correctly from the sampling point to the sampler.
- Ensure that the distribution arm has been fully secured and adjusted.

6 Electrical connection

⚠ WARNING

Danger due to damage of the unit

- If it is assumed that the unit can no longer be operated safely (e.g. by visible damage), it must immediately be taken out of operation. Ensure that the unit is secured against unintentional use.

6.1 Connecting the sampler

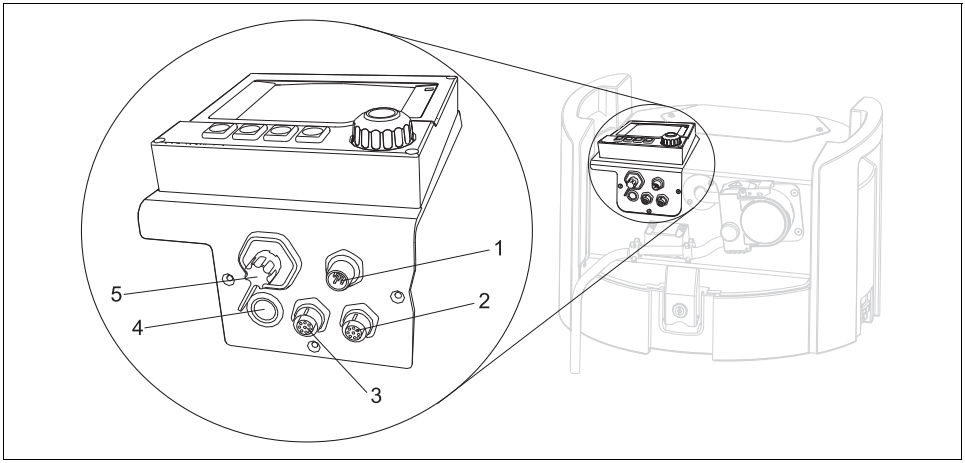

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Fig. 4: Electrical connections of the controller

1 Battery charger connection socket
2 Socket for M12 sensor connector (optional)
3 Socket for M12 sensor connector (optional)
4 Signal cable connection socket (optional)
5 Service interface

6.1.1 Battery connection

The unit is shipped with the battery built-in. The battery is not connected. Before the first commissioning, charge the battery. The battery needs approx 5 hours for a full charge. For further information on the battery charger, please read the accompanying handbook.

1. Unscrew the battery compartment cover, see Fig. 1, pos. 2.
2. Remove the battery from the battery compartment.
3. Connect the plugs in the unit to the marked connections on the battery (red --> red; black --> black).
4. Make sure the connections are solidly fixed.
5. Place the battery into the battery compartment. The connections of the battery have to be in the front.
6. Once the battery has been successfully connected, replace the battery compartment cover and screw down tight.
7. To disconnect the battery proceed in the reverse order.

Only replace the rechargeable batteries with type Panasonic LC-R127R2PG1.

Battery charger connection with built-in batteries

The appliance inlet of the charger must be reached easily and always be accessible to disconnect the charger from mains.

Connect the battery charger to the unit connection socket, see Fig. 3, pos. 1. On "low battery" indication the battery is automatically recharged.

Only use the battery chargers indicated by the manufacturer (see section "Technical data").

Battery charger connection with removed batteries

When recharging the removed batteries use the charging adapter cable (accessories nb. 71111882).

6.2 Terminal assignment for input/output signals

The following signals can be configured for external sampler control:

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

Output signals
- 2 binary signals > 1 s pulse width or edge (optional)
- 2 current outputs 0/4 to 20 mA (optional)

6.3 Signal cable connection (optional)

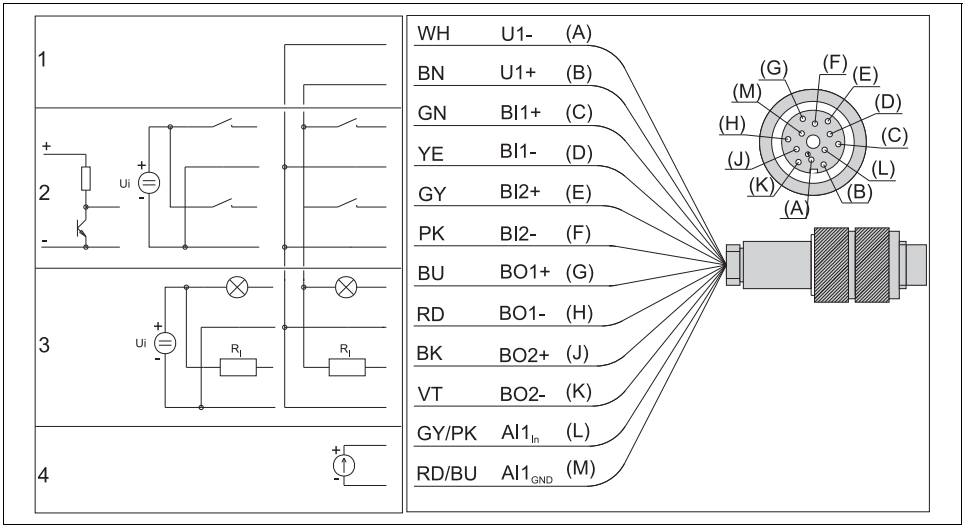

Fig. 5: Pin connection and wiring diagram for the signal cable (option K3)

1 Power supply U: 24 V max. 30 mA load
2 Binary inputs BI: > 20 ms, only low voltage Ui ≤ 30 V DC
3 Binary outputs BO: only low voltage Ui ≤ 30 V DC, max. current when using ext. voltage (max. 200 mA)
4 Analog input AI: 0 to 20 mA, 4 to 20 mA

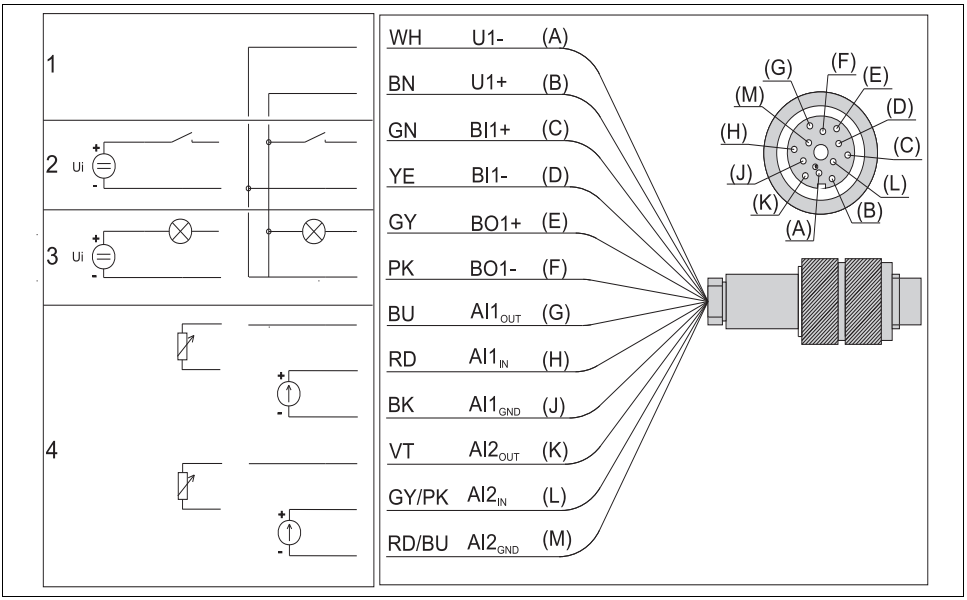

Fig. 6: Pin connection and wiring diagram for the signal cable (option K4)

1 Power supply U: 24 V max. 30 mA load
2 Binary input BI: > 20 ms, only low voltage Ui ≤ 30 V DC
3 Binary output BO: only low voltage Ui ≤ 30 V DC, max. current when using ext. voltage (max. 200 mA)
4 Analog inputs AI: 0 to 20 mA, 4 to 20 mA

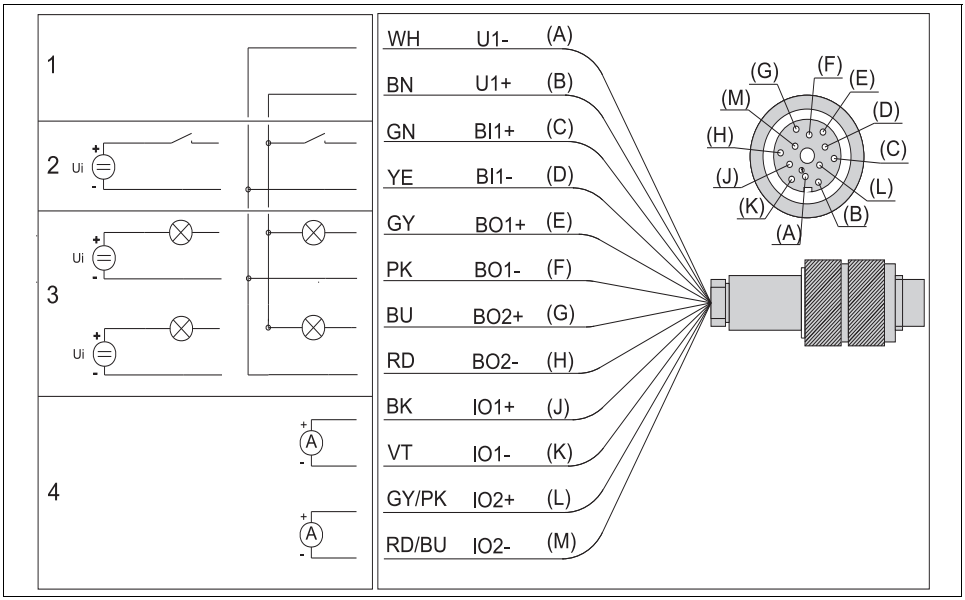

Fig. 7: Pin connection and wiring diagram for the signal cable (option K5)

1 Power supply U: 24 V max. 30 mA load
2 Binary input BI: > 20 ms, only low voltage Ui ≤ 30 V DC
3 Binary output BO: only low voltage Ui ≤ 30 V DC, max. current when using ext. voltage (max. 200 mA)
4 Current outputs IO: 0 to 20 mA, 4 to 20 mA

6.4 Sensor connection (optional)

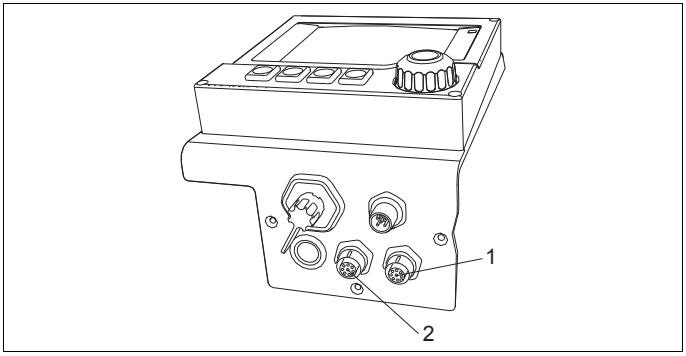

Fig. 8: Connection sockets for sensors

1 Socket for M12 sensor connector (= channel 1 for versions with one sensor)
2 Socket for M12 sensor connector (= channel 2 for versions with two sensors)

6.5 Guaranteeing the degree of protection

Only the mechanical and electrical connections that are described in this manual, and are necessary for the required, designated application, may be established on the device supplied.

- Please play close attention when performing the work as degrees of protection individually confirmed for this product (ingress protection (IP), electrical safety, EMC interference immunity, Ex protection) can no longer be guaranteed in the case of the following, for example:
  - Leaving off covers
  - Loose or insufficiently tightened cables/cable ends

6.6 Post-connection check

⚠ WARNING

Wiring errors

Incorrect wiring puts the safety of people and the measuring point at risk. The manufacturer does not accept any responsibility for errors that result from failure to comply with the instructions in this manual.

- Only put the transmitter into operation if you can answer **yes** to **all** of the following questions.

Device state and specifications

1. Are the sampler, suction line and all the cables free from damage on the outside?

Electrical connection

2. Are the mounted cables strain relieved?
3. Do the cables used meet the required specifications?
4. Does the supply voltage match the voltage indicated on the nameplate?

Connection for sampling

5. Is the suction line connected along with the suction strainer?
6. Is the suction line routed at a gradient without any loops?
7. Are all the sample connections leak-tight?
8. Are sample bottles in the sampling compartment?

7 System integration

7.1 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.

7.1.1 Connection

- Connect the service port on the controller housing to the Commubox (FXA291).
- Via the USB port, connect the Commubox to the computer.
- Commubox is supplied with a CD which contains USB drivers that must be installed when connecting for the first time.
- FieldCare must be installed on the computer for the application. The software can either be downloaded from www.de.endress.com or ordered on a CD.

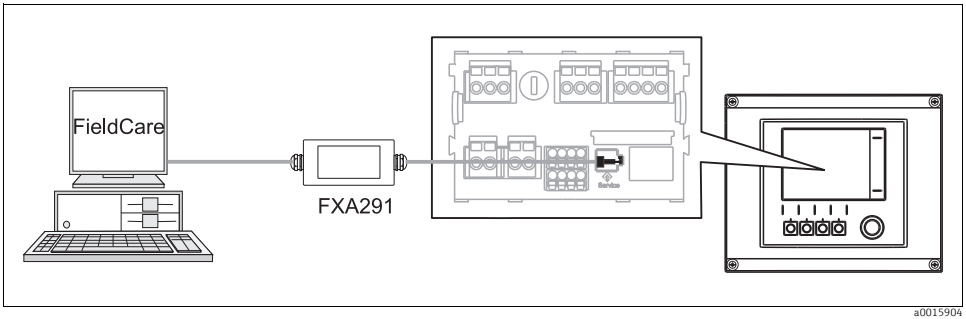

Fig. 9: Connection overview

7.1.2 Creating the data connection

1. Start Fieldcare.
2. Establish the connection to the Commubox.
3. For this purpose, under "Host PC" click "Add device" and select "CDI Communication FXA291".
4. Click "Configuration" to select the serial interface for FXA291 and to set the baud rate (115200).
5. Click "Link connection" to start communicating with the FXA291 (◁▷ are green).
6. Click "Add device" again and select your device type.
7. Click "Link connection" to start communicating with the device (◁▷ are green).
8. Select "Online parameterize" to be able to communicate with the device online.

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. Either side is able to prevent access from the other side.

7.1.3 Operation

- Clicking a menu name or a function corresponds to pressing the navigator.
- You can make your settings conveniently via the computer keyboard.
- Via Fieldcare, you can save logbooks, make backups of configurations and transfer the configurations to other devices.
- To start exporting the logbook click "Operating devices", "Device functions" and "Further functions". Select ".dat" to save the file in a protected format for processing with the Field Data Manager.
- You can also print out configurations or save them as PDFs.

8 Operation options

8.1 Overview

8.1.1 Display and operating elements

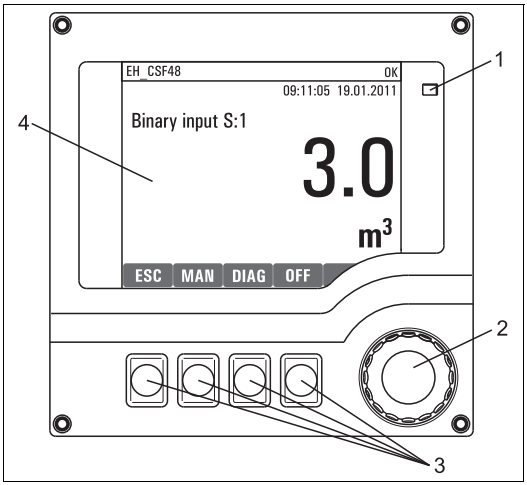

Fig. 10: Overview of operation

1 *LED*
2 *Navigator (jog/shuttle and press/hold function)*
3 *Soft keys (function depends on the menu)*
4 *Display (red background in the event of an error)*

8.1.2 Display

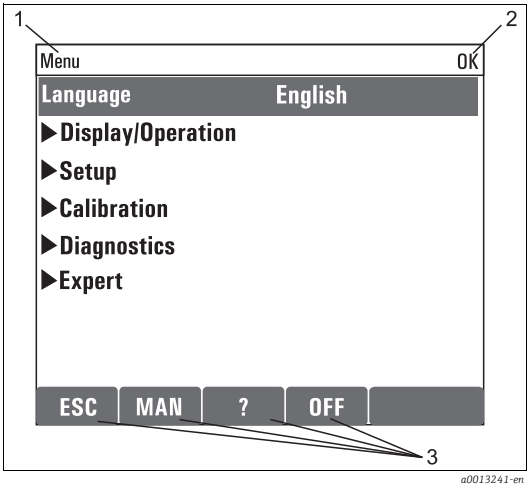

Fig. 11: Display (example)

1 *Menu path and/or device designation*
2 *Status display*
3 *Assignment of the soft keys, e.g.*
ESC: escape or abortion of a sampling process
MAN: manual sample
?: help, if available
OFF: switches the device to standby or aborts a program

8.2 Access to the operating menu via the local display

8.2.1 Operation concept

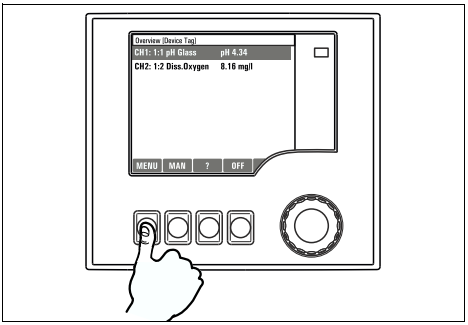

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Fig. 12: Pressing the soft key: selecting the menu directly

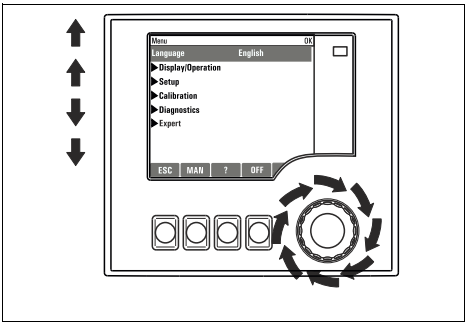

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Fig. 13: Turning the navigator: moving the cursor in the menu

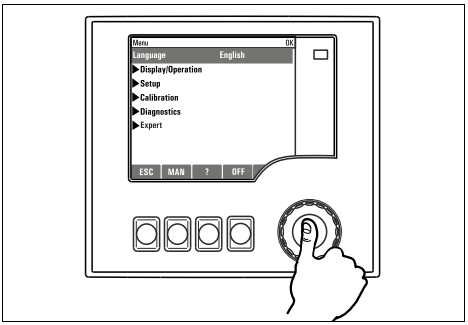

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Fig. 14: Pressing the navigator: launching a function

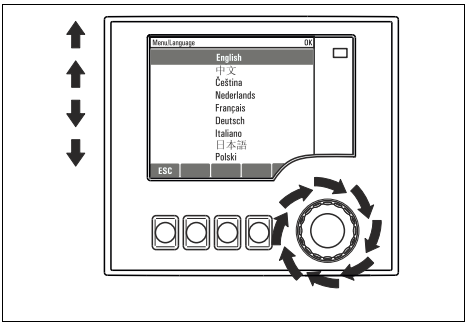

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Fig. 15: Turning the navigator: selecting a value (e.g. from a list)

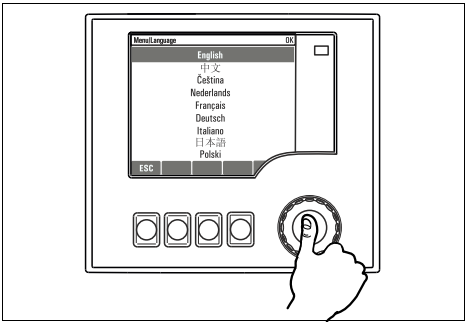

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Fig. 16: Pressing the navigator: accepting the new value

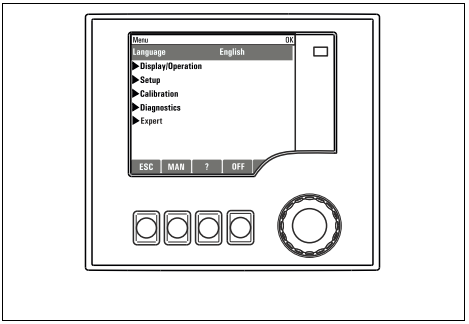

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Fig. 17: Result: new setting is accepted

8.2.2 Locking or unlocking operating keys

Locking operating keys

1. Press the navigator for longer than 2 s.
   ↳ A context menu for locking the operating keys is displayed.

You have the choice of locking the keys with or without password protection. "With password" means that you can only unlock the keys again by entering the correct password. You can set this password here: Menu/Setup/General settings/Extended setup/Data management/Change lock password.

2. Choose whether you want to lock with or without a password.
   ↳ The keys are locked. No more entries can be made. In the soft key bar you will see the symbol 🔒.

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

Unlocking operating keys

1. Press the navigator for longer than 2 s.
   ↳ A context menu for unlocking the operating keys is displayed.
2. Select "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 🔓 symbol is no longer displayed on the screen.

8.3 Configuration options

8.3.1 Display only

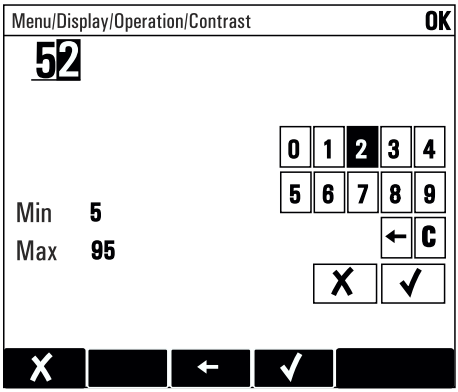
- You can only read the values but cannot change them.
- Typical read-only values are: sensor data and system information
- Example: Menu/Setup/Inputs/../Sensor type

8.3.2 Picklists

- You receive a list of options.
- You select one of the options.
- Example: Menu/Setup/General settings/Temperature unit

8.3.3 Numerical values

- You are changing a variable.
- The maximum and minimum values for this variable are shown on the display.
- Set a value within this range.
- Example: Menu/Display/Operation/Contrast

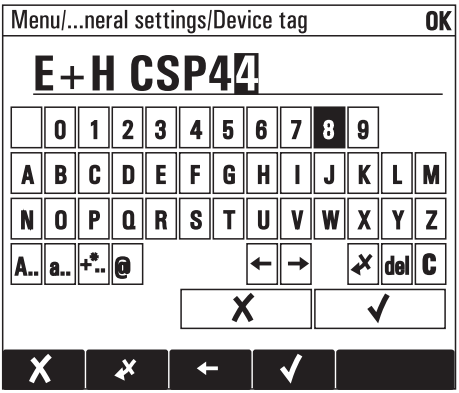


8.3.4 Actions

- 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:
  - Starting a sampling program
  - Starting manual sampling
  - Saving or loading configurations
- Example: Menu/Manual sampling/Start sampling

8.3.5 Customized text

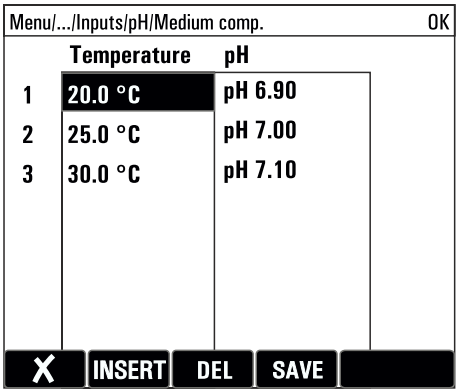
- You are assigning an individual designation.
- Enter a text. You can use the characters in the editor for this purpose (upper-case and lower-case letters, numbers and special characters).
- Using the soft keys, you can:
  - Cancel your entries without saving the data (✗)
  - Delete the character in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



8.3.6 Tables

- Tables are required in order to represent mathematical functions.
- To edit a table, use the navigator to move through the rows and columns and change the cell values.
- You only edit numerical values. The controller automatically takes units of measure into account.
- You can insert table rows (soft key "INSERT") or delete them (soft key "DEL").
- When finished, save the table (soft key "SAVE").
- Use the soft key ✗ to cancel your entry at any time.

- Example: Menu/Setup/Inputs/pH/Medium comp.



9 Commissioning

9.1 Function check

⚠ WARNING

Incorrect connection, incorrect supply voltage

Safety risks for staff and incorrect operation of the device

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

9.2 Switching on the unit

9.2.1 Configuring operating language

Setting the language, configuring the display

1. Connect the battery (see section "Electrical connection").
   ↳ Wait for the initialization to complete.
2. Press the soft key for "MENU". Select your language in the top menu item.
3. Go to the "Display/Operation" menu and configure your desired display settings (Contrast, Backlight and Screen rotation).
   ↳ You have now changed the display to suit your requirements and can operate the device in the preferred language.
4. Go to the "Setup/Basic setup" menu and run a quick setup, see "Basic setup" section.
   ↳ Close the unit cover before starting the sampling process.

9.2.2 Initial 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
- OFF

1) "%0V" here stands for text that depends on the context. This text is generated automatically by the software and inserted in place of %0V.

9.2.3 Display settings

Path: Menu/Display/Operation

Function	Options	Info
Contrast	5 to 95 % **Factory setting** 50 %	Adjust the screen settings to suit your working environment. **Backlight="Automatic"** The backlighting is switched off automatically after a short time if a button is not pressed. It switches back on again as soon as you press the navigator button. **Backlight="On"** The backlighting does not switch off automatically.
Backlight	Options ▪ On ▪ Off ▪ Automatic **Factory setting** Automatic	
Screensaver	Options ▪ Off ▪ Automatic **Factory setting** Off	The screensaver switches off the display if more than 5 minutes have elapsed since the last action executed in the software. The device continues to operate as normal, even when the display is switched off. Press the Navigator button to reactivate the display.
Screen rotation	Options ▪ Manual ▪ Automatic **Factory setting** Manual	If "Automatic" is selected, the single-channel measured value display switches from one channel to the next every second.
Current program:	Read only	The name of the sampling program currently selected is displayed.
Status	Read only	Display "Active": The sampling program has been started and the device takes a sample as per the set parameters. Display "Inactive": No sampling program has been started, or a program that was running has been stopped.
▷ Start	Action	The selected sampling program is started.
▶ User definable screens		
▶ Meas. screen 1 ... ▶ Meas. screen 6		You can create 6 measuring screens of your own and give them a name. As the functions are the same for all 6 measuring screens, only one measuring screen is described below.
Meas. screen	Options ▪ Off ▪ On **Factory setting** Off	Once you have defined your own measuring screen, you can switch it on here. You can find the new screen under "User definable screens" in the "All measured values" measuring mode.
Label	Customized text, 20 characters	Name of the measuring screen Appears in the status line of the measuring display.

Path: Menu/Display/Operation

Function	Options	Info
Number of lines	1 to 8 **Factory setting** 1	Specify the number of measured values displayed.
▶ Line 1 ... ▶ Line 8		As the following functions are the same for all the lines, they are only described once.
Signal type	Options ▪ Source of data ▪ Output **Factory setting** Source of data	Select a source of data or an output as the signal type.
Source of data *Signal type = "Source of data"*	Options ▪ None ▪ Binary input ▪ Current inputs ▪ Temperature ▪ Memosens sensor input (optional) **Factory setting** None	Select a binary-, current- or temperature input as the data source.
Output *Signal type = "Output"*	Options ▪ None ▪ Binary outputs ▪ Current outputs ▪ Relay **Factory setting** None	Select an output. You can choose from binary outputs, current outputs and relays.
Measured value	Options ▪ Depends on the source of data or output **Factory setting** None	You can display different measured values depending on the source of data or output.
Label	Customized text, 20 characters	User-defined description for parameter to be displayed
▷ Set label to "%0V"[1)]	Action	If you perform this action you accept the parameter name that is automatically suggested. Your own name ("Label") is lost!
▶ Measurement		Current measured values at the inputs are displayed. Analog and binary inputs cannot be modified here. If digital sensor inputs are selected they can be configured here.
▶ Show summary of current program		The bottle statistics for the sampler are displayed. The statistics appear for each individual bottle after the program starts. Further information is provided in the "Bottle statistics" section.

Path: Menu/Display/Operation

Function	Options	Info
▶ Show summary of inputs		The configured counters of the analog and binary input are displayed. Max. 8 lines

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

9.3 Basic setup

Making basic settings

1. Go to the "Setup/Basic setup" menu.

Make the following settings:

2. Device tag: Give your device a name of your choice (max. 32 characters).
3. Set date: Correct the set date if necessary.
4. Set time: Correct the set time if necessary.
5. Number of bottles: Correct the set number of bottles if necessary.
6. Bottle volume: Correct the set bottle volume if necessary.

For quick commissioning, you can ignore the additional settings for outputs etc. You can make these settings later in the specific menus.

7. Return to the overview by pressing and holding the soft key for "ESC" for at least one second.
   ↳ Your sampler now works with your general settings.

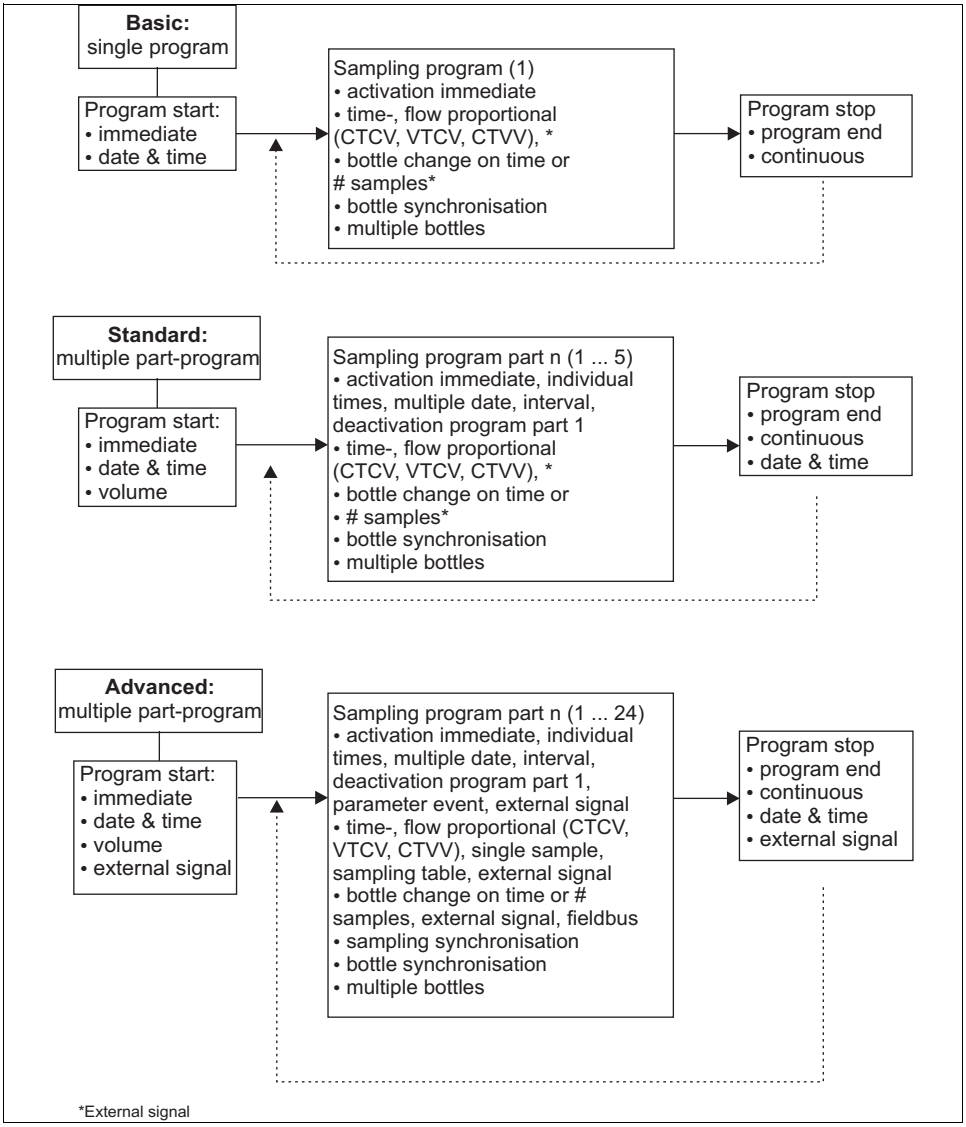
If you want to configure your most important input and output parameters already in "Basic setup", proceed as follows:

▶ Configure the current outputs, limit contactors, device diagnostics and cleaning cycles with the submenus which follow.

9.4 Sampling programs

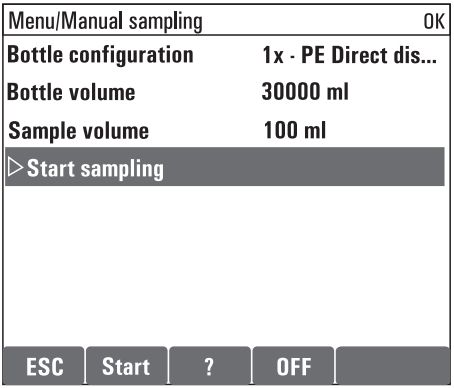
9.4.1 Differences between program types

The following overview shows the differences between the Basic, Standard and Advanced program types:



9.4.2 Manual sampling

1. Manual sampling is triggered by the "MAN" soft key. This pauses any program currently running.
   ↳ The current bottle configuration and the current sample volume are displayed. The distributor position and sample volume can be changed.
2. Select "Start sampling".
   ↳ A new screen is displayed indicating the progress of the sampling process.
3. After manual sampling, a running program can be displayed and continued with the "ESC" key.
4. Example:



   ↳ The sample volume for "Manual sampling" is not taken into account in the calculated bottle volume.

9.4.3 Programming for automatic sampling

Create a simple sampling program in the general overview under "Select sampling program/New/Basic" or in the "Menu/Setup/Sampling programs/Setup program/New/Basic" menu:

- Enter the "Program name".
- The settings from the "Basic setup" for bottle configuration and bottle volume are displayed.
- Sampling mode = "Time paced CTCV" is preset.
- Enter the "Sampling interval".
- Enter "Sampling volume" per sample.
- Select "Bottle change mode" after number or time for average samples.
  With the option "Bottle change after a time", you can choose the bottle synchronization before the start condition (None, 1st bottle change time, 1st time of change + bottle number). The description for this can be found in the "Bottle synchronization" section.
- In "Multiple bottles", enter the number of bottles the sample should be distributed over.
- "Start condition": immediately or time-delayed.
- "Stop condition": After program end or continuous operation.
- Pressing the "SAVE" soft key saves the program and ends data entry.
- Example:

Menu/... programs/Setup program	OK
Program name:	**Program4**
Bottle configuration	**1x - PE Direct dis...**
Bottle volume	**30000 ml**
Sampling mode	**Time paced CTCV**
Sampling interval	**10 min**
Sampling volume	**100 ml**
Samples per bottle	**1**
Start condition	**Immediate**
ESC	**SAVE** **?** **OFF**

10 Operation

10.1 Display

10.1.1 Measuring mode

To display the measuring values go to "Measurement" in the general overview or press the "MEAS" soft key when a program is running.

There are various display modes:
(Press the navigator button to change the mode)

1. Channel overview
   The names of all the channels, each sensor type connected and the current primary values are shown on the display.
2. Primary value of the selected channel
   The name of the channel, the sensor type connected and the current primary value are shown on the display.
3. Primary and secondary measured value of the selected channel
   The name of the channel, the sensor type connected and the current primary and secondary value are shown on the display.
4. All the measured values of all the inputs and outputs
   The current primary and secondary value, as well as all the raw values, are shown on the display.
5. User-definable screens
   You configure what values you want to display. You can choose from all the measured values of physical and "virtual" sensors (calculated using mathematical functions) and output parameters.

In the first 3 modes, you can switch between channels by turning the navigator. In addition to having an overview of all the channels, in the 4th mode you can also select a value and press the navigator to see more details for the value. You can also find your user-defined screens in this mode.

10.1.2 Device status

Icons on the display alert you to special device conditions.

Icon	Location	Description
F	Title bar	Diagnostics message "Failure"
M	Title bar	Diagnostics message "Maintenance request"
C	Title bar	Diagnostics message "Check"
S	Title bar	Diagnostics message "Out of specification"
⇆	Title bar	Fieldbus or TCP/IP communication active
⧗	Title bar	Hold active
⧗	At measured value	Hold for the actuator (current output, limit contactor etc.) is active
⤒	At measured value[1)]	An offset has been added to the measured value
⊗	At measured value	Measured value has status "Bad" or "Alarm"
ATC	At measured value	Automatic temperature compensation active
MTC	At measured value	Manual temperature compensation active
SIM	Title bar	Simulation mode active or Memocheck SIM connected
SIM	At measured value	The measured value is influenced by a simulated value
SIM	At measured value	The displayed measured value is simulated

1) Only pH or ORP measurement

If two or more diagnostics messages occur simultaneously, only the icon for the message with the highest priority is shown on the display (for the order of priority according to NAMUR, see the "Changing diagnostic information" section).

10.1.3 Assignment views

"Assignment views" appear as the last function in many sections of the menu, e.g. Channel assignment view.
You can use this function to see what actuators or functions are connected to or a sensor channel.
The assignments appear in hierarchical order.

10.2 General settings

10.2.1 Basic settings

Some settings are only visible with optional hardware.

Path: Menu/Setup/General settings

Function	Options	Info
Device tag	Customized text, 32 characters	Select any name for your controller. Use the TAG name for example.
Temperature unit	Options ▪ °C ▪ °F ▪ K **Factory setting** °C	
Current output range	Options ▪ 0 to 20 mA ▪ 4 to 20 mA **Factory setting** 4 to 20 mA	In accordance with Namur NE43, the linear range is from 3.8 to 20.5 mA (Current output range="4 to 20 mA") or from 0 to 20.5 mA (Current output range="0 to 20 mA"). If the range is exceeded or undershot, the current value stops at the range limit and a diagnostics message (460 or 461) is output.
Error current	0.0 to 23.0 mA **Factory setting** 21.5 mA	The function meets NAMUR NE43. Set the current value that should be output at the current outputs in the event of an error.
The value for "Error current" should be outside the measuring range. If you decided that your Current output range = "-0 to 20 mA", you should set an error current between 20.1 and 23 mA. If the Current output range = "4 to 20 mA" you could also define a value < 4 mA as the error current. The device allows an error current within the measuring range. In such instances pay attention to possible affects this may have on your process.		
Alarm delay	0 to 9999 s **Factory setting** 0 s	The system only displays the errors that are present longer than the set delay time. This makes it possible to suppress error messages that only occur briefly and are caused by normal process-specific fluctuations.
Device Hold	Options ▪ Disabled ▪ Enabled **Factory setting** Disabled	You can enable an immediate, general hold here. The function has the same effect as the "HOLD" soft key in the measuring screens.

10.2.2 Date and time

Path: Menu/Setup/General settings/Date/Time

Function	Options	Info
Set date	Depends on the format	Editing mode: DD (day): 01 to 31 MM (month): 01 to 12 YYYY (year): 1970 to 2106
Set time	Depends on the format	Editing mode: hh (hour): 00 to 23 / 0 am to 12 pm mm (minutes): 00 to 59 ss (seconds): 00 to 59
▶ Extended setup		
Date format	Options ▪ DD.MM.YYYY ▪ YYYY-MM-DD ▪ MM-DD-YYYY **Factory setting** DD.MM.YYYY	Decide which date format you want to use.
Time format	Options ▪ HH:MM am (12h) ▪ HH:MM (24h) ▪ HH:MM:SS (24h) **Factory setting** HH:MM:SS (24h)	Decide whether you want to use the 12-hour or 24-hour clock. Seconds can also be displayed with the latter version.
Time zone	Options ▪ None ▪ Choice of 35 time zones **Factory setting** None	If no time zone is selected, then Greenwich Mean Time is used (London).
DST	Options ▪ Off ▪ Europe ▪ USA ▪ Manual **Factory setting** Off	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.

10.2.3 Automatic hold

Path: Menu/Setup/General settings/Automatic hold

Function	Options	Info
▶ Device specific hold		
Setup menu	Options ▪ Disabled ▪ Enabled **Factory setting** Disabled	Decide whether a hold should be output at the current output when the particular menu is opened.
Diagnostics menu		
Calibration active	**Factory setting** Enabled	
Hold release time	0 to 600 s **Factory setting** 0 s	The hold is maintained for the duration of the delay time when you switch to the measuring mode.

If a device-specific hold is enabled, any cleaning that was previously started is stopped. You can only start a manual cleaning if a hold is active.
The hold has no influence on the sampling.

10.2.4 Logbooks

Logbooks record the following events:
- Calibration/adjustment events
- Operator events
- Diagnostic events
- Programming events

Here you define how the logbooks should store the data.
In addition, you are also able to define individual data logbooks . Assign the logbook name and select the measured value to be recorded. You can configure the recording rate (Scan time) individually for every data logbook.
Further information on the logbooks is provided in the "Diagnostics and Troubleshooting" section.

Path: Menu/Setup/General settings/Logbooks

Function	Options	Info
Logbook ident	Customized text	Part of the file name when exporting a logbook
Event logbook	Options ▪ Off ▪ Ring buffer ▪ Fill up buffer **Factory setting** Ring buffer	All diagnostic messages are recorded **Ring buffer** If the memory is full, the latest entry automatically overwrites the oldest entry. **Fill up buffer** If the memory is 80% full, the device displays a diagnostic message. If the memory is full, there is an overflow, i.e. no new values can be saved. The controller displays a corresponding diagnostic message. The memory then has to be cleared manually.
Logbook program	Options ▪ Off ▪ Ring buffer ▪ Fill up buffer **Factory setting** Ring buffer	All program messages are recorded **Ring buffer** If the memory is full, the latest entry automatically overwrites the oldest entry. **Fill up buffer** If the memory is 80% full, the device displays a diagnostic message. If the memory is full, there is an overflow, i.e. no new values can be saved. The controller displays a corresponding diagnostic message. The memory then has to be cleared manually.
▶ Overflow warnings *Event logbook="Fill up buffer"*		
Calibration logbook	Options ▪ Off ▪ On **Factory setting** Off	Decide whether you want to receive a diagnostic message from the controller in the event of memory overrun of the logbook in question.
Diagnostic logbook		
Configuration logbook		

Path: Menu/Setup/General settings/Logbooks

Function	Options	Info
Overflow warnings *Logbook program="Fill up buffer"*	Options ▪ Off ▪ On **Factory setting** Off	If the fill-up buffer overruns, you can decide whether you want to receive a diagnostic message from the controller or not for each individual logbook.
Measuring parameter	Read only	Plain-text information on the parameter that is being recorded
Main value	Read only	Information on the main value and the unit.
Unit	Read only	
▶ Data logbooks		
▶ New		You can create a maximum of 8 data logbooks.
Logbook name	Customized text, 20 characters	
Source of data	Options ▪ None ▪ Binary input 1 ▪ Binary input 2 ▪ Analog input 1 ▪ Analog input 2 ▪ Temperature ▪ Sensor 1 (optional) ▪ Sensor 2 (optional) **Factory setting** None	Select the input that should be the data source of the logbook entries.
Measured value	Options ▪ Depends on Source of data **Factory setting** None	You can record different measured values depending on the source of data.
Scan time	00:00:01 to 01:00:00 **Factory setting** 00:01:00	Minimum interval between two entries Format: HH:MM:SS
Data logbook	Options ▪ Off ▪ Ring buffer ▪ Fill up buffer **Factory setting** Off	**Ring buffer** If the memory is full, the latest entry automatically overwrites the oldest entry. **Fill up buffer** If the memory is 80% full, the device displays a diagnostic message. If the memory is full, there is an overflow, i.e. no new values can be saved. The controller displays a corresponding diagnostic message. The memory then has to be cleared manually.

Path: Menu/Setup/General settings/Logbooks

Function	Options	Info
Overflow warning *Data logbook="Fill up buffer"*	Options ▪ Off ▪ On **Factory setting** Off	If the fill-up buffer overruns, you can decide whether you want to receive a diagnostic message from the controller or not for each individual logbook.
▷ Add another logbook	Action	*Only if you want to create another data logbook immediately.* You add a new data logbook at a later data using ▶ New.
▷ Finished	Action	This allows you to exit the menu ▶ New.
▷ Start/stop simultaneously	Action	Appears if you have created more than one data logbook. With one click, you can start or stop recording for all the data logbooks.
▶ "Logbook name"		The name of this submenu is based on the name of the logbook and only appears once you have created a logbook.
This menu appears several times if you have several data logbooks.		
Source of data	Read only	This is for information purposes only. If you want to record another value, delete this logbook and create a new data logbook.
Measured value		
Log time left *Data logbook="Fill up buffer"*	Read only	Displays the days, hours and minutes remaining until the logbook is full.
Log size *Data logbook="Ring buffer"*	Read only	Displays the number of entries remaining until the logbook is full.
Logbook name	Customized text, 20 characters	You can change the name here again.
Scan time	00:00:01 to 01:00:00 **Factory setting** 00:01:00	As above Minimum interval between two entries Format: HH:MM:SS
Data logbook	Options ▪ Off ▪ Ring buffer ▪ Fill up buffer **Factory setting** Off	**Ring buffer** If the memory is full, the latest entry automatically overwrites the oldest entry. **Fill up buffer** If the memory is 80% full, the device displays a diagnostic message. If the memory is full, there is an overflow, i.e. no new values can be saved. The controller displays a corresponding diagnostic message. The memory then has to be cleared manually.

Path: Menu/Setup/General settings/Logbooks

Function	Options	Info
▶ Line plotter		Menu to define the graphic display
Axes	Options ▪ Off ▪ On **Factory setting** On	Should the axes (x, y) be displayed (On) or not (Off)?
Orientation	Options ▪ Horizontal ▪ Vertical **Factory setting** Horizontal	You can choose whether the value curves should be displayed from left to right ("Horizontal") or from top to bottom ("Vertical"). If you want to display two data logbooks simultaneously, make sure that both logbooks have the same settings here.
X-Description	Options ▪ Off ▪ On **Factory setting** On	Decide whether a description should be displayed for the axes and whether grids should be shown. In addition, you can also decide whether a pitch should be displayed.
Y-Description		
Grids		
Pitches		
X Pitch/Grid distance	10 to 50% **Factory setting** 10 %	Specify the pitch.
Y Pitch/Grid distance		
▷ Remove	Action	This action removes the data logbook. Any data that have not been saved are lost.

Example for setting up a new data logbook (for sensors)

1. Menu/Setup/General settings/Logbooks/Data logbooks/New:
   a. Logbook name: Assign a name, e.g. "01".
   b. Source of data: Select a data source, e.g. the sensor connected to binary input 1.
   c. Measured value: Select the measured value that you want to record.
   d. Scan time: Specify the interval between two logbook entries.
   e. Data logbook: Activate the logbook. Specify the type of memory, "Ring buffer" or "Fill up buffer".
2. ../Finished: Execute this action.
   --> Your new logbook now appears in the list of data logbooks.
3. Select the data logbook with the name "01".
4. If you selected "Fill up buffer", you can also decide whether you want to receive a diagnostic message in the event of memory overrun.
5. Depending on the type of memory selected, you receive information about the memory space (for "Ring buffer") or the time remaining until memory overrun (for "Fill up buffer").
6. Define the graphic display mode in the "Line plotter" submenu.

10.2.5 Configuring the sampling depending on the device version

Path: Menu/Setup/General settings

Function	Options	Info
▶ Sampling		
Number of bottles	Choice of all possible bottle combinations	The bottle configuration you ordered is preset in the device.
Bottle volume	0 to 100000 ml **Factory setting** Depends on the bottle configuration	If continuous operation is selected for a sampling program, there is the danger of overfilling the bottles. Do not forget to empty the bottles!
Distribution parking (only for version with distributor drive)	Options ▪ Back ▪ None **Factory setting** Back	Causes the distribution arm to go to the center at the back or remain parked in the current position when the device is started or the program is ended.
Distribution reference (only for version with distributor drive)	Options ▪ Pre sampling ▪ Pre bottle change ▪ Pre program start **Factory setting** Pre sampling	The distributor arm goes through a reference point depending on the option selected.
Power failure	Options ▪ Resume program ▪ Stop program **Factory setting** Resume program	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 retries	0 to 3 **Factory setting** 0	If sampling is started and no sample is drawn in, sampling can be repeated up to 3 times.
Sampling delay	0 to 99 s **Factory setting** 0 s	The start of the sampling cycle can be delayed by up to 99 s. The binary output is switched without any delay.

Path: Menu/Setup/General settings

Function	Options	Info
Liquid detection	Options ▪ Automatic ▪ Semi automatic ▪ Off **Factory setting** Automatic	If "Semiautomatic" is selected, the purge times and intake times can be defined separately. **Off:** The definition of the purge times and intake times is completely time-controlled. **Automatic:** The last intake time determined is the new purge time. **Semi automatic:** If the suction heights tend to vary greatly.
Rinse cycles	0 to 3 **Factory setting** 0	The suction line is rinsed with the sample up to 3 times.
Safety interlock(optional)	Options ▪ Off ▪ On **Factory setting** Off	If the peristaltic pump is opened, the safety interlock stops all the functions.
▶ Diagnostics settings		
▶ Pump tube life		
Control	Options ▪ Off ▪ On **Factory setting** On	Indicates the pump hose has to be exchanged.
Warning	10 to 50 h **Factory setting** 30 h	When the tube has been in operation for this length of time, a diagnostic message is displayed to indicate that the tube should be replaced in time.
Alarm	30 to 200 h **Factory setting** 50 h	
Totalizer	00-00:00 to 49710-06:28 **Factory setting** 00-00:00	Operating time of the current pump hose in days, hours and minutes
▷ Reset	Action	The tube life counter is reset to 0:00 h.

10.2.6 Extended setup

Diagnostics settings

The list of diagnostic messages displayed depends on the path selected. There are device-specific messages, and messages that depend on what sensor is connected.

Path: ... /Extended setup/Diagnostics settings/Diag. behavior (optional)

Function	Options	Info
List of diagnostic messages		Select the message to be changed. Only then can you make the settings for this message.
Diag. code	Read only	
Diagnostic message	Options ▪ On ▪ Off **Factory setting** Depends on the message	You can deactivate or reactivate a diagnostic message here. Deactivating means: ▪ No error message in the measuring mode ▪ No error current at the current output
Error current	Options ▪ On ▪ Off **Factory setting** Depends on the message	Decide whether an error current should be output at the current output if the diagnostic message display is activated. If general device errors occur, the error current is output at all the current outputs. In the case of channel-specific errors, the error current is only output at the particular current output.
Status signal	Options ▪ Maintenance (M) ▪ Out of specification (S) ▪ Function check (C) ▪ Failure (F) **Factory setting** Depends on the message	The messages are divided into different error categories in accordance with NAMUR NE 107. Decide whether you want to change a status signal assignment for your application.
Diag. output	Options ▪ None ▪ Binary output **Factory setting** None	You can use this function to select a binary output to which the diagnostic message should be assigned. For sensors with the Memosens protocol: Before you can assign the message to an output, you must first configure a relay output to "Diagnostics" (Menu/Setup/Outputs, assign the "Diagnostics" function and set the Operating mode to "as assigned").
Cleaning program(optional)	Options ▪ None ▪ Cleaning 1 ▪ Cleaning 2 ▪ Cleaning 3 ▪ Cleaning 4 **Factory setting** None	Decide whether the diagnostic message should trigger a cleaning program. You can define the cleaning programs under: Menu/Setup/Additional functions/Cleaning.

Path: ... /Extended setup/Diagnostics settings/Diag. behavior (optional)

Function	Options	Info
Detail information	Read only	Here you can find more information on the diagnostic message and instructions on how to resolve the problem.

Data management

Firmware update

Please contact your local sales office for information on firmware updates available for your controller and its compatibility with earlier versions.
Your **current firmware version** can be found at: Menu/Diagnostics/System information/Software version.

Activation code

You require activation codes for:
- Additional functions,
- Software upgrades

If activation codes are available for your device, these codes are provided on the inner nameplate. The corresponding device functions are activated at the factory. You only require the codes if servicing the device.

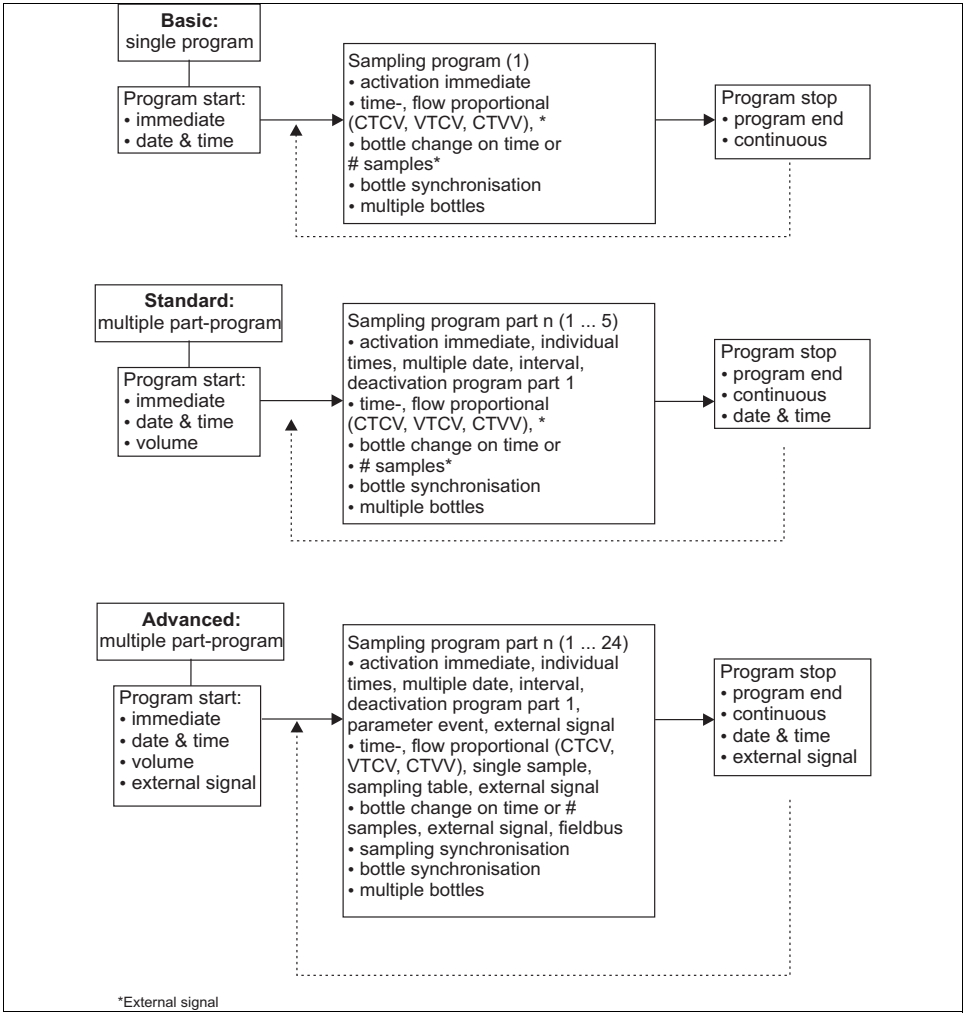
1. Enter the activation code: Menu/Setup/General settings/Extended setup/Data management/Activation code.
2. Confirm your entry.
   ↳ Your new hardware or software function is activated and can be configured.

The table below tells you what functions an activation code enables:

Function	Activation code beginning with
Second Memosens input	062...
Two current outputs (BASE-E module only)	081...

10.3 Programming

The Liquiport 2010 CSP44 offers users a wide range of options for configuring individual sampling programs. The 3 different program types (Basic, Standard and Advanced) make it easy for you to find the right program for your application.



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10.3.1 Overview of the possible program types

Basic program type	Standard program type	Advanced program type
Time proportional sampling (CTCV)	Time proportional sampling (CTCV)	Time proportional sampling (CTCV)
Flow-paced	Flow-paced	Flow-paced
		Single sample
		Sampling table
		External signal
Flow proportional sampling/time override (CTVV)	Flow proportional sampling/time override (CTVV)	Flow proportional sampling/time override (CTVV)

The graphic below explains the various ways sampling can be controlled on the basis of a flow curve:

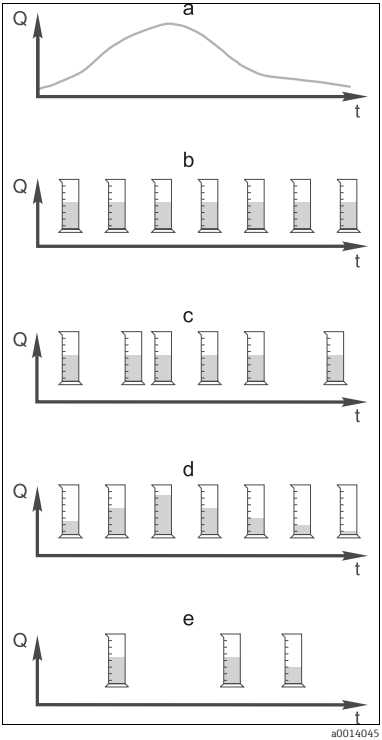


Fig. 18: Sampling control

Q Flow
t Time

a. Flow curve
b. **Time-paced sampling**
A constant sampling volume (e.g. 50 ml) is taken at steady intervals (e.g. every 5 min).
c. **Flow-paced sampling**
A constant sampling volume is taken at variable intervals (depending on the inflow volume).
d. **Time/flow-paced sampling**
A variable sampling volume (the sampling volume depends on the inflow) is taken at steady time intervals (e.g. every 10 min).
e. **Event-controlled sampling**
Sampling is triggered by an event (e.g. pH limit value). Sampling can be time-paced, flow-paced, or time/flow-paced, or single samples can be taken.

The following table explains the various types of sampling using specific examples.

Type of sampling	Example	Info
Time proportional sampling (CTCV)	▪ Sampling interval: 5 min ▪ Sampling volume: 50 ml ▪ Bottle change mode: 2 h With this setting, a 50 ml sample is taken every 5 minutes. 12 samples are thus taken every hour. Each bottle is filled over a period of 2 hours. This results in a total sampling volume of 24 samples per bottles x 50 ml = 1200 ml.	This type of sampling remains constant over time and does not take changes in flow or polluting load into account. It is possible to take a representative sample if the intervals are brief (e.g. 5 min).
Flow-paced	**Controlled via current input** ▪ Signal: 0 to 20 mA = 0 to 600 m^3/h ▪ Sampling volume: 50 ml ▪ Sampling interval: 20 m^3 ▪ Bottle change mode: 2 h If 20 mA = 600 m^3/h, a sample is taken every 2 minutes (smallest sampling interval with maximum flow). The total number of samples amounts to 60 samples per bottle. With a flow of 300 m^3/h, a sample is taken every 4 minutes. **Controlled via binary input** ▪ Signal pulse: 5 m^3 ▪ Sampling volume: 50 ml ▪ Sampling interval: 20 m^3 ▪ Bottle change mode: 2 h 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: Given a maximum flow of 600 m^3/h, the pulse frequency at 5 m^3 is 120 pulses/h or 2 pulses/min. With a sampling interval of 20 m^3, sampling takes place after 4 pulses = 2 minutes.	▪ The current inputs can be configured for the current range of 0 to 20 mA or 4 to 20 mA. ▪ The binary inputs require power (24 V DC) for floating contacts. In the case of flow-paced sampling, the sampling interval is calculated on the basis of the volume flow. The same sampling volume is take at variable intervals. **Advantage:** Good, representative results in the event of minor fluctuations in flow. **Disadvantage:** Longer intervals when the level of water is low mean that malfunctions cannot be detected.

Type of sampling	Example	Info
Flow proportional sampling/time override (CTVV)	**Controlled via current input** ▪ Signal: 0 to 20 mA ▪ Sampling interval: 10 min ▪ Sampling volume: variable The maximum sampling volume is defined at the maximum flow rate. Example: The maximum flow rate at 20 mA at the current input is 160 l/s, and the maximum sampling volume is 200 ml. When transferring samples into a 30l mixed sample container, 144 samples are taken per day with a maximum sampling volume of 28.8 l. With a flow rate of 80 l/s, a sampling volume of only 100 ml would be grabbed, and a sampling volume of 50 ml would be grabbed at a flow rate of 40 l/s. The sampling volume is always calculated based on the flow. **Controlled via binary input** ▪ Binary input (pulse per flow unit) ▪ Sampling interval: 10 min ▪ Sampling volume: variable The sampling volume is defined for a flow pulse, e.g.: 1 pulse is 20 ml. For instance, if 5 flow pulses are counted between the sampling intervals, this results in a sampling volume of 5 x 20 = 100 ml, and a volume of 8 x 20 = 160 ml for 8 pulses. If a binary input is used for time/flow-paced sampling, the sampling volume is calculated per sample as a percentage of the specified sampling volume.	Samples are taken at set intervals with a variable sampling volume. The sampling volume is calculated from the **flow rate**. More volume is grabbed when the flow is high than when it is low. Since the flow normally fluctuates and the maximum flow is only rarely a constant variable, the sampling volume transferred to the container will depend on the daily average. **Advantage:** Very good, representative sampling given large fluctuations in the flow and constant time intervals. **Disadvantage:** Too little sampling volume is made available for analysis when the flow is low. **Advantage with current input:** For the sampling interval, either the current flow rate or the average value between the last and current flow rate is used to calculate the exact sampling volume (depending on the presetting). **Disadvantage with binary input:** For the sampling interval, the pulses counted since the last sampling are multiplied by a volume. If this is too high - e.g. 100 ml - the composition of the sample is not representative for analysis.
Event	Event-based sampling is controlled via the current input, binary input and/or sensor input. The subprogram created waits to be activated by an event that can consist of up to 3 individual events. Every possible condition can be created using logical "and" / "or" links. For example, the information from a flowmeter connected to the current input can be linked to a rain gage and a pH sensor signal connected to the binary input. An event is defined as limit value violation (exceeded or undershot), range monitoring within or outside a range, or a rate of change. Users can decide whether additional sampling is started when the event starts and/or ends. For the duration of the event, users can choose from time-paced, flow-paced or time/flow-paced sampling, or can take single samples, use a sampling table or the external control system.	The sampler waits for an event. This event takes place via internal sensor signal processing or via devices connected externally. As bottle assignment is possible when using several bottles, events can be assigned to individual bottles. A maximum of 24 subprograms can be started simultaneously and assigned to individual bottles.

Bottle synchronization

The bottle synchronization setting is possible with all types of program. In addition, bottle synchronization can be switched via an external signal.
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.. The following options are available for this:

- None: The time of sampling and bottle change are not synchronized.
- 1. bottle change time: Sampling starts with the first bottle. The changeover to the next bottles is synchronized. For example, a time of 2 hours was set for bottle changeover, and 00:00 was set for the synchronization. If the program is started at 5:23 a.m., for example, bottle 1 is initially filled. The system switches for the first time to bottle 2 at midnight (00:00), to bottle 3 at 2 a.m. etc.
- Time of change + bottle number: A specific filling time is assigned to every bottle. For example, midnight to 2 a.m. for bottle 1; 2 a.m. to 4 a.m. for bottle 2; 4 a.m. to 6 a.m. for bottle 3 etc. If the program is started at 10 a.m., for example, the device starts filling bottle 6.
  It is also possible to start synchronization on a specific day of the week.
  For example, a time of 24 hours was set for bottle changeover, Monday 00:00 was the time set for synchronization, and Tuesday 8 a.m. was set for starting the program. The system fills bottle 2 until 00:00 on Wednesday and then switches to bottle 3.
- External signal: The system changes to the next bottle when an external signal is received. The external signal first has to be configured via the binary input. The binary input can then be selected as the source.

In the Standard and Advanced program the bottle position is currently not restored following a power failure.

10.3.2 Program type: Basic

With the Basic program type, you can create simple sampling programs quickly based on time, volume and flow. In the case of volume- and flow-controlled sampling, the inputs have to be configured appropriately beforehand. If you want to create a program and use it immediately, you have to check the configuration of the sampler before programming. You can make the settings under "Menu/Setup/General settings/Sampling": e.g. the bottle configuration, and the bottle volume, as well as the correct dosing volume for the device version with a vacuum pump. The dosing volume setting makes it possible to correctly calculate the level in the bottle and is a reliable way of preventing the bottles from being overfilled.

You can go to the Setup program either via the overview under "Select sampling program" or via the path "Menu/Setup/Sampling programs".

Path: Menu/Setup/Sampling programs

Function	Options	Info
Current program:	Read only	The last sampling program to be created or used is displayed.
Status	Read only	Display "Active": The sampling program has been started and the device takes a sample as per the set parameters. Display "Inactive": No sampling program has been started, or a program that was running has been paused. Display "Pause": Sampling program paused.
▶ Setup program		
New		A list of all the programs created is displayed. For this reason, it is often helpful to add a "B" for Basic in the program name.
Program1, which is supplied with the device, is displayed, as is a list of all the programs already created (Basic, Standard or Advanced programs). You can either create a new program or select an existing one. If you select an existing program, you can edit, delete, start or duplicate it. Furthermore, you can also see whether this program is a Basic, Standard or Advanced program. If you are creating a new program, select the Basic, Standard or Advanced program type.		
▶ Basic		
Program name	Customized text	Use a distinct name for your sampling program. The program name can be up to 16 characters long.
Bottle configuration	Choice of all possible bottle combinations **Options:** - 1x - PE direct distribution - 12x - PE direct distribution - 24x - PE direct distribution - 12x+6x PE direct distribution	The ordered bottle configuration is preset or the configuration selected in the setup is displayed.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Bottle volume	0 to 100000 ml **Factory setting** 30000 ml	Set the bottle volume. The preset value depends on the bottle configuration configured. The bottle volume is always 30 l for individual containers. In the case of asymmetric distribution, e.g. 12 x 1 l + 6 x 2 l, you can set the bottle volume on the left and right in the menu items that follow.
Sampling mode	Options ▪ Time paced CTCV ▪ Flow paced VTCV ▪ Time/flow paced CTVV **Factory setting** Time paced CTCV	The following functions depend on the option selected. These versions are illustrated individually in the following section to provide a clearer understanding of the options. **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.

Settings with a time-paced Basic program

Settings with the Basic program type with 1 bottle

Sampling mode = "Time paced CTCV"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Sampling interval	00:01:00 to 99:59:00 HH:MM:SS **Factory setting** 00:10:00 HH:MM:SS	Set the sampling interval.
Sampling volume	10 to 10000 ml **Factory setting** 100 ml	Set the sampling volume. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples.
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (days, hours and minutes) after which the system should change to the next bottle.
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number **Factory setting** None	None: The time of sampling and bottle change are not synchronized. 1. bottle change time: Sampling starts with the first bottle. Set the synchronization time. 1. Time of change + bottle number: Each bottle is assigned to a specific fill time. Set the synchronization time and the weekday.
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
If Start condition **Immediate** is selected:		
Sample at start	Options ▪ Yes ▪ No **Factory setting** Yes	Yes: The first sample is taken when the program is started. No: The system waits for the interval to elapse before the first sample is taken.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Settings with the Basic program type with multiple bottles

Sampling mode = "Time paced CTCV"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Sampling interval	00:01:00 to 99:59:00 HH:MM:SS **Factory setting** 00:10:00 HH:MM:SS	Set the sampling interval.
Sampling volume	10 to 10000 ml **Factory setting** 100 ml	Set the sampling volume. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples. If the bottle is full beforehand based on the calculated level, the system prevents more samples being added to the bottle. Such samples are logged as failed samples in the program logbook.
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (days, hours and minutes) after which the system should change to the next bottle.
Multiple bottles	0 to 23 The configuration options depend on the current number of bottles **Factory setting** 0	Multiple bottles: "Simultaneous" transfer of two samples to separate bottles.
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number **Factory setting** None	None: The time of sampling and bottle change are not synchronized. 1. bottle change time: Sampling starts with the first bottle. Set the synchronization time. 1. Time of change + bottle number: Each bottle is assigned to a specific fill time. Set the synchronization time and the weekday.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
If Bottle change mode **External signal** is selected:		
Bottle change signal input	Options ▪ No bottle change input configured ▪ Binary input S:x **Factory setting** No bottle change input configured	The bottle change input can be configured under ▶ Inputs .
Multiple bottles	0 to 23 The configuration options depend on the current number of bottles **Factory setting** 0	Multiple bottles: "Simultaneous" transfer of two samples to separate bottles.
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.
If Start condition **Immediate** is selected:		
Sample at start	Options ▪ Yes ▪ No **Factory setting** Yes	Yes: The first sample is taken when the program is started. No: The system waits for the interval to elapse before the first sample is taken.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles. The bottle level is reset once a program loop has been run through.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Settings with a flow-paced Basic program

Settings with the Basic program type with 1 bottle

Sampling mode = "Flow paced VTCV"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Flowmeter input	Options ▪ No flow input configured ▪ Binary input S:x ▪ Current input S:x **Factory setting** No flow input configured	Select the flow input. The binary input or the current input must be configured for this function. Only the inputs configured as a flow input are displayed.
Sampling interval	1.000 to 9999.000 m^3 **Factory setting** 10,000 m^3	Set the sampling interval. The unit and the number of decimal places are displayed as configured under Setup/Inputs.
Sampling volume	10 to 10000 ml **Factory setting** 100 ml	Set the sampling volume. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (days, hours and minutes) after which the system should change to the next bottle.
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number **Factory setting** None	None: The time of sampling and bottle change are not synchronized. 1. bottle change time: Sampling starts with the first bottle. Set the synchronization time. 1. Time of change + bottle number: Each bottle is assigned to a specific fill time. Set the synchronization time and the weekday.
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.
If Start condition **Immediate** is selected:		
Sample at start	Options ▪ Yes ▪ No **Factory setting** Yes	Yes: The first sample is taken when the program is started. No: The system waits for the interval to elapse before the first sample is taken.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Settings with the Basic program type with multiple bottles

Sampling mode = "Flow paced VTCV"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Flowmeter input	Options ▪ No flow input configured ▪ Binary input S:x ▪ Current input S:x **Factory setting** No flow input configured	Select the flow input. The binary input or the current input must be configured for this function. Only the inputs configured as a flow input are displayed.
Sampling interval	1.000 to 9999.000 m^3 **Factory setting** 10,000 m^3	Set the sampling interval. The unit and the number of decimal places are displayed as configured under Setup/Inputs.
Sampling volume	10 to 10000 ml **Factory setting** 100 ml	Set the sampling volume. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples.
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (in days, hours and minutes) after which the system should change to the next bottle.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Multiple bottles	0 to 23 The configuration options depend on the current number of bottles. **Factory setting** 0	Multiple bottles: "Simultaneous" transfer of two samples to separate bottles.
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number **Factory setting** None	None: The time of sampling and bottle change are not synchronized. 1. bottle change time: Sampling starts with the first bottle. 1. Time of change + bottle number: Each bottle is assigned to a specific fill time.
If Bottle change mode **External signal** is selected:		
Bottle change signal input	Options ▪ No bottle change input configured **Factory setting** No bottle change input configured	The bottle change input can be configured under ▶ Inputs .
Multiple bottles	0 to 23 The configuration options depend on the current number of bottles **Factory setting** 0	Multiple bottles: "Simultaneous" transfer of two samples to separate bottles.
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.
If Start condition **Immediate** is selected:		
Sample at start	Options ▪ Yes ▪ No **Factory setting** Yes	Yes: The first sample is taken when the program is started. No: The system waits for the interval to elapse before the first sample is taken.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Settings with a time/flow-paced Basic program

Settings with the Basic program type with 1 bottle

Sampling mode = "Time/flow paced CTVV"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Sampling volume input	Options ▪ No flow input configured ▪ Binary input S:x ▪ Current input S:x **Factory setting** No flow input configured	Select the sampling volume input. The binary input or the current input must be configured for this function. Only the inputs configured as a sampling volume input are displayed.
Sampling interval	00:01:00 to 99:59:00 HH:MM:SS **Factory setting** 00:10:00 HH:MM:SS	Set the sampling interval.
If Sampling volume input **Binary input** is selected:		
Sampling volume / pulse	10 to 1000 ml **Factory setting** 20 ml	Set what sampling volume should be grabbed per pulse. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
If Sampling volume input **Current input** is selected:		
Sampling volume 20mA	10 to 10000 ml **Factory setting** 100 ml	Set what sampling volume should be grabbed at 20 mA. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
Flow calculation	Options ▪ Current ▪ Average flow **Factory setting** Current	**Current:** The current flow is converted to the sampling volume at the time of sampling. **Average flow:** The system calculates the mean between the last and the current sample and sets the sampling volume accordingly.
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples.
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (days, hours and minutes) after which the system should change to the next bottle.
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number **Factory setting** None	None: The time of sampling and bottle change are not synchronized. 1. bottle change time: Sampling starts with the first bottle. Set the synchronization time. 1. Time of change + bottle number: Each bottle is assigned to a specific fill time. Set the synchronization time and the weekday.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Settings with the Basic program type with multiple bottles

Sampling mode = "Time/flow paced CTVV"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Sampling volume input	Options ▪ No flow input configured ▪ Binary input S:x ▪ Current input S:x **Factory setting** No flow input configured	Select the sampling volume input. The binary input or the current input must be configured for this function. Only the inputs configured as a sampling volume input are displayed.
Sampling interval	00:01:00 to 99:59:00 HH:MM:SS **Factory setting** 00:10:00 HH:MM:SS	Set the sampling interval.
If Sampling volume input **Binary input** is selected:		
Sampling volume / pulse	10 to 1000 ml **Factory setting** 20 ml	Set what sampling volume should be grabbed per pulse. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
If Sampling volume input **Current input** is selected:		
Sampling volume 20mA	10 to 10000 ml **Factory setting** 100 ml	Set what sampling volume should be grabbed at 20 mA. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
Flow calculation	Options ▪ Current ▪ Average flow **Factory setting** Current	**Current:** The current flow is converted to the sampling volume at the time of sampling. **Average flow:** The system calculates the mean between the last and the current sample and sets the sampling volume accordingly.
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed either after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (in days, hours and minutes) after which the system should change to the next bottle.
Multiple bottles	0 to 23 The configuration options depend on the current number of bottles **Factory setting** 0	Multiple bottles: "Simultaneous" transfer of two samples to separate bottles.
If Bottle change mode **External signal** is selected:		
Bottle change signal input	Options ▪ No bottle change input configured ▪ Binary input S:x **Factory setting** No bottle change input configured	The bottle change input can be configured under ▶ Inputs .
Multiple bottles	0 to 23 The configuration options depend on the current number of bottles **Factory setting** 0	Multiple bottles: "Simultaneous" transfer of two samples to separate bottles.
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Settings with a Basic program and external signal

Settings with the Basic program type with 1 bottle

Sampling mode = "External signal"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Sampling volume	10 to 1000 ml **Factory setting** 100 ml	Enter the sample volume.
Sampling signal input	Options ▪ No sampling input configured **Factory setting** No sampling input configured	Select the input for the sampling signal. The fieldbus must be configured for this function. The sampling input can be configured under ▶ Inputs .
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples.
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (days, hours and minutes) after which the system should change to the next bottle.
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number **Factory setting** None	None: The time of sampling and bottle change are not synchronized. 1. bottle change time: Sampling starts with the first bottle. Set the synchronization time. 1. Time of change + bottle number: Each bottle is assigned to a specific fill time. Set the synchronization time and the weekday.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.
If Start condition **Immediate** is selected:		
Sample at start	Options ▪ Yes ▪ No **Factory setting** Yes	Yes: The first sample is taken when the program is started. No: The system waits for the interval to elapse before the first sample is taken.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Settings with the Basic program type with multiple bottles
Sampling mode = "External signal"

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Sampling volume	10 to 1000 ml **Factory setting** 100 ml	Enter the sample volume.
Sampling signal input	Options ▪ No sampling input configured **Factory setting** No sampling input configured	Select the input for the sampling signal. The fieldbus must be configured for this function. The sampling input can be configured under ▶ Inputs .
Bottle change mode	Options ▪ Number of samples ▪ Time ▪ External signal **Factory setting** Number of samples	The bottle can be changed either after a specific number of samples, after a time or by an external signal.
If Bottle change mode **Number of samples** is selected:		
Samples per bottle	1 to 9999 **Factory setting** 1	Set the number of samples.
If Bottle change mode **Time** is selected:		
Time interval	00-00:02 to 31-00:00 DD-HH:MM **Factory setting** 00-01:00 DD-HH:MM	Set the time (in days, hours and minutes) after which the system should change to the next bottle.
If Bottle change mode **External signal** is selected:		
Bottle change signal input	Options ▪ No bottle change input configured **Factory setting** No bottle change input configured	The bottle change input can be configured under ▶ Inputs .
Multiple bottles	0 to 23 The configuration options depend on the current number of bottles **Factory setting** 0	Multiple bottles: "Simultaneous" transfer of two samples to separate bottles.

Path: Menu/Setup/Sampling programs/Setup program/New/Basic

Function	Options	Info
Start condition	Options ▪ Immediate ▪ Date/time **Factory setting** Immediate	The sampling program can be started either immediately or at a specific, configurable time.
If Start condition **Immediate** is selected:		
Sample at start	Options ▪ Yes ▪ No **Factory setting** Yes	Yes: The first sample is taken when the program is started. No: The system waits for the interval to elapse before the first sample is taken.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
Stop condition	Options ▪ Program end ▪ Continuous **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

10.3.3 Program types: Standard and Advanced

A Standard program can comprise a maximum of 5 subprograms. An Advanced program can comprise a maximum of 24 subprograms. These subprograms can be run simultaneously or consecutively.
Each event subprogram can consist of up to 3 conditions.
As the device contains dual bottle trays, you can assign a program easily, and easily detect a change in the program.

Settings for the Standard program

Path: Menu/Setup/Sampling programs

Function	Options	Info
▶ Setup program		
New		A list of all the programs created is displayed. For this reason, it is often helpful to add an "S" for Standard in the program name.
▶ Standard		
Program name	Customized text	Use a distinct name for your sampling program. The program name can be up to 16 characters long.
Bottle configuration	Choice of all possible bottle combinations	The ordered bottle configuration is preset or the configuration selected in the setup is displayed.
Bottle volume	0 to 100000 ml **Factory setting** 30000 ml	Set the bottle volume.
Start condition	Options ▪ Immediate ▪ Date/time ▪ Volume **Factory setting** Immediate	The sampling program can be started either immediately, at a specific, configurable time, or when a certain totalized flow is reached.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.

Path: Menu/Setup/Sampling programs

Function	Options	Info
If Start condition **Volume** is selected:		
Start volume input	Options ▪ No flow input configured ▪ Binary input S:x ▪ Current input S:x **Factory setting** No flow input configured	Select the start volume input. The binary input or the current input must be configured for this function. Only the inputs configured for flow measurement are displayed.
Start flow sum	1.000 to 9999.000 m^3 **Factory setting** 10,000 m^3	Set the start volume.
Stop condition	Options ▪ Program end ▪ Continuous ▪ Date/time **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. All the assigned bottles are filled. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles. **Date/time:** The device stops the set program at a specific time.
If Stop condition **Date/time** is selected:		
Stop date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the stop date for the sampling program. The format depends on the option configured under general settings.
Stop time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is stopped. The format depends on the option configured under general settings.
▶ Setup subprogram		
New		
Programpart		Use a distinct name for your subprogram. The program name can be up to 16 characters long.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Sampling mode	Options ▪ Time paced CTCV ▪ Flow paced VTCV ▪ Time/flow paced CTVV ▪ External signal **Factory setting** Time paced CTCV	**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. **External signal** A pulse at the binary input starts a sampling cycle
The settings that depend on the sampling mode are listed in the "Program type: Basic" section.		
Enable subprogram	Options ▪ Immediate ▪ Individual dates ▪ Repeating date ▪ Interval ▪ Deactivation **Factory setting** Immediate	**Immediate:** The subprogram is enabled immediately. **Individual dates:** Set the start and stop dates for enabling the subprogram. **Repeating date:** Set the start condition, activity time and repetition interval for the subprogram. **Interval:** Set the start condition, activity time and inactivity time for the subprogram. **Deactivation:** Only visible if there is more than one subprogram
If Enable subprogram **Individual dates** is selected:		
▶ Individual dates Set the start and stop times for the subprogram. Enter a new date via "INSERT". Delete a date via "DELETE". You can assign a maximum of 25 start and stop dates.		
If Enable subprogram **Repeating date** is selected:		
Start condition	Options ▪ No delay ▪ Date/Time ▪ Time **Factory setting** No delay	**No delay:** The subprogram is started when the program is enabled. **Date/Time:** Set the start date and start time for enabling the subprogram. **Time:** Set the start time for enabling the subprogram.
Activity time	00:01 to 99:59 HH:MM **Factory setting** 00:01 HH:MM	Specify how long the subprogram should be active in hours and minutes. The time to be selected depends on the setting for the repetition mode.
▶ Multiple date		

Path: Menu/Setup/Sampling programs

Function	Options	Info
Repetition mode	Options ▪ Daily interval ▪ Weekly interval ▪ Days of week **Factory setting** Daily interval	**Daily interval**: Specify whether the subprogram should be repeated every day. **Weekly interval**: Specify whether the subprogram should be repeated every week. **Days of week**: Specify whether the subprogram should be repeated on certain days of the week. --> Select the days of the week in the subsequent menu item.
Repetition interval (only for Daily interval and Weekly interval)	1 to 999 **Factory setting** 1	Specify for how many days or weeks the subprogram should be active. Example: Repetition mode = daily interval Repetition interval = 2 The subprogram is enabled every second day from the start condition.
If Enable subprogram **Interval** is selected:		
Start condition	Options ▪ No delay ▪ Date/Time ▪ Time **Factory setting** Date/Time	**No delay:** The subprogram is started when the program is enabled. **Date/Time:** Set the start date and start time for enabling the subprogram. **Time:** Set the start time for enabling the subprogram.
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the 1st interval. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time for the 1st interval. The format depends on the option configured under general settings.
Activity time	00-00:01 to 31-00:00 DD-HH:MM **Factory setting** 00-00:01 DD-HH:MM	Specify how long the subprogram should be active in days, hours and minutes. The subprogram always begins with an activation.
Inactivity time	00-00:01 to 31-00:00 DD-HH:MM **Factory setting** 00-00:01 DD-HH:MM	Specify how long the subprogram should be inactive in days, hours and minutes.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Sample at enable	Options ▪ No ▪ Yes **Factory setting** Yes	Specify whether the first sample should be taken directly when the subprogram is enabled. For example, with intervals, a sample is taken at the start of every activation interval.
Sample at disable	Options ▪ No ▪ Yes **Factory setting** No	Specify whether a sample should be taken when the subprogram is disabled. For example, with intervals, a sample is taken at the end of every activation interval.
New bottle at disable	Options ▪ No ▪ Yes **Factory setting** Yes	
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number ▪ External BC sync input **Factory setting** None	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.. **None** The time of sampling and bottle change are not synchronized. **1. bottle change time** Sampling starts with the first bottle. The changeover to the next bottles is synchronized. **1. Time of change + bottle number** A specific fill time is assigned to each bottle. **External BC sync input** The system changes to the next bottle when an external signal is received. The external signal first has to be configured via the binary input. The binary input can then be selected as the source.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
Use "SAVE" to save the subprogram setup. Then press "ESC" to return to the main program. A prompt to save the program appears if you have not yet saved the subprogram. You can avoid saving the program by pressing "ESC".		
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Bottle assignment (only possible with multiple bottles) This menu item appears when more than one bottle is available, regardless of the number of subprograms.	Options ▪ No bottle assignment ▪ Dynamical bottle assignment ▪ Statical bottle assignment **Factory setting** Dynamical bottle assignment	**No bottle assignment:** Each subprogram fills the same bottle until the bottle is full. All the subprograms then change to the next bottle. Only visible if there is more than one subprogram. **Dynamical bottle assignment:** When the subprogram changes, the system switches to the next empty bottle. **Statical bottle assignment:** A table can be used to assign a subprogram to each bottle.
Via the "Bottle change" menu item, the bottle change can be configured after a certain time or number of samples if bottle distribution with more than one bottle has been selected and either dynamic or static bottle assignment has been selected.		
If Bottle assignment **Statical bottle assignment** is selected:		
▶ Bottle assignment table Select a bottle and assign it a subprogram.		

Settings for the Advanced program

Path: Menu/Setup/Sampling programs

Function	Options	Info
▶ Setup program		
New		A list of all the programs created is displayed. For this reason, it is often helpful to add an "A" for Advanced in the program name.
▶ Advanced		
Program name	Customized text	Use a distinct name for your sampling program. The program name can be up to 16 characters long.
Bottle configuration	Choice of all possible bottle combinations	The ordered bottle configuration is preset or the configuration selected in the setup is displayed.
Bottle volume	10 to 100000 ml **Factory setting** 30000 ml	Set the bottle volume.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Start condition	Options ▪ Immediate ▪ Date/time ▪ Volume ▪ External start ▪ External duration **Factory setting** Immediate	**Immediate** The sampling program is started immediately. **Date/time** The sampling program is started at a specific time that can be configured. **Volume** The sampling program is started when a certain totalized flow is reached. **External start** The sampling program is started by a pulse at the configured binary input. **External duration** The sampling program is active as long as the configured input has the corresponding level.
If Start condition **Date/time** is selected:		
Start date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the start date for the sampling program. The format depends on the option configured under general settings.
Start time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is started. The format depends on the option configured under general settings.
If Start condition **Volume** is selected:		
Start volume input	Options ▪ No flow input configured ▪ Binary input S:x ▪ Current input S:x **Factory setting** No flow input configured	Select the start volume input. The binary input or the current input must be configured for this function. Only the inputs configured for flow measurement are displayed.
Start flow sum	1.000 to 9999.000 m^3 **Factory setting** 10,000 m^3	Set the start volume.
If Start condition **External start** is selected:		
Start signal input	Options ▪ No program start input configured ▪ Binary input S:x **Factory setting** No program start input configured	Select the program start input. The binary input must be configured for this function. Only the inputs configured as a program start input are displayed.

Path: Menu/Setup/Sampling programs

Function	Options	Info
If Start condition **External duration** is selected:		
Start signal input	Options ▪ No program duration input configured ▪ Binary input S:x **Factory setting** No program duration input configured	Select the program duration input. The binary input must be configured for this function. Only the inputs configured as a program duration input are displayed.
Stop condition (not for External start)	Options ▪ Program end ▪ Continuous ▪ Date/time ▪ External signal **Factory setting** Program end	**Program end:** The device stops sampling automatically once it has run through the set program. **Continuous:** The device runs through the set program continuously in an infinite loop. Do not forget to empty the bottles. **Date/time:** The device stops the set program at a specific time. **External signal:** The device stops the set program if a pulse is sent to a binary input configured accordingly.
If Stop condition **Date/time** is selected:		
Stop date	01.01.2000 to 31.12.2099 **Factory setting** DD.MM.YYYY	Set the stop date for the sampling program. The format depends on the option configured under general settings.
Stop time	00:00:00 to 23:59:59 **Factory setting** HH:MM:SS (24h)	Set the time when the sampling program is stopped. The format depends on the option configured under general settings.
If Stop condition **External signal** is selected:		
Stop signal input	Options ▪ No program stop input configured ▪ Binary input S:x **Factory setting** No program stop input configured	Select the program stop input. The binary input must be configured for this function. Only the inputs configured as a program stop input are displayed.
▶ Setup subprogram		
New		
Programpart		Use a distinct name for your subprogram. The program name can be up to 16 characters long.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Sampling mode	Options ▪ Time paced CTCV ▪ Flow paced VTCV ▪ Time/flow paced CTVV ▪ Single sample ▪ Sampling table ▪ External signal **Factory setting** Time paced CTCV	**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. **Single sample:** The device takes a single sample with a specific volume. **Sampling table:** The time and the sampling volume is assigned to a certain bottle in the sampling table. **External signal:** A sample is taken when an external signal is received.
The settings that depend on the sampling mode (time-paced, flow-paced and time/flow-paced sampling) are listed in the "Program type: Basic" section.		
If Sampling mode **Single sample** is selected:		
Sampling volume	10 to 10000 ml **Factory setting** 100 ml	Set the sampling volume. The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.
If Sampling mode **Sampling table** is selected:		
▶ Sampling table Assign the time and sampling volume to a certain bottle. Add a new entry via "INSERT". Delete an entry via "DELETE". You can make a maximum of 24 entries.		
Example: - Bottle: 1 - Bottle: 2 ...	 - Delta (=waiting time): 01:00:00 - Delta (=waiting time): 00:10:00	 - Volume: 100 ml - Volume: 100 ml
1st sampling one hour after program start: 100 ml in bottle 1 2nd sampling 10 minutes later: 100 ml in bottle 2 The sampling table indicates: After the defined "Delta time" (column 2) the volume of column 3 will be dosed into the bottle of column 1.		

Path: Menu/Setup/Sampling programs

Function	Options	Info
If Sampling mode **External signal** is selected:		
Sampling signal input	Options ▪ No sampling input configured ▪ Binary input S:x **Factory setting** No sampling input configured	Select the input for the sampling signal. The binary input must be configured for this function. Only the configured inputs are displayed.
Enable subprogram	Options ▪ Immediate ▪ Individual dates ▪ Repeating date ▪ Interval ▪ Event ▪ External start ▪ Deactivation **Factory setting** Immediate	**Immediate:** The subprogram is enabled immediately. **Individual dates:** Set the start and stop dates for enabling the subprogram. **Repeating date:** Set the start condition, activity time and repetition interval for the subprogram. **Interval:** Set the start condition, activity time and inactivity time for the subprogram. **Event:** The subprogram is enabled by an event. Up to 3 measuring signals are linked to form a start signal using And/Or logic. **External start:** The subprogram is enabled by a pulse at a binary input configured accordingly. **Deactivation:** Subprogram 2 or 2+n is started as soon as subprogram 1 is disabled. (Only possible with multiple subprograms)
The settings (Immediate, Individual dates, Repeating date and Interval) that depend on the activation of the subprogram are listed in the "Program type: Standard" section.		
If Enable subprogram **Event** is selected:		
Start condition	Options ▪ No delay ▪ Date/Time ▪ Time **Factory setting** No delay	**No delay:** The subprogram is started when the program is enabled. **Date/Time:** Set the start date and start time for enabling the subprogram. **Time:** Set the start time for enabling the subprogram.
▶ Activation event		

Path: Menu/Setup/Sampling programs

Function	Options	Info
Number of events	Options ▪ 1 ▪ 2 ▪ 3 **Factory setting** 1	Specify how many measuring inputs (1-3) you want to link to generate an activation signal.
▶ Event Editor 1 If you have more than one event editor, the "Event editor" menu item appears often. Use the "Link" menu item to configure the logical link between the signals.		
Source of data	Options ▪ None ▪ Binary input S:x ▪ Current input S:x ▪ Temperature input (depending on the version and sensor) **Factory setting** None	Select the input via which the activation event is to be output. The inputs are configured in the "Setup/Inputs" menu. The binary inputs are only visible if they have been configured accordingly (rainfall or flow).
Measured value	Options (depends on sensor/data source) ▪ None ▪ Totalized flow **Factory setting** None	
Operating mode	Options ▪ Upper limit ▪ Lower limit ▪ Within range ▪ Out of range ▪ Rate of change **Factory setting** Upper limit	Type of limit value monitoring: ▪ Limit value overshoot or undershoot ▪ Measured value within or outside a range ▪ Rate of change
Limit value	**Range of adjustment and factory setting** Depends on the measured value	*Operating mode="Above limit check" or "Below limit check"* ▪ The event is triggered if the limit value + hysteresis is exceeded for the switch-on duration. ▪ The event is reset again if the limit value - hysteresis is undershot for the duration of the switch-off delay at least.
Range lower value Range upper value	**Range of adjustment and factory setting** Depends on the measured value	*Operating mode="In range check" or "Out of range check"* ▪ The event is triggered if the range lower value + hysteresis is exceeded for the switch-on duration. ▪ The event is reset again if the range upper value - hysteresis is undershot for the duration of the switch-off delay at least.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Hysteresis	**Range of adjustment and factory setting** Depends on the measured value	The hysteresis is the difference between the switch-on point and the switch-off point if values, which cause the limit switch to pick up, become closer or move further apart. It is needed to ensure a stable switching behavior.
Start delay	0 to 9999 s **Factory setting** 0 s	Synonyms: pick-up and drop-out delay
Switch off delay		
Delta value	**Range of adjustment and factory setting** Depends on the measured value	*Operating mode="Change rate"* The event is triggered if the measured value changes by at least the delta value (both positive and negative) within the set delta time. The event is deleted as soon as the rate of change is lower than the set value and the auto confirmation time has elapsed.
Delta time	00:01 to 23:59 **Factory setting** 01:00	
Auto Confirm	00:01 to 23:59 **Factory setting** 00:01	
If Enable subprogram **External start** is selected:		
Activation input	Options ▪ No program part start input configured ▪ Binary input S:x **Factory setting** No program part start input configured	Select the input for start of the subprogram. The binary input must be configured for this function. Only the configured inputs are displayed.
Sample at enable (not for single sample and sampling table)	Options ▪ No ▪ Yes **Factory setting** Yes	Specify whether the first sample should be taken directly when the subprogram is enabled.
Sample at disable (not for single sample and sampling table and also not for "Immediate" and event)	Options ▪ No ▪ Yes **Factory setting** No	Specify whether a sample should be taken when the subprogram is disabled.

Path: Menu/Setup/Sampling programs

Function	Options	Info
Deactivation	Options ▪ Bottles full ▪ Enable invalid ▪ Deactivation with event **Factory setting** Enable invalid	Select the disable function of the subprogram: **Bottles full** The subprogram is disabled once all the assigned bottles have been filled. **Enable invalid** Disable via limit value **Deactivation with event** New parameter can be defined
Bottle change mode	Options ▪ No ▪ Yes **Factory setting** Yes	**No:** The bottle is changed following a disable/enable **Yes:** When the cycle is finished, the system continues filling the last bottle.
Synchronize samplings	Options ▪ To subprogram start ▪ To clock **Factory setting** To subprogram start	**To subprogram start** The intervals defined in the sampling mode are enabled when the subprogram is started. **To clock** The intervals defined in the sampling mode are enabled after a specific time. For example, if 30 min is entered this means that the interval is only activated at a time of xx:30. --> You configure this time in the "Offset synchronization" menu item.
Bottle synchronization	Options ▪ None ▪ 1. bottle change time ▪ 1. Time of change + bottle number ▪ External BC sync input **Factory setting** None	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.. **None** The time of sampling and bottle change are not synchronized. **1. bottle change time** Sampling starts with the first bottle. The changeover to the next bottles is synchronized. **1. Time of change + bottle number** A specific fill time is assigned to each bottle. **External BC sync input** The system changes to the next bottle when an external signal is received. The external signal first has to be configured via the binary input. The binary input can then be selected as the source.
Assignment bin. output	Options ▪ No binary output configured ▪ Binary output S:x **Factory setting** No binary output configured	Assignment of the binary output to the program cycle.
Use "SAVE" to save the subprogram setup. Then press "ESC" to return to the main program.		

Path: Menu/Setup/Sampling programs

Function	Options	Info
▶ Inputs		Settings for the inputs can be made as described in the "Inputs" section.
Bottle assignment (only possible with multiple bottles) This menu item does not appear unless 2 or more bottles are available.	Options ▪ No bottle assignment ▪ Dynamical bottle assignment ▪ Statical bottle assignment **Factory setting** No bottle assignment	**No bottle assignment:** Each subprogram fills the same bottle until the bottle is full. All the subprograms then change to the next bottle. **Dynamical bottle assignment:** When the subprogram changes, the system switches to the next bottle. **Statical bottle assignment:** A table can be used to assign a subprogram to each bottle.
Via the "Bottle change" menu item, the bottle change can be configured after a certain time or number of samples if more than 1 subprogram is available and either dynamic or static bottle assignment has been selected.		
If Bottle assignment **Statical bottle assignment** is selected:		
▶ Bottle assignment table Select a bottle and assign it a subprogram.		

10.3.4 Selecting and executing the program

In the overview, you can see all the programs created under "Select sampling program". Here, you also have the possibility of creating a new program with "New". Using the navigator, you can select the program you want to execute here and then choose from the following items: "Edit", "Delete", "Start", "Duplicate or "Cancel".

Path: Setup program

Function	Info
▶ Edit	The selected program is displayed and can be edited. Press the "SAVE" key to save the changes.
▶ Delete	The selected program is deleted following a confirmation prompt.
▶ Start	The selected program is started immediately. The program can be canceled or paused by pressing the "OFF" key. If there are differences between the setup and the selected program, the "Program configuration contains errors!" message appears, e.g. the bottle configuration in the program does not match the configuration in the setup. The program is not started. In this example, the actual bottle configuration must be checked against the configuration in the setup and the program and changed accordingly. Only the bottle configuration entered in the setup is valid for the program to be executed.
▶ Duplicate	The selected program is duplicated and saved with an ID.
▶ Cancel	Back to the overview.

The "Setup program" display contains the "ESC", "MAN", "?" and "OFF" soft keys.

Path: Setup program

Function	Info
▶ ESC	Back to the overview. Any program currently running is canceled.
▶ MAN	Manual sampling can be configured and started here. Any program currently running is paused. -> See "Sampling program/Manual sampling" section
▶ ?	A help text is displayed for the item.
▶ OFF	If no program is enabled, the device can be switched off here. If a program is enabled, the following options appear: **Power down sampler:** Following a confirmation prompt, the device is set to the standby mode. Power continues to be supplied to the device and the LED flashes green. **Stop program %0V:** [1)] Stops a program currently running following a confirmation prompt. The overview display appears. **Pause program %0V:** Is selected if maintenance work is pending. The program is paused and the pause time is entered in the logbook. The current program is resumed when the "Resume program" button is pressed.

Path: Program active

Function	Info
▶ ESC	Back to the overview. Any program currently running is canceled.
▶ STAT	For selecting statistics about measured values, sampling and inputs See "Display settings" section.
▶ OFF	If no program is enabled, the device can be switched off here. If a program is enabled, the following options appear: **Power down sampler:** Following a confirmation prompt, the device is set to the standby mode. Power continues to be supplied to the device and the LED flashes green. **Stop program %0V:**[1)] Stops a program currently running following a confirmation prompt. The overview display appears. **Pause program %0V:** Is selected if maintenance work is pending. The program is paused and the pause time is entered in the logbook. The current program is resumed when the "Resume program" button is pressed.

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

10.4 Inputs

Liquiport 2010 CSP44 is fitted with the number of inputs specified in the order option. All inputs are galvanically isolated from one another.

10.4.1 Binary inputs

The binary inputs are used to control the sampler using external signals.
With the CSP44, the power supply is made available at the multiple I/O socket (see "Electrical connection" section).

Path: Menu/Setup/Inputs

Function	Options	Info
▶ Binary input S:x		
Mode	Options ▪ Off ▪ On **Factory setting** Off	Switches the function on or off
Input mode	Options ▪ Flow rate ▪ Rainfall ▪ External event **Factory setting** Flow rate	▪ Pulse input for connected flowmeters or rain gages ▪ Control of sampling functions via external signals
If Input mode **Flow rate** is selected:		
Signal slope	Options ▪ Low-High ▪ High-Low **Factory setting** Low-High	Preselect the level change of the signal.
Unit	Options ▪ m^3 ▪ l ▪ cf ▪ gal **Factory setting** m^3	Select the unit.
Meas. value format	**Factory setting** #.#	Specify the number of decimal places for the flow.
1 Impulse =	0 to 1000 m^3 **Factory setting** 10 m^3	Definition of the pulse value, limits are calculated depending on the unit

Path: Menu/Setup/Inputs

Function	Options	Info
▶ Unit of totalized flow		
Current totalized flow	- - -	The totalized flow values are displayed.
Reset totalizer	Options ▪ Manual ▪ Automatic ▪ At program start **Factory setting** Manual	**Manual:** Reset the counter manually. **Automatic:** The counter is reset automatically at intervals. **At program start:** The counter is reset at program start.
If counter reset **Manual** is selected:		
▷ Reset totalized flow	Action	The totalized flow currently calculated is set to zero when the counter is reset.
If counter reset **Automatic** is selected:		
Interval	Options ▪ Daily ▪ Weekly ▪ Monthly **Factory setting** Daily	**Daily:** If a daily interval is selected, set the Time in the menu item that follows. **Weekly:** If a weekly interval is selected, set the Day of week and the Time in the menu items that follow. **Monthly:** If a monthly interval is selected, set the Day of month and the Time in the menu items that follow.
Time	00:00:00 to 23:59:59 HH:MM:SS **Factory setting** 12:00:00 HH:MM:SS	
If Input mode **Rainfall** is selected:		
Signal slope	Options ▪ Low-High ▪ High-Low **Factory setting** Low-High	Preselect the level change of the signal.
Unit	Options ▪ mm ▪ inch **Factory setting** mm	Select the unit.
Meas. value format	**Factory setting** #.#	Specify the number of decimal places.
1 Impulse =	0.00 to 5.00 mm **Factory setting** 1.0 mm	Definition of the pulse value, limits are calculated depending on the unit. The correct switch value is provided in the Operating Instructions of your rain gage.

Path: Menu/Setup/Inputs

Function	Options	Info
Intensity	Options ▪ mm/min ▪ mm/h ▪ mm/d **Factory setting** mm/min	Select the intensity per minute, hour or day according to your requirements.
▶ Totalized rainfall		
Totalized rainfall	- - -	The totalized rainfall is displayed.
Reset totalizer	Options ▪ Manual ▪ Automatic ▪ At program start **Factory setting** Manual	**Manual:** Reset the counter manually. **Automatic:** The counter is reset automatically at intervals. **At program start:** The counter is reset at program start.
If counter reset **Manual** is selected:		
▷ Reset totalized rainfall	Action	The totalized rainfall currently calculated is set to zero when the meter is reset manually.
If counter reset **Automatic** is selected:		
Interval	Options ▪ Daily ▪ Weekly ▪ Monthly **Factory setting** Daily	**Daily:** If a daily interval is selected, set the Time in the menu item that follows. **Weekly:** If a weekly interval is selected, set the Day of week and the Time in the menu items that follow. **Monthly:** If a monthly interval is selected, set the Day of month and the Time in the menu items that follow.
Time	00:00:00 to 23:59:59 HH:MM:SS **Factory setting** 12:00:00 HH:MM:SS	

Path: Menu/Setup/Inputs

Function	Options	Info
If Input mode **External event** is selected:		
Operation	Options ▪ No operation ▪ Start sampling ▪ Program start ▪ Program stop ▪ Program duration ▪ Program pause ▪ Partprogram activation ▪ Change bottle ▪ Bottle synchronization ▪ External hold ▪ Start cleaning **Factory setting** No operation	**No operation**: No action is executed. **Start sampling**: A pulse triggers sampling. **Program start**: A pulse starts a program. **Program stop**: A pulse stops the program running. **Program duration**: A program is active as long as the input signal is present. The signal is a level signal, i.e. the action takes effect as long as the level is present. The level that triggers the action is configured in the Signal slope menu item that follows. **Program pause**: The input signal stops the program running. The programs continue running when the signal disappears. The signal is a level signal, i.e. the action takes effect as long as the level is present. The level that triggers the action is configured in the Signal slope menu item that follows. **Partprogram activation**: A pulse triggers a subprogram. **Change bottle**: A pulse triggers a changeover to the next bottle. **Bottle synchronization**: A pulse triggers a changeover to the set bottle position. --> Then select the bottle position (depends on the bottle configuration). **External hold**: The input signal triggers an external hold. The signal is a level signal, i.e. the action takes effect as long as the level is present. The level that triggers the action is configured in the Signal slope menu item that follows. **Start cleaning**: A pulse triggers the cleaning.
Signal slope	Options ▪ Low-High ▪ High-Low **Factory setting** Low-High	Preselect the level change of the signal. --> If Low-High is selected, the high level brings about the corresponding setting.
▷ Binary input assignment view		Overview of the outputs to which this binary input is linked.

10.4.2 Current inputs

The current input must be assigned an analog signal for the functions described. Active and passive current inputs are optionally available to connect two-wire or four-wire devices.

For the correct wiring of the current inputs, see:
"Electrical connection" section

Path: Menu/Setup/Inputs

Function	Options	Info
▶ Current input S:x		
Mode	Options ▪ Off ▪ 0..20 mA ▪ 4..20 mA **Factory setting** Off	Enter the output signal of the connected device: 0 to 20 mA or 4 to 20 mA.
Input mode	Options ▪ Flow rate ▪ Parameter ▪ Current **Factory setting** Current	Select the input variable. **Flow rate:** The input can be used as the source for time/flow-paced or flow-paced sampling programs. **Parameter:** The input can be used as the source for limit switches, logbooks and enabling and disabling events for sampling programs. **Current:** The input can be used as the source for limit switches, logbooks and enabling and disabling events for sampling programs. A unit name cannot be specified.
If Input mode **Flow rate** is selected:		
Unit of flow	Options ▪ l/s ▪ m^3/s ▪ m^3/h ▪ m^3/d ▪ cfs ▪ cfm ▪ gpm ▪ gph ▪ mgd **Factory setting** l/s	Select the unit.
Unit of totalized flow	Options ▪ l ▪ m^3 ▪ cf ▪ gal **Factory setting** m^3	Select the unit for the totalized flow.

Path: Menu/Setup/Inputs

Function	Options	Info
Meas. value format	**Factory setting** #.#	Specify the number of decimal places for the flow.
Minimum flow	0 to 10000 l/s **Factory setting** 0 l/s	The set limit value prevents sampling if the flow falls below this value (only for time/flow-paced sampling).
Lower range value	0 to 10000 l/s **Factory setting** 0 l/s	Enter a value for the start of the measuring range. 0/4 mA is assigned to this value as per your specifications.
Upper range value	0 to 10000 l/s **Factory setting** 100000 l/s	Enter a value for the end of the measuring range. 20 mA is assigned to this value as per your specifications.
Damping	0 to 60 s **Factory setting** 0 s	The damping causes a floating average curve of the measured values over the time specified.
▶ Totalized flow The totalized flow is calculated when the program is started if you use a sampling program with volume, flow-paced sampling or time/flow-paced sampling as the start condition. The samples are taken based on this value. The current totalizer is used for calculating purposes if the totalized flow is used as the measured value for an enabling or disabling event.		
Current totalized flow	- - -	The totalized flow values are displayed.
Reset totalizer	Options ▪ Manual ▪ Automatic ▪ At program start **Factory setting** Manual	**Manual:** Reset the counter manually. **Automatic:** The counter is reset automatically at intervals. **At program start:** The counter is reset at program start.
Flow rate	- - -	The current flow rate is displayed.
If counter reset **Manual** is selected:		
▷ Reset totalized flow	Action	The totalized flow currently calculated is set to zero when the counter is reset.
If counter reset **Automatic** is selected:		
Interval	Options ▪ Daily ▪ Weekly ▪ Monthly **Factory setting** Daily	**Daily:** If a daily interval is selected, set the Time in the menu item that follows. **Weekly:** If a weekly interval is selected, set the Day of week and the Time in the menu items that follow. **Monthly:** If a monthly interval is selected, set the Day of month and the Time in the menu items that follow.

Path: Menu/Setup/Inputs

Function	Options	Info
If Input mode **Parameter** is selected:		
Meas. value format	**Factory setting** #.#	Specify the number of decimal places.
Parameter name	Customized text	Assign a name.
Unit of measure	Customized text	Enter the engineering unit.
Lower range value	-20 to 10000 **Factory setting** 0	Enter a value for the start of the measuring range. 0/4 mA is assigned to this value as per your specifications.
Upper range value	-20 to 10000 **Factory setting** 10	Enter a value for the end of the measuring range. 20 mA is assigned to this value as per your specifications.
Damping	0 to 60 s **Factory setting** 0 s	The damping causes a floating average curve of the measured values over the time specified.
If Input mode **Current** is selected:		
Meas. value format	**Factory setting** #.#	Specify the number of decimal places.
Damping	0 to 60 s **Factory setting** 0 s	The damping causes a floating average curve of the measured values over the time specified.

10.5 Outputs

10.5.1 Binary outputs (optional)

Up to two binary outputs are available as an option.

Possible application
--> For outputting a manipulated variable to connected actuators

The binary output must be assigned in the program or subprogram before it can be activated.

Path: Menu/Setup/Outputs

Function	Options	Info
▶ OutputBinary		
Function	Options ▪ Off ▪ Event ▪ Limit value ▪ Diagnostics message ▪ Cleaning (only for version with sensors with the Memosens protocol) **Factory setting** Off	The following functions depend on the option selected. Function = "Off" switches off the function of the binary output and means no further settings are required.
If Function: **Event** is selected:		
Signal slope	Options ▪ Low-High ▪ High-Low **Factory setting** Low-High	Select the level change of the signal

Path: Menu/Setup/Outputs

Function	Options	Info
Event	Options ▪ Program enabled ▪ End of program ▪ Sampling start ▪ End of sampling ▪ Dosing ▪ Sampling cycle ▪ Bottle change ▪ External stop ▪ No sample ▪ Sub program enabled **Factory setting** Sampling cycle	**Program enabled:** A permanent signal is switched when the sampling program starts. **End of program:** A pulse or permanent signal is switched when the sampling program ends. **Sampling start:** A pulse is switched when a sample is taken. **End of sampling:** A pulse is switched when sampling has ended. **Dosing:** A pulse is switched while the device doses a sample. **Sampling cycle:** The output signal is switched for the duration of the sampling cycle. **Bottle change:** A pulse is switched when a bottle is changed. **External stop:** A pulse is switched when an external stop is performed. **No sample:** The output signal is switched if no sample was taken. **Sub program enabled:** The output signal is switched if this subprogram is active.
If Function: **Limit value** is selected:		
Signal slope	Options ▪ Low-High ▪ High-Low **Factory setting** Low-High	Select the level change of the signal
Source of data	Options ▪ None ▪ Limit switch 1-8 **Factory setting** None	Select the limit switch via which the status of the relay is to be output. The limit switches are configured in the "Setup/Additional functions/LimitSwitch" menu.
If Function: **Diagnostics message** is selected:		
Signal slope	Options ▪ Low-High ▪ High-Low **Factory setting** Low-High	Select the level change of the signal

Path: Menu/Setup/Outputs

Function	Options	Info
Operating mode	Options ▪ as assigned ▪ Namur M ▪ Namur S ▪ Namur C ▪ Namur F **Factory setting** as assigned	**as assigned:** If this option is selected, the diagnostics messages which you have individually assigned to the binary output are output via the binary output. **Namur M - F:** If you decided to use one of the Namur classes, all the messages that are assigned to the individual class are output via the binary output. You can also change the Namur class assignment for every diagnostics message. (Menu/Setup/General settings/Diagnostics/Device behavior or Menu/Setup/Inputs/../Diagnostics settings/Diag. behavior)
▷ Attributed diagnostic messages	Read only List of diagnostic messages	All the messages assigned to the relay output appear on the display. You do not have the option of editing the information here.
If Function: **Cleaning** is selected: (only for version with sensors with the Memosens protocol)		
Signal slope	Options ▪ Low-High ▪ High-Low **Factory setting** Low-High	Select the level change of the signal
Assignment	Options ▪ None ▪ Cleaning 1-4 **Factory setting** None	Use this function to choose the cleaning instance which should be started when the binary output is active.

10.5.2 Current outputs

Up to two optional current outputs are available.
Set the current range from 0 to 20 mA or 4 to 20 mA under Menu/Setup/General settings.

Possible applications
- For outputting a measured value to a process control system or an external recorder
- For outputting a manipulated variable to connected actuators

The current output curve is always linear.

Path: Menu/Setup/Outputs/Current output

Function	Options	Info
Current output	Options ▪ On ▪ Off **Factory setting** Off	Use this function to activate and deactivate a variable being output at the current output
Source of data	Options ▪ None ▪ Connected inputs ▪ Temperature sensors **Factory setting** None	The sources of data on offer depend on your device version. all the sensors and controllers connected to inputs are available for selection.
Measured value	Options ▪ None ▪ Depends on theSource of data **Factory setting** None	The measured value you can select depends on the option selected under "Source of data".
The table on the next page lists the measured values available depending on the data source. In the "Additional functions" menu, you can also select and configure the current output for outputting the controlled variable.		
Range lower value Range upper value	Selection range and factory settings depend on: "Measured value"	You can output the entire measuring range of the "Measured value" or just some of it at the current output. For this purpose, specify the start and end of the range in accordance with your requirements.
Hold behavior	Options ▪ Freeze ▪ Fixed value ▪ None **Factory setting** Depends on the channel:output	**Freeze** The device freezes the last current value. **Fixed value** You define a fixed current value that is output at the output. **None** A hold does not affect this current output.
Hold current *Hold behavior="Fixed value"*	0.0 to 23.0 mA **Factory setting** 22.0 mA	Specify which current should be output at this current output in the event of a hold.

Measured value depending on the Source of data

Source of data	Measured value
pH Glass pH ISFET	Options ▪ Raw value mV ▪ pH ▪ Temperature
ORP	Options ▪ Temperature ▪ ORP mV ▪ ORP %
Oxygen (amp.) Oxygen (opt. WW)	Options ▪ Temperature ▪ Partial pressure ▪ Concentration liquid ▪ Saturation ▪ Raw value nA(only Oxygen (amp.)) ▪ Raw value µs(only Oxygen (opt. WW))
Cond i Cond c	Options ▪ Temperature ▪ Conductivity ▪ Resistance(only Cond c) ▪ Concentration(only Cond i)
Chlorine	Options ▪ Temperature ▪ Current ▪ Concentration
ISE	Options ▪ Temperature ▪ pH ▪ Ammonium ▪ Nitrate ▪ Potassium ▪ Chloride
TU/TS	Options ▪ Temperature ▪ Turbidity g/l ▪ Turbidity FNU
Nitrate	Options ▪ Temperature ▪ NO3 ▪ NO3-N
SAC	Options ▪ Temperature ▪ SAC ▪ Transm. ▪ Absorption ▪ COD ▪ BOD

Measured value depending on the Source of data

Source of data	Measured value
Current input 1-3	Options depend on the configuration
Temperature 1-3	
Mathematical functions	All the mathematical functions can also be used as a data source and the calculated value can be used as the measured value.

10.5.3 Functions of the optional binary outputs

Outputting the status of a limit switch

Function="LimitSwitch"

Function	Options	Info
Source of data	Options ▪ None ▪ Limit switch 1 ▪ Limit switch 2 ▪ Limit switch 3 ▪ Limit switch 4 ▪ Limit switch 5 ▪ Limit switch 6 ▪ Limit switch 7 ▪ Limit switch 8 **Factory setting** None	Select the limit switch via which the status of the relay is to be output. The limit switches are configured in the "Setup/Additional functions/Limit switches" menu.

Outputting diagnostics messages via the relay

You can output two categories of diagnostics messages via the relay:
1. Diagnostic messages from one of the 4 Namur classes
   (--> see the "Adapting diagnostics information" section for more information on the Namur classes)
2. Diagnostics messages which you have individually assigned to the relay output

A message is individually assigned to the relay output at 2 specific points in the menu:
- Menu/Setup/General settings/Diagnostics/Device behavior
  (device-specific messages)
- Menu/Setup/Inputs/../Diagnostics settings/Diag. behavior
  (sensor-specific messages)

Before being able to assign a special message to the relay output in "Device behavior", you must first configure Outputs/relay x:y or /Alarm relay/Function="Diagnostics".

Function="Diagnostics"

Function	Options	Info
Operating mode	Options ▪ as assigned ▪ Namur M ▪ Namur S ▪ Namur C ▪ Namur F **Factory setting** as assigned	**as assigned** If this option is selected, the diagnostics messages which you have individually assigned to the relay are output via the relay. **Namur M... F** If you decided to use one of the Namur classes, all the messages that are assigned to the individual class are output via the relay. You can also change the Namur class assignment for every diagnostics message. (Menu/Setup/General settings/Diagnostics/Device behavior or Menu/Setup/Inputs/../Diagnostics settings/Diag. behavior)
Attributed diagnostic messages *Operating mode="as assigned"*	Read only List of diagnostic messages	All the messages assigned to the relay output appear on the display. You do not have the option of editing the information here.

10.6 Additional functions

10.6.1 Limit switches

There are different ways of configuring a limit switch:
- Assigning a switch-on and switch-off point
- Assigning a switch-on and switch-off delay for a relay
- Setting an alarm threshold and also outputting an error message
- Starting a cleaning function

Path: Menu/Setup/Additional functions/Limit switches/Limit switches 1 to 8

Function	Options	Info
Source of data	Options ▪ None ▪ Connected sensors ▪ Connected inputs ▪ Temperature sensors **Factory setting** None	Specify the input or output which should be the source of data for the limit switch. The sources of data on offer depend on your device version. All the sensors and controllers connected to inputs are available for selection.
Measuring value	Options ▪ None ▪ Depends on theSource of data **Factory setting** None	The measured value you can select depends on the option selected under "Source of data".

Measured value depending on the Source of data

Source of data	Measured value
pH Glass pH ISFET	Options ▪ Raw value mV ▪ pH ▪ Temperature
ORP	Options ▪ Temperature ▪ ORP mV ▪ ORP %
Oxygen (amp.) Oxygen (opt. WW)	Options ▪ Temperature ▪ Partial pressure ▪ Concentration liquid ▪ Saturation ▪ Raw value nA(only Oxygen (amp.)) ▪ Raw value µs(only Oxygen (opt. WW))

Measured value depending on the Source of data

Source of data	Measured value
Cond i	Options ▪ Temperature ▪ Conductivity ▪ Resistance(only Cond c) ▪ Concentration(only Cond i)
Cond c	
Chlorine	Options ▪ Temperature ▪ Current ▪ Concentration
ISE	Options ▪ Temperature ▪ pH ▪ Ammonium ▪ Nitrate ▪ Potassium ▪ Chloride
TU/TS	Options ▪ Temperature ▪ Turbidity g/l ▪ Turbidity FNU
Nitrate	Options ▪ Temperature ▪ NO3 ▪ NO3-N
SAC	Options ▪ Temperature ▪ SAC ▪ Transm. ▪ Absorption ▪ COD ▪ BOD
Current input 1-3	Options depend on the configuration
Temperature 1-3	
Mathematical functions	All the mathematical functions can also be used as a data source and the calculated value can be used as the measured value.

Path: Menu/Setup/Additional functions/Limit switches/Limit switches 1 to 8

Function	Options	Info
Cleaning program	Options ▪ None ▪ Cleaning 1 ▪ Cleaning 2 ▪ Cleaning 3 ▪ Cleaning 4 **Factory setting** None	Use this function to choose the cleaning instance which should be started when the limit switch is active.
Function	Options ▪ On ▪ Off **Factory setting** Off	Activating/deactivating the limit switch
Operating mode	Options ▪ Above limit check ▪ Below limit check ▪ In range check ▪ Out of range check ▪ Change rate **Factory setting** Above limit check	Type of limit value monitoring: ▪ Limit value overshoot or undershoot→ 19 ▪ Measured value within or outside a range→ 20 ▪ Rate of change→ 22
Limit value	**Settings** Depends on the measured value	*Operating mode="Above limit check" or "Below limit check"*

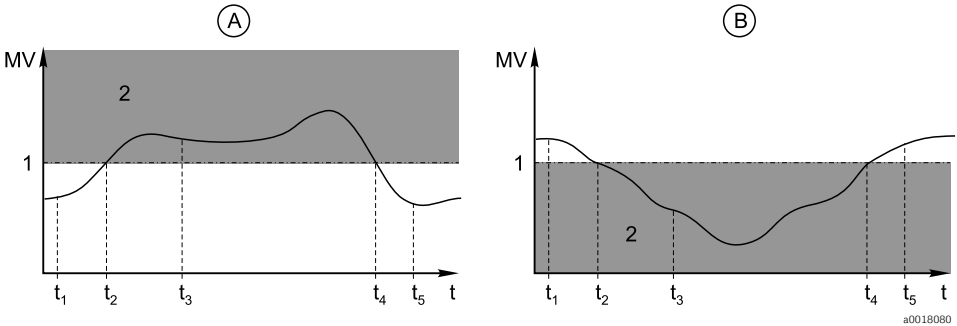


Fig. 19: Limit value exceeded (A) and undershot (B) (without hysteresis and switch-on delay)

1 Limit value
2 Alarm range
t1,t3,t5No action
t2,t4An event is generated

- If the measured values (MV) are increasing, the relay contact is closed when the on-value is exceeded ("Limit value" + "Hysteresis") and the start delay has elapsed ("Start delay").
- If the measured values are decreasing, the relay contact is reset when the off-value is undershot ("Limit value" - "Hysteresis") and following the release delay ("Switch off delay").

Path: Menu/Setup/Additional functions/Limit switches/Limit switches 1 to 8

Function	Options	Info
Range lower value	**Settings** Depends on the measured value	*Operating mode="In range check" or "Out of range check"*
Range upper value		

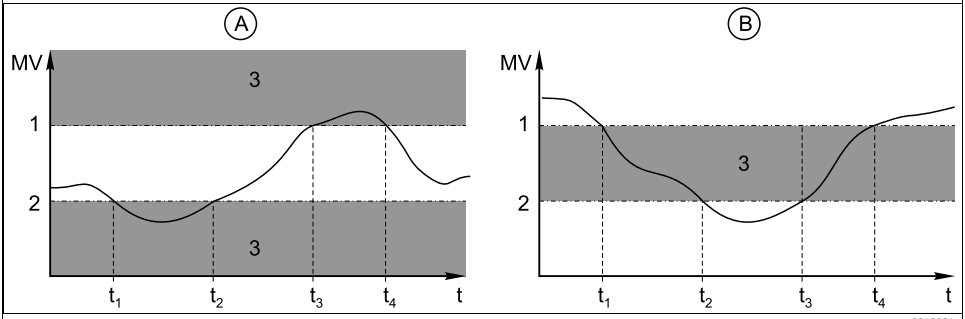
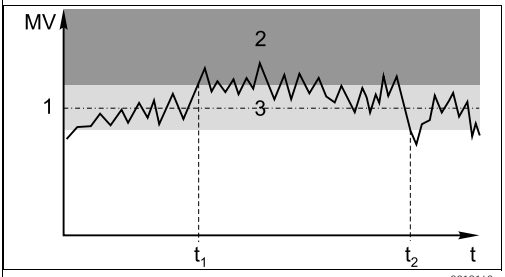


Fig. 20: Monitoring outside (A) and within (B) a range (without hysteresis and switch-on delay)

1 End of range
2 Start of range
3 Alarm range
t1, 2, 3, 4An event is generated

- If the measured values (MV) are increasing, the relay contact is closed when the on-value is exceeded ("Range lower value" + "Hysteresis") and the start delay has elapsed ("Start delay").
- If the measured values are decreasing, the relay contact is reset when the off-value is undershot ("Range upper value" - "Hysteresis") and following the release delay ("Switch off delay").

Hysteresis	**Settings** Depends on the measured value	*Operating mode="In range check", "Out of range check","Above limit check" or "Below limit check"*



The hysteresis is needed to ensure a stable switching behavior.

The device software adds or subtracts the value set here to the upper and lower limit value (Limit value, Range lower value or Range upper value). The result is that the hysteresis range around the limit value is double the value for "Hysteresis".
An event is only generated if the measured value (MV) completely crosses the hysteresis range. → 21

Fig. 21: Hysteresis using the example of limit value overshoot

1 Limit value
2 Alarm range
3 Hysteresis range
t1, t2An event is generated

Path: Menu/Setup/Additional functions/Limit switches/Limit switches 1 to 8

Function	Options	Info
Start delay	0 to 9999 s **Factory setting** 0 s	*Operating mode="In range check", "Out of range check","Above limit check" or "Below limit check"* Synonyms: pick-up and drop-out delay
Switch off delay		
Delta value	**Settings** Depends on the measured value	*Operating mode="Change rate"* The slope of the measured value (MV) is monitored in this mode. An event is generated if, in the specified time frame (Delta time), the measured value increases or drops by more than the specified value (Delta value). If the value continues to increase or drop so sharply afterwards, no other event is generated. Once the slope is back below the limit value, the alarm status is reset after a preset time (Auto Confirm). In the example given, events are triggered when the following conditions occur: $t_2 - t_1$ < "Delta time" **and** ΔMV_1 > "Delta value" $t_4 - t_3$ > "Auto Confirm" **and** ΔMV_2 < "Delta value" $t_6 - t_5$ < "Delta time" **and** ΔMV_3 > ΔMV
Delta time	00:01 to 23:59 **Factory setting** 01:00	
Auto Confirm	00:01 to 23:59 **Factory setting** 00:01	

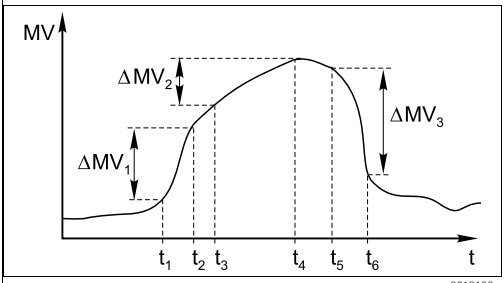


Fig. 22: Rate of change

10.6.2 Mathematical functions

In addition to "real" process values which are delivered by analog inputs or physical sensors connected to the device, you can also calculate a maximum of 6 "virtual" process values using mathematical functions.

The "virtual" process values can be:
- Output via a current output or a fieldbus
- Used as a controlled variable
- Assigned as a measured variable to a limit contactor
- Used as a measured variable to trigger cleaning
- Displayed in user-defined measuring menus.

Difference

You can subtract the measured values of two sensors and use the result to detect incorrect measurements, for example.
To calculate a difference, you must use two measured values with the same engineering unit.

Path: Menu/Setup/Additional functions/Mathematical functions/MF 1 to 6/Mode/Difference

Function	Options	Info
Calculation	Options ▪ Off ▪ On **Factory setting** Off	On/off switch for the function
Y1	The options depend on the sensors connected	Select the sensors and the measured variables that should be used as the minuend (Y1) or subtrahend (Y2).
Measured value		
Y2		
Measured value		
Difference value	Read only	View this value in a user-defined measuring screen or output the value via the current output.

Redundancy

Use this function to monitor two or three sensors with redundant measurements. The arithmetic average of the two closest measured values is calculated and output as the redundancy value.

Path: Menu/Setup/Additional functions/Mathematical functions/MF 1 to 6/Mode/Redundancy

Function	Options	Info
Calculation	Options ▪ Off ▪ On **Factory setting** Off	On/off switch for the function
Y1	The options depend on the sensors connected	You can select different types of sensor that output the same measured value. **Example for temperature redundancy:** You have a pH sensor and an oxygen sensor at inputs 1 and 2. Select both as "Y1" and "Y2". For "Measured value" select the temperature.
Measured value		
Y2		
Measured value		
Y3 (optional)		
Measured value		
Deviation control	Options ▪ Off ▪ On **Factory setting** Off	You can monitor the redundancy. Specify an absolute limit value that may not be exceeded.
Deviation limit	Depends on the selected measured value	
Redundancy	Read only	View this value in a user-defined measuring screen or output the value via the current output.

rH value

To calculate the rH value, a pH sensor and an ORP sensor must be connected. It is irrelevant whether you are using a pH glass sensor, an ISFET sensor or the pH electrode of an ISE sensor.

Path: Menu/Setup/Additional functions/Mathematical functions/MF 1 to 6/Mode/rH calculation

Function	Options	Info
Calculation	Options ▪ Off ▪ On **Factory setting** Off	On/off switch for the function
pH source	Connected pH sensor	Set the input for the pH sensor and the input for the ORP sensor. Measured value interrogation is obsolete as you must select pH or ORP mV.
ORP source	Connected ORP sensor	
Calculated rH	Read only	View this value in a user-defined measuring screen or output the value via the current output.

Degassed conductivity

Carbon dioxide from the air can be a contributing factor to the conductivity of a medium. The degassed conductivity is the conductivity of the medium excluding the conductivity caused by carbon dioxide.

In the power station industry, for example, it is advantageous to use the degassed conductivity:
- The percentage of conductivity caused by corrosion products or fouling in the feed water can be determined as early as when the turbines are started. The system excludes the initially high conductivity values resulting from the ingress of air.
- If carbon dioxide is regarded as non-corrosive, the live steam can be directed to the turbine far earlier during startup.
- If the conductivity value increases during normal operation, it is possible to immediately determine an ingress of coolant or air by calculating the degassed conductivity.

Path: Menu/Setup/Additional functions/Mathematical functions/MF 1 to 6/Mode/Degassed conductivity

Function	Options	Info
Calculation	Options ▪ Off ▪ On **Factory setting** Off	On/off switch for the function
Cation conductivity	Connected conductivity sensor	"Cation conductivity" is the sensor downstream from the cation exchanger and upstream from the "degassing module", "Degassed conductivity" is the sensor at the outlet of the degassing module. Measured value interrogation is obsolete as you can only choose conductivity.
Degassed conductivity	Connected conductivity sensor	

Path: Menu/Setup/Additional functions/Mathematical functions/MF 1 to 6/Mode/Degassed conductivity

Function	Options	Info
CO2 concentration	Read only	View this value in a user-defined measuring screen or output the value via the current output.

Dual conductivity

You can subtract two conductivity values and use the result, for example, to monitor the efficiency of an ion exchanger.

Path: Menu/Setup/Additional functions/Mathematical functions/MF 1 to 6/Mode/Dual conductivity

Function	Options	Info
Calculation	Options ▪ Off ▪ On **Factory setting** Off	On/off switch for the function
Inlet	The options depend on the sensors connected	Select the sensors that should be used as the minuend (Inlet, e.g. sensor upstream from the ion exchanger) and subtrahend (Outlet, e.g. sensor downstream from the ion exchanger.
Measured value		
Outlet		
Measured value		
Main value format	Options ▪ Auto ▪ # ▪ #.# ▪ #.## ▪ #.### **Factory setting** Auto	
Cond. unit	Options ▪ Auto ▪ µS/cm ▪ mS/cm ▪ S/cm ▪ µS/m ▪ mS/m ▪ S/m **Factory setting** Auto	
Dual conductivity	Read only	View this value in a user-defined measuring screen or output the value via the current output.

Calculated pH value

The pH value can be calculated from the measured values of two conductivity sensors under certain conditions. Areas of application include power stations, steam generators and boiler feedwater.

Path: Menu/Setup/Additional functions/Mathematical functions/MF 1 to 6/Mode/pH calculation from conductivity

Function	Options	Info
Calculation	Options ▪ Off ▪ On **Factory setting** Off	On/off switch for the function
Method	Options ▪ NaOH ▪ NH3 ▪ LiOH **Factory setting** NaOH	The calculation is performed on the basis of Guideline VGB-R-450L of the Technical Association of Large Power Plant Operators (Verband der Großkesselbetreiber, (VGB)). **NaOH** $pH = 11 + \log \{(\kappa_v - 1/3\ \kappa_h)/273\}$ **NH3** $pH = 11 + \log \{(\kappa_v - 1/3\ \kappa_h)/243\}$ **LiOH** $pH = 11 + \log \{(\kappa_v - 1/3\ \kappa_h)/228\}$ κ_v ... "Inlet" ... direct conductivity κ_h ... "Outlet" ... acid conductivity
Inlet Outlet	Choice of conductivity sensor	Inlet Sensor upstream from the cation exchanger, "direct conductivity" Outlet Sensor downstream from the cation exchanger, "acid conductivity" The choice of measured value is obsolete since it must always be "Conductivity".
Calculated pH	Read only	View this value in a user-defined measuring screen or output the value via the current output.

11 Diagnostics and troubleshooting

The sampler continuously monitors its own functions.
The color of the display background changes to red if a diagnostics message for error category "F" occurs.
The LED beside the display flashes red if a diagnostics message for error category "M" occurs.

11.1 General troubleshooting

11.1.1 Troubleshooting

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

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 this manual. 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. If the measured values are implausible, the onsite display is faulty or you encounter other problems, search under "Process errors without messages" or "Device-specific errors".
   ↳ Follow the recommended measures.
4. Contact the Service Department if you cannot rectify the error yourself. Only cite the error number.

11.1.2 Process errors without messages

See Operating Instructions for "Memosens", BA01245C

11.1.3 Device-specific errors

Problem	Possible cause	Tests and/or remedial measures
The device cannot be switched on/display remains dark	No supply voltage	Check if voltage supplied
	Basic module defective	Replace basic 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
Control signals are not accepted or outputs do not switch	Incorrect program setting	Check program setting
	Incorrect wiring	Check wiring
	Electronics failure	Replace basic module
Sample not representative	Siphon in sampling hose	Check sampling hose
	Connection not air-tight/sampling hose taking in air	– Check tubes/connections – Check the sampling hose is routed correctly
	Bottles not being filled correctly	– Incorrect distribution selected in the controls – Calibrate the distribution arm
	Distribution arm does not move	– Incorrect distribution selected in the controls – Check distribution arm connection – Distributor defective, replace distributor or – Have repaired by E+H Service
	Incorrect bottle filled	– Incorrect distribution selected in the controls
	Wrong pump tube	Only use genuine pump tube
	Faulty sensory mechanism	Replace sensory mechanism (contact E+H Service)
No sampling	Connection leaking	Check tubes/connections for leaks
	Sampling hose taking in air	Check the sampling hose is routed correctly
	Wrong pump tube	Only use genuine pump tube
	Faulty sensory mechanism	Replace sensory mechanism (contact E+H Service)
Implausible measured values (only for version with sensors with the Memosens protocol)	Inputs defective	First perform tests and take measures as outlined in "Process-specific errors" section Measuring input test: – Connect a resistor instead of the conductivity sensor
Current output, incorrect current value	Incorrect adjustment	Check with integrated current simulation, connect mA meter directly to current output.
	Load too large	
	Shunt / short to ground in current loop	

Problem	Possible cause	Tests and/or remedial measures
No current output signal	Basic module defective	Check with integrated current simulation, connect mA meter directly to current output.

11.2 Diagnostic information on the onsite display

Up-to-date diagnostic events are displayed along with their status category, diagnostic code and short text. By clicking the navigator, you can call up additional information and tips on remedial measures.

11.3 Adjusting diagnostic information

11.3.1 Classification of diagnostics messages

More detailed information on the current diagnostics messages displayed is provided in the DIAG/Diagnostics list menu.

In accordance with Namur specification NE 107, the diagnostics 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.
  - **M** = Maintenance required. Action should be taken as soon as possible.
    The device still measures/takes a sample correctly. Immediate measures must not be taken. However, proper maintenance efforts would prevent a possible malfunction in the future.
  - **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 specifications. Operation is still possible. However, you run the risk of increased wear, shorter operating life or lower accuracy levels. The cause of the problem is to be found outside the measuring point.
- Message text

If you contact the Service Department, please cite the message number only. Since you can individually change the assignment of an error to an error category, the Service Department cannot use this information.

11.3.2 Adjusting the device behavior

All the diagnostics messages are assigned to specific error categories at the factory. Since other settings might be preferred depending on the application, error categories and the effect errors have on the measuring point can be configured individually. Furthermore, every diagnostics message can be disabled.

Example
The controller returns diagnostics message 531 "Logbook full". You want to change this message so that an error is not indicated on the display for example.

1. Go to:
   - Menu/Setup/General settings/Extended setup/Diagnostics/Device behavior
     for device-specific diagnostics messages (as in this example)
   - Menu/Setup/Inputs/<Sensor type>/Extended setup/Diagnostics settings/Diag. behavior
     for sensor-specific diagnostics messages.
2. Select the diagnostics message and press the navigator button.
3. Decide:
   a. Should the message be deactivated?
   b. Do you want to change the error category?
   c. Should an error current be output?
   d. Do you want to trigger a cleaning program?
4. Deactivate the message, for example (Diagnostics message to "Off").

Configuration options

The list of diagnostic messages displayed depends on the path selected. There are device-specific messages, and messages that depend on what sensor is connected.

Path: ... /Extended setup/Diagnostics settings/Diag. behavior (optional)

Function	Options	Info
List of diagnostic messages		Select the message to be changed. Only then can you make the settings for this message.
Diag. code	Read only	
Diagnostic message	Options ▪ On ▪ Off **Factory setting** Depends on the message	You can deactivate or reactivate a diagnostic message here. Deactivating means: ▪ No error message in the measuring mode ▪ No error current at the current output
Error current	Options ▪ On ▪ Off **Factory setting** Depends on the message	Decide whether an error current should be output at the current output if the diagnostic message display is activated. If general device errors occur, the error current is output at all the current outputs. In the case of channel-specific errors, the error current is only output at the particular current output.
Status signal	Options ▪ Maintenance (M) ▪ Out of specification (S) ▪ Function check (C) ▪ Failure (F) **Factory setting** Depends on the message	The messages are divided into different error categories in accordance with NAMUR NE 107. Decide whether you want to change a status signal assignment for your application.
Diag. output	Options ▪ None ▪ Binary output **Factory setting** None	You can use this function to select a binary output to which the diagnostic message should be assigned. For sensors with the Memosens protocol: Before you can assign the message to an output, you must first configure a relay output to "Diagnostics" (Menu/Setup/Outputs, assign the "Diagnostics" function and set the Operating mode to "as assigned").
Cleaning program(optional)	Options ▪ None ▪ Cleaning 1 ▪ Cleaning 2 ▪ Cleaning 3 ▪ Cleaning 4 **Factory setting** None	Decide whether the diagnostic message should trigger a cleaning program. You can define the cleaning programs under: Menu/Setup/Additional functions/Cleaning.
Detail information	Read only	Here you can find more information on the diagnostic message and instructions on how to resolve the problem.

11.4 Overview of diagnostic information

11.4.1 Device-specific, general diagnostic settings

No.	Message	Factory settings			Tests or remedial measures
		Cat.	Diag. on/off	Error current	
202	Selftest active	F	On	Off	Wait for self-test to be finished
216	Hold active	C	On	Off	Output values and status of the channel are on hold
241	Device error	F	On	On	Internal device error 1. Update the software 2. Contact the Service Department 3. Replace the backplane (Service)
242	Software incomp.	F	On	On	
243	Device error	F	On	On	
261	Electr. module	F	On	On	Electronics module defective 1. Replace the module 2. Contact the Service Department
262	Module connect.	F	On	On	Electronics module not communicating 1. Check cable connection, replace if necessary 2. Check the power supply of the sampling control module 3. Contact the Service Department
263	Electr. module	F	On	On	Wrong kind of electronics module 1. Replace the module 2. Contact the Service Department
284	Firmware update	M	On	Off	Update completed successfully
285	Update error	F	On	On	Firmware update failed 1. Repeat update 2. SD card error --> use another card 3. Incorrect firmware --> repeat with suitable firmware 4. Contact the Service Department
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 the Service Department (battery replacement)
304	Module data	F	On	On	At least 1 module has incorrect configuration data 1. Check the system information 2. Contact the Service Department
305	Power consum.	F	On	On	Total power consumption too high 1. Check installation 2. Remove sensors/modules
306	Software error	F	On	On	Internal firmware error --> Contact the Service Department

No.	Message	Factory settings			Tests or remedial measures
		Cat.	Diag. on/off	Error current	
311	Temp. sensor	F	On	On	Temperature sensor PT2 in sample compartment is defective. ▪ Sample temperature measurement not possible ▪ A sampling program will not be canceled -> Replace sensor
314	No sample flow	F	On	On	Negative pressure cannot be created in the peristaltic pump. -> Check pump tube for leaks -> Immerse suction line in medium
322	Read sub-program	F	On	On	Selected subprogram cannot be read from the program memory --> Create new subprogram
323	Write sub-prg.	F	On	On	Subprogram created cannot be saved -> Hardware error -> Contact the Service Department
324	Delete sub-prg.	F	On	On	Selected subprogram cannot be deleted from the program memory -> Reset the software
325	Readsub-prg.list	F	On	On	Subprogram list cannot be read from the program memory -> Reset the software
328	Distribution arm	F	On	On	Distribution arm zero point not found during test run -> Perform distribution arm test under Diagnostics/System test/Distribution arm -> Contact the Service Department
331	Peristaltic pump	F	On	On	▪ Peristaltic pump defective ▪ Motor cable broken -> Contact the Service Department
332	Peristaltic pump	F	On	On	Control of peristaltic pump defective --> Contact the Service Department
333	Pressure sensor	F	On	On	Medium detection not possible No sampling possible. ▪ Suction line not drained before sampling ▪ Pressure sensor defective -> Check suction line, where necessary purge it using the pump test under Diagnostics/System test/Pump test -> Contact the Service Department

No.	Message	Factory settings			Tests or remedial measures
		Cat.	Diag. on/off	Error current	
337	Pump tubing	M	On	Off	Pump tube operating time reached shortly Display under Diagnostics/Runtime info/Tubing age -> Schedule replacement -> After replacement, reset the operating time under Diagnostics/Runtime info
338	Pump tubing	M	On	Off	Pump tube operating time reached Display under Diagnostics/Runtime info/Tubing age -> Change the pump tubing -> After replacement, reset the operating time under Diagnostics/Runtime info
343	Power supply	M	On	Off	Power supply failure
344	Program pause	C	On	Off	Sampling program paused
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	Sample confirm.	F	On	On	Sampling command has not been processed -> Check internal cable to 1IF -> Reset the software
348	Read program	F	On	On	Selected program cannot be read from the program memory --> Create new program
349	Write program	F	On	On	Program created cannot be saved Hardware error has occurred --> Contact the Service Department
351	Delete prog.	F	On	On	Selected program cannot be deleted from the program memory --> Reset the software
352	Read Prog.list	F	On	On	Program list cannot be read from the program memory --> Perform device reset under Diagnostics/System test/Reset/Device reset
353	Overfill check	F	On	Off	Total capacity of bottle reached ▪ No further sampling to current bottle is triggered -> Adjust the sampling program under Program selection if desired
354	Bottle check	F	On	Off	No empty bottles available for current program ▪ No further sampling -> Check the program settings under Program selection

No.	Message	Factory settings			Tests or remedial measures
		Cat.	Diag. on/off	Error current	
355	Start time over	M	On	Off	Start time entered is in the past ▪ Enter a new start time
356	Overfill check	F	On	Off	The total sample volume does not fit in the sample bottle -> Change the sample volume
357	Sampling faulted	M	On	Off	▪ Sample discarded ▪ There are too many sampling requests pending -> Adjust the sampling program under Program selection
358	Configuration	F	On	On	Program configuration does not match the current device configuration -> Adjust the configuration
359	Emptying error	F	On	On	▪ Error when draining ▪ Draining and sampling program canceled -> Check connection to FMSY1 module -> Check 4R module, replace if necessary -> Restart the software under Setup/Diagnostics/System test/Restart
366	Module connect.	F	On	On	No communication with actuator module -> Check internal connecting cable to module 1IF
370	Intern. Voltage	F	On	On	Internal voltage outside the valid range --> Check supply voltage
373	Electr. temp.	M	On	Off	High electronics temperature --> Check ambient temperature and energy consumption
374	Sensor check	F	On	Off	No measurement signal from sensor -> Check sensor connection -> Check sensor, replace if necessary
375	No 4R module	F	On	On	No connection to 4R module -> Check 4R module, replace if necessary -> Restart the software under Setup/Diagnostics/System test/Restart
401	Reset to default	F	On	On	Factory reset is performed
406	Param. active	C	Off	Off	--> Wait for configuration to be finished
407	Diag. active	C	Off	Off	--> Wait for maintenance to be finished
412	Writing backup	F	On	Off	--> Wait for the write process to be finished
413	Reading backup	F	On	Off	--> Wait

No.	Message	Factory settings			Tests or remedial measures
		Cat.	Diag. on/off	Error current	
460	Curr. under-run	S	On	Off	Reasons ▪ Sensor in air ▪ Air pockets in assembly ▪ Sensor fouled ▪ Incorrect flow to sensor Measures 1. Check sensor installation 2. Clean sensor 3. Adjust assignment of current outputs
461	Current exceeded	S	On	Off	
462	Output Deviation	S	On	Off	When the current output is read back, the value deviates from the target value displayed. Possible reasons: Current load outside specification, short-circuit or open current loop, module defective 1. Check installation of current loop 2. Check module 3. Contact the Service Department
502	No text catalog	F	On	On	--> Contact the Service Department
503	Language change	M	On	Off	Language change failed --> Contact the Service Department
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 ring memory 3. Deactivate logbook
531	Logbook full	M	On	Off	
532	License error	M	On	Off	--> Contact the Service Department
540	Parameter save	M	On	Off	Configuration saving has failed, --> repeat
541	Parameter load	M	On	Off	Configuration successfully loaded
542	Parameter load	M	On	Off	Configuration loading has failed, --> repeat
543	Parameter load	M	On	Off	Configuration loading aborted
544	Parameter reset	M	On	Off	Factory default successful
729	Filter candle	M	On	Off	▪ Filter cartridge change necessary ▪ The limit value for operating hours has been exceeded -> Replace the filter cartridge for the sample preparation system and reset the operating hours counter in the Diagnostics menu

No.	Message	Factory settings			Tests or remedial measures
		Cat.	Diag. on/off	Error current	
730	Clean. solution	M	On	Off	▪ Warning for level of cleaning solution for sample preparation system ▪ Depending on the cleaning duration, the cleaning interval and external events, the remaining quantity is sufficient for a few hours or days -> Top up cleaning solution for sample preparation system -> Check level switch for cleaning solution
910	Limit switch	S	On	Off	Limit switch activated
921	Pump bracket	F	On	On	The pump bracket is detected as open. ▪ Pump bracket open ▪ Reed contact defective -> Close pump bracket -> Contact the Service Department
951 - 958	Hold active CH1 ... 8	C	On	Off	Output values and status of the channels are on hold. Wait until the hold is released again.
969	Modbus Watchdog	S	Off	Off	The device did not receive a Modbus telegram from the master within the specified time. The status of Modbus process values received is set to invalid.
970	Input Overload	S	On	On	Current input overloaded The current input is switched off from 23 mA due to overload and reactivated automatically when a normal load is present.
971	Input low	S	On	On	Current input too low At 4 to 20 mA, the input current is less than the lower error current. --> Check the input for short-circuits.
972	Input > 20 mA	S	On	On	Current output range exceeded
973	Input < 4 mA	S	On	On	Current output range undershot
974	Diag. confirmed	C	Off	Off	User has acknowledged the message displayed in the measuring menu.
975	Device reset	C	Off	Off	Device reset
991	CO2 conc. range	F	On	On	CO_2 concentration (degassed conductivity) outside the measuring range
992	pH calc range	F	On	On	pH calculation outside the measuring range
993	rH calc range	F	On	On	rH calculation outside the measuring range
994	Dual cond range	F	On	On	Dual conductivity outside the measuring range

11.4.2 Sensor-specific diagnostics messages

See Operating Instructions for "Memosens", BA01245C

11.5 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"
  Diagnostics 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.

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

11.6 Diagnostics list

All the current diagnostics messages are listed here.
A time stamp is available for each message. Furthermore, the system also displays the configuration and description of the message as saved in "Menu/Setup/General settings/Diagnostics/Device behavior".
For this purpose, select the appropriate message and press the navigator.

11.7 Logbooks

11.7.1 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	1000	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	250	(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	Only accessible with the special activation code (Service)	1000	Yes	No	Yes	Yes

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

11.7.2 Logbooks menu

Diagnostics/Logbooks

Function	Options	Info
▶ Program logbook		Chronological list of the programming events.
▶ Show	Events are displayed	Select a particular event to display more detailed information.
▶ Go to date	User input ▪ Go to date ▪ Time	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 current program	Read only	The bottle statistics for the sampler are displayed. The statistics appear for each individual bottle after the program starts. Further information is provided in the "Bottle statistics" section.

Diagnostics/Logbooks

Function	Options	Info
▶ Summary of inputs	Read only	The counters configured for the analog and binary input are displayed. Max. 8 lines
▷ Delete all entries	Action	You can delete all the program logbook entries here.
▶ All events		Chronological list of all the logbook entries, with information on the type of event.
▶ Show	Events are displayed	Select a particular event to display more detailed information.
▶ Go to date	User input ▪ Go to date ▪ Time	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.
▶ Calibration events		Chronological list of the calibration events.
▶ Show	Events are displayed	Select a particular event to display more detailed information.
▶ Go to date	User input ▪ Go to date ▪ Time	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.
▷ Delete all entries	Action	You can delete all the calibration logbook entries here.
▶ Configuration events		Chronological list of the configuration events.
▶ Show	Events are displayed	Select a particular event to display more detailed information.
▶ Go to date	User input ▪ Go to date ▪ Time	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.
▷ Delete all entries	Action	You can delete all the operation logbook entries here.
▶ Diagnostic events		Chronological list of the diagnostics events.
▶ Show	Events are displayed	Select a particular event to display more detailed information.
▶ Go to date	User input ▪ Go to date ▪ Time	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.
▷ Delete all entries	Action	You can delete all the diagnostics logbook entries here.

You can view your data logbook entries graphically on the display ("Show plot").
You can also adapt the display to suit your individual requirements:

- If you 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.
- Furthermore, you can also define a cursor. If you select this option, you can move along the graph with the navigator and view the logbook entry (date stamp/measured value) in text form for every point in the graph.
- Simultaneous display of two logbooks ("Select 2nd plot" and "Show plot"), → 23:
  - A small cross marks the currently selected graph for which the zoom can be changed or a cursor used, for example.
  - You can select the other graph in the context menu (by pressing the navigator button), and 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 allows you to use the zoom function simultaneously on both graphs, for example.

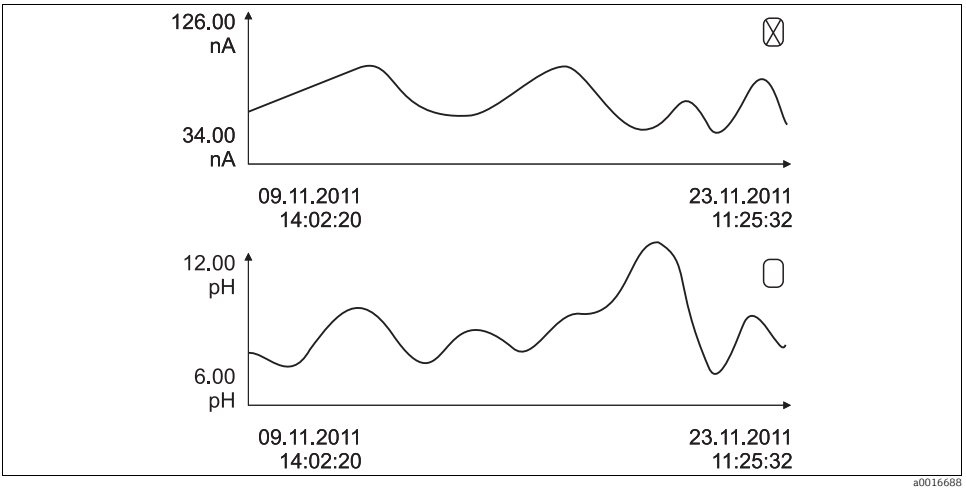


Fig. 23: Two graphs displayed simultaneously. The top graph is "selected".

Diagnostics/Logbooks

Function	Options	Info
▶ Data logbooks		Chronological list of the data logbook entries for sensors.
Data logbook 1 <Logbook name>		This submenu is available for each data logbook that you have set up and activated.
Source of data	Read only	Displays the input or the mathematical function
Measured value	Read only	Displays the measured value that is recorded
Log time left	Read only	Displays the days, hours and minutes until the logbook is full. Please note the instructions regarding the selection of the memory type in the General settings/Logbooks menu (--> BA "Operation and settings").
▶ Show	Events are displayed	Select a particular event to display more detailed information.
▶ Show plot	Graphic display of the logbook entries	The entries are displayed according to your settings in the General settings/Logbooks menu.
Select 2nd plot	Choice of another data logbook	You can view a second logbook at the same time as the current logbook.
▶ Go to date	User input ▪ Go to date ▪ Time	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.
▷ Delete all entries	Action	You can delete all the data logbook entries here.
▶ Save logbooks		
File format	Options ▪ CSV ▪ FDM	Save the logbook in the preferred file format. You can then open the file you saved (.csv) on the PC and process it in MS-Excel for example.[1]. You can import the FDM files into Fieldcare and archive them so they are tamper-proof.
▷ Program logbook ▷ All data logbooks ▷ Data logbook 1...n ▷ All event logbooks ▷ Calibration logbook ▷ Diagnostic logbook ▷ Configuration logbook ▷ HW version logbook ▷ Version logbook	The action commences as soon as the option is selected	Save the logbook in the preferred file format. You can then open the CSV file you saved on the PC and process it in MS-Excel for example. You can import the FDM files into Fieldcare and archive them so they are tamper-proof.

The file name is made up of the "Logbook ident" (Menu/Setup/General settings/Logbooks), an abbreviation for the particular logbook and a time stamp.

1) CSV files use international number formats and separators. Therefore they must be imported into MS Excel as external data with the correct format settings. If you double-click the file to open it, the data are only displayed correctly if MS Excel is installed with the US country setting.

11.7.3 Program logbook

The following table shows an overview of the exported program logbook and explains the most important terms in the program logbook.

Entry	Example	Info
Timestamp	05.05.2010 12:40	Time stamp - the start time in the case of sampling
Event	BasicPrgStart	**Power on** --> Time the device was started **Power failure** --> Time the power failed (to the minute) **BasicPrgStart, StdPrgStart** --> Time the program was started **BasicSampling, StdSampling** --> Entry made during sampling **PrgPartStart, PrgPartStop** --> Time a subprogram is enabled and disabled **PrgStop** --> Time the program was ended
Name	Program1	In the case of **BasicPrgStart, StdPrgStart, BasicSampling** or **PrgStop** --> the name of the program appears In the case of **StdSampling, PrgPartStart** or **PrgPartStop** --> the name of the subprogram appears
Bottle configuration	12x+6x - PE/glass plate distribution	The selected bottle configuration is displayed
Left bottle volume	1000	The bottle volume is displayed --> "Right bottle volume" remains empty for bottle configurations with different volumes
Right bottle volume	3000	
Sampling mode	Time-paced CTCV	**Time-paced CTCV** --> in proportion to time **Flow-paced VTCV** --> in proportion to volume **Time/flow-paced CTVV** --> in proportion to flow **Single sample** --> single sample **Sample table** --> single sample --> the sampling mode is displayed
Sampling interval/unit	10 min	--> The interval and unit are displayed
Samples/bottle	4	**With bottle change** --> Number of samples per bottle
Bottles/sample	0	Multiple bottles
Sampling volume/unit	100 ml	Sample volume when sampling

Entry	Example	Info
Start mode	Immediate	Field only populated for **PrgPartStart, BasicPrgStart** and **StdPrgStart:** --> The program start setting is displayed - **Immediate** --> immediately - **Date/time** --> after date/time - **Volume** --> with a volume - **Event** --> when an event occurs - **Interval** --> after an interval - **Individual dates** --> individual timetable - **Multiple date** --> multiple dates
Start date	05.05.2010	Field only populated if **Start mode = Date/Time:** --> The start date is displayed
Stop mode	Program end	The program stop setting is displayed - **Program end** --> when the program ends - **Continuous** --> continuous operation - **Bottles full** --> when bottles are full - **Date/time** --> after date/time - **Event** --> when an event occurs
Stop date	06.05.2010	Field only populated if **Program end = Date/Time:** --> The time the program was stopped is displayed
Start flow sum/unit	100 m^3	Field only populated if **Start mode = Volume:** --> The starting volume is displayed
Bottle number	1	The field is only populated for **BasicSampling** or **StdSampling:** --> The bottle which was filled with the sample is displayed
Sample nbr	2	Number of samples transferred to the current bottle
Sampling result	Sampling Ok	**Sampling Ok** --> sampling ok **Sampling nOk** --> sampling failed --> For detailed diagnostics messages, see the diagnostics logbook
Running sample number	1	Running sample number in the current program
Flow sum since last sampling	1	For **flow-paced** and **time/flow-paced** sampling: --> Flow since the last sampling For all other types of sampling: --> Display: 0

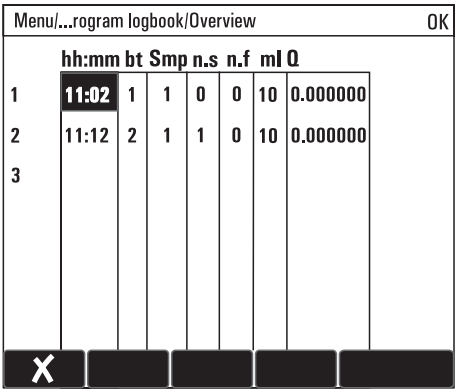
11.7.4 Bottle statistics

In "Menu/Diagnostics/Logbooks/Logbook program", select the "Show summary of current program" item to display the bottle statistics for the sampler. The statistics are displayed for each individual bottle when the program is started. This gives you detailed feedback on the last sampling operations.

The statistics are deleted when the following event occurs:
- Program is started

The statistics are selectively overwritten when the following event occurs:
- When the 1st bottle is reached in situations where "Continuous operation" is configured as the end of the program in the program settings.

The statistics are displayed as follows:



Column	Display	Info
1	**hh:mm**	The time the first sample was transferred to the bottle is displayed.
2	**bt**	The bottle number is displayed.
3	**Smp**	Displays how often sampling was triggered per bottle.
4	**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.
5	**n.f.**	The value indicates how often sampling was canceled since the system was unable to take in any medium, or enough medium, into the dosing chamber to cover the LF1 probe.
6	**ml**	The sampling volume collected per bottle is displayed.
7	**Q**	The total flow for every bottle is displayed (if connected).

11.8 Device information

11.8.1 System information

Diagnostics/System information

Function	Options	Info
Device tag	Read only	Individual device tag, --> "General settings"
Order code	Read only	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].
To find out what device version you have, enterthe order code in the search screen at the following address: www.products.endress.com/order-ident		
Orig. order code ext.	Read only	Complete order code for the original device, resulting from the product structure.
Current order code ext.	Customized text	Current code, taking into account changes to the hardware. You must enter this code yourself.
Serial number	Read only	The serial number allows you to access device data and documentation on the Internet: www.products.endress.com/device-viewer
Software version	Read only	Current version
Sw version FMSY1	Read only	Current version
FMSY1-proj. version	Read only	Current version
ENP version	Read only	Version of the electronic nameplate
▶ System modules		
Depends on the electronics module available, e.g.: Base	Read only ▪ Description ▪ Serial number ▪ Order code ▪ Hardware version ▪ Software version	This information is provided for every electronics module available. Specify the serial numbers and order codes when servicing, for example.
▶ Sensors		
Depends on the sensors connected	Read only ▪ Description ▪ Serial number ▪ Order code ▪ Hardware version ▪ Software version	This information is provided for every sensor available. Specify the serial numbers and order codes when servicing, for example.

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

11.8.2 Sensor information

Select the channel you want from the list of channels.

Information in the following categories is displayed:
- Extreme values
  Extreme conditions to which the sensor has been exposed up to now, e.g. min./max. temperatures[2)]
- Operating time
  Sensor operation under extreme conditions
- Calibration information
  Calibration data of the last calibration
- Sensor specifications
  Measuring range limits for main measured value and temperature
- General information
  Sensor identification information

The specific data that are displayed depends on what sensor is connected.

11.9 Simulation

You can simulate values at inputs and outputs for testing purposes:
- Current values at current outputs
- Measured values at inputs

Only current values are simulated. It is not possible to use the simulation function to calculate the totalized value for the flow or rainfall.

The inputs and outputs must be activated in the Setup menu prior to simulation.

Diagnostics/Simulation

Function	Options	Info
▶ Current output x:y		Simulation of an output current This menu appears once for each current output.
Simulation	Options ▪ On ▪ Off **Factory setting** Off	If you simulate the value at the current output, this is indicated on the display by a simulation icon in front of the current value.
Current	2.4 to 23.0 mA **Factory setting** 4 mA	Set the desired simulation value.

2) Not available for all sensor types.

Diagnostics/Simulation

Function	Options	Info
▶ Alarm relay ▶ Relay x:y		Simulation of a relay state This menu appears once for each relay.
Simulation	Options ▪ On ▪ Off **Factory setting** Off	If you simulate the relay state, this is indicated on the display by a simulation icon in front of the relay display.
State	Options ▪ Low ▪ High **Factory setting** Low	Set the desired state. The relay switches in accordance with your setting when you switch on the simulation. The display shows "On" (="Low") or "Off" (="High") for the simulated relay state.
▶ Meas. inputs		Simulation of a measured value This menu appears once for each measuring input.
▶ Channel : parameter		
Sim. main value	Options ▪ On ▪ Off **Factory setting** Off	If you simulate the measured value, this is indicated on the display by a simulation icon in front of the measured value.
Main value	Depends on the sensor **Factory setting** Depends on the sensor	Set the desired simulation value.
Sim. temperature	Options ▪ On ▪ Off **Factory setting** Off	If you simulate the temperature measured value, this is indicated on the display by a simulation icon in front of the temperature.
Temperature	-50.0 to +250.0 °C (-58.0 to 482.0 °F) **Factory setting** 20.0 °C (68.0 °F)	Set the desired simulation value.

11.10 Resetting the measuring device

Diagnostics/Systemtest/Reset

Function	Options	Info
Power supply	Read only	The current supply voltage is displayed.
▶ Manual sampling		
Bottle configuration	Read only	
Bottle volume	Read only	
Distributor position	Options ▪ Bottle 1 ...	Select which bottle should be filled with the sample.
Sample volume	10 to 10000 ml **Factory setting** 100 ml	The sample volume can be changed.
▷ Start sampling	Action	
▶ Peristaltic pump		
▷ Pump purge	Action	
Pump purge, to stop press ESC	Read only	
Current pump run time	Read only	
Power supply	Read only	The current supply voltage is displayed. With AC power supply: 24 V ±0.5 V With DC power supply: 22 to 28 V
Motor current	Read only	The current consumption of the pump is displayed.
Vacuum	Read only	The vacuum is an indicator of the suction height. -> 100 mbar is equivalent to a suction height of approx. 1 m.
Medium detected	Read only	Yes: the medium was detected No: no medium was detected
▷ Pump suction	Action	
Pump suction, to stop press ESC	Read only	
Current pump run time	Read only	
Power supply	Read only	The current supply voltage is displayed. With AC power supply: 24 V ±0.5 V With DC power supply: 22 to 28 V
Motor current	Read only	The current consumption of the pump is displayed.

Diagnostics/Systemtest/Reset

Function	Options	Info
Vacuum	Read only	The vacuum is an indicator of the suction height. -> 100 mbar is equivalent to a suction height of approx. 1 m.
Medium detected	Read only	Yes: the medium was detected No: no medium was detected
▷ Distribution arm	Action	Only for bottle configurations with more than one bottle.
Test distribution arm	Read only	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.
Position	Read only	
▷ Device reset	Options ▪ OK ▪ ESC	Restart and keep all the settings
▷ Factory default	Options ▪ OK ▪ ESC	Restart with factory settings Settings that have not been saved are lost.
▶ Power supply	Read only ▪ Digital Supply 1: 1.2V ▪ Digital Supply 2: 3.3V ▪ Analog Supply: 12.5V ▪ Sensor Supply: 24V ▪ Temperature	Detailed list of power supply to instrument. The actual values can vary without a malfunction having occurred.

11.11 Term information

The following information is displayed:
- Operating hours device:
  Displays the total operating hours of the device in days, hours and minutes
- Sample totalizer :
  Number of all samples taken and sample errors
- Pump tube life :
  Displays how old the tube is in days, hours and minutes
  This counter must be reset when a tube is replaced.

Set the specific counter reading to zero with "Reset".

11.12 Status of inputs/outputs

Path: Display/Operation/Measurement

The following measured values are listed (read only):
- Binary inputs
  Current function state: on or off
- Current inputs
  Actual current values of all the current inputs available
- Binary outputs
  Current function state: on or off
- Temperature sensors
  Current value is displayed
- Current outputs (for version with sensors with the Memosens protocol)
  Actual current values of the current outputs

11.13 Firmware history

Date	Version	Changes to software	Documentation: edition
12/2013	01.05.00	Extension ▪ Calendar function for cleaning ▪ Conductivity: – Measuring range switching also for conductive conductivity measurement – External temperature signal via current input ▪ Oxygen: – External pressure or temperature signals via current input – Connected conductivity sensor can be used to calculate the salinity. ▪ Channel-specific diagnostics codes for HOLD function.	BA00465C/07/EN/16.13 BA01245C/07/EN/01.13

Date	Version	Changes to software	Documentation: edition
04/2013	01.04.00	Extension ▪ Conductivity: – Measuring range switch – Temperature compensation ISO 7888 at 20 °C ▪ Keylock with password protection ▪ pH: – Icon for manual and automatic temperature compensation (ATC/MTC+MED) – Monitoring for the upper and lower limits of the glass SCS value can be switched on/off independently of each another ▪ ISE – Simultaneous calibration of two parameters – User-defined electrode type – Raw measured values can be selected for current output – Timer for membrane replacement ▪ Logbooks remain intact after the firmware update Improvement ▪ Offset icon only for pH or ORP ▪ Turbidity: autoranging can be switched off ▪ Export Print (xml): export file revised and style sheet added for better legibility. ▪ Overview of input with counter function ▪ Input menu accessible via program creation ▪ External signal for basic programs ▪ Quick programming via start screen	BA00465C/07/EN/15.13 BA00470C/07/EN/15.13 BA00492C/07/EN/15.13 BA00493C/07/EN/15.13 SD01068C/07/EN/01.12
07/2012	01.03	Extension ▪ USP/EP (United States Pharmacopeia and European Pharmacopeia) and TDS (Total Dissolved Solids) for conductivity Improvement ▪ Adapted factory settings ▪ SAC: Factory calibration in the field incl. filter operating time reset and lamp change ▪ ISFET leak current visible in measuring screen ▪ Multiselect for limit switch and cleaning cycles	BA00465C/07/EN/14.12 BA00470C/07/EN/14.12 BA00492C/07/EN/14.12 BA00493C/07/EN/14.12
04/2011	01.02	Extension ▪ Support for additional sensors: – Chlorine – ISE – SAC – Interface ▪ Mathematics functions Improvement ▪ Modified software structures ▪ Adapted factory settings ▪ User-defined measuring screens	BA465C/07/EN/13.11 BA470C/07/EN/13.11 BA492C/07/EN/13.11 BA493C/07/EN/13.11
06/2010	01.00	Original software	BA465C/07/EN/06.10 BA470C/07/EN/06.10 BA464C/07/EN/04.10 BA467C/07/EN/04.10

12 Maintenance

⚠ WARNING

Process pressure and temperature, contamination, electrical voltage

Risk of serious or fatal injury

- ▶ De-energize the device and disconnect the battery connection.
- ▶ If a sensor has to be removed during maintenance work, avoid hazards posed by pressure, temperature and contamination.

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, only use genuine spare parts. With genuine parts, the function, accuracy and reliability are also ensured after maintenance work.

12.1 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. With a maintenance contract, you can increase your level of operational safety and relieve your operating staff of some of their workload. Ask your Endress+Hauser Service Organization for detailed information on maintenance contracts.

12.2 Calibration

12.2.1 Sensors

Sensors with Memosens protocol are calibrated at the factory.
Users must decide whether the process conditions present require calibration during initial commissioning.
Additional calibration is not required in many standard applications.
Calibrate the sensors at sensible intervals depending on the process.

All information on calibration is provided in BA01245C "Memosens".

12.2.2 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 "F236 Distribution arm" appears on the display

1. Select the number of bottles in the "Setup/Basic setup" menu.

2. Proceed as follows to calibrate the distribution arm:

Path: Menu/Calibration active

Function	Options	Info
▶ Distribution arm		
▷ Go to ref. point	Action	The reference run is started. The reference point is in the middle at the front. Separate the upper compartment from the lower compartment to see the reference point.
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.		

3. Afterwards perform a distribution arm test in the "Diagnostics/System test/Reset/Distribution arm" menu.

12.2.3 Peristaltic pump sample volume

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

In order to calibrate the sample volume, a measurement beaker with a volume of at least 200 ml is required.
In the case of CSP44 remove the pump hose from the hose feeder and feed it into the measurement beaker.

Proceed as follows to calibrate:

Path: Menu/Calibration active

Function	Options	Info
▶ Sample volume		
▶ 1-point calibration		
Distributor position	Options - Front - Bottle x - Back	Select the distributor position.
Sample volume	20 to 2000 ml **Factory setting** 100 ml	Set the sample volume.
▷ Start sampling	Action	The progress of the sampling operation is displayed.
Check whether the sample volume is correct. Use ▶ No to enter the sample volume actually taken, e.g. 110 ml. Use ▷ Yes to repeat the sampling.		
▶ 2-point calibration Use 2-point calibration for levels that fluctuate greatly. The second sampling point must be either higher or lower (height difference of at least 1 m).		
Distributor position	Options - Front - Bottle x - Back	Select the distributor position.
Sample volume	20 to 2000 ml **Factory setting** 100 ml	Set the sample volume.
▷ Start 1. sampling	Action	The progress of the sampling operation is displayed.
Check whether the sample volume is correct. Use ▶ No to enter the sample volume actually taken, e.g. 110 ml. Use ▷ Yes to repeat the sampling.		

Path: Menu/Calibration active

Function	Options	Info
▷ Start 2. sampling	Action	The progress of the sampling operation is displayed.

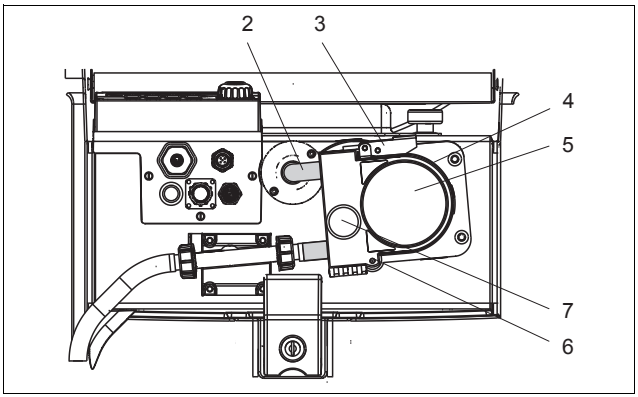
Check whether the sample volume is correct. Use ▶ No to enter the sample volume actually taken, e.g. 110 ml. Use ▷ Yes to repeat the sampling.

12.3 Replacing the pump tube

⚠ CAUTION

Danger of injury due to rotating parts

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

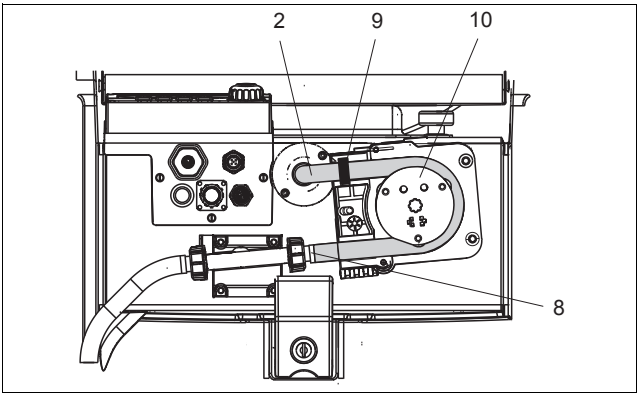


2 Pump tubing
3 Fastening clip
4 Pump bracket
5 Pump head cover
6 Positioning pin
7 Knurled head screw

Fig. 24: Opening the peristaltic pump

Open the peristaltic pump as follows:

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



2 *Pump tubing*
8 *Clamp*
9 *Marking ring*
10 *Roller*

Fig. 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 all the rolls turn smoothly and evenly.
4. Apply some lubricant to the roller.
5. Secure the new pump tube to the pressure sensor with the clamp (item 8).
6. Guide the pump tube around the roller and insert the marking ring into the groove (item 9), see .
7. Close the pump head cover and screw it tight. Close the pump bracket.
8. To avoid incorrect metering, reset the tube life to zero under Menu/Diagnostics/Term information/Pump tube life using the "Reset" function.

Calibrate the sample volume each time you replace a pump tube.
--> see the "Calibration" section

12.4 Cleaning

12.4.1 Housing

Clean the housing with soap-based commercially available cleaning agents.

NOTICE

Prohibited cleaning agents

Damage to the housing surface or housing seal

- For cleaning purposes, never use concentrated mineral acids or bases.
- Never use organic cleaners such as benzyl alcohol, methanol, methylene chloride, xylene or concentrated glycerol cleaner.
- Never use high-pressure steam for cleaning purposes.

12.4.2 Wetted parts

- 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.

Peristaltic pump

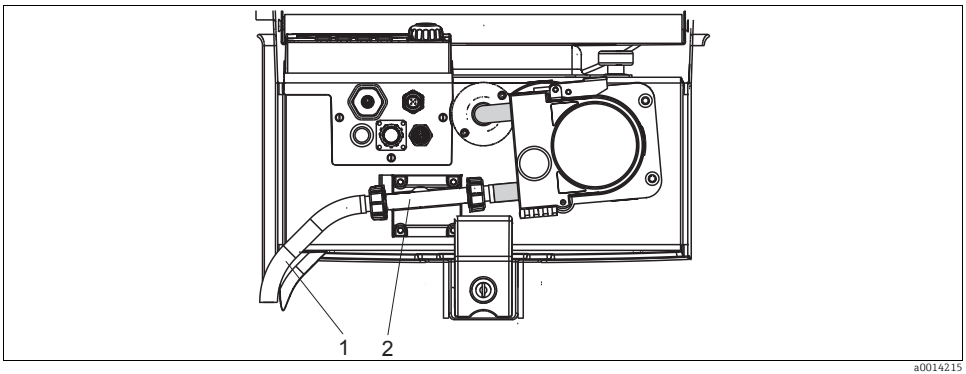


Fig. 26: Peristaltic pump

1 Suction line
2 Pressure sensor

Clean the wetted parts as follows:

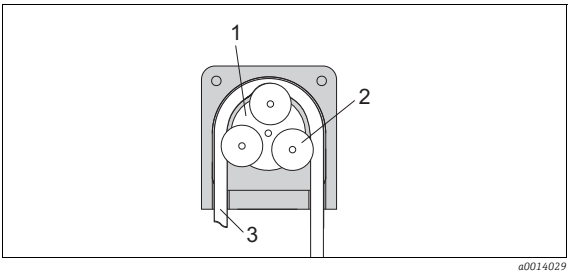
1. Connect a container containing clear water to the suction line (item 1).
2. Remove the bottles from the sample compartment.
3. Rinse the wetted parts with clear water by taking a manual sample or by performing a pump test (under Menu/Diagnostics/Systemtest/Reset/Peristaltic pump -> Pump purge/Pump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

Interior of peristaltic pump

⚠ WARNING

Danger of injury due to rotating parts

- ▶ 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.



1 Pump rotor
2 Roller
3 Pump tubing

Fig. 27: 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 the "Replacing the pump tube" section.
3. Remove the pump tube.
4. Remove any silicone deposits on the roller and the flexible pump bracket.
5. Make sure the roller turns smoothly and evenly.

Cleaning the distribution arm

Make sure the distribution arm is seated correctly! The distribution arm must be locked as otherwise the rotation movement could be blocked or the system might no longer approach the bottles correctly.

Clean the distribution arm as follows:

1. Open the fastening clips on the side to separate the top device section from the bottom device section. Turn the top device section 90°.
2. Unscrew the distribution arm.
3. Clean the distribution arm with water or soapsuds. Use a bottle brush if necessary.
4. Reinstall the clean distribution arm.

12.4.3 Sample compartment

The sample compartment has a fully integrated plastic inner lining.

Clean the sample compartment as follows:
1. Remove the bottles.
2. Spray-clean the sample compartment with a water hose.

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

12.4.4 Digital sensors

⚠ CAUTION

The cleaning system is not switched off during calibration or maintenance activities

Risk of injury due to medium or cleaning agent

- If a cleaning system is connected, switch it off before removing a sensor from the medium.
- If you are not switching off the cleaning system because you wish to test the cleaning function, wear protective clothing, goggles and gloves or take other appropriate measures.

1. If an error occurs or the maintenance schedule stipulates that the sensor has to be replaced, use a new sensor, or a sensor that has been precalibrated in the laboratory. A sensor is calibrated in the laboratory under optimum external conditions, thereby ensuring better quality of measurement.
2. Remove the sensor to be serviced and install the new sensor.
3. You must perform calibration if you use a sensor that is not precalibrated.
4. The sensor data are automatically accepted by the transmitter. A release code is not required.
5. Measurement is resumed.
6. Take the used sensor back to the laboratory. In the laboratory you can get the sensor ready for reuse while ensuring the availability of the measuring point.
   - Clean the sensor. For this purpose, use the cleaning agent specified in the sensor manual.
   - Inspect the sensor for cracks or other damage.
   - If no damage is found, regenerate the sensor. Where necessary, store the sensor in a regeneration solution (--> sensor manual).
   - Recalibrate the sensor for reuse.

12.4.5 Assemblies

Refer to the assembly operating manual for information on servicing and troubleshooting the assembly. The assembly operating manual describes the procedure for mounting and disassembling the assembly, replacing the sensors and seals, and contains information on the material resistance properties, as well as on spare parts and accessories.

12.5 Replacing the rechargeable batteries

First remove the cover of the battery compartment to replace the batteries.

⚠ WARNING

Device is energized

Incorrect wiring can result in injury or fatality

- ▶ If a power supply unit or a charger is connected, disconnect it from the mains.

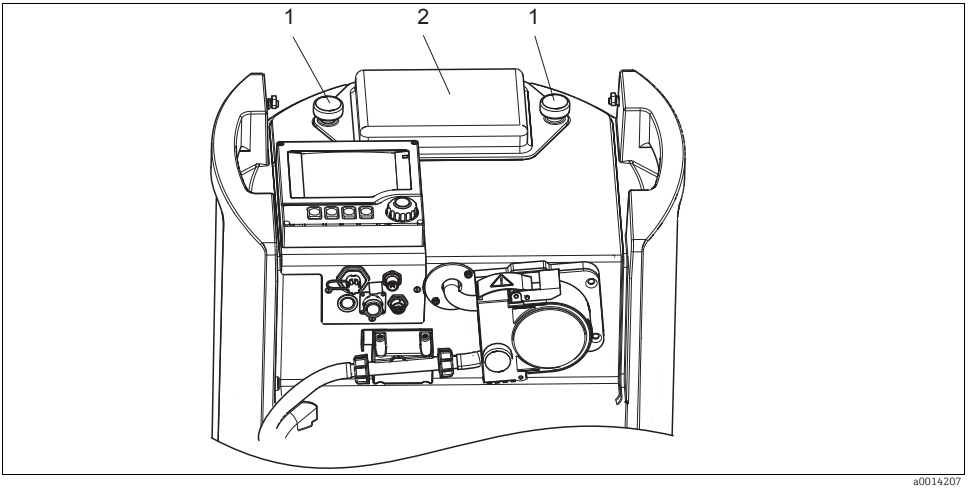


Fig. 28: Battery compartment cover

1 Fixing screws
2 Battery compartment cover

1. Release the two fixing screws (item 1).
2. Remove the cover of the battery compartment (item 2).
3. Remove the old batteries and disconnect them.
4. Connect the new rechargeable batteries (make sure to connect to the correct poles).
5. Insert the new rechargeable batteries and secure the battery compartment cover.

Rechargeable batteries must be replaced every 3 years by the following type of battery: Panasonic LC-R127R2PG1.

13 Repair

13.1 Spare parts

Contact your Endress+Hauser Service if you have any questions regarding spare parts.

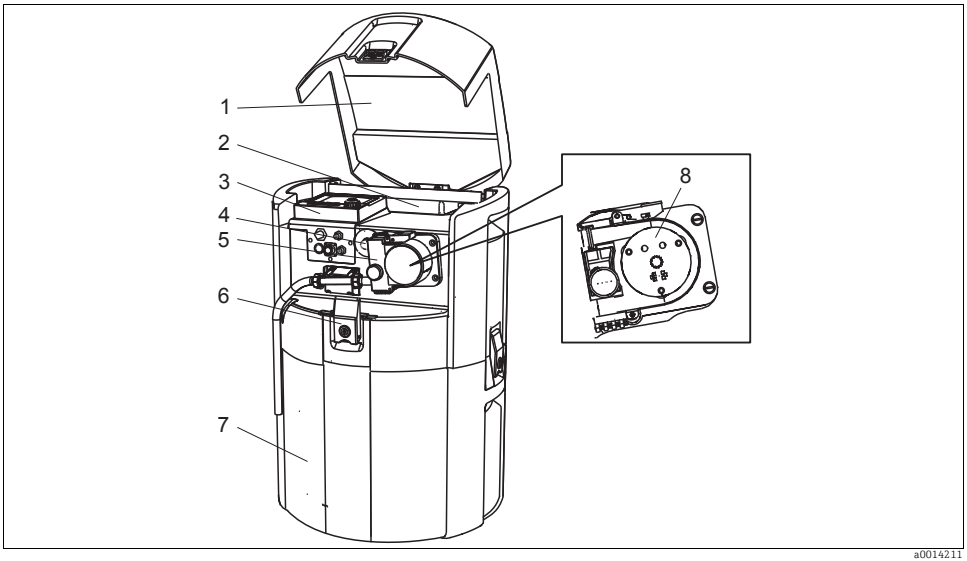


Fig. 29: Spare parts

Item No.	Designation and contents	Order number Spare parts kit
1	Lid for housing upper complete	71119023
2	Rechargeable battery pack	71119018
3	Housing cover with display CM44	71119035
4	Pump tubing, 2 pcs.	71114701
	Pump tubing, 25 pcs.	71114702
5	Peristaltic pump: pump housing	71119029
6	Lockable latch with keys	71119017
	Keys	71119017
7	Housing base	71119022
8	Peristaltic pump: pump head	71119008

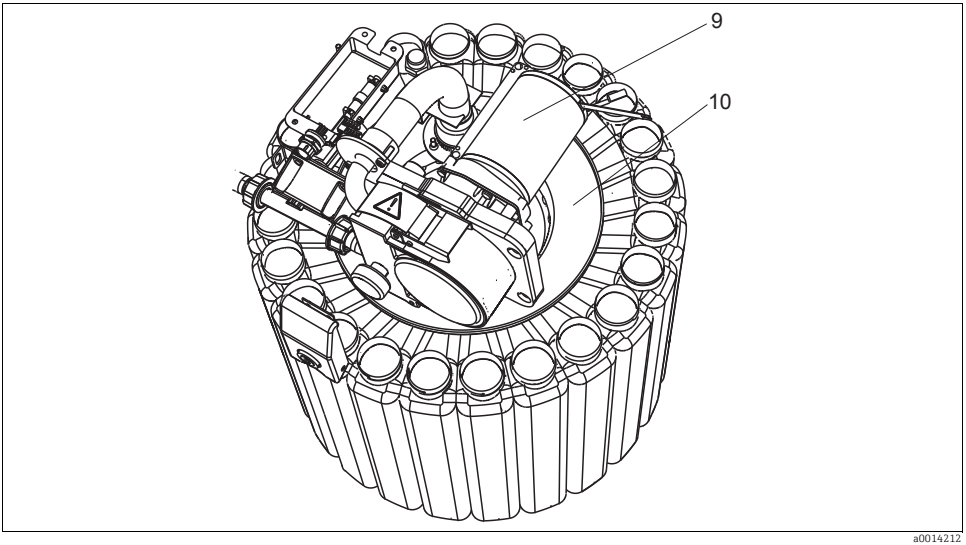


Fig. 30: Spare parts

Item No.	Designation and contents	Order number Spare parts kit
9	Peristaltic pump: pump motor	71119030
10	Downholder complete	71119013
	Distribution arm	71119007
	Distribution drive	71119025
	Seal set for peristaltic pump: O-ring ID=12.42 W=1.78 OD=15.98 EPDM, 2 pcs O-ring ID=20.92 W=2.62 OD=25.53 EPDM, 2 pcs O-ring ID=13.00 W=4.00 OD=21.00 NBR, 1 pc	71110928

13.2 Return

The sampler is repaired on site. Contact your Endress+Hauser Service Department.

13.3 Disposal

The device contains electronic components and must therefore be disposed of in accordance with regulations on the disposal of electronic waste.
Please observe local regulations.

The battery must be disposed of in accordance with local regulations governing the disposal of batteries.

14 Accessories

The most important accessories available at the time this document went to print are listed below. Contact your Service Department or sales center for accessories that are not listed here.

14.1 Accessories for Liquiport 2010 CSP44

	Base, complemented
71111864	CSP44 base + 1 x 20 liter (5.28 US gal.), PE
71111866	CSP44 base + 12 x 2 liter (0.53 US gal.), PE
71111867	CSP44 base + 12 x 0.7 liter (0.18 US gal.), glass
71111868	CSP44 base + 24 x 1 liter (0.26 US gal.), PE
71111870	CSP44 base + 12 x 1 liter (0.26 US gal.) + 6 x 2 liter (0.53 US gal.), PE

	Bottles + covers
71112221	20 liter (5.28 US gal.) PE + cap, 1 pc.
71111178	2 liter (0.53 US gal.) PE wedge shaped bottle + cover, 12 pcs.
71111176	1 liter (0.26 US gal.) PE wedge shaped bottle + cover, 24 pcs.
71111874	0.7 liter (0.18 US gal.) glass + cap, 12 pcs.

	Accessories base
71111878	Kit CSP44 base cover, transporting
71111880	Kit CSP44 freezer cartridge

	Suction line
71111233	Suction line ID 10 mm (3/8"), clear PVC, fabric-reinforced, length 10 m (33 ft), strainer V4A
71111234	Suction line ID 10 mm (3/8"), black EPDM, length 10 m (33 ft), strainer V4A
71111482	... m; suction line coil ID 10 mm (3/8"), PVC
71111484	... m; suction line coil ID 10 mm (3/8"), EPDM
71111184	Strainer V4A for ID 10 mm (3/8"), 1 pc.

	Tubing customized
71114701	Pump tubing, 2 pcs.
71114702	Pump tubing, 25 pcs.

	Installation
71111881	CSP44 suspension kit, for use in 500 to 600 mm diameter manhole

	Power supply
71111872	Lead-acid battery 24 V DC
71111882	Kit CSP44 charger adapter cable, battery for power unit
71111883	Kit CSP44 power unit/charger for indoor use, 100 to 120/200 to 240 V AC ±10 %, 50/60 Hz
71111884	Kit CSP44 power unit/charger for outdoor use, IP 65, 100 to 120/200 to 240 V AC ±10 %, 50/60 Hz

	Communication; software
51516983	Commubox FXA291 + FieldCare Device Setup
71129799	Field Data Manager software; 1 license

	Retrofit kits
71111879	Kit CSP44 retrofit distribution system (distribution arm, distribution drive)

14.2 Measuring cable

Memosens data cable CYK10
- For digital sensors with Memosens technology
  pH, ORP, oxygen (amperometric), chlorine, conductivity (conductive)
- Order as per product structure (--> Online Configurator, www.products.endress.com/cyk10)
- Technical Information TI00118C/07/EN

Measuring cable CYK81
- Unterminated cable for extending sensor cables (e.g. Memosens)
- 2 x 2 cores, twisted with shielding and PVC sheath (2 x 2 x 0.5 mm^2 + shielding)
- Material sold by the meter, Order No.: 51502543

14.3 Sensors

You can only connect sensors with M12 plug.

14.3.1 Glass electrodes

Orbisint CPS11D
- pH sensor with Memosens technology
- Dirt-repellent PTFE junction
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps11d)
- Technical Information TI00028C/07/EN

Memosens CPS31D
- pH sensor with Memosens technology
- Gel-filled reference system with ceramic diaphragm
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps31d)
- Technical Information TI00030C/07/EN

Ceraliquid CPS41D
- pH sensor with Memosens technology
- Ceramic junction and KCl liquid electrolyte
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps41d)
- Technical Information TI00079C/07/EN

Ceragel CPS71D
- pH sensor with Memosens technology
- Poison-resistant reference with ion trap
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps71d)
- Technical Information TI00245C/07/EN

Orbipore CPS91D
- pH sensor with Memosens technology
- Open aperture junction for media with high potential for fouling
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps91d)
- Technical Information TI00375C/07/EN

Orbipac CPF81D
- pH compact sensor for installation or immersion operation in industrial water and wastewater
- Order as per product structure (--> Online Configurator, www.products.endress.com/cpf81d)
- Technical Information TI191C/07/EN

14.3.2 Pfaudler electrodes

Ceramax CPS341D
- Electrode with pH sensitive enamel
- For the toughest requirements in terms of precision, pressure, temperature, sterility and durability
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps341d)
- Technical Information TI00468C/07/EN

14.3.3 ORP sensors

Orbisint CPS12D
- ORP sensor with Memosens technology
- Dirt-repellent PTFE junction;
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps12d)
- Technical Information TI367C/07/EN

Ceraliquid CPS42D
- ORP sensor with Memosens technology
- Ceramic junction and KCl liquid electrolyte
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps42d)
- Technical Information TI373C/07/EN

Ceragel CPS72D
- ORP sensor with Memosens technology
- Poison-resistant reference with ion trap
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps72d)
- Technical Information TI374C/07/EN

Orbipac CPF82D
- ORP compact sensor for installation or immersion operation in industrial water and wastewater
- Order as per product structure (--> Online Configurator, www.products.endress.com/cpf82d)
- Technical Information TI191C/07/EN

Orbipore CPS92D
- ORP sensor with Memosens technology
- Open aperture junction for media with high potential for fouling
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps92d)
- Technical Information TI435C/07/EN

14.3.4 pH-ISFET sensors

Tophit CPS471D
- Sterilizable and autoclavable ISFET sensor with Memosens technology
- For food and pharmaceutical industry, process engineering, water treatment and biotechnology
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps471d)
- Technical Information TI283C/07/EN

Tophit CPS441D
- Sterilizable ISFET sensor with Memosens technology
- For low-conductivity media, with liquid KCl electrolyte
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps441d)
- Technical Information TI352C/07/EN

Tophit CPS491D
- ISFET sensor with Memosens technology
- Open aperture junction for media with high potential for fouling
- Order as per product structure (--> Online Configurator, www.products.endress.com/cps491d)
- Technical Information TI377C/07/EN

14.3.5 Inductive conductivity sensors

Indumax CLS50D
- Inductive conductivity sensor with very good resistance properties for standard, Ex and high-temperature applications
- Memosens protocol
- Order as per product structure (--> Online Configurator, www.products.endress.com/cls50d)
- Technical Information TI182C/07/EN

14.3.6 Conductive conductivity sensors

Condumax CLS15D
- Conductive conductivity sensor for pure water, ultrapure water and applications in hazardous areas
- Order as per product structure (--> Online Configurator, www.products.endress.com/cls15d)
- Technical Information TI00109C/07/EN

Condumax H CLS16D
- Hygienic, conductive conductivity sensor for pure water, ultrapure water and applications in hazardous areas
- With EHEDG and 3A approval
- Order as per product structure (--> Online Configurator, www.products.endress.com/cls16d)
- Technical Information TI00227C/07/EN

Condumax W CLS21D
- Two-electrode sensor in plug-in head and fixed cable version
- Order as per product structure (--> Online Configurator, www.products.endress.com/cls21d)
- Technical Information TI00085C/07/EN

14.3.7 Oxygen sensors

Oxymax COS51D
- Amperometric sensor for dissolved oxygen, with Memosens technology
- Order as per product structure (--> Online Configurator, www.products.endress.com/cos51d)
- Technical Information TI00413C/07/EN

Oxymax COS61D
- Optical oxygen sensor for drinking water and industrial water measurement
- Measuring principle: quenching
- Memosens protocol
- Material: stainless steel 1.4571 (AISI 316Ti)
- Order as per product structure (--> Online Configurator, www.products.endress.com/cos61d)
- Technical Information TI387C/07/EN

14.3.8 Chlorine sensors

CCS142D
- Membrane-covered amperometric sensor for free available chlorine
- Memosens technology
- Measuring range 0.01 to 20 mg/l
- Order as per product structure (--> Online Configurator, www.products.endress.com/ccs142d)
- Technical Information TI419C/07/EN

14.3.9 Ion-selective sensors

ISEmax CAS40D
- Ion-selective sensors
- Order as per product structure (--> Online Configurator, www.products.endress.com/cas40d)
- Technical Information TI491C/07/EN

14.3.10 Turbidity sensors

Turbimax CUS51D
- For nephelometric turbidity and solids measurement in wastewater
- 4-beam alternating light method based on scattered light
- With Memosens protocol
- Order as per product structure (--> Online Configurator, www.products.endress.com/cus51d)
- Technical Information TI461C/07/EN

14.3.11 SAC and nitrate sensors

Viomax CAS51D
- SAC and nitrate measurement in drinking water and wastewater
- With Memosens protocol
- Order as per product structure (--> Online Configurator, www.products.endress.com/cas51d)
- Technical Information TI459C/07/EN

15 Technical data

15.1 Input

15.1.1 Measured variables

See documentation for the connected sensor.

15.1.2 Input types (optional)

- Up to 2 analog inputs
- Up to 2 binary inputs
- 1 or 2 digital sensors with Memosens protocol

15.2 Temperature inputs (optional)

15.2.1 Measuring range

-30 to 70 °C (-20 to 160 °F)

15.2.2 Input type

Pt1000

15.2.3 Accuracy

±0.5 K

15.3 Binary input, passive (optional)

15.3.1 Span

12 to 30 V, galvanically isolated

15.3.2 Signal characteristics

Minimum pulse width: 100 ms

15.4 Analog input, passive/active (optional)

15.4.1 Span

0/4 to 20 mA, galvanically isolated

15.4.2 Accuracy

±0.5 % of measuring range

15.5 Output (optional)

15.5.1 Output signal

Up to 2 binary outputs:
Open collector, max. 30 V, 200 mA

Up to 2 x 0/4 to 20 mA, active, galvanically isolated from the sensor circuits and from each other

15.5.2 Communication

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

15.6 Power supply

15.6.1 Electrical connection

See "Wiring" chapter.

15.6.2 Supply voltage

Sampler: internal 24 V DC, 7.2 Ah lead-acid battery

The sampler cannot be operated without the battery.

Charger for Liquiport 2010 CSP44:

Field-suitable IP 67	100 to 240 V AC; charge current 2.0 A; also suitable for mains operation
Indoor use	100 to 240 V AC; charge current 2.0 A; also suitable for mains operation
Mains operation means that the sampler is in operation during the charging process.	

Specification of charger for Liquiport 2010 CSP44:
- Max. output current = 2 A
- Max. output voltage = 29.5 V
- Double/reinforced insulation
- Constant current
- CSA or UL recognized according to UL 60950-1, UL 60601-1 or UL 61010-1 or the relevant CSA standards

15.6.3 Power consumption

Max. 60 W (only when using the battery chargers indicated by the manufacturer)

15.6.4 Capacity of battery

42 hours ≙168 samples (at a sampling interval of 15 minutes, a sampling volume of 100 ml and a suction height of 4 meters)
Standby capacity: 144 hours

Data apply if analog input is switched off and to devices without a Memosens input.

15.6.5 Fuses

Input fuse: (behind the plate of the distribution arm in the black box)
T3.15A

Electronics fuse: (in the controller)
T4.0A

15.7 Performance characteristics

15.7.1 Sampling methods

- Event sampling
- Single and multiple samples
- Sampling table
- Time proportional sampling (CTCV)
- Flow proportional sampling (VTCV)
- Flow proportional sampling/time override (CTVV)

15.7.2 Dosing volume

10 to 10000 ml (0.3 to 340 fl.oz.)

The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.

15.7.3 Dosing accuracy

±5 ml (0.17 fl.oz.) or ±5 % of the set volume

15.7.4 Repeatability

5 %

15.7.5 Intake speed

> 0.5 m/s (> 1.6 ft/s) with 10 mm (3/8") ID, in accordance with EN 25667, ISO 5667
> 0.6 m/s (> 1.9 ft/s) for 10 mm (3/8") ID, in accordance with Ö 5893, US EPA

15.7.6 Suction height

Max. 8 m (26 ft)

15.7.7 Hose length

Max. 30 m (98 ft)

15.8 Environment

15.8.1 Ambient temperature range

0 to 40 °C (32 to 100 °F)
Do not install the sampler in areas with high temperature and direct sunlight!

15.8.2 Storage temperature

-20 to 60 °C (0 to 140 °F)

15.8.3 Degree of protection

Sampler with cover closed: IP 54
Controller: IP 65

15.8.4 Electromagnetic compatibility

Interference emission and interference immunity as per EN 61326-1: 2006, class A for industry

15.8.5 Electrical safety

In accordance with EN 61010-1, protection class I, environment ≤2,000 m (6,500 ft) above MSL; the device is designed for contamination level 2.

15.8.6 Relative humidity

10 to 95%, not condensing

15.9 Process

15.9.1 Medium temperature range

2 to 50 °C (36 to 122 °F)

15.9.2 Process pressure

Unpressurized

15.9.3 Medium properties

Sample media must be free of abrasive substances.
Pay attention to the material compatibility of the wetted parts.

15.10 Mechanical construction

15.10.1 Dimensions

--> "Installation" section

15.10.2 Weight

	Liquiport 2010 CSP44
Empty weight	15 kg (33 lbs)
Overall weight with battery and 24 x 1 l bottles	19 kg (42 lbs)
Upper compartment with battery	10 kg (22 lbs)
Lower compartment with 24 x 1 l bottles	9 kg (20 lbs)

With full bottles the weight of the sampler is more than 25 kg (55 lbs). To comply with ISO 11228-1 only transport the sampler together with a second person.

15.10.3 Material

	Liquiport 2010 CSP44
Housing	Plastic PE
Housing parts	Plastic PE
Bottles	Plastic PE, glass (depending on version)
Distribution arm	Plastic PE
Sensor housing	Plastic PP
Pump tubing	Silicone
Suction line	Plastic PVC reinforced braided, EPDM black

15.10.4 Process connections

Intake hose ID 10 mm (3/8")

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