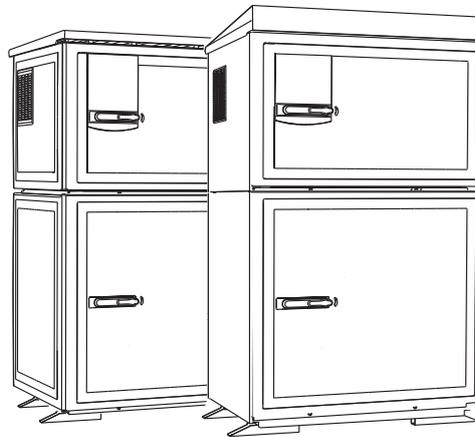


Technical Information

Liquistation CSF48

Automatic stationary sampler for liquid media Integrated controller with up to four measuring channels and optional digital Memosens technology



Application

Liquistation CSF48 is a stationary sampler designed for the fully automated removal, defined distribution, and temperature-controlled storage of liquid media. The standard product version has two 0/4 to 20 mA analog inputs, two binary inputs and two binary outputs. Thanks to the modular platform concept, the CSF48 can be quickly and easily modified to create a measuring station.

- Communal and industrial wastewater treatment plants
- Laboratories and water management offices
- Monitoring of liquid media in industrial processes

Your benefits

- Four different kinds of housing material
- Two-door housing for reliable sample temperature regulation
- Air circulation in sample chamber with inner lining
- Swift menu guidance, navigator and large display
- Dual bottle trays for easy sample transportation
- Practice-oriented programs ranging from simple time programs to event programs
- Functionality can be extended by installing modular electronic components
- Integrated data logger for recording measured values
- Service interface for data transmission
- Optional battery backup system ensures uninterrupted operation in the event of power failure

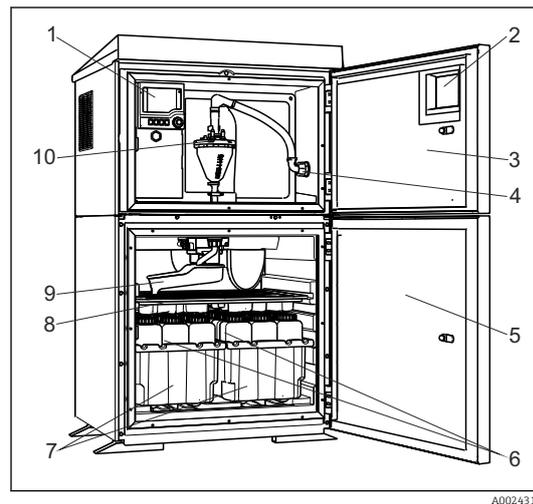
Function and system design

Liquistation CSF48 sampler

A complete sampling unit comprises:

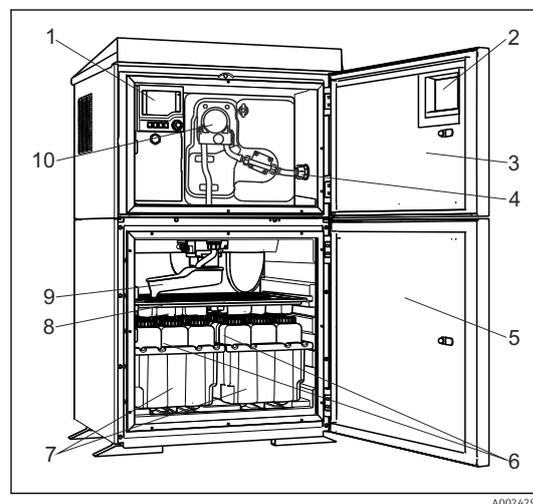
Liquistation CSF48 for open channels include the following, depending on version:

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



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

1 Example of a Liquistation CSF48, version with vacuum pump



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

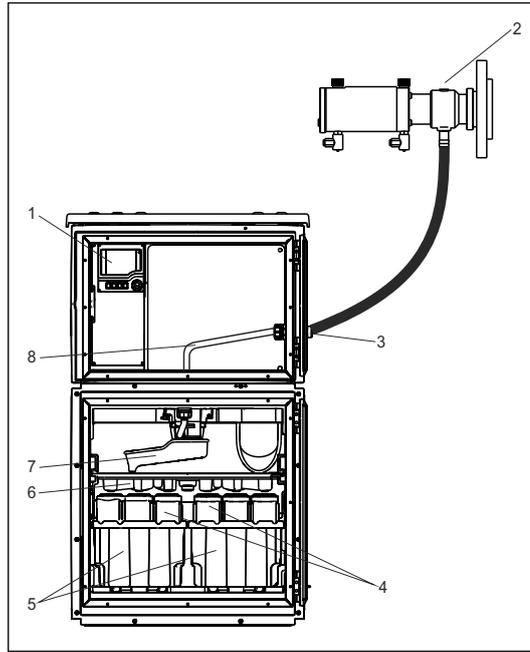
2 Example of a Liquistation CSF48, version with peristaltic pump

Liquistation CSF48 sampler with Samplefit CSA420 sampling assembly

A complete sampling unit for pressurized pipes comprises:

Liquistation CSF48 and Samplefit CSA420 sampling assembly with:

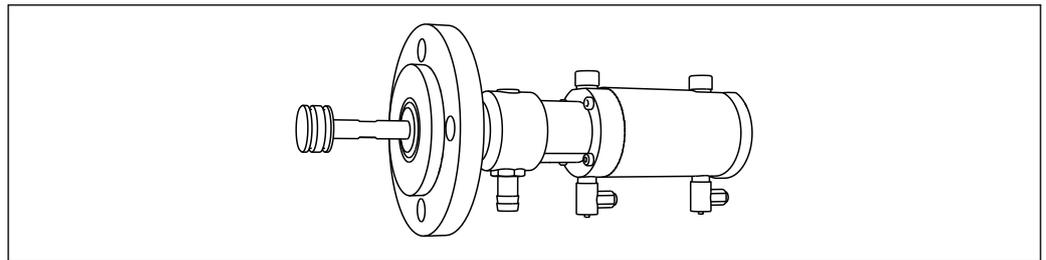
- Controller with display, soft keys and navigator
- Samplefit CSA420 sampling assembly for 10 ml, 30 ml or 50 ml sample volume, depending on version
- PE or glass sample bottles for sample preservation
- Sampling chamber temperature regulator (optional) for safe sample storage



- 1 Controller
- 2 Samplefit CSA420 sampling assembly
- 3 Gland for sample line
- 4 Sample bottles, e.g. 2 x 12 bottles, PE, 1 liter
- 5 Bottle trays (depending on sample bottles selected)
- 6 Distribution plate (depending on sample bottles selected)
- 7 Distribution arm
- 8 Distribution plate (depending on sample bottles selected)
- 9 Distribution arm
- 10 Direct supply line for sample

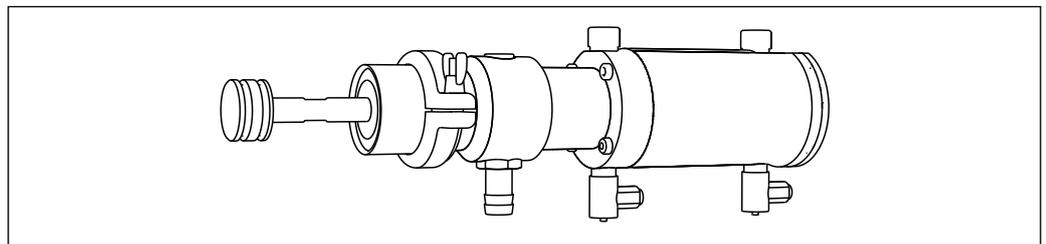
3 Example of a Liquistation CSF48 with CSA420 sampling assembly

Example of Samplefit CSA420 sampling assembly with flange connection



4 Samplefit CSA420 sampling assembly with flange connection DN50, PP

Example of Samplefit CSA420 sampling assembly with Triclamp connection



5 Samplefit CSA420 sampling assembly with triclamp connection DN50, DIN 32676

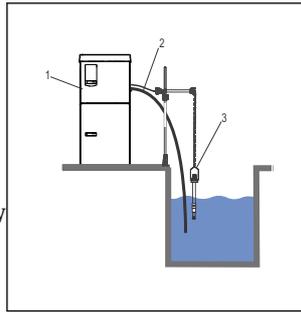
Sampler with online measurement

i The following overview shows examples of the design and layout of a measuring system. Other sensors and assemblies can be ordered for conditions specific to your application. See Accessories section and also --> www.endress.com/products

Measuring point

A complete measuring system with online measurement consists of:

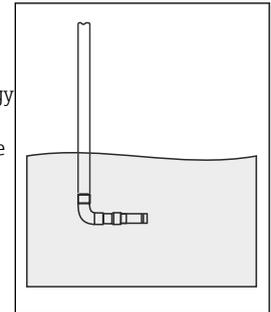
- Liquistation CSF48 sampler
- Sensors with Memosens technology
- Immersion or flow assemblies to suit the sensors used



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Nitrate

- Liquistation CSF48 sampler
- Sensors with Memosens technology
- Immersion or flow assemblies to suit the sensors used



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6 Measuring system

- 1 Liquistation CSF48
- 2 Suction line
- 3 Sensors with immersion assembly

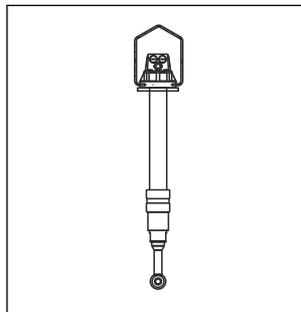
Conductivity

Inductive conductivity measurement

- Flexdip CYA112 immersion assembly
- Indumax CLS50D sensor with fixed cable

Conductive conductivity measurement

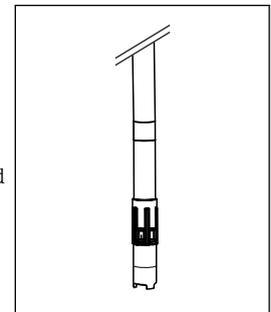
- Flexdip CYA112 immersion assembly
- Condumax CLS15D sensor



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Oxygen

- Flexdip CYA112 immersion assembly
- Flexdip CYH112 holder
- Sensor
 - Oxymax COS61D (optical) with fixed cable,
 - Oxymax COS51D (amperometric) cable CYK10

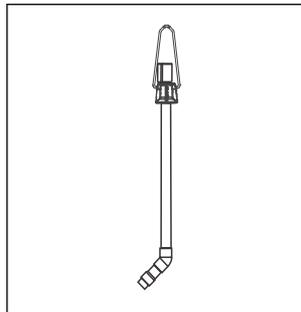


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Figure: CYA112 with COS61D

Turbidity

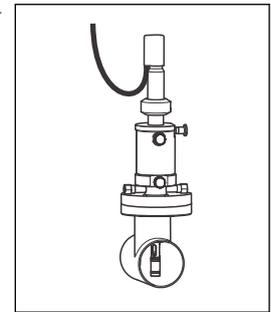
- Flexdip CYA112 immersion assembly
- Spray head CUR4 (optional)
- Turbimax CUS51D sensor with fixed cable



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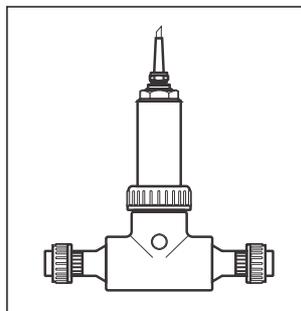
pH value or ORP

- Retractable assembly Cleanfit CPA471
- Orbisint CPS11D, CPS12D sensor
- Measuring cable CYK10



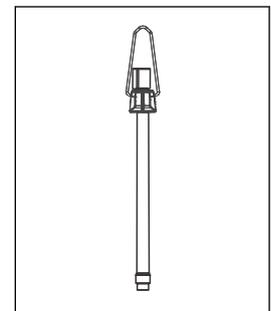
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- Flowfit CUA250 flow assembly
- Turbimax CUS51D sensor with fixed cable



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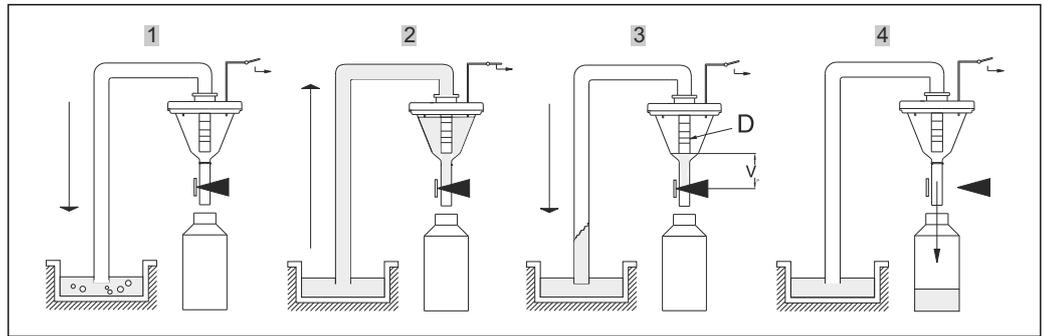
- Flexdip CYA112 immersion assembly
- Orbisint CPS12D, CPS11D sensor
- Measuring cable CYK10



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Mode of operation with a vacuum pump

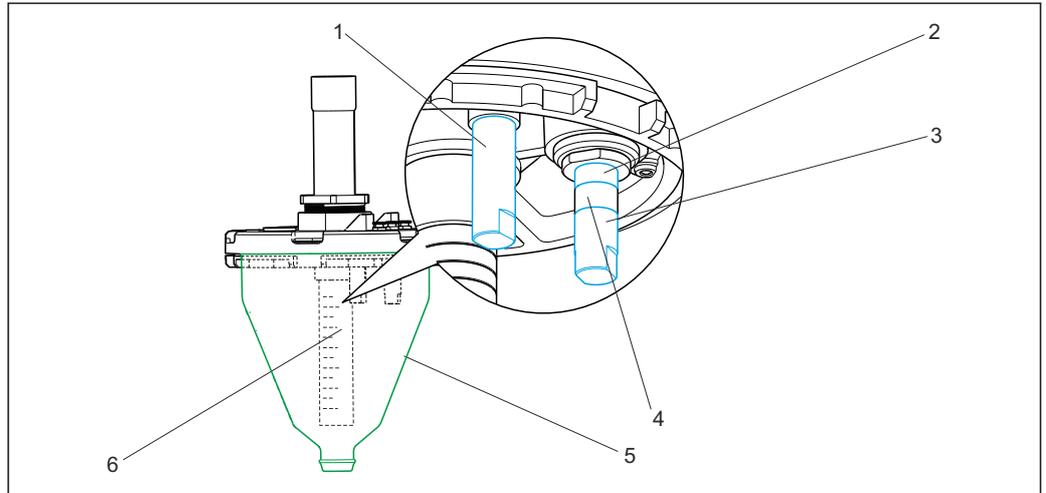
Sampling takes place in four steps:



A0022647

1. Blow clear
 - ↳ The vacuum pump blows the suction line clear via the dosing system.
2. Intake
 - ↳ The "Airmanager" (pneumatic control unit) switches the air path of the vacuum pump to "intake". The sample is drawn into the dosing beaker until it reaches the conductivity probes of the dosing system.
3. Dose
 - ↳ The intake process ends. Depending on the position of the dosing tube (item D), the excess sample liquid flows back to the sampling point.
4. Drain
 - ↳ The hose clamp is opened and the sample is drained into the sample bottle.

Dosing system with conductive sample sensor



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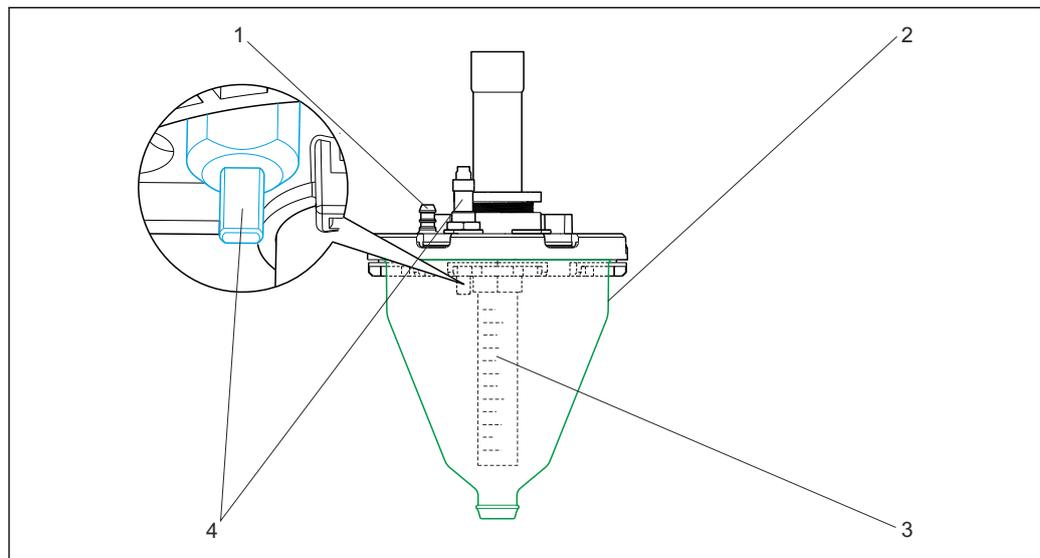
7 Conductive dosing system

- 1 Conductivity sensor 1 (common electrode)
- 2 Conductivity sensor 2 (safety electrode)
- 3 Conductivity sensor 3 (standard electrode)
- 4 Insulation
- 5 Measuring jug (plastic version with graduated scale or glass)
- 6 Graduated dosing tube, white and blue scale

Sample detection principle

When the sample is drawn in, the sample level reaches conductivity sensors 1 and 3. The system thus detects that the measuring jug is filled and terminates the suction process. If sensor 3 is heavily fouled or fails, conductivity sensor 2 switches to safety mode and turns off the system. This patented sample detection method along with predictive maintenance information prevent vacuum pump failure as a result of flooding.

Dosing system with capacitance sample sensor



A0024340

8 Capacitance dosing system

- 1 Hose connection for the vacuum pump
- 2 Graduated measuring jug
- 3 Graduated dosing tube, white and blue scale
- 4 Capacitance level sensor

Sample detection principle

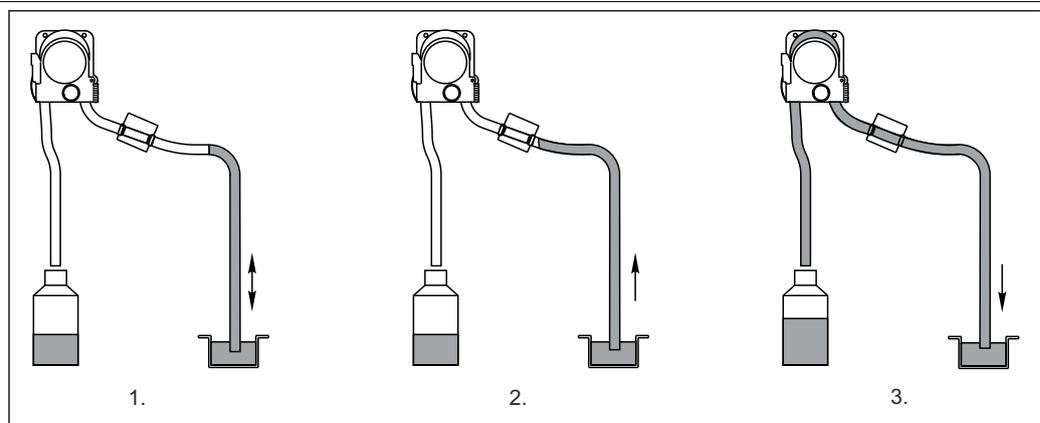
When the level of medium in the measuring jug changes, the capacitance of a capacitor partly formed by the liquid also changes..

The capacitance sensor ensures rapid sample detection in media that form foam and have a high fat content, and media with a conductivity $< 30 \mu\text{S}/\text{cm}$. Only capacitance level detection is possible in the latter type of media.

i Sample dosing with/without pressure

Sample dosing without pressure is the factory setting for all standard applications in which the sample medium is taken from an open channel or a gravity line. The excess sample can flow back under atmospheric pressure. Sample dosing with pressure is selected for applications in which the sample is taken from a pipe, for example, or for applications involving a low suction height and a low sample volume. In such instances, the sample medium cannot flow back on its own. The maximum pressure in the pipe must be $< 0.8 \text{ bar}$. Pressure is applied and the excess sample is forced out of the measuring jug and back to the sampling point. The sample volume is set by adjusting the dosing tube. The white "A" scale applies if dosing without pressure, and the blue "B" scale applies if dosing with pressure.

Mode of operation with a peristaltic pump



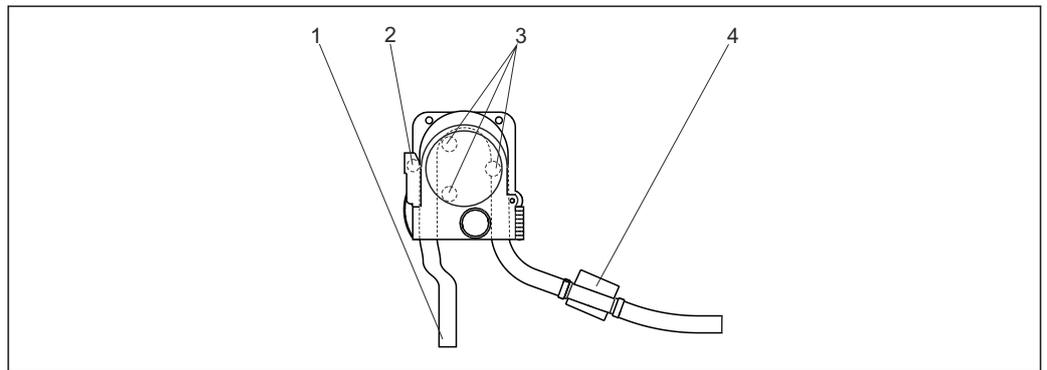
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9 Sampling steps with a peristaltic pump

Sampling takes place in three steps:

1. Rinse
 - ↳ The peristaltic pump runs in reverse and forces medium back to the sampling point.
2. Intake
 - ↳ The peristaltic pump runs forward and draws in medium. If the medium detection system detects the sample, the pump is controlled by the flow and the specified sample volume is calculated automatically.
3. Drain
 - ↳ The pump runs in reverse again and forces the medium back to the sampling point.

One advantage this system offers for obtaining a representative sample is the possibility of rinsing the suction line several times: Medium is initially drawn in until the medium detection system reacts, then the pump switches and forces the medium back to the sampling point. This process can be repeated a maximum of three times. The sample is then taken as described.



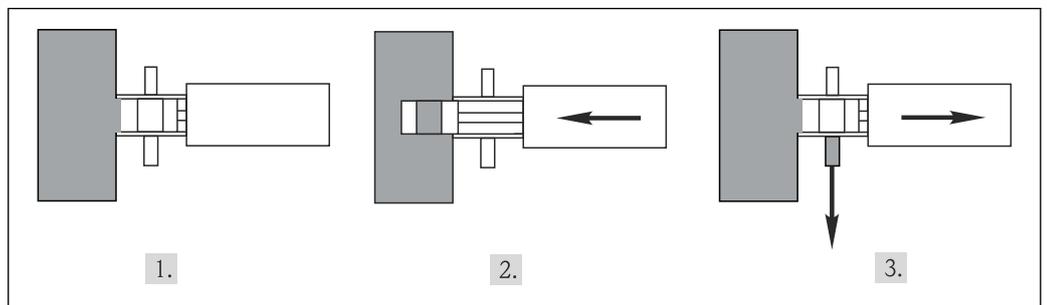
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10 Peristaltic pump

- 1 Pump tube
- 2 Safety switch (optional)
- 3 Pump rollers
- 4 Medium detection system (patented)

The pump rollers deform the hose, thereby causing a negative pressure and the suction effect. The medium detection system is based on a pressure sensor which detects the difference between a pipe that is filled and not filled. Thanks to a patented process for automatically detecting the suction height, the user does not have to enter the suction height or suction line length. The self-learning software guarantees that the sample volume remains constant. An optional safety switch integrated in the pump housing immediately switches off the pump when the pump is opened (recommended if third-party staff are performing maintenance work).

Mode of operation with a sampling assembly



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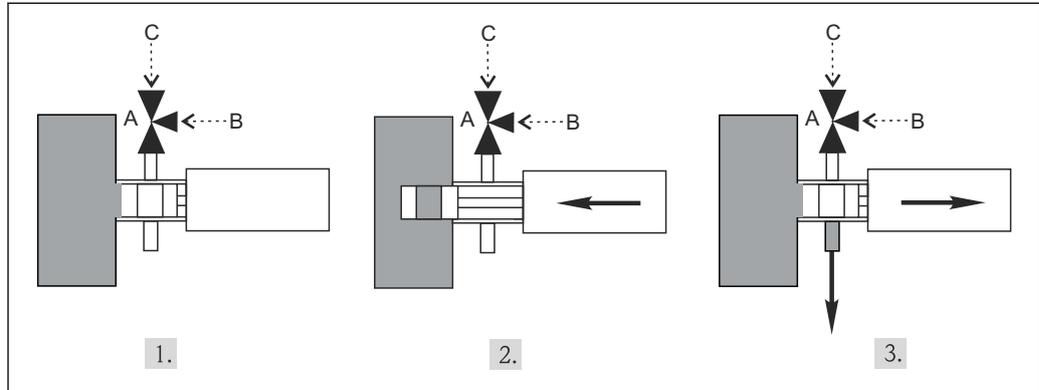
11 Sampling steps with a sampling assembly

Sampling takes place in three steps:

1. **Standby position:** The plunger is in standby position in the assembly. The sample chamber is ventilated from the outside.

2. **Filling:** The plunger is driven by compressed air into the sample flow. An adjustable hold time allows for a representative blending of the sample in the sample chamber.
3. **Emptying:** The plunger is in standby position in the assembly. The sample chamber is ventilated from the outside. The sample is drained into the sample bottle(s).

Sampling assembly with optional rinsing valve



12 Sampling steps with a sampling assembly

- A Rinsing valve
 B Compressed air
 C Atmosphere

The rinsing valve provides you with these additional functions:

- Draining under pressure - valve is connected to compressed air
 In the sampling setup menu, the function "Dosing with pressure" can be selected. This allows the sample to flow under pressure into the sample bottle(s).
- Cleaning with compressed air or water
 - In the sampling setup menu, the function "Cleaning" with air or water can be selected. Once you select "before", "after" or "before and after every sampling", you can choose a cleaning position.
- In addition, you can select sample rinsing cycles in the "Cleaning before and after sampling" menu. The system can be pre-rinsed up to 10 times with the current sample.

i Automatic sampling using the sampling assembly is designed for aqueous samples. For highly viscous samples, e.g. sludge >1 %, sampling can only be done directly into a container.

The air or water pressure must be set for the application in question using pressure reducing valves.

Sampling with a flow assembly

A flow assembly is integrated in the stand for sampling purposes.

The flow assembly is used for sampling in pressurized systems e.g.:

- Tanks positioned at a height
- Pressure piping
- Conveyance using external pumps

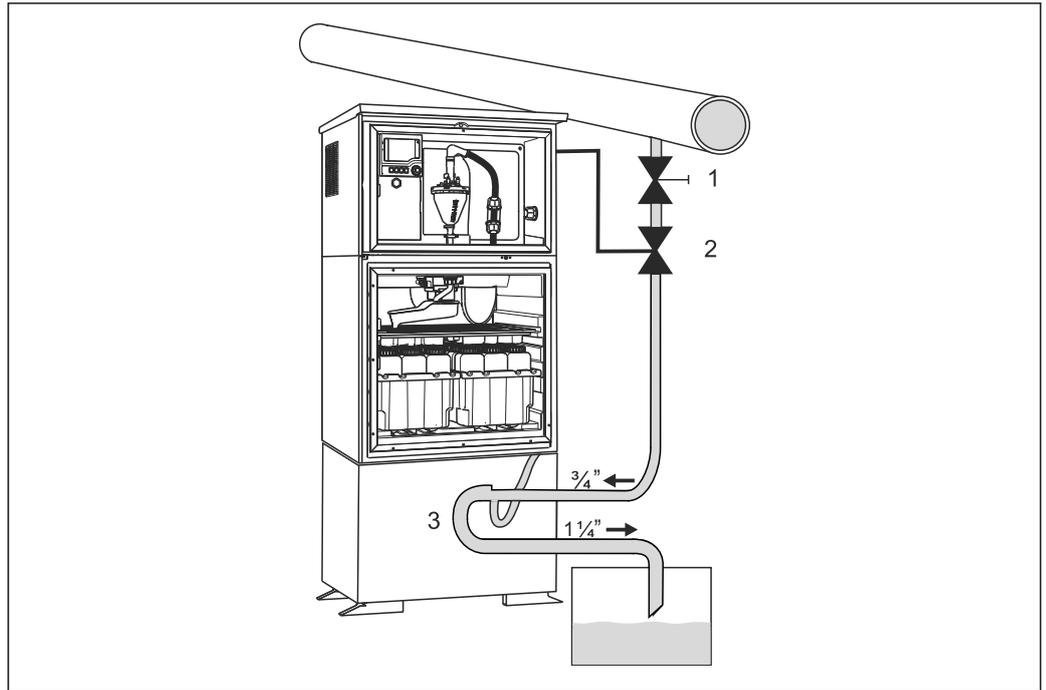
The flow rate should be 1000 to 1500 l/h.

NOTICE

Pressure in the assembly

Damage to the assembly

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



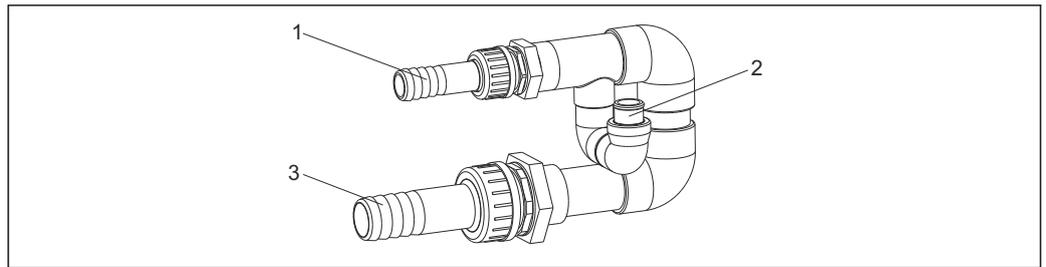
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13 Example: Sampling from pressure piping

- 1 Ball valve 1
- 2 Valve 2
- 3 Flow assembly integrated into the stand

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

i Valve 1 and valve 2 are not included in the scope of delivery (order code 71180379).



A0013127

14 Flow assembly (can also be ordered separately as kit no.: 71119408)

Flow assembly inflow: 3/4"
 Sampling connection
 Flow assembly outflow: 1 1/4"

Sample distribution

CSF48 offers a wide range of bottle combinations and distribution versions. The versions can be changed or replaced easily without the need for special tools. In addition, the software program makes it possible to configure individual bottles and bottle groups and assign them to switchover or event programs.

Sample preservation

The sample bottles are located in the sampling chamber. This is fitted with a seamless plastic lining to ensure easy cleaning. All parts that transport medium (distribution arm, dosing system etc.) can be disassembled and cleaned easily without the need for tools.

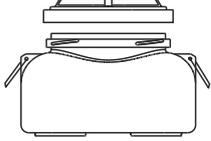


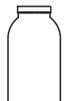
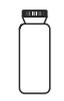
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15 Distributor plate, bottle trays and distribution arm

- i** Distribution version "V": The maximum sample volume per sample is limited to 80 ml of liquid with a low solids content. A special distribution arm and distributor plate are used.
- i** Distribution version "W": This version contains a centering plate for 4 x 5000 ml Schott Duran GLS 80 glass bottles. These glass bottles must be ordered from your local Schott dealer.

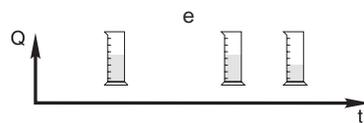
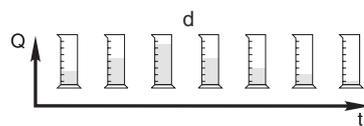
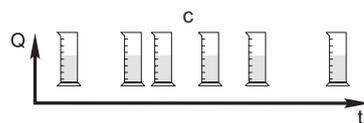
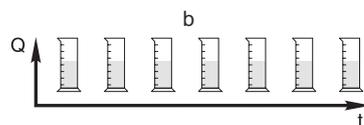
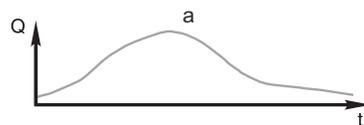
Bottle groups and distribution version depending on the order version:

	CSF48-*****																			
	B	C	D	E	G	H	J	L	M	N	O	P	Q	R	S	T	U	V	W	
30 liter, PE, direct distribution  <small>A0024349</small>	1																			
60 liter, PE, direct distribution  <small>A0025843</small>		1																		
25 liter, PE, direct distribution  <small>A0024349</small>			2									1	1							
17 liter, PE, direct distribution  <small>A0025967</small>															4					

	CSF48-*****																			
	B	C	D	E	G	H	J	L	M	N	O	P	Q	R	S	T	U	V	W	
13 liter, PE, direct distribution  <small>A0025968</small>			4																	
5 liter, glass, preparation  <small>A0025970</small>																				4
3.8 liter, glass, direct distribution  <small>A0025970</small>																			4	
3 liter, PE, plate distribution  <small>A0025971</small>					12			6		6				6						
2 liter, PE, plate distribution  <small>A0025856</small>																				24
1 liter, PE, plate distribution  <small>A0025972</small>						24			12	12					12					
1 liter, glass, plate distribution  <small>A0025974</small>								24												
13 liter, PE, plate distribution  <small>A0025975</small>								2	2											

	CSF48-*****																			
	B	C	D	E	G	H	J	L	M	N	O	P	Q	R	S	T	U	V	W	
2 liter, PE, direct distribution  A0025976												12	6							
1 liter, PE, direct distribution  A0025978												24	12							
1.8 liter, glass, plate distribution  A0025979															12					

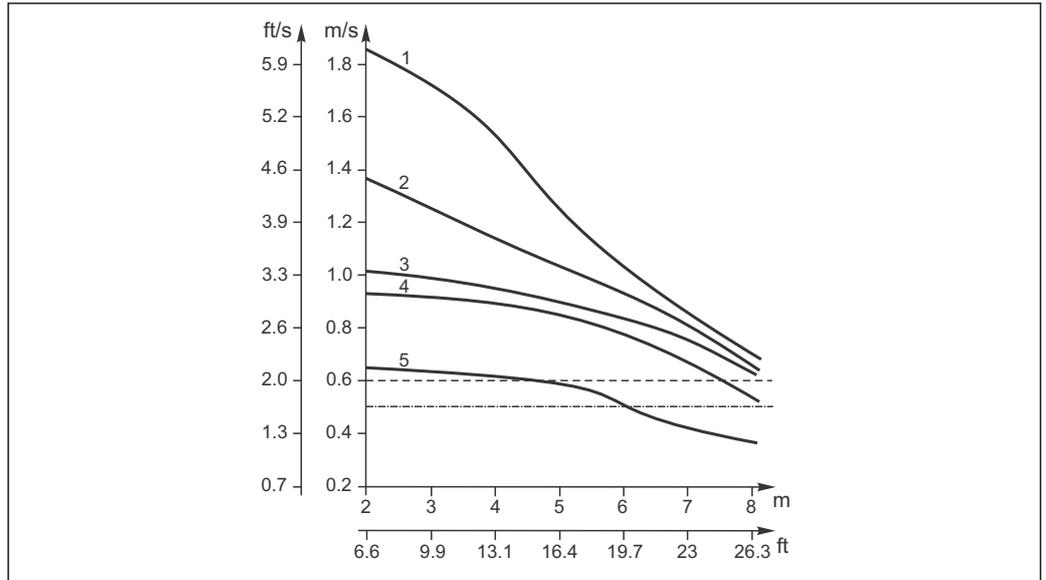
Sampling control



- a. **Flow curve**
- b. **Time-proportional sampling (CTCV)**
A constant sample volume (e.g. 50 ml) is taken at regular intervals (e.g. every 5 minutes).
- c. **Volume-proportional sampling (VTCV)**
A constant sample volume is taken at variable intervals (depending on the inflow volume).
i Time override can be enabled in an advanced program. This allows long, flow-controlled sample intervals to be interrupted if the flow rate is low. A time-controlled sample is collected.
- d. **Flow-proportional sampling (CTVV)**
A variable sample volume (the sample volume depends on the flow rate) is taken at regular intervals (e.g. every 10 min).
i Only in version with peristaltic pump.
- e. **Event-controlled sampling**
Sampling is triggered by an event (e.g. pH limit value). Sampling can be time-paced, volume-paced or flow-paced, or single samples can be taken.

Single and multiple samples can also be grouped in a program in addition to the sampling methods listed. Furthermore, the software allows interval sampling, switchover and event functions. The latter permit up to 24 subprograms to be active simultaneously for a variety of applications. A sampling table makes it possible for users to program the bottle assignment, time interval and sample volume. Signals for external control can be connected via 2 analog inputs and 2 binary inputs in the standard version of the product. Customized text is entered to ensure the correct assignment of the inputs in the memory.

Intake speed with different suction lines



17 Intake speed in m/s at suction heights in m

- a Intake speed according to Ö 5893 (Austrian standard); US EPA
- b Intake speed according to EN 25667, ISO 5667
- 1 ID 10 mm (3/8") vacuum pump
- 2 ID 13 mm (1/2") vacuum pump
- 3 ID 10 mm (3/8") peristaltic pump
- 4 ID 16 mm (5/8") vacuum pump
- 5 ID 19 mm (3/4") vacuum pump

Sample temperature regulation (optional)

The temperature of the sampling chamber can be adjusted using the controller. The factory setting is 4 °C (39 °F). The current temperature is shown on the display and recorded in the internal data logger. A temperature sensor for measuring individual sample temperatures can also be ordered as an option. The vaporizer and defrost heater are integrated in a special housing such that they are protected against corrosion and damage. The compressor and condenser are located in the upper section of the sampler, and can be easily accessed (for maintenance purposes) by removing the upper rear panel.



18 Cooling system

Sampler housing

Pay attention to the installation conditions in the "Installation" section and the information on the materials of the different housing types in the "Mechanical construction" section.

NOTICE

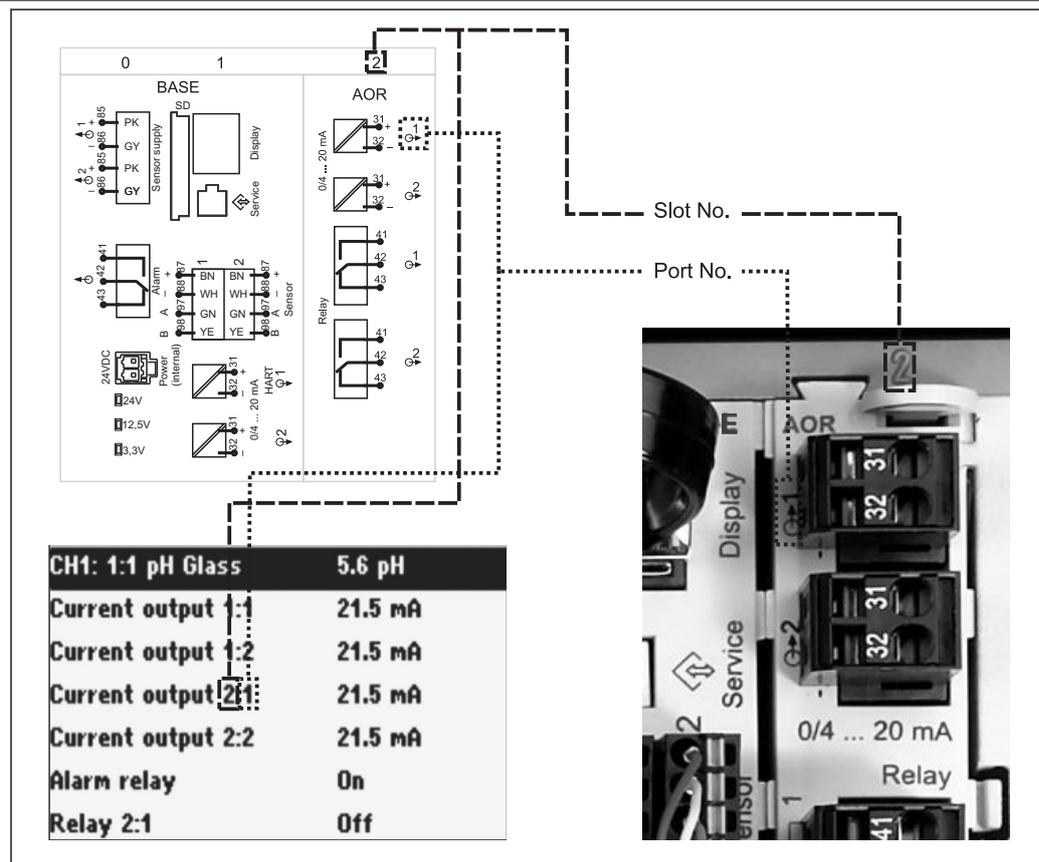
The plastic material polystyrene VO can discolor if exposed directly to sunlight.

In the case of stainless steel housings, the frame around the window can discolor if exposed directly to sunlight.

- ▶ The plastic material ASA+PC VO is recommended for outdoor installations where a sun guard is not used. The discoloring does not affect the function and operation of the device.

Equipment architecture

Slot and port assignment



19 Slot and port assignment of hardware and presentation on the display

The electronics configuration follows a modular concept:

- There are several slots for electronics modules. Diese werden als "Slots" bezeichnet.
- These slots are numbered consecutively in the housing. Slots 0 and 1 are always reserved for the basic module.
- Each electronics module has one or more inputs and outputs or relays. Here they are all collectively known as "ports".

- Ports are consecutively numbered per electronics module and are recognized automatically by the software.
 - Outputs and relays are named according to their function, e.g. "current output", and are displayed with the slot and port numbers in ascending order
Example:
"Current output 2:1" shown on the display means: slot 2 (e.g. AOR module) : port 1 (current output 1 of the AOR module)
 - Inputs are assigned to measuring channels in the ascending order of "slot:port number"
Example:
"CH1: 1:1" shown on the display means:
Slot 1 (base module) : port 1 (input 1) is channel 1 (CH1) and a conductivity sensor is connected here
-  The unique terminal name is derived from the following:
Slot no. : Port no. : Terminal

Communication and data processing

Types of communication:

- Fieldbuses
 - HART
 - PROFIBUS DP (Profile 3.02)
 - Modbus TCP or RS485
- Configuration via Ethernet
- EtherNet/IP

-  Only one type of Fieldbus communication can ever be active. The last activation code entered decides which bus is used.

The device drivers available make it possible to perform a basic setup and display measured values and diagnostics information via the fieldbus. A full device configuration via the fieldbus is not possible.

Bus termination on the device

- Via slide switch at bus module 485
- Displayed via LED "T" on bus module 485

Dependability

Reliability

Memosens technology



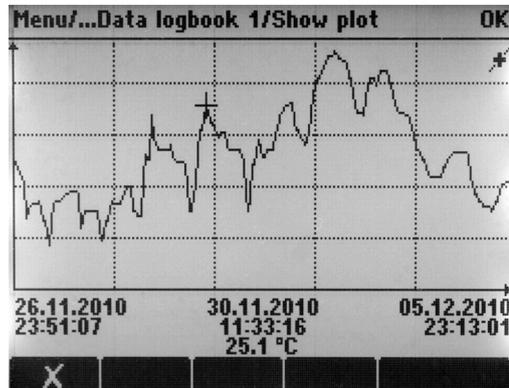
Memosens makes your measuring point safer and more reliable:

- Non-contact, digital signal transmission enables optimum galvanic isolation
- No contact corrosion
- Completely watertight
- Laboratory sensor calibration possible, thus increasing measured value availability
- Predictive maintenance thanks to recording of sensor data, e.g.:
 - Total hours of operation
 - Hours of operation with very high or very low measured values
 - Hours of operation at high temperatures
 - Number of steam sterilizations
 - Sensor condition



A0024356

- Hardware logbook:
 - Hardware configuration and modifications
 - Max. 125 entries
- Version logbook:
 - Including software updates
 - Max. 50 entries
- Operation logbook: max. 250 entries
- Diagnostics logbook: max. 250 entries



21 Data logbook: Graphic display

A0024359

Mathematical functions (virtual process values)

In addition to "real" process values, which are provided by connected physical sensors or analog inputs, mathematical functions can be used to calculate a maximum of 6 "virtual" process values.

The "virtual" process values can be:

- Output via a current output or a fieldbus
- Used as a regulating control variable
- Assigned as a measured variable to a limit contactor
- Used as a measured variable to trigger cleaning
- Displayed in user-defined measuring menus.

The following mathematical functions are possible:

- Calculation of pH from two conductivity values according to VGB Standard 405, e.g. in boiler feedwater
- Difference between two measured values from different sources, e.g. to monitor membranes
- Differential conductivity, e.g. to monitor the efficiency of ion exchangers
- Degassed conductivity, e.g. for process controls in power plants
- Redundancy to monitor two or three redundant sensors
- rH calculation from the measured values of a pH and an ORP sensor

FieldCare and Field Data Manager

FieldCare

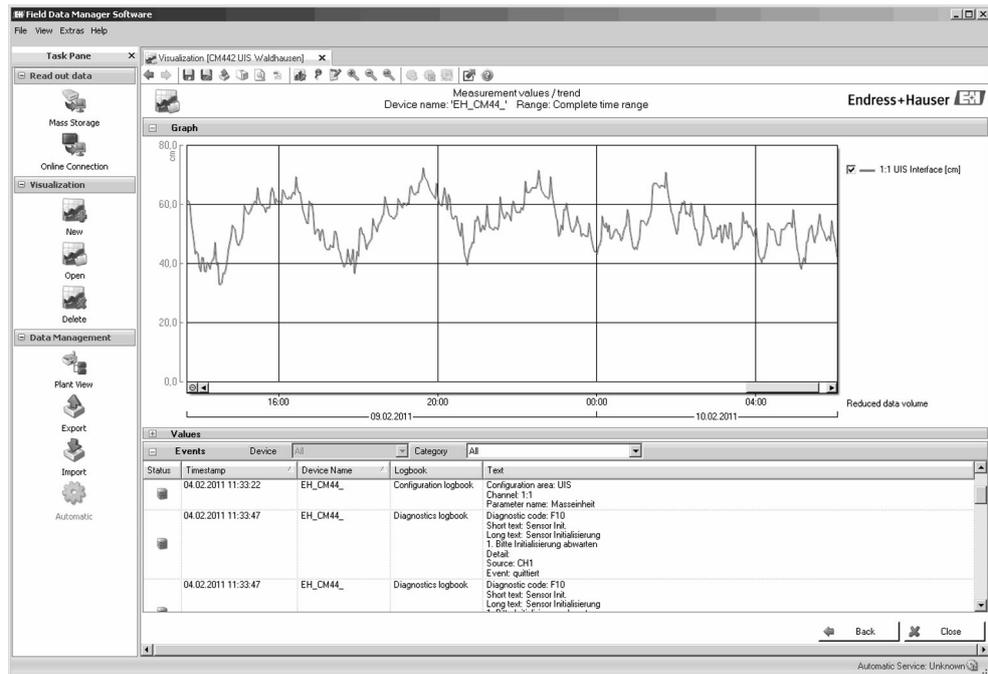
Configuration and asset management software based on FDT/DTM technology

- Complete device configuration when connected via FXA291 and service interface
- Access to a number of configuration parameters and identification, measuring and diagnostic data when connected via HART modem
- Logbooks can be downloaded in CSV format or binary format for "Field Data Manager" software

Field Data Manager

Visualization software and database for measuring, calibration and configuration data

- SQL database which is protected against manipulation
- Functions to import, save and print out logbooks
- Load curves to display measured values



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22 Field Data Manager: Load curves

SD card

The exchangeable storage medium enables:

- Quick and easy software updates and upgrades
- Data storage of internal device memory (e.g. logs)
- Transfer of complete configurations to a device with an identical setup (backup function)
- Transfer of configurations without the TAG and bus address to devices with an identical setup (copy function)

Endress+Hauser offers industry-approved SD cards as accessories. These memory cards provide maximum data security and integrity.

Other SD cards can also be used. However, Endress+Hauser does not accept any responsibility for the data security of such cards.

Safety

Real-time clock

The device has a real-time clock, which is backed up by a button cell in the event of a power failure. This ensures that the device continues to keep the correct time and date if it is restarted and that the time stamp for the logbooks is correct.

Data security

All settings, logbooks etc. are stored in a non-volatile memory to ensure that the data are retained even in the event of a disruption to the power supply.

Input

Types of input

- 2 analog inputs
- 2 binary inputs + 2 binary inputs (optional)
- 1 to 4 digital inputs for sensors with Memosens protocol (optional)

measured variables

→ Documentation of the connected sensor

Temperature inputs

Measuring range	Measuring range -30 to 70 °C (-20 to 160 °F)
Type of input	Type of input Pt1000
Accuracy	Accuracy ± 0.5 K

Binary input, passive

Span	Span 12 to 30 V, galvanically isolated
Signal characteristics	Signal characteristics Minimum pulse width: 100 ms

Analog input, passive/active

Span	Span 0/4 to 20 mA, galvanically isolated
Accuracy	Accuracy ±0.5 % of measuring range

Output

Output signal	2 binary outputs (standard) + 2 binary outputs (optional): open collector, max. 30 V, 200 mA Depending on version (optional): <ul style="list-style-type: none"> ▪ 1 x 0/4 to 20 mA, active, HART communication, galvanically isolated from one another and from the sensor circuits ▪ 1 x 0/4 to 20 mA, active, galvanically isolated from one another and from the sensor circuits ▪ 2 x 0/4 to 20 mA, active, galvanically isolated from one another and from the sensor circuits ▪ 4 x 0/4 to 20 mA, active, galvanically isolated from one another and from the sensor circuits ▪ 6 x 0/4 to 20 mA, active, galvanically isolated from one another and from the sensor circuits
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HART	
Signal encoding	FSK ± 0.5 mA via current signal
Data transmission rate	1200 baud
Galvanic isolation	Yes
Load (communication resistor)	250 Ω

PROFIBUS DP	
Signal encoding	EIA/TIA-485, PROFIBUS-DP-compliant as per IEC 61158
Data transmission rate	9.6 kBd, 19.2 kBd, 93.75 kBd, 187.5 kBd, 500 kBd, 1.5 MBd, 6MBd, 12MBd
Galvanic isolation	Yes
Connector	Spring terminal (max. 1.5 mm), bridged internally in the connector (T-function), M12 optional
Bus termination	Internal slide switch with LED display

Modbus RS485	
Signal encoding	EIA/TIA-485
Data transmission rate	2400, 4800, 9600, 19200, 38400, 57600 and 115200 Baud
Galvanic isolation	Yes
Connector	Spring terminal (max. 1.5 mm), bridged internally in the connector (T-function), M12 optional
Bus termination	Internal slide switch with LED display

Ethernet	
Signal encoding	IEEE 802.3 (Ethernet)
Data transmission rate	10 / 100 MBd
Galvanic isolation	Yes
Connection	RJ45, M12 optional
IP address	DHCP or configuration via menu

EtherNet/IP	
Signal encoding	IEEE 802.3 (Ethernet)
Data transmission rate	10 / 100 MBd
Galvanic isolation	Yes
Connection	RJ45, M12 optional (D-coded)
IP address	DHCP or configuration via menu

Signal on alarm

Adjustable, as per NAMUR Recommendation NE 43

- In measuring range 0 to 20 mA (HART is not available with this measuring range):
Error current from 0 to 23 mA
- In measuring range 4 to 20 mA:
Error current from 2.4 to 23 mA
- Factory setting for error current for both measuring ranges:
21.5 mA

Load

Max. 500 Ω

Linearization/transmission behavior

Linear

Current outputs, active (optional)

Span

0 to 23 mA
 2.4 to 23 mA for HART communication

Signal characteristic

Linear

Electrical specification

Output voltage:
 Max. 24 V

Cable specification

Recommended: shielded cable
 Max. 2.5 mm² (14 AWG)

Relay outputs (optional)

Electrical specification of relay types

Relay types

- 2 x changeover contact, coupled with binary output (optional)
- 1 single-pin changeover contact (alarm relay)
- 2 or 4 relay cards (optional)

Relay switching capacity

Power unit (Alarm relay)

Switching voltage	Load (max.)	Switching cycles (min.)
230 V AC, cosΦ = 0.8 to 1	0.1 A	700,000
	0.5 A	450,000
24 V DC, L/R = 0 to 1 ms	0.1 A	500,000
	0.5 A	350,000

Relay coupled with binary output

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

Extension module

Switching voltage	Load (max.)	Switching cycles (min.)
230 V AC, cosΦ = 0.8 to 1	0.1 A	700,000
	2 A	120,000
	115 V AC, cosΦ = 0.8 to 1	0.1 A
2 A		170,000
24 V DC, L/R = 0 to 1 ms	0.1 A	500,000
	2 A	150,000

Minimum load (typical)

- Min. 100 mA at 5 V DC
- Min. 1 mA at 24 V DC
- Min. 5 mA at 24 V AC
- Min. 1 mA at 230 V AC

Protocol-specific data

HART	Manufacturer ID	11 _h
	Device type	119C _h (CM44x), 119D _h (CSFxx)
	Transmitter-specific version	001 _h
	HART version	7.2
	Device description files (DD)	www.endress.com/hart Device Integration Manager (DIM)
	Device variables	16 user-configurable and 16 predefined, dynamic variables PV, SV, TV, QV
	Supported features	PDM DD, AMS DD, DTM, FieldXpert DD
PROFIBUS-DP	Manufacturer ID	11 _h
	Device type	
	Profile version	3.02
	GSD files	www.endress.com/profibus Device Integration Manager DIM
	Output values	16 AI blocks, 8 DI blocks
	Input variables	4 AO blocks, 8 DO blocks
	Supported features	<ul style="list-style-type: none"> ▪ 1 MSCY0 connection (cyclical communication, master class 1 to slave) ▪ 1 MSAC1 connection (acyclical communication, master class 1 to slave) ▪ 2 MSAC2 connections (acyclical communication, master class 2 to slave) ▪ Device lock: The device can be locked using the hardware or software. ▪ Addressing using DIL switches or software ▪ GSD, PDM DD, DTM
Modbus RS485	Protocol	RTU/ASCII
	Function codes	03, 04, 06, 08, 16, 23
	Broadcast support for function codes	06, 16, 23
	Output data	16 measured values (value, unit, status), 8 digital values (value, status)
	Input data	4 setpoints (value, unit, status), 8 digital values (value, status), diagnostic information
	Supported features	Address can be configured using switch or software
Modbus TCP	TCP port	502
	TCP connections	3
	Protocol	TCP
	Function codes	03, 04, 06, 08, 16, 23
	Broadcast support for function codes	06, 16, 23
	Output data	16 measured values (value, unit, status), 8 digital values (value, status)
	Input data	4 setpoints (value, unit, status), 8 digital values (value, status), diagnostic information
	Supported features	Address can be configured using DHCP or software

Web server

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

TCP port	80
Supported features	<ul style="list-style-type: none"> ▪ Remote-controlled device configuration ▪ Save/restore device configuration (via SD card) ▪ Logbook export (file formats: CSV, FDM) ▪ Access to web server via DTM or Internet Explorer

EtherNet/IP

Protocol	EtherNet/IP	
ODVA certification	Yes	
Device profile	Generic device (product type: 0x2B)	
Manufacturer ID	0x049E _h	
Device type ID	0x109C _h	
Polarity	Auto-MIDI-X	
Connections	CIP	12
	I/O	6
	Explicit message	6
	Multicast	3 consumers
Minimum RPI	100 ms (default)	
Maximum RPI	10000 ms	
System integration	EtherNet/IP	EDS
	Rockwell	Add-on-Profile Level 3, Faceplate for Factory Talk SE
IO data	Input (T → O)	Device status and diagnostic message with highest priority Measured values: <ul style="list-style-type: none"> ▪ 16 AI (analog input) + Status + Unit ▪ 8 DI (discrete input) + Status
	Output (O → T)	Actuating values: <ul style="list-style-type: none"> ▪ 4 AO (analog output) + status + unit ▪ 8 DO (discrete output) + Status

Power supply

Electrical connection

--> For a detailed wiring diagram, see the Operating Instructions for Liquistation CSF48

Supply voltage

- 100 to 120/200 to 240 V AC ±10 %, 50/60 Hz
- 24 V DC +15/-9 %

NOTICE**The device does not have a power switch**

- ▶ A fuse with a maximum rating of 10 A must be provided by the customer. Observe the local regulations for installation.

Cable entries

Depending on version:

- 1 x M25, 7 x M20 cable gland
- 1 x M25, 1 x M20 cable gland

Permitted cable diameter:

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

Mains fuse**Optional fuses on DIN rail:**

- T10A (for 24V power supply)
 - T3.15A (for 230V power supply)
 - T10A (fuse for battery backup)
-

Power consumption

- Version with vacuum pump: 290 VA
 - Version with peristaltic pump: 290 VA
 - Version with sampling assembly: 290 VA
 - Version with 24V power supply: 240 W
-

Power supply failure

Replace the rechargeable batteries with type Panasonic LC-R127R2PG1.

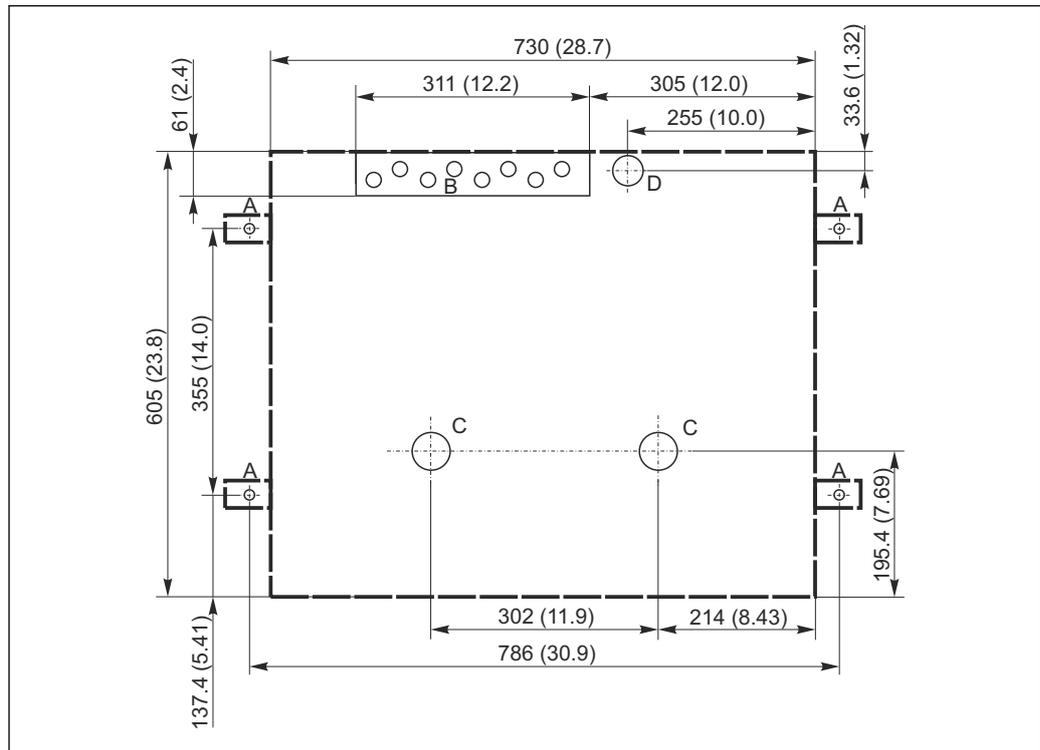
Real-time clock: lithium battery, type CR2032

Performance characteristics

Sampling methods	<p>Vacuum pump/peristaltic pump/sampling assembly:</p> <ul style="list-style-type: none"> ■ Event sampling ■ Single and multiple samples ■ Sampling table <p>Vacuum pump:</p> <ul style="list-style-type: none"> ■ Time-paced CTCV ■ Flow-paced VTCV <p>Peristaltic pump:</p> <ul style="list-style-type: none"> ■ Time-paced CTCV ■ Flow-paced VTCV ■ Time/flow-paced CTVV
Dosing volume	<p>Vacuum pump: 20 to 350 ml (0.7 to 12 fl.oz.)</p> <p>Peristaltic pump: 10 to 10000 ml (0.3 to 340 fl.oz.)</p> <p> The dosing accuracy and the repeatability of a sample volume < 20 ml can vary, depending on the specific application.</p> <p>Sampling assembly: 10, 30 or 50 ml (0.3; 1 or 1.7 fl.oz.)</p>
Dosing accuracy	<ul style="list-style-type: none"> ■ Vacuum pump: ± 5 ml (0.17 fl.oz.) or 5 % of the set volume ■ Peristaltic pump: ± 5 ml (0.17 fl.oz.) or 5 % of the set volume ■ Sampling assembly: ± 2 ml (0.07 fl.oz.) or 5 % of the set volume
Repeatability	5 %
Intake speed (vacuum pump / peristaltic pump)	<p>> 0.5 m/s (> 1.6 ft/s) for ≤ 13 mm (1/2") ID, according to EN 25667, ISO 5667, CEN 16479-1</p> <p>> 0.6 m/s (> 1.9 ft/s) for 10 mm (3/8") ID, according to Ö 5893 (Austrian standard); US EPA</p>
Suction height	<ul style="list-style-type: none"> ■ Vacuum pump: Max. 6 m (20 ft) or max. 8 m (26 ft), depending on the version ■ Peristaltic pump: Max. 8 m (26 ft)
Hose length	Max. 30 m (98 ft)
Temperature control (optional)	<p>Temperature sensors:</p> <ul style="list-style-type: none"> ■ Sampling chamber temperature ■ Sample temperature (optional) ■ Outside temperature (optional) <p>Temperature control unit:</p> <ul style="list-style-type: none"> ■ Sample temperature range: 2 to 20 °C (36 to 68 °F) Factory setting: 4 °C (39 °F) ■ Automatic defrosting system ■ Cooling rate in accordance with Ö 5893 (Austrian standard): 4 liters of water at 20 °C cool down to 4 °C in less than 210 minutes ■ Temperature constancy of sample at 4 °C over the operating temperature range of -15 to 40 °C (5 to 105 °F)

Post-installation

Mounting instructions

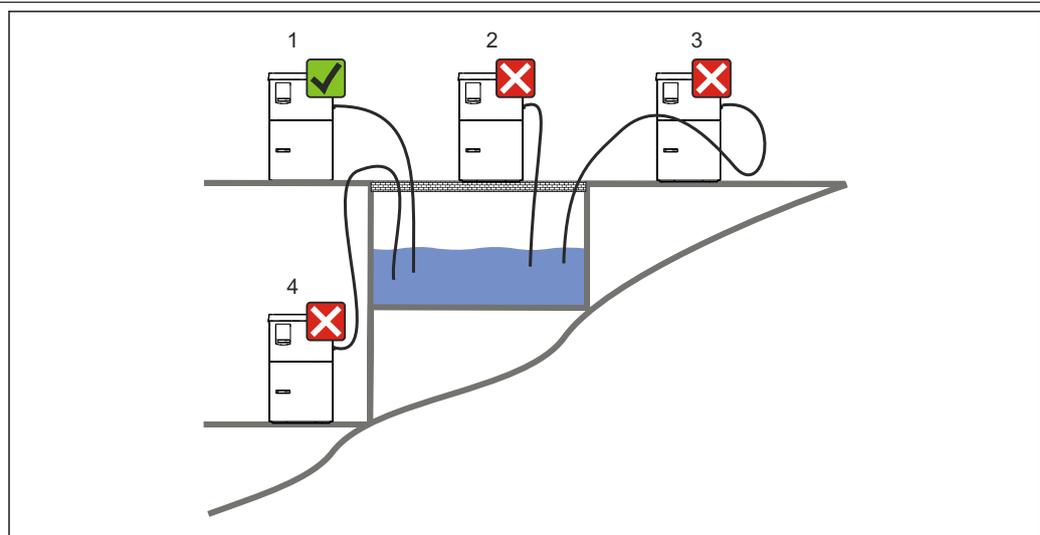


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23 Foundation plan

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

Mounting conditions for Liquistation CSF48



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24 Liquistation mounting conditions

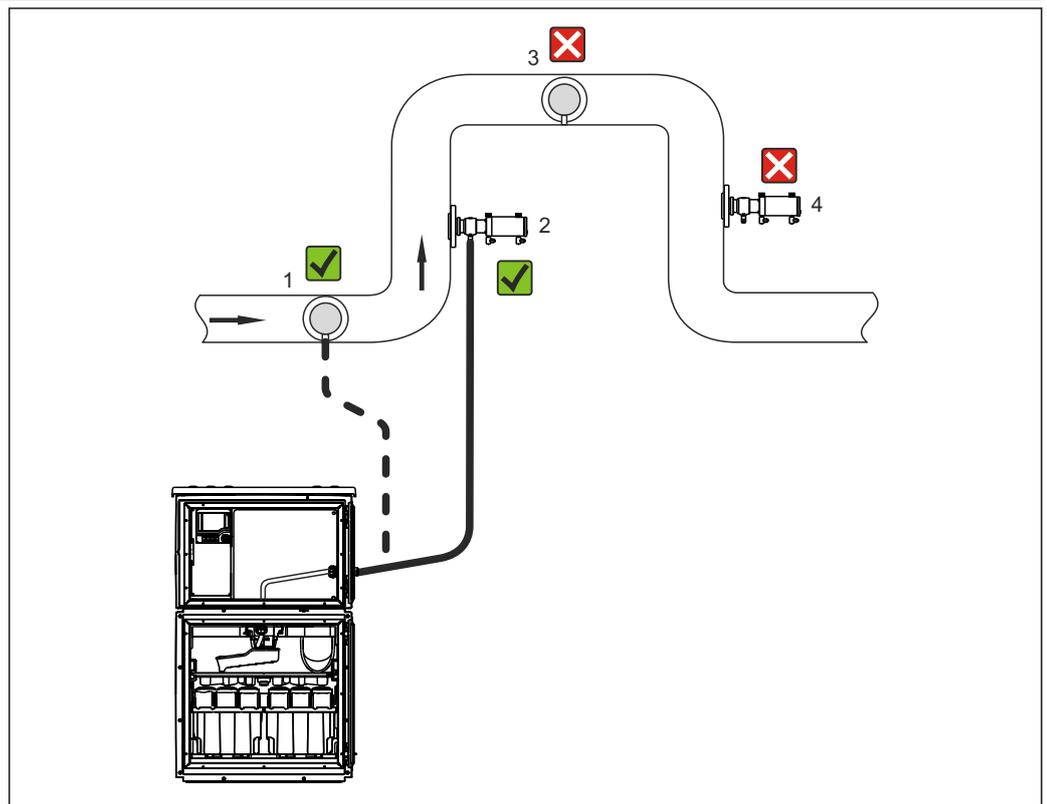
1. Correct
 - ↳ The suction line must be routed with a downward gradient to the sampling point.
2. Incorrect
 - ↳ The sampler should never be mounted in a place where it is exposed to aggressive gases.

3. Incorrect
 - ↳ Avoid siphoning effects in the suction line.
4. Incorrect
 - ↳ The suction pipe should never be routed with an upward gradient to the sampling point.

Note the following when erecting the device:

- Erect the device on a level surface.
- Protect the device against additional heating (e.g. from heaters).
- Protect the device against mechanical vibrations.
- Protect the device against strong magnetic fields.
- Make sure air can circulate freely at the side panels of the cabinet. Do not mount the device directly against a wall. Allow at least 150 mm (5.9") from the wall to the left and right.
- Do not erect the device directly above the inlet channel of a wastewater treatment plant.

Installation conditions for Samplefit CSA420 sampling assembly



25 Installation conditions for Liquistation CSF48 with Samplefit CSA420 sampling assembly

Note the following when installing the sampling assembly in a pipe:

- The best installation location is in the ascending pipe (pos. 2). Installation is also possible in the horizontal pipe (pos. 1).
- Avoid installation in the down pipe (pos. 4).
- Avoid siphoning effects in the sample line.
- The minimum vertical distance between the assembly and the inlet of the sampler should be at least 0.5 m (1.65 ft).

Note the following when erecting the sampler:

- Erect the device on a level surface.
- Protect the device against additional heating (e.g. from a heating system).
- Protect the device against mechanical vibrations.
- Protect the device against strong magnetic fields.
- Make sure air can circulate freely at the side panels of the cabinet. Do not mount the device directly against a wall. Distance from wall on left and right: at least 150 mm (5.9").
- Do not erect the device directly above the inlet channel of a wastewater treatment plant.

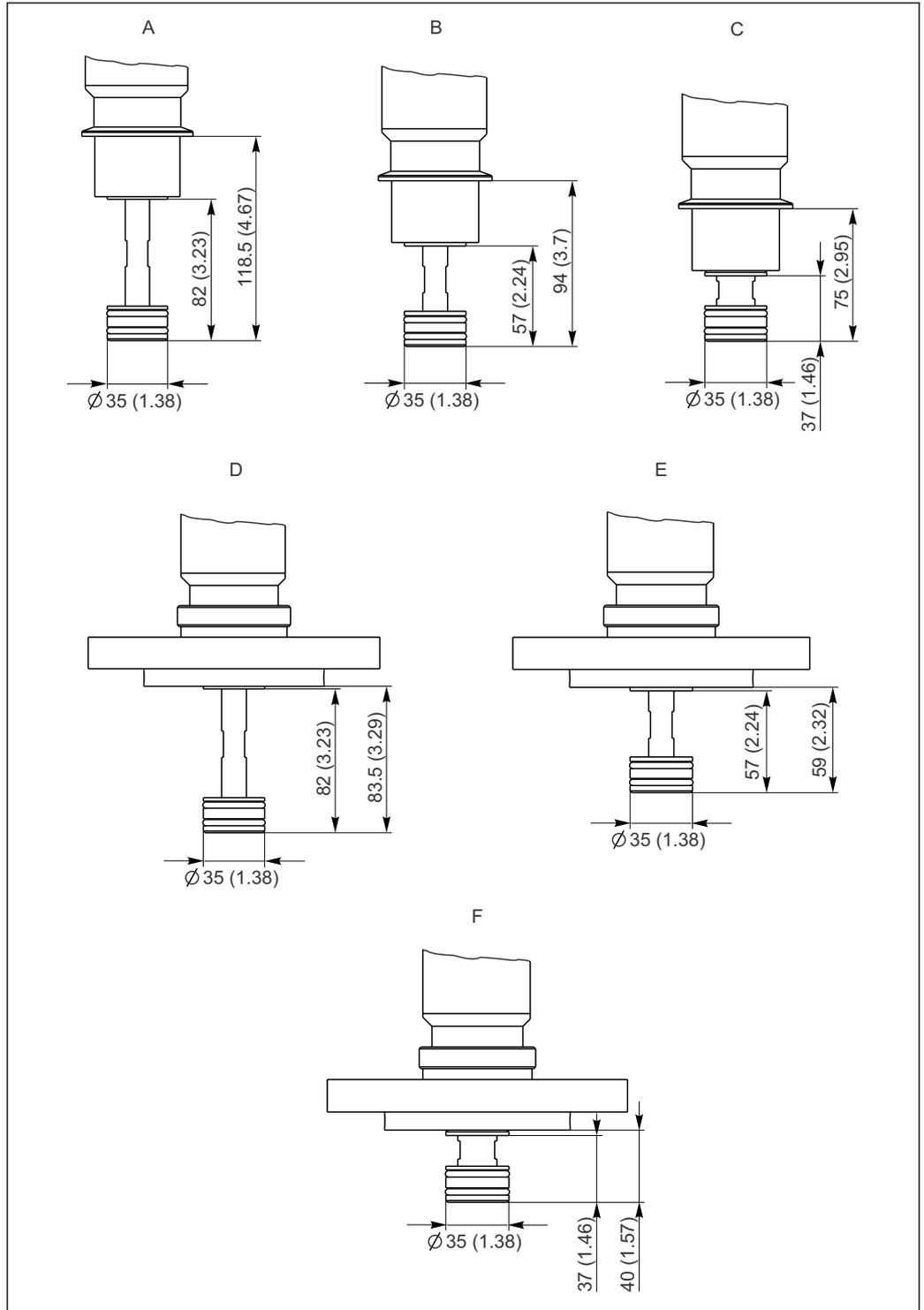
Environment

Ambient temperature	With temperature control unit:	-20 to 40 °C (0 to 100 °F)
	Without temperature control unit:	0 to 40 °C (32 to 100 °F)
	For ASA+PC or stainless steel housing:	-20 to 40 °C (0 to 100 °F)
	For plastic polystyrene housing:	0 to 40 °C (32 to 100 °F)
Storage temperature	-20 to 60 °C (0 to 140 °F)	
Degree of protection	<ul style="list-style-type: none"> ■ Dosing chamber, front: IP 54 ■ Dosing chamber, rear: IP 33 ■ Front panel with display (internal): IP 65 ■ Sampling chamber: IP 54 	
Electromagnetic compatibility	Interference emission and interference immunity as per EN 61326-1:2006, class A for industry	
Electrical safety	In accordance with EN 61010-1, protection class I, environment ≤ 2000 m (6500 ft) above MSL. The device is designed for pollution degree 2.	
Relative humidity	10 to 95%, not condensing	

Process

Process temperature	2 to 50 °C (36 to 122 °F)	
Process characteristics	<p>Liquistation with vacuum pump Capacitance level measurement used for:</p> <ul style="list-style-type: none"> ■ Very foamy media or media containing fats and grease ■ Media with a conductivity < 30 µS/cm <p>Liquistation with peristaltic pump Sample media must be free of abrasive substances.</p> <p>Liquistation with sampling assembly</p> <ul style="list-style-type: none"> ■ Sample media must be free of abrasive substances. ■ The distributor version of the device cannot be used for sample media with a solids content in excess of 1 %. The sample must be transferred directly to a bottle or a container. <p> Pay attention to the material compatibility of the wetted parts.</p>	
Process pressure	<ul style="list-style-type: none"> ■ Unpressurized, open channel ■ Max. 0.8 bar piping (only with shutoff/inlet valve) <p>Sampling assembly: Max. 6 bar</p>	
Process connection	<ul style="list-style-type: none"> ■ Vacuum pump: Suction line ID 10 mm (3/8"), 13 mm (1/2"), 16 mm (5/8") or 19 mm (3/4") ■ Peristaltic pump: Suction line ID 10 mm (3/8") ■ Sampling assembly: <ul style="list-style-type: none"> - Flange DN50, PP - Triclamp DN50, DIN 32676 	

Process connection Samplefit
CSA420 sampling assembly



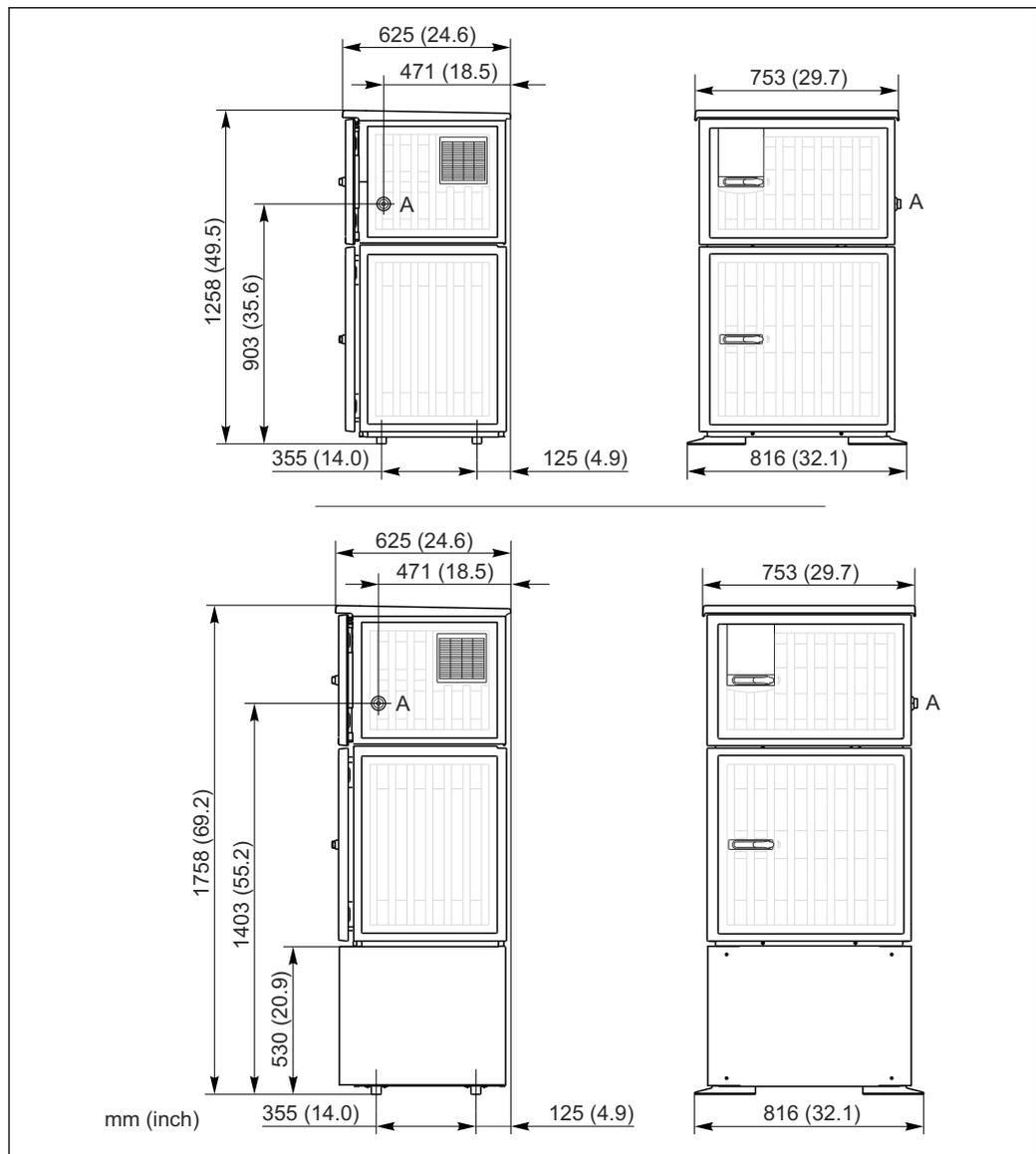
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26 Samplefit CSA420. Engineering unit in mm (inch)

- A Triclamp DN50, 50ml version
- B Triclamp DN50, 30ml version
- C Triclamp DN50, 10ml version
- D Flange DN50, 50ml version
- F Flange DN50, 30ml version
- D Flange DN50, 10ml version

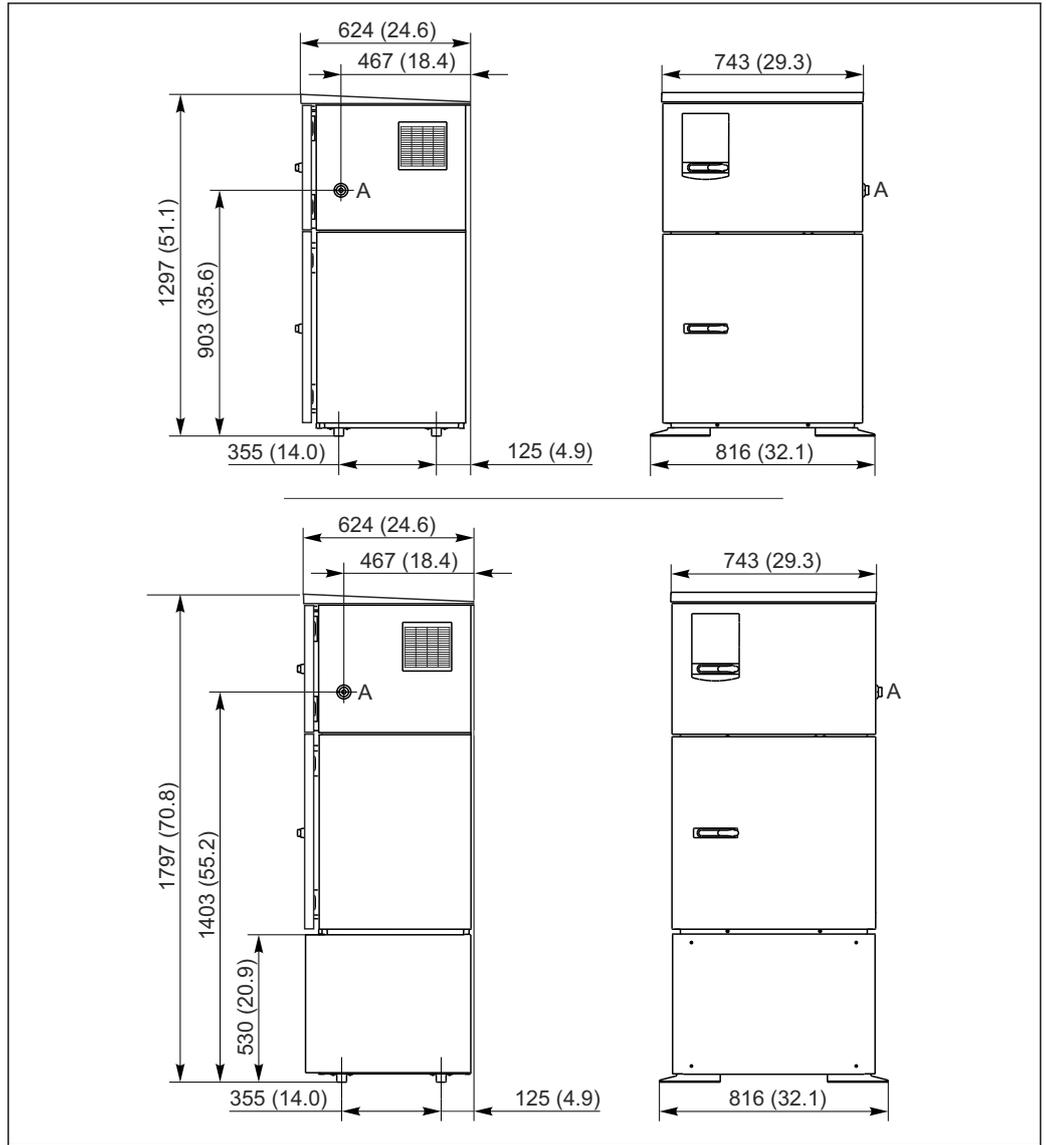
Mechanical construction

Dimensions



27 Dimensions of Liquistation CSF48, plastic version, with/without stand (mm/inch)

A Suction line connection



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28 Dimensions of Liquistation CSF48, stainless steel version, with/without stand (mm/inch)

A Suction line connection

Weight

Sampler version	Weight
Plastic version without cooling module	91 kg (201 lbs)
Plastic version with cooling module	101 kg (223 lbs)
Plastic version without cooling module and with fixed castor frame	105 kg (232 lbs)
Stainless steel version with cooling module	118 kg (260 lbs)
Stainless steel version with stand and cooling module	146 kg (322 lbs)

Materials

 Plastic polystyrene VO can change color when exposed to direct sunlight. For outdoor use without a weather protection cover, the use of Plastic ASA+PC VO is recommended. The functionality is not affected by the discoloration.

Non-wetted parts	
Cabinet housing	<p>Plastic polystyrene VO For standard applications in wastewater treatment plants and environmental monitoring</p> <p>Plastic ASA+PC VO For industrial wastewater treatment plants with an aggressive atmosphere</p> <p>Stainless steel V2A (1.4301) For standard applications in wastewater treatment plants and environmental monitoring</p> <p>Stainless steel V4A (1.4571) For industrial wastewater treatment plants with an aggressive atmosphere</p>
Sample compartment inner lining	Plastic PP
Window	Safety glass, coated
Insulation	Plastic EPS "Neopor®"

Wetted parts	Vacuum pump	Peristaltic pump	Sampling assembly:
Dosing tube	Plastic PP	-	-
Dosing chamber cover	Plastic PP	-	-
Conductivity sensors	Stainless steel V4A (1.4404)	-	-
Capacitance sensor	PSU	-	-
Dosing chamber	PMMA, glass (depending on version)	-	-
Dosing system outflow hose	Silicone	-	EPDM
Pump tubing	-	Silicone	-
Process seal	-	-	Viton EPDM Kalrez
Distribution arm	Plastic PP		
Distribution arm cover	Plastic PE		
Distribution plate	Plastic PS		
Composite container/bottles	Plastic PE, glass (depending on version)		
Intake hose	Plastic PVC, EPDM (depending on version)		
Hose connection	Plastic PP		
Rinse connection	-	-	Plastic PP

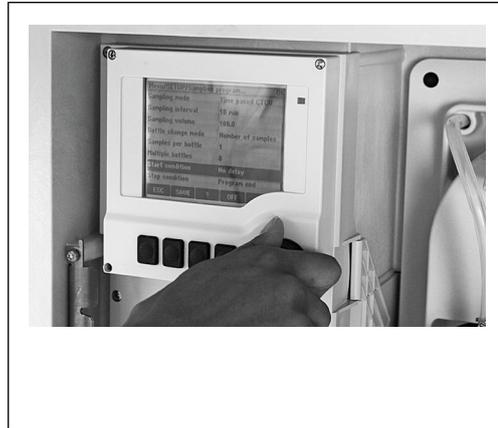
 Choose process seal depending on the application. Viton is recommended for standard applications involving watery samples.

Operability

Operating concept

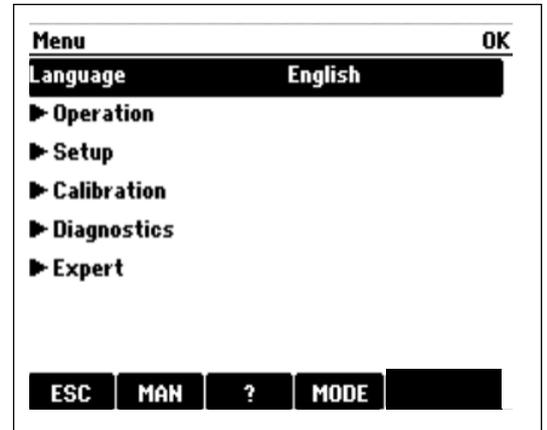
The simple and structured operating concept sets new standards:

- Intuitive operation with the navigator and soft keys
- Fast configuration of application-specific measurement options
- Easy configuration and diagnosis thanks to plain-text display
- All languages that can be ordered are available in every device



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29 Easy operation



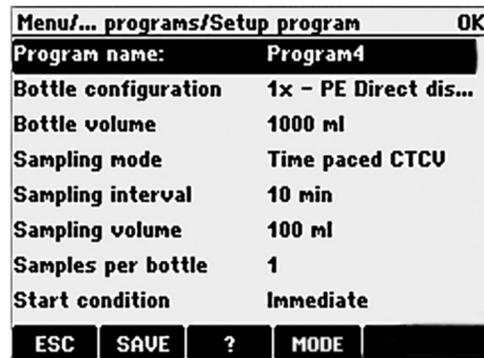
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30 Plain-text menu

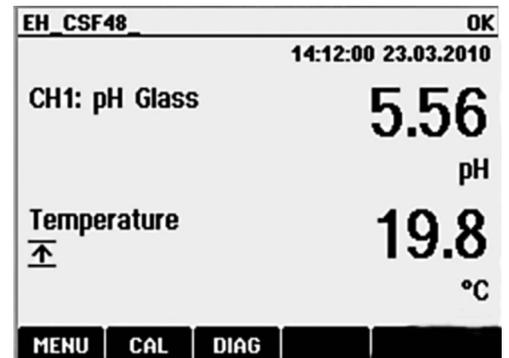
Display

Graphic display:

- Resolution: 240 x 160 pixel
- Back light with switch-off function
- Red display background for alarms alerts users to errors
- Transflective display technology for maximum contrast even in bright environments
- User-definable measuring menus mean you can always keep track of the values that are important for your application.



31 Example of program setup



32 Example of measuring menu

Local operation

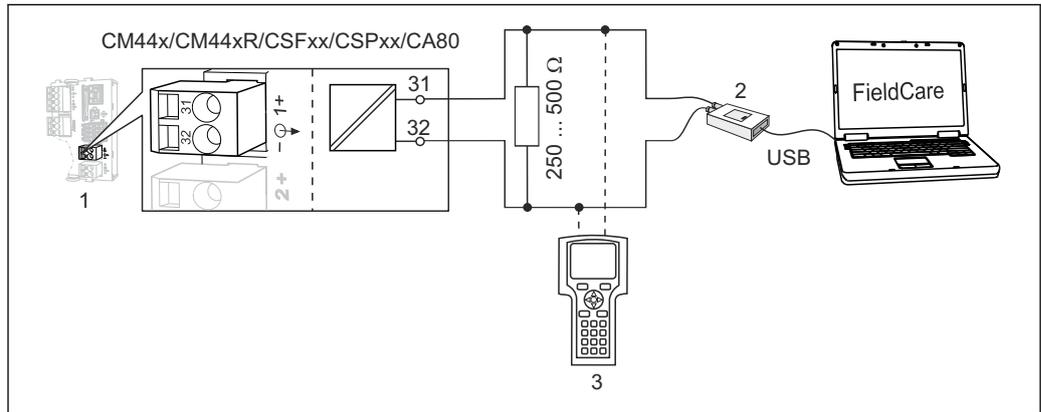


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- Liquid crystal display, illuminated
- 160 x 240 pixels
- 4 operating keys (soft key function) and navigator
- Menu-guided operation

Remote operation

Via HART (e.g. via HART modem and FieldCare)

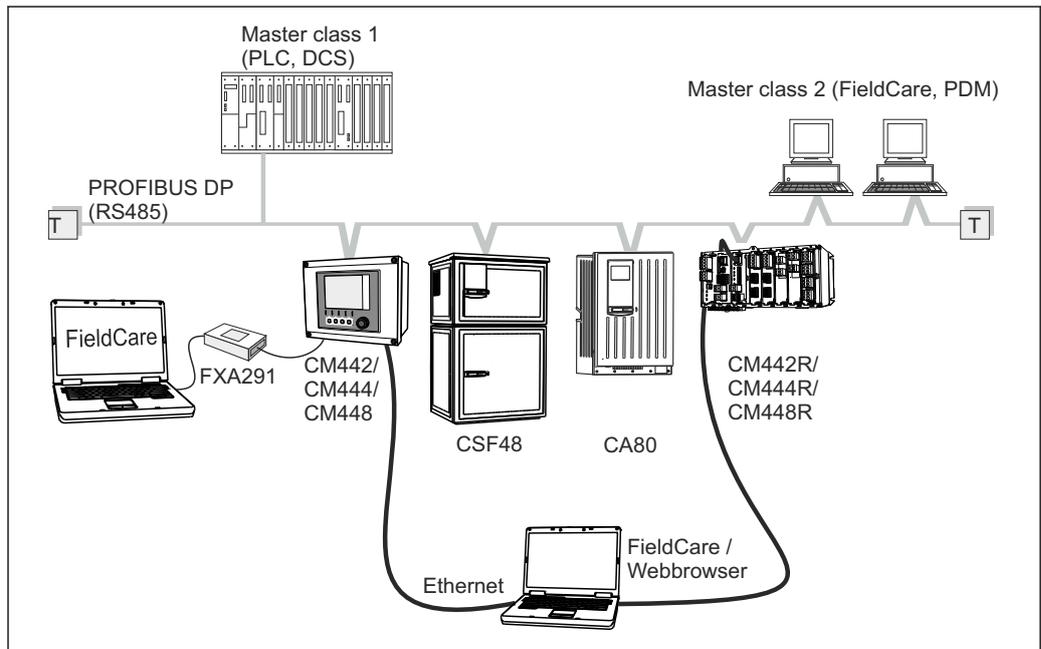


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33 HART using modem

- 1 Device module Base-E: current output 1 with HART
 - 2 HART modem to connect to PC, e.g. Commubox FXA191 (RS232) or FXA195¹⁾ (USB)
 - 3 HART handheld terminal
- ¹⁾ Switch position "on" (substitutes the resistor)

Via PROFIBUS DP

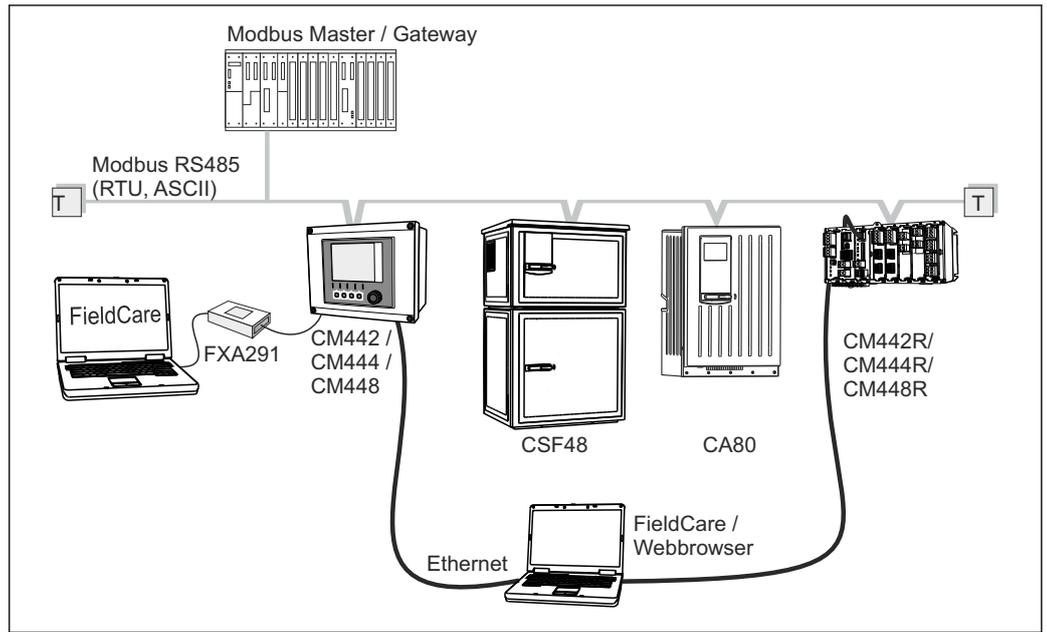


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34 PROFIBUS DP

T Terminating resistor

Via Modbus RS485

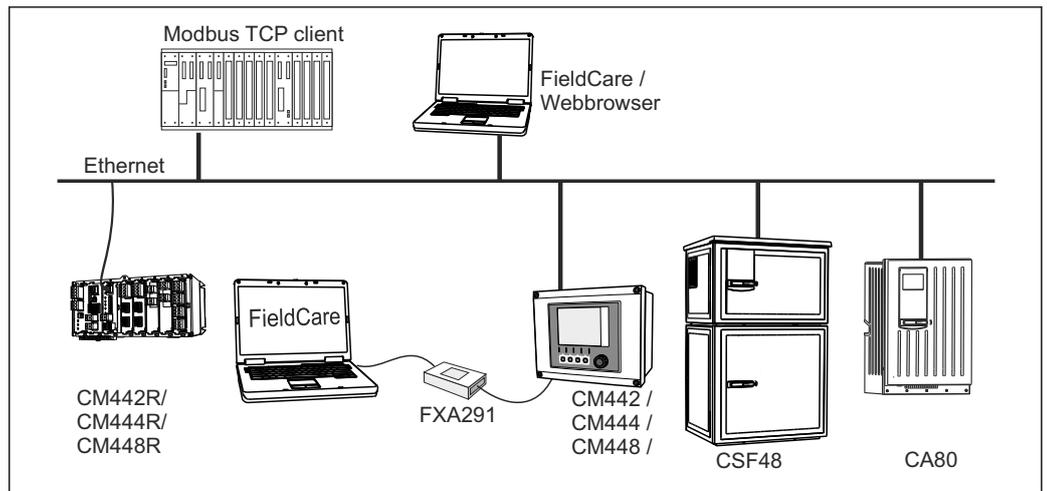


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35 Modbus RS485

T Terminating resistor

Via Ethernet/web server/Modbus TCP/EtherNet/IP



A0024455

36 Modbus TCP and / or EtherNet/IP

Communication

- 1 service interface
- Interface optionally accessible via front panel
- Commubox FXA291 (accessory) required for communication with the PC

Software

Field Data Manager

- Standardized user interface under Windows®
- Read-out of internal memory containing the measured flow rate, sample volume taken etc.

FieldCare

- Device settings saved in a database
- Configuration

Certificates and approvals

CE mark	<p>Declaration of Conformity</p> <p>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.</p>
MCERTS	<p>The device 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.</p>
cCSAus	<p>cCSAus General purpose</p> <p>The product meets the requirements in accordance with "Class 8721 05, laboratory equipment, electrical; Class 8721 85, laboratory equipment, electrical, certified to US standards" for indoor use. Certificate no.: 2318018</p>

Ordering information

Product page	www.endress.com/csf48
Product Configurator	<p>The navigation area is located on the right of the product page.</p> <ol style="list-style-type: none"> 1. Under "Device support" click "Configure your selected product". <ul style="list-style-type: none"> ↳ The Configurator opens in a separate window. 2. Select all the options to configure the device in line with your requirements. <ul style="list-style-type: none"> ↳ In this way, you receive a valid and complete order code for the device. 3. Export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the screen.
Scope of delivery	<p>The scope of delivery comprises:</p> <ul style="list-style-type: none"> ■ 1 Liquistation CSF48 with: <ul style="list-style-type: none"> - The ordered bottle configuration - Optional hardware ■ Accessories kit <ul style="list-style-type: none"> - Connection nipple for suction line with various angles (straight, 90°), Allen key (for version with vacuum pump only) - For sampling assembly: <ul style="list-style-type: none"> 2 or 3 compressed air lines 5 m each, 1 sample line EPDM 13 mm ID 5 m ■ 1 print version of Brief Operating Instructions in the language ordered ■ Optional accessories

Accessories



The following are the most important accessories available at the time this documentation was issued. For accessories not listed here, please contact your service or sales office.

Accessories for Liquistation CSF48

Order no.	Complete suction line
71111233	Suction line ID 10 mm (3/8"), PVC clear, reinforced fabric, length 10 m (33 ft), suction head V4A
71111234	Suction line ID 10 mm (3/8"), EPDM black, length 10 m (33 ft), suction head V4A
71111235	Suction line ID 13 mm (1/2"), PVC green, reinforced spiral wire, length 10 m (33 ft), suction head V4A
71111236	Suction line ID 13 mm (1/2"), EPDM black, length 10 m (33 ft), suction head V4A
71111237	Suction line ID 16 mm (5/8"), PVC green, reinforced spiral wire, length 10 m (33 ft), suction head V4A
71111238	Suction line ID 16 mm (5/8"), EPDM black, length 10 m (33 ft), suction head V4A
71111239	Suction line ID 19 mm (3/4"), PVC green, reinforced spiral wire, length 10 m (33 ft), suction head V4A
71111240	Suction line ID 19 mm (3/4"), EPDM black, length 10 m (33 ft), suction head V4A

Order no.	Suction line coil
71111482	... m, suction line ID 10 mm (3/8"), PVC clear
71111484	... m, suction line ID 10 mm (3/8"), EPDM black
71111485	... m, suction line ID 13 mm (1/2"), PVC green
71111486	... m, rolled goods, suction line ID 13 mm (1/2"), EPDM black
71111487	... m, suction line D 16 mm (5/8"), PVC green
71111481	... m, suction line ID 16 mm (5/8"), EPDM black
71111488	... m, suction line ID 19 mm (3/4"), PVC green
71111489	... m, suction line ID 19 mm (3/4"), EPDM black
71111490	... m, suction line ID 32 mm (1 1/4"), PVC green

Order no.	Suction head
71111184	Suction head V4A for ID 10 mm (3/8"), 1 pc.
71111185	Suction head V4A for ID 13 mm (1/2"), 1 pc.
71111186	Suction head V4A for ID 16 mm (5/8"), 1 pc.
71111187	Suction head V4A for ID 19 mm (3/4"), 1 pc.

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

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

Order no.	Communication; software
71110815	SD card, 1 GB, Industrial Flash Drive
51516983	Commubox FXA291 + FieldCare Device Setup
71129799	Field Data Manager software; 1 license, analysis report
71127100	SD card with Liquiline firmware, 1 GB, industrial flash drive
71128428	Activation code for digital HART communication

Order no.	Retrofit kits
71111205	Kit CSF48: Retrofit kit for temperature sensor PT1000
71111206	Kit CSF48: Retrofit kit 1x digital sensor, Memosens protocol + 2x output 0/4-20mA (hardware + software)
71111208	Kit CSF48: Retrofit kit 2x digital sensor, Memosens protocol + 2x output 0/4-20mA (hardware + software)
71111210	Kit CSF48: Retrofit kit 1x to 2x digital sensor, Memosens protocol + 2x output 0/4-20mA (software)
71146969	Kit CSF48: Retrofit kit 2x digital sensor + 2x output 0/4-20mA and extension backplane
71136999	Kit CSF48: Retrofit kit service interface (CDI flange connector, counter nut)
71136885	Kit CSF48: Retrofit kit relay (2x + cable set)
71136101	Kit CSF48: Retrofit kit door stop (2x)
71184459	Kit CSF48: Retrofit kit BASE-E module + backplane extension
71135631	Kit CM444/CM448/CSF48: Extension module 2DS; 2 x digital sensor, Memosens
71140891	Kit CM444/CM448: Upgrade code for 2 x 0/4 to 20 mA for BASE-E
71128428	Activation code for digital HART communication

Sensors

Glass electrodes

Orbisint CPS11D

- pH electrode for process technology
- Optional SIL version for connecting to SIL transmitter
- With dirt-repellent PTFE diaphragm
- Product Configurator on the product page: www.endress.com/cps11d

 Technical Information TI00028C

Ceraliquid CPS41D

- pH electrode with ceramic junction and KCl liquid electrolyte
- Product Configurator on the product page: www.endress.com/cps41d

 Technical Information TI00079C

Ceragel CPS71D

- pH electrode with double-chamber reference system and integrated bridge electrolyte
- Product Configurator on the product page: www.endress.com/cps71d

 Technical Information TI00245C

Orbipore CPS91D

- pH electrode with open aperture diaphragm for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps91d

 Technical Information TI00375C

Memosens CPS16D

- Combined pH/ORP sensor for process technology
- With dirt-repellent PTFE diaphragm
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cps16D

 Technical Information TI00503C

Memosens CPS76D

- Combined pH/ORP sensor for process technology
- Hygienic and sterile applications
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cps76d

 Technical Information TI00506C

Memosens CPS96D

- Combined pH/ORP sensor for chemical processes
- With poison-resistant reference with ion trap
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cps96d

 Technical Information TI00507C

Orbipac CPF81D

- Compact pH sensor for installation or immersion operation
- In industrial water and wastewater
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cpf81d

 Technical Information TI00191C

Pfautler electrodes

Ceramax CPS341D

- pH electrode with pH-sensitive enamel
- Meets highest demands of measuring accuracy, pressure, temperature, sterility and durability
- Product Configurator on the product page: www.endress.com/cps341d

 Technical Information TI00468C

ORP sensors

Orbisint CPS12D

- ORP sensor for process technology
- Product Configurator on the product page: www.endress.com/cps12d

 Technical Information TI00367C

Ceraliquid CPS42D

- ORP electrode with ceramic junction and KCl liquid electrolyte
- Product Configurator on the product page: www.endress.com/cps42d

 Technical Information TI00373C

Ceragel CPS72D

- ORP electrode with double-chamber reference system and integrated bridge electrolyte
- Product Configurator on the product page: www.endress.com/cps72d

 Technical Information TI00374C

Orbipore CPS92D

- ORP electrode with open aperture diaphragm for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps92d

 Technical Information TI00435C

pH ISFET sensors**Tophit CPS471D**

- Sterilizable and autoclavable ISFET sensor for food and pharmaceuticals, process engineering
- Water treatment and biotechnology
- Product Configurator on the product page: www.endress.com/cps471d



Technical Information TI00283C

Tophit CPS441D

- Sterilizable ISFET sensor for low-conductivity media
- Liquid KCl electrolyte
- Product Configurator on the product page: www.endress.com/cps441d



Technical Information TI00352C

Tophit CPS491D

- ISFET sensor with open aperture diaphragm for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps491d



Technical Information TI00377C

Inductively measuring conductivity sensors**Indumax CLS50D**

- High-durability inductive conductivity sensor
- For standard, hazardous and high-temperature applications
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cls50d



Technical Information TI00182C

Conductively measuring conductivity sensors**Condumax CLS15D**

- Conductive conductivity sensor
- For pure water applications, ultrapure water applications and Ex applications
- Product Configurator on the product page: www.endress.com/CLS15d



Technical Information TI00109C

Condumax CLS16D

- Hygienic, conductive conductivity sensor
- For pure water applications, ultrapure water applications and Ex applications
- With EHEDG and 3A approval
- Product Configurator on the product page: www.endress.com/CLS16d



Technical Information TI00227C

Condumax CLS21D

- Two-electrode sensor in plug-in head version
- Product Configurator on the product page: www.endress.com/CLS21d



Technical Information TI00085C

Oxygen sensors**Oxymax COS22D / COS22**

- Sterilizable sensor for dissolved oxygen
- With Memosens technology or as an analog sensor
- Product Configurator on the product page: www.endress.com/cos22d or www.endress.com/cos22



Technical Information TI00446C

Oxymax COS61D

- Optical oxygen sensor for drinking water and industrial water measurement
- Measuring principle: quenching
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cos61d

 Technical Information TI00387C

Oxymax COS61D

- Optical oxygen sensor for drinking water and industrial water measurement
- Measuring principle: quenching
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cos61d

 Technical Information TI00387C

Oxymax COS22D / COS22

- Sterilizable sensor for dissolved oxygen
- With Memosens technology or as an analog sensor
- Product Configurator on the product page: www.endress.com/cos22d or www.endress.com/cos22

 Technical Information TI00446C

Chlorine sensors

CCS142D

- Membrane-covered amperometric sensor for free chlorine
- Measuring range 0.01 to 20 mg/l
- With Memosens technology
- Product Configurator on the product page: www.endress.com/ccs142d

 Technical Information TI00419C

Ion-selective sensors

ISEmax CAS40D

- Ion selective sensors
- Product Configurator on the product page: www.endress.com/cas40d

 Technical Information TI00491C

Turbidity sensors

Turbimax CUS51D

- For nephelometric measurements of turbidity and solids in wastewater
- 4-beam scattered light method
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cus51d

 Technical Information TI00461C

SAC and nitrate sensors

Viomax CAS51D

- SAC and nitrate measurement in drinking water and wastewater
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cas51d

 Technical Information TI00459C

Interface measurement

Turbimax CUS71D

- SAC and nitrate measurement in drinking water and wastewater
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cus71d

 Technical Information TI00490C

Measuring cables

CYK10 Memosens data cable

- For digital sensors with Memosens technology
- Product Configurator on the product page: www.endress.com/cyk10



Technical Information TI00118C

www.addresses.endress.com
