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 sampling, 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 sampler can be quickly and easily modified to create a measuring station.

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

Depending on the version ordered, one to four digital sensors with Memosens technology can be connected to the CSF48. Furthermore, two to six 0/4 to 20 mA analog outputs are available, as well as a switching and cleaning function with up to four relays and an alarm relay.

Your benefits

- Rugged and reliable:
  - Four different kinds of housing material
  - Two-door housing for reliable sample temperature regulation
  - Optimal air circulation in both the upper and lower enclosure
- Simple and easy to use:
  - Swift menu guidance, navigator and large display
  - Two bottle trays for easy sample transportation
  - Parts carrying medium are easy to disassemble, making cleaning and maintenance simple
- Flexible:
  - User friendly programs ranging from simple time programs to event programs
  - Functionality can be extended by installing modular electronic components
  - Sample can be supplied from righthand side or from below
- Communicative:
  - Integrated data logger for recording measured values
  - Service interface for data transmission
- Safe:
  - Optional battery backup system ensures uninterrupted operation in the event of power failure
  - Touch-safe low-voltage supply for electronic components
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Liquistation CSF48

Function system design

Liquistation CSF48 sampler

A complete sampling unit comprises:

- Controller with display, soft keys and navigator
- Vacuum or 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

Example of a Liquistation CSF48, version with vacuum pump

Example of a Liquistation CSF48, version with peristaltic pump
A complete sampling unit for pressurized pipes comprises:

- Controller with display, soft keys and navigator
- Sampling assembly Samplefit CSA420 for 10 ml, 30 ml or 50 ml sample volume (depending on the version ordered)
- Plastic (PE) or glass sample bottles for sample preservation
- Sample compartment temperature control (optional) for safe sample storage
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 chapter Accessories and -> 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

Nitrate
- Sensor Viomax CAS51D with fixed cable
- Assembly Flexdip CYA112
- Holder Flexdip CYH112

Conductivity
Inductive conductivity measurement
- Immersion assembly Flexdip CYA112
- Sensor Indumax CLS50D with fixed cable
Conductive conductivity measurement
- Immersion assembly Flexdip CYA112
- Sensor Condumax CLS15D

Oxygen
- Immersion assembly Flexdip CYA112
- Holder Flexdip CYH112
- Sensor Oxymax
  - COS61D (optical) with fixed cable,
  - COS51D (amperometric) cable CYK10

Figure: CYA112 with COS61D

pH value or ORP
- Retractable assembly Cleanfit CPA471
- Sensor Orbisint CPS11D, CPS12D
- Measuring cable CYK10

Turbidity
- Immersion assembly Flexdip CYA112
- Spray head CUR4 (optional)
- Sensor Turbimax CUS51D with fixed cable

- Flow assembly Flowfit CUA250
- Sensor Turbimax CUS51D with fixed cable
Mode of operation with a vacuum pump

1. **Purge**
   The hose valve is closed. The vacuum pump blows the suction line clear via the dosing system.

2. **Intake**
   The "air manager" - a pneumatic control unit - switches the air path of the vacuum pump to "intake". The sample is drawn into the dosing chamber under vacuum. The level of liquid reaches the detectors in the dosing system.

3. **Dose**
   The intake process is completed and pressure compensation takes place. Depending on the position of the dosing tube (D), the excess sample liquid flows back to the sampling point.

4. **Drain**
   The hose valve is opened and the sample is drained into the sample bottle.

Dosing system with conductive sample sensor

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

*Not shown since hidden: hose connection for vacuum pump → graphic for "Capacitance dosing system"*
**Level detection principle**
When the sample is drawn in, the sample level reaches conductivity sensors 1 and 3. The system thus detects that the dosing chamber 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**

![Capacitance dosing system](image.png)

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

**Level detection principle**
When the level of medium in the dosing chamber changes, the capacitance of the sensor also changes. The capacitance sensor ensures rapid sample detection in media that forms foam or has a high fat content. Capacitance level detection method must be used in medias with a conductivity < 30 μS/cm.

**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, 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 bar. Pressure is applied and the excess sample is forced out of the dosing chamber and back to the sampling point. The sampling 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

Sampling takes place in three steps:

1. **Purge/rinse**
   The peristaltic pump runs in reverse and forces liquid back to the sampling point.

2. **Intake**
   The peristaltic pump runs forward and draws in liquid. If the liquid detection system detects the sample, the pump is controlled by the flow and the specified sample volume is calculated automatically.

3. **Purge**
   The pump runs in reverse again and forces the liquid 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:
Liquid is initially drawn in until the liquid detection system reacts, then the pump switches and forces the liquid back to the sampling point. This process can be repeated a maximum of three times. The sample is then taken as described.

The pump rollers deform the tubing, thereby causing a negative pressure and the suction effect.
The liquid 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 interlock 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

Sampling steps with sampling assembly

Sampling takes place in three steps:

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

2. **Sample**
   The plunger is driven by compressed air into the sample pipe. An adjustable hold time allows a representative blending of the sample in the sample chamber.

3. **Drain**
   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.

Sampling assembly with optional rinsing valve

Sampling steps with sampling assembly

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 under pressure" can be chosen. As a result the sample flows under pressure into the sample bottles.

- **Cleaning with compressed air or water**
  - In the sampling setup menu the function "cleaning" with air or water can be chosen. After the selection of "before", "after" or "before and after every sampling" you can choose a cleaning position.

- **Additionally you can choose sample rinsing cycles in the menu "cleaning before and after sampling".** The system can be pre-rinsed up to 10 times with the actual sample.

Automatical sampling with sampling assembly is designed for aqueous samples. For high-viscosity samples e.g. sludge >1 % sampling is only possible directly into a container.
**Sampling with a flow assembly**

A flow assembly is integrated into the stand for sampling purposes. The flow assembly is used when sampling in pressurized systems, e.g.:

- Containers located at a higher level
- Pressurized pipes
- Pumping with external pumps

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

![Flow assembly diagram](image)

**Flow assembly**
(can be ordered separately: kit no. 71119408)

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

![Example drawing](image)

**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 ... 1500 l/h. When the sampling cycle begins, you can use one of the relay outputs to control and open valve 2. The medium flows through the pipe and the flow assembly into the outflow. When a settable delay time has elapsed, the sampler takes the sample directly from the flow assembly. Valve 2 is closed again once the sample has been taken.

Valves 1 and 2 are not contained in the scope of delivery (order code: C-A100709-50).
Sampling control

a. Flow curve

b. Time proportional sampling:
   Constant time constant volume (CTCV)
   A constant sampling volume (e.g. 50 ml) is taken at steady intervals (e.g. every 5 min).

c. Flow proportional sampling:
   Variable time constant volume (VTCV)
   A constant sampling volume is taken at variable intervals (depending on the inflow volume).

d. Flow proportional sampling/time override:
   Constant time variable volume (CTVV)
   A variable sampling volume (the sampling volume depends on the inflow) is taken at steady time intervals (e.g. every 10 min).
   Only for versions with peristaltic pump

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.

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

Intake speed in m/s at suction heights in m (vertical lift)

- **a** Intake speed as per Ö 5893 (Austrian standard); US EPA recommended
- **b** Intake speed as per EN 25667, ISO 5667

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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 makes it possible to configure individual bottles and bottle groups as well as assign them to change based on a programmed event.
### Bottle groups and distribution version depending on the order version:

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<tr>
<td><img src="image" alt="Bottle Icon" /> 2 liter, PE, direct distribution</td>
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<tr>
<td><img src="image" alt="Bottle Icon" /> 1 liter, PE, direct distribution</td>
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</tr>
<tr>
<td><img src="image" alt="Bottle Icon" /> 1.8 liter, glass, plate distribution</td>
<td></td>
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</tbody>
</table>
Sample preservation

The sample bottles are located in the sample compartment. This is fitted with a seamless plastic inner shell to ensure easy and effective cleaning. All parts that transport liquid (distribution arm, dosing system, distribution plate etc.) can be removed and cleaned easily without the need for additional tools.

Sample temperature regulation (optional)

The temperature of the sample compartment 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 by removing the upper rear panel.
Modular design

The modular sampler design means it can be easily adapted to suit your needs:
- Retrofit add-on modules for new or extended range of functions, e.g., current outputs and relays
- Upgrade from one channel to multichannel measurement with digital sensors

Equipment architecture

The electronic components are modular in design:
- There are several points available to connect electronic modules. They are known as "slots".
- The slots are numbered consecutively in the housing. Slots 0 and 1 are always reserved for the basic module.
- Each electronic module has one or more input(s) and output(s) or relays, collectively termed "ports" here.
- The ports are numbered consecutively for each electronic module and are automatically detected 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" means:
  Slot 2 (e.g., module AOR) : Port 1 (current output 1 of module AOR)
• Inputs are assigned to measuring channels in ascending order “Slot:Port number”
  Example:
  – “CH1: 1:1” means:
    Slot 1 (basic module) : Port 1 (input 1) is channel 1 (CH1) and a conductivity sensor is connected to it
  The unique terminal name can be explained as follows:
    Slot no. : Port no. : Terminal

**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 highest or lowest measured values
  – Hours of operation with highest temperature
  – Number of steam sterilizations
  – Sensor condition

**Display**

Graphic display:
• Backlight with switch-off function
• Red display background for alarms alerts users to errors
• Transreflective 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.

**Communication and data processing**

**Types of communication:**
• Fieldbuses
  – HART
  – PROFIBUS DP (Profile 3.02)
  – Modbus TCP or RS485
• Configuration via Ethernet

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

**Bus termination on the device**
• Via slide switch at bus module 485
• Displayed via LED “T” on bus module 485
Maintainability

Data storage

- Independent, integrated ring memories (FIFO) or stack memories for recording:
  - An analog value (e.g. flow rate, pH value, conductivity)
  - Events (e.g. power failure)
  - Sample statistics (e.g. sample volume, filling times, bottle assignment)
- Program memory: max. 100 programs
- Data logbooks:
  - Adjustable scan time: 1 to 3600 s (6 h)
  - Max. 8 data logbooks
  - 150,000 entries per logbook
  - Graphic display (load curves) or text display
- Calibration logbook: max. 75 entries
- Hardware version logbook:
  - Hardware configuration and modifications
  - max. 125 entries
- Version logbook:
  - e.g. software updates
  - max. 50 entries
- Operation logbook: max. 250 entries
- Diagnostics logbook: max. 250 entries

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
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.

**Input**

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

**Measured variables**

--> Documentation of the connected sensor

**Temperature inputs**

**Measuring range**

-30 to 70 °C (-20 to 160 °F)

**Input type**

Pt1000

**Accuracy**

±0.5 Kelvin
Binary input, passive

Span  
12 to 30 V, galvanically isolated

Signal characteristics  
Minimum pulse width: 100 ms

Analog input, passive/active

Span  
0/4 to 20 mA, galvanically isolated

Accuracy  
±0.5 % of measuring range

Output

Output types  
2 binary outputs (standard):  
Open collector, max. 30 V, 200 mA

Depending on version (optional):  
- 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

HART

<table>
<thead>
<tr>
<th>Signal coding</th>
<th>FSK ± 0.5 mA above current signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data transmission rate</td>
<td>1200 baud</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>Yes</td>
</tr>
<tr>
<td>Load (communication resistance)</td>
<td>250 Ω</td>
</tr>
</tbody>
</table>

PROFIBUS DP

<table>
<thead>
<tr>
<th>Signal coding</th>
<th>EIA/TIA-485, PROFIBUS DP-compliant acc. to IEC 61158</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data transmission rate</td>
<td>9.6 kBd, 19.2 kBd, 93.75 kBd, 187.5 kBd, 500 kBd, 1.5 MBd, 6 MBd, 12MBd</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>Yes</td>
</tr>
<tr>
<td>Connectors</td>
<td>Spring-cage terminal (max. 1.5 mm) bridged internally in the connector (T function), M12 optional</td>
</tr>
<tr>
<td>Bus termination</td>
<td>Internal slide switch with LED display</td>
</tr>
</tbody>
</table>
Modbus RS485

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal coding</td>
<td>EIA/TIA-485</td>
</tr>
<tr>
<td>Data transmission rate</td>
<td>2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200 baud</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>Yes</td>
</tr>
<tr>
<td>Connectors</td>
<td>Spring-cage terminal (max. 1.5 mm) bridged internally in the connector (T function), M12 optional</td>
</tr>
<tr>
<td>Bus termination</td>
<td>Internal slide switch with LED display</td>
</tr>
</tbody>
</table>

Ethernet and Modbus TCP

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal coding</td>
<td>IEEE 802.3 (Ethernet)</td>
</tr>
<tr>
<td>Data transmission rate</td>
<td>10/100 MBd</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>Yes</td>
</tr>
<tr>
<td>Connection</td>
<td>RJ45, M12 optional</td>
</tr>
<tr>
<td>IP address</td>
<td>DHCP or configuration using menu</td>
</tr>
</tbody>
</table>

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 both measuring ranges:
    - 21.5 mA

Load
- Max. 500 Ω

Linearization/transmission behaviour
- 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
- Cable type
  - Recommended: shielded cable
- Cross-section
  - Max. 2.5 mm² (14 AWG)

Relay outputs (optional)

Electrical specification
- Relay types
  - 2 x changeover contact connected to binary output (optional)
  - 1 single-pin changeover contact (alarm relay)
**Relay switching capacity**

- **Power unit (alarm relay)**
  - Max. 0.5 A with 230 V AC, \(\cos \phi = 0.8 \text{ to } 1\)
    - Min. 450,000 switching cycles
  - Max. 0.1 A with 230 V AC, \(\cos \phi = 0.8 \text{ to } 1\)
    - Min. 700,000 switching cycles
  - Max. 0.5 A with 24 V DC, L/R = 0 to 1 ms
    - Min. 350,000 switching cycles
  - Max. 0.1 A with 24 V DC, L/R = 0 to 1 ms
    - Min. 500,000 switching cycles
- **Relay coupled with binary output**
  - Max. 5 A with 230 V AC, \(\cos \phi = 0.8 \text{ to } 1\)
    - Min. 100,000 switching cycles
  - Max. 5 A with 24 V DC, L/R = 0 to 1 ms
    - Min. 100,000 switching cycles
- **Extension module**
  - Max. 2 A with 230 V AC, \(\cos \phi = 0.8 \text{ to } 1\)
    - Min. 120,000 switching cycles
  - Max. 0.1 A with 230 V AC, \(\cos \phi = 0.8 \text{ to } 1\)
    - Min. 700,000 switching cycles
  - Max. 2 A with 115 V AC, \(\cos \phi = 0.8 \text{ to } 1\)
    - Min. 170,000 switching cycles
  - Max. 0.1 A with 115 V AC, \(\cos \phi = 0.8 \text{ to } 1\)
    - Min. 1,000,000 switching cycles
  - Max. 2 A with 24 V DC, L/R = 0 to 1 ms
    - Min. 150,000 switching cycles
  - Max. 0.1 A with 24 V DC, L/R = 0 to 1 ms
    - Min. 500,000 switching cycles

**Minimum load (typical)**

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

---

**Protocol-specific data**

**HART**

<table>
<thead>
<tr>
<th>Manufacturer ID</th>
<th>11h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device type</td>
<td>119C (CM44x), 119D (CSFxx), 119E (CSPxx)</td>
</tr>
<tr>
<td>Device revision</td>
<td>001h</td>
</tr>
<tr>
<td>HART version</td>
<td>7.2</td>
</tr>
<tr>
<td>Device description files (DD/DTM)</td>
<td><a href="http://www.endress.com">www.endress.com</a></td>
</tr>
<tr>
<td>Device Integration Manager (DIM)</td>
<td>Device Integration Manager (DIM)</td>
</tr>
<tr>
<td>Device variables</td>
<td>16 configured by the user and 16 pre-defined, dynamic variables PV, SV, TV, QV</td>
</tr>
<tr>
<td>Supported features</td>
<td>PDM DD, AMS DD, DTM</td>
</tr>
</tbody>
</table>
### PROFIBUS-DP

<table>
<thead>
<tr>
<th>Manufacturer ID</th>
<th>11h</th>
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<tbody>
<tr>
<td>Device type</td>
<td>15SDh (CM44x), 15SCh (CSFxx), 151 Eh (CSPxx)</td>
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<tr>
<td>Profile version</td>
<td>3.02</td>
</tr>
<tr>
<td>GSD files</td>
<td><a href="http://www.products.endress.com/profibus">www.products.endress.com/profibus</a></td>
</tr>
<tr>
<td>GSD version</td>
<td>Device Integration Manager DIM</td>
</tr>
<tr>
<td>Output variables</td>
<td>16 AI blocks, 8 DI blocks</td>
</tr>
<tr>
<td>Input variables</td>
<td>8 AO blocks, 4 DO blocks</td>
</tr>
<tr>
<td>Supported features</td>
<td></td>
</tr>
</tbody>
</table>
  - 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

<table>
<thead>
<tr>
<th>Protocol</th>
<th>RTU/ASCII</th>
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</thead>
<tbody>
<tr>
<td>Function codes</td>
<td>03, 04, 06, 08, 16, 23</td>
</tr>
<tr>
<td>Broadcast support for function codes</td>
<td>06, 16, 23</td>
</tr>
<tr>
<td>Output data</td>
<td>16 measured values (value, unit, status), 8 digital values (value, status)</td>
</tr>
<tr>
<td>Input data</td>
<td>4 setpoints (value, unit, status), 4 digital values (value, status), diagnostic information</td>
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<tr>
<td>Supported features</td>
<td>Address can be configured using switch or software</td>
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</table>

### Modbus TCP

<table>
<thead>
<tr>
<th>TCP port</th>
<th>502</th>
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<tbody>
<tr>
<td>TCP connections</td>
<td>3</td>
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<tr>
<td>Protocol</td>
<td>RTU</td>
</tr>
<tr>
<td>Function codes</td>
<td>03, 04, 06, 08, 16, 23</td>
</tr>
<tr>
<td>Broadcast support for function codes</td>
<td>06, 16, 23</td>
</tr>
<tr>
<td>Output data</td>
<td>16 measured values (value, unit, status), 8 digital values (value, status)</td>
</tr>
<tr>
<td>Input data</td>
<td>4 setpoints (value, unit, status), 6 digital values (value, status), diagnostic information</td>
</tr>
<tr>
<td>Supported features</td>
<td>Address can be configured using DHCP or software</td>
</tr>
</tbody>
</table>

### Web server

<table>
<thead>
<tr>
<th>TCP port</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supported features</td>
<td></td>
</tr>
</tbody>
</table>
  - Remote-controlled device configuration
  - Save/restore device configuration
  - Logbook export [file formats: CSV, FDM]
  - Access to web server via DTM or Internet Explorer
# Power supply

### Electrical connection

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

### Supply voltage

Depending on the version:

- 100 to 120/200 to 240 V AC ±10 %, 50/60 Hz
- 24 V DC ±10 to 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.
- For samplers with CSA approval use a 10 A 250 VAC HBC fuse.

### Cable entry

Depending on the 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:

- T10A (for 24V power supply)
- T3.15A (for 230V power supply)
- T10A (fuse for battery backup)
- For version with CSA approval: T4A (for cooling module)

### Power consumption

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

### Power failure

- Power supply (optional): 2 x 12 V, 7.2 Ah, with additional charge controller
  - Replace the rechargeable batteries with type Panasonic LC-R127R2PG1.
- Real-time clock: lithium battery, type CR2032
### Performance characteristics

#### Sampling methods

**Vacuum pump / peristaltic pump / sampling assembly:**
- Event sampling
- Single and multiple samples
- Sampling table

**Vacuum pump / sampling assembly:**
- Time proportional sampling (CTCV)
- Flow proportional sampling (VTCV)

**Peristaltic pump:**
- Time proportional sampling (CTCV)
- Flow proportional sampling (VTCV)
- Flow proportional sampling/time override (CTVV)

#### Dosing volume

- **Vacuum pump:**
  20 to 350 ml (0.7 to 12 fl.oz.)
- **Peristaltic pump:**
  10 to 10000 ml (0.3 to 340 fl.oz.)
- **Sampling assembly:**
  10, 30 or 50 ml (0.3; 1 or 1.7 fl.oz.)

Dosing volume < 20 ml can vary in dosing accuracy and repeatability depending on the application.

#### Dosing accuracy

- **Vacuum pump:**
  ±5 ml (0.17 fl.oz.) or 5 % of the set volume
- **Peristaltic pump:**
  ±5 ml (0.17 fl.oz.) or 5 % of the set volume
- **Sampling assembly:**
  ±2 ml (0.07 fl.oz.) or 5 % of the set volume

#### Repeatability

- **Vacuum pump:** 5 %
- **Peristaltic pump:** 5 %
- **Sampling assembly:** 5 %

#### Intake speed (Vacuum pump / peristaltic pump)

- > 0.5 m/s (> 1.6 ft/s) for ≤ 13 mm (1/2") 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 (Austrian standard), US EPA

#### Suction height

- **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)

**Temperature sensors:**
- Sampling compartment temperature
- Sample temperature (optional)
- Outside temperature (optional)

**Cooling module:**
- Sample temperature range: 2 to 20 °C (36 to 68 °F)
- Automatic defrost system
- Cooling speed in accordance with Ö 5893 (Austrian standard):
  4 liter water at 20 °C will be cooled to 4 °C in less than 210 minutes
- Temperature stability of the sample at 4 °C for the operating temperature range -15 °C to 40 °C (5 to 104 °F)
Installation

Installation instructions

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

1. **Correct**
   The suction line must be routed with a downward slope 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 line should never be routed with an upward slope to the sampling point.

Note the following when mounting the sampler:
- Mount the sampler 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.
- Make sure air can circulate freely through the side panels of the housing. Do not mount the sampler directly against a wall. Allow at least 150 mm (5.91") between the wall and the sampler on the left and right-hand sides.
- Do not mount the sampler directly over the inlet channel of a municipal wastewater treatment plant.
Installation conditions of sampling assembly
Samplefit CSA420

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

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

Note the following when mounting the sampler:

- Mount the sampler 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.
- Make sure air can circulate freely through the side panels of the housing. Do not mount the sampler directly against a wall. Allow at least 150 mm (5.91") between the wall and the sampler on the left and right-hand sides.
- Do not mount the sampler directly over the inlet channel of a municipal wastewater treatment plant.
Environment

| Ambient temperature range | With temperature control unit: -20 to 40 °C (0 to 100 °F)  
|                          | Without temperature control unit: 0 to 40 °C (32 to 100 °F)  
| Storage temperature      | -20 to 60 °C (0 to 140 °F)  
| Degree of protection     | Dosing compartment (front): IP 54  
|                          | Dosing compartment (back): IP 34  
|                          | Control (front panel): IP 65  
|                          | Sampling compartment: 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; pollution degree 2  
| Relative humidity        | 10 to 95%, not condensing  

Process

| Medium temperature range | 2 to 50 °C (36 to 122 °F)  
| Process pressure         | Vacuum pump / peristaltic pump:  
|                          | Unpressurized, open channel (unpressurized sampling)  
|                          | Max. 0.8 bar piping (pressurized sampling)  
|                          | Sampling assembly:  
|                          | Max. 6 bar  
| Process connection       | 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:  
|                          | Flange DN50, DIN 11851  
|                          | Triclamp 2", DIN 32676  
|
Process connection
Sampling assembly Samplefit CSA420

A Triclamp 2", 50ml-variant
B Triclamp 2", 30ml-variant
C Triclamp 2", 10ml-variant
D Flange DN50, 50ml-variant
E Flange DN50, 30ml-variant
F Flange DN50, 10ml-variant
Medium properties

**Liquistation with vacuum pump**
Capacitance level measurement used for:
- Media that tend to create a lot of foam or contain fats and grease
- Media with a conductivity < 30 μS/cm

**Liquistation with peristaltic pump**
- Sample media has to be free of abrasive substances.

**Liquistation with sampling assembly**
- Sample media has to be free of abrasive substances.
- For sample media with a solids content of more than 1% no plate distribution can be used. The sample has to be filled directly into a bottle or a container.

Pay attention to the material compatibility of the wetted parts.

---

**Mechanical construction**

**Dimensions**

Dimensions of plastic version of Liquistation CSF48 without/with stand

A  Suction line connection
Dimensions of stainless steel version of Liquistation CSF48 without/with stand

A  Suction line connection

<table>
<thead>
<tr>
<th>Weight</th>
<th>CSF48 sampler version</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic version without refrigeration</td>
<td>91 kg (201 lbs)</td>
<td></td>
</tr>
<tr>
<td>Plastic version with refrigeration</td>
<td>101 kg (223 lbs)</td>
<td></td>
</tr>
<tr>
<td>Plastic version without refrigeration and with fixed castor frame</td>
<td>105 kg (232 lbs)</td>
<td></td>
</tr>
<tr>
<td>Stainless steel version with refrigeration</td>
<td>118 kg (260 lbs)</td>
<td></td>
</tr>
<tr>
<td>Stainless steel version with stand and refrigeration</td>
<td>146 kg (322 lbs)</td>
<td></td>
</tr>
</tbody>
</table>
Material

Plastic Polystyrol VO can change color when exposed to direct sunlight. For outdoor-use without weather protection cover it is recommend to use Plastic ASA+PC V0. The functionality is not affected by the discoloration.

<table>
<thead>
<tr>
<th>Non-wetted parts</th>
<th>Plastic polystyrene V0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet housing</td>
<td>For standard applications in wastewater treatment plants and environmental monitoring</td>
</tr>
<tr>
<td>Plastic ASA+PC V0</td>
<td>For industrial wastewater treatment plants with an aggressive atmosphere</td>
</tr>
<tr>
<td>Stainless steel V2A (1.4301)</td>
<td>For standard applications in wastewater treatment plants and environmental monitoring</td>
</tr>
<tr>
<td>Stainless steel V4A (1.4571)</td>
<td>For industrial wastewater treatment plants with an aggressive atmosphere</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wetted parts</th>
<th>Vacuum pump</th>
<th>Peristaltic pump</th>
<th>Sampling assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dosing tube</td>
<td>Plastic PP</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dosing chamber cover</td>
<td>Plastic PP</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Conductivity sensors</td>
<td>Stainless steel V4A (1.4404)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Capacitance sensor</td>
<td>PSU</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dosing chamber</td>
<td>PMMA, glass (depending on version)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dosing system outflow tubing</td>
<td>Silicone</td>
<td>-</td>
<td>EPDM</td>
</tr>
<tr>
<td>Pump tubing</td>
<td>-</td>
<td>Silicone</td>
<td>-</td>
</tr>
<tr>
<td>Process seal</td>
<td>-</td>
<td>-</td>
<td>Viton EPDM Kalrez</td>
</tr>
<tr>
<td>Distribution arm</td>
<td>Plastic PP</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Distribution arm cover</td>
<td>Plastic PE</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Distribution plate</td>
<td>Plastic PS</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Composite container/bottles</td>
<td>Plastic PE, glass (depending on version)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Suction line</td>
<td>Plastic PVC, EPDM (depending on version)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Suction line connection</td>
<td>Plastic PP</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rinse connection</td>
<td>-</td>
<td>-</td>
<td>Plastic PP</td>
</tr>
</tbody>
</table>

Choose process seal depending on the application. It is recommended to use Viton for standard application.
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

Local operation

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

Remote operation

HART using modem
1 Device module Base-L, or -E: current output I with HART
2 HART modem to connect to PC, e.g. Commubox FXA191 (RS232) or FXA195\(^1\) (USB)
3 HART handheld terminal

1) Switch position "on" (replaces resistance)
PROFIBUS DP

T  Terminating resistor

Modbus RS485

T  Terminating resistor
Communication
- 1 service interface
- Accessible via front panel connection (optional)
- Commubox FXA291 (accessory) required for communication with the PC

Software
Field Data Manager
- Standardized user interface under Windows®
- Reading out the internal memory containing the measured flow rate, sample volume taken etc.

FieldCare
- Device settings saved in a database
- Configuration

Ordering information

Product structure
You can create a valid and complete order code online with the configurator.
Enter the URL www.products.endress.com/csf48 or www.products.endress.com/csa420 into your browser to get to the product page.

1. You can choose from the following options on the product page located on the right:

   Product page function
   :: Add to product list
   :: Price & order information
   :: Compare this product
   :: Configure this product

2. Click "Configure this product".
3. The configurator opens in a separate window. You can now configure your device and receive the complete order code that applies for the device.
4. Afterwards, export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the page.
Scope of delivery

The scope of delivery comprises:

- 1 stationary sampler with:
  - The ordered bottle configuration
  - Optional hardware
- Accessories kit with:
  - Connection fitting for suction line with various angles (straight, 90°), Allen key (for version with vacuum pump only)
- 1 "Commissioning" 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
- Optional accessories

Certificates and approvals

<table>
<thead>
<tr>
<th>CE approval</th>
<th>Declaration of conformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE approval</td>
<td>The product meets the requirements of the harmonized European standards. It thus complies with the legal requirements of the EC directives. The manufacturer confirms successful testing of the product by affixing the CE symbol.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MCERTS</th>
<th>MCERTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCERTS</td>
<td>The product has been assessed by Sira Certification Service and complies with &quot;MCERTS Performance Standards for Water Monitoring Equipment Part 1, Version 2.1 dated November 2009&quot;. Certificate no.: Sira MC100176/00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>cCSAus</th>
<th>CSA C/US General Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>cCSAus</td>
<td>The product meets the requirements of &quot;Class 8721 05, laboratory equipment, electrical; Class 8721 85, laboratory equipment, electrical, certified to US standards&quot; for indoor use. Certificate no.: 2318018</td>
</tr>
</tbody>
</table>
Accessories

In the following sections, you find the accessories available at the time of issue of this documentation. For information on accessories that are not listed here, please contact your local service or sales representation.

### Accessories for Liquistation CSF48

<table>
<thead>
<tr>
<th>Bottles + caps</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111150 Bottle tray + 2 x 5 liter (1.32 US gal.) glass + cap</td>
</tr>
<tr>
<td>711134282 Bottle tray + 6 x 1.8 liter (0.48 US gal.) glass + cap</td>
</tr>
<tr>
<td>71111152 Bottle tray + 6 x 3 liter (0.79 US gal.) PE + cap</td>
</tr>
<tr>
<td>71111153 Bottle tray + 12 x 1 liter (0.26 US gal.) glass + cap</td>
</tr>
<tr>
<td>71111154 Bottle tray + 12 x 1 liter (0.26 US gal.) PE + cap</td>
</tr>
<tr>
<td>71111155 Bottle tray + 12 x 2 liter (0.53 US gal.) PE wedge shaped bottle + cap</td>
</tr>
<tr>
<td>71111156 Bottle tray + 24 x 1 liter (0.26 US gal.) PE wedge shaped bottle + cap</td>
</tr>
<tr>
<td>71111157 Bottle tray + 12 x 1 liter (0.26 US gal.) + 6 x 2 liter (0.53 US gal.) PE wedge shaped bottle + cap</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distribution plate; Locating insert</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111158 Distribution plate for 2 x 6 bottles</td>
</tr>
<tr>
<td>71111159 Distribution plate for 2 x 12 bottles</td>
</tr>
<tr>
<td>71111160 Distribution plate for 1-2 + 6 bottles</td>
</tr>
<tr>
<td>71111161 Distribution plate for 1-2 + 12 bottles</td>
</tr>
<tr>
<td>71111162 Distribution plate for 6 + 12 bottles</td>
</tr>
<tr>
<td>71111163 Locating insert for bottle tray with wedge shaped bottles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottles + caps</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111164 1 liter (0.26 US gal.) PE + cap, 24 pcs.</td>
</tr>
<tr>
<td>71111165 1 liter (0.26 US gal.) glass + cap, 24 pcs.</td>
</tr>
<tr>
<td>71134277 1.8 liter (0.48 US gal.) glass + cap, 6 pcs.</td>
</tr>
<tr>
<td>71111167 3 liter (0.79 US gal.) PE + cap, 12 pcs.</td>
</tr>
<tr>
<td>71111168 5 liter (1.32 US gal.) glass + cap, 1 pc.</td>
</tr>
<tr>
<td>71111169 13 liter (3.43 US gal.) PE + cap, 1 pc.</td>
</tr>
<tr>
<td>71111170 20 liter (5.28 US gal.) PE + cap, 1 pc.</td>
</tr>
<tr>
<td>71111172 30 liter (7.92 US gal.) PE + cap, 1 pc.</td>
</tr>
<tr>
<td>71111173 60 liter (15.8 US gal.) PE + cap, 1 pc.</td>
</tr>
<tr>
<td>71111174 1 liter (0.26 US gal.) PE wedge shaped bottle + cap, 24 pcs.</td>
</tr>
<tr>
<td>71111178 2 liter (0.53 US gal.) PE wedge shaped bottle + cap, 12 pcs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complete suction line</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111233 Suction line ID 10 mm (3/8”), reinforced braided, PVC, clear, length 10 m (33 ft), strainer V4A</td>
</tr>
<tr>
<td>71111234 Suction line ID 10 mm (3/8”), EPDM, length 10 m (33 ft), strainer V4A</td>
</tr>
<tr>
<td>71111235 Suction line ID 13 mm (1/2”), reinforced spiral wire, PVC, length 10 m (33 ft), strainer V4A</td>
</tr>
<tr>
<td>71111236 Suction line ID 13 mm (1/2”), EPDM, length 10 m (33 ft), strainer V4A</td>
</tr>
<tr>
<td>71111237 Suction line ID 16 mm (5/8”), reinforced spiral wire, PVC, length 10 m (33 ft), strainer V4A</td>
</tr>
<tr>
<td>71111238 Suction line ID 16 mm (5/8”), EPDM, length 10 m (33 ft), strainer V4A</td>
</tr>
<tr>
<td>71111239 Suction line ID 19 mm (3/4”), reinforced spiral wire, PVC, length 10 m (33 ft), strainer V4A</td>
</tr>
<tr>
<td>71111240 Suction line ID 19 mm (3/4”), EPDM, length 10 m (33 ft), strainer V4A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Suction line coil</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111482 ... m, ID 10 mm (3/8”), PVC suction line coil</td>
</tr>
<tr>
<td>71111484 ... m, ID 10 mm (3/8”), EPDM suction line coil</td>
</tr>
<tr>
<td>71111485 ... m, ID 13 mm (1/2”), PVC suction line coil</td>
</tr>
<tr>
<td>71111486 ... m, ID 13 mm (1/2”), EPDM suction line coil</td>
</tr>
<tr>
<td>71111487 ... m, ID 16 mm (5/8”), PVC suction line coil</td>
</tr>
<tr>
<td>71111481 ... m, ID 16 mm (5/8”), EPDM suction line coil</td>
</tr>
<tr>
<td>71111488 ... m, ID 19 mm (3/4”), PVC suction line coil</td>
</tr>
<tr>
<td>71111489 ... m, ID 19 mm (3/4”), EPDM suction line coil</td>
</tr>
<tr>
<td>71111490 ... m, ID 32 mm (11/4”), PVC drain hose flow assembly</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strainer</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111184 Strainer V4A for ID 10 mm (3/8”), 1 pc.</td>
</tr>
<tr>
<td>71111185 Strainer V4A for ID 13 mm (1/2”), 1 pc.</td>
</tr>
<tr>
<td>71111186 Strainer V4A for ID 16 mm (5/8”), 1 pc.</td>
</tr>
<tr>
<td>71111187 Strainer V4A for ID 19 mm (3/4”), 1 pc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tubing customized; Vacuum pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111188 Dosing tubing to distributor, 2 pcs.</td>
</tr>
<tr>
<td>71111189 Dosing tubing to distributor, 25 pcs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tubing customized; Peristaltic pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111191 Pump tubing, long and short tubing included, 2 pcs. of each</td>
</tr>
<tr>
<td>71111192 Pump tubing, long and short tubing included, 25 pcs. of each</td>
</tr>
</tbody>
</table>
**Sensors**

**Glass electrodes**

Orbisint CPS11D
- pH sensor with Memosens technology
- Dirt-repellent PTFE diaphragm
- Order as per product structure (→ online Configurator, www.products.endress.com/cps11d)
- Technical Information TI028C/07/EN

Ceraliquid CPS41D
- pH sensor with Memosens technology
- Ceramic diaphragm and KCl liquid electrolyte
- Order as per product structure (→ online Configurator, www.products.endress.com/cps41d)
- Technical Information TI079C/07/EN

Ceragel CPS71D
- pH sensor with Memosens technology
- Double-chamber reference system and integrated bridge electrolyte
- Order as per product structure (→ online Configurator, www.products.endress.com/cps71d)
- Technical Information TI245C/07/EN

Orbipore CPS91D
- pH sensor with Memosens technology
- Open aperture diaphragm for media with a high dirt load
- Order as per product structure (→ online Configurator, www.products.endress.com/cps91d)
- Technical Information TI375C/07/EN

**Communication; Software**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>71110815</td>
<td>SD card, 1 GB, Industrial Flash Drive</td>
</tr>
<tr>
<td>71160983</td>
<td>Communication FXA201 + FieldCare Device Setup</td>
</tr>
<tr>
<td>71127199</td>
<td>Field Data Manager Software; 1 licence, Analysis report</td>
</tr>
<tr>
<td>71127100</td>
<td>SD card with Liquiline firmware, 1 GB, Industrial Flash Drive</td>
</tr>
<tr>
<td>71128428</td>
<td>Activation code for digital HART-communication</td>
</tr>
<tr>
<td>71135635</td>
<td>Activation code for PROFIBUS DP</td>
</tr>
<tr>
<td>71135636</td>
<td>Activation code for Modbus RS485</td>
</tr>
<tr>
<td>71135637</td>
<td>Activation code for Modbus TCP</td>
</tr>
</tbody>
</table>

**Retrofit kits**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>71111195</td>
<td>Kit CSF48: Retrofit kit distribution assembly (distribution arm, distribution drive)</td>
</tr>
<tr>
<td>71111196</td>
<td>Kit CSF48: Retrofit kit casters</td>
</tr>
<tr>
<td>71111197</td>
<td>Kit CSF48: Retrofit kit stand, V2A, 304(x)</td>
</tr>
<tr>
<td>71111198</td>
<td>Kit CSF48: Retrofit kit stand, V4A, 316(x)</td>
</tr>
<tr>
<td>71111199</td>
<td>Kit CSF48: Retrofit kit for flow assembly, without stand; with stand cover V2A, 304(x)</td>
</tr>
<tr>
<td>71111200</td>
<td>Kit CSF48: Retrofit kit for flow assembly, without stand; with stand cover V4A, 316(x)</td>
</tr>
<tr>
<td>71111205</td>
<td>Kit CSF48: Retrofit kit temperature sensor PT100</td>
</tr>
<tr>
<td>71111206</td>
<td>Kit CSF48: Retrofit kit 1 x digital sensor, Memosens protocol + 2 x output 0/4-20 mA (hardware + software)</td>
</tr>
<tr>
<td>71111207</td>
<td>Kit CSF48: Retrofit kit 2 x digital sensor, Memosens protocol + 2 x output 0/4-20 mA (hardware + software)</td>
</tr>
<tr>
<td>71111210</td>
<td>Kit CSF48: Retrofit kit 1 x to 2 x digital sensors, Memosens protocol + 2 x output 0/4-20 mA (software)</td>
</tr>
<tr>
<td>71140909</td>
<td>Kit CSF48: Retrofit kit 2 x digital sensor + 2 x output 0/4-20 mA and extension backplane</td>
</tr>
<tr>
<td>71136099</td>
<td>Kit CSF48: Retrofit kit service interface (CDI-flange connector, counter nut)</td>
</tr>
<tr>
<td>71136885</td>
<td>Kit CSF48: Retrofit kit relay (2 x + cable set)</td>
</tr>
<tr>
<td>71136101</td>
<td>Kit CSF48: Retrofit kit door stop (2 x)</td>
</tr>
<tr>
<td>71111053</td>
<td>Kit CM442/CM444/CM448/CSF48: extension module AOR; 2 x relay, 2 x analog output 0/4 ... 20 mA</td>
</tr>
<tr>
<td>71125375</td>
<td>Kit CM442/CM444/CM448/CSF48: extension module 2B; 2 x relay</td>
</tr>
<tr>
<td>71125376</td>
<td>Kit CM442/CM444/CM448/CSF48: extension module 4B; 4 x relay</td>
</tr>
<tr>
<td>71135632</td>
<td>Kit CM442/CM444/CM448/CSF48: extension module 2AO; 2 x analog output 0/4 ... 20 mA</td>
</tr>
<tr>
<td>71135633</td>
<td>Kit CM442/CM444/CM448/CSF48: extension module 4AO; 2 x analog output 0/4 ... 20 mA</td>
</tr>
<tr>
<td>71135634</td>
<td>Kit CM442/CM444/CM448/CSF48: extension module 485; ethernet configuration; can be extended to PROFIBUS DP or Modbus RS485 or Modbus TCP using activation code</td>
</tr>
<tr>
<td>71140888</td>
<td>Upgrade kit: CM442/CM444/CM448/CSF48: extension module 485; PROFIBUS DP (+ ethernet configuration)</td>
</tr>
<tr>
<td>71140889</td>
<td>Upgrade kit: CM442/CM444/CM448/CSF48: extension module 485; Modbus RS485 (+ ethernet configuration)</td>
</tr>
<tr>
<td>71140890</td>
<td>Upgrade kit: CM442/CM444/CM448/CSF48: extension module 485; Modbus TCP (+ ethernet configuration)</td>
</tr>
<tr>
<td>71140891</td>
<td>Kit CM444/CM448: upgrade code for 2 x 0/4 to 20 mA for BASE-E</td>
</tr>
<tr>
<td>71128428</td>
<td>Activation code for digital HART communication</td>
</tr>
</tbody>
</table>

**Accessories for parameter measurements**
Orbipac CPF81D
- Compact pH sensor for installation or immersion operation in process water and wastewater
- Order as per product structure (→ online Configurator, www.products.endress.com/cpf81d)
- Technical Information TI191C/07/EN

Pfaudler sensors
Ceramax CPS341D
- pH electrode with pH-sensitive enamel
- Meets highest demands of measuring accuracy, pressure, temperature, sterility and durability
- Order as per product structure (→ online Configurator, www.products.endress.com/cps341d)
- Technical Information TI468C/07/EN

ORP sensors
Orbisint CPS12D
- ORP sensor with Memosens technology
- Dirt-repellent PTFE diaphragm;
- 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 diaphragm 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
- Double-chamber reference system and integrated bridge electrolyte;
- Order as per product structure (→ online Configurator, www.products.endress.com/cps72d)
- Technical Information TI374C/07/EN

Orbipac CPF82D
- Compact ORP sensor for installation or immersion operation in process 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 diaphragm for media with a high dirt load
- Order as per product structure (→ online Configurator, www.products.endress.com/cps92d)
- Technical Information TI435C/07/EN

ISFET sensors
Tophit CPS471D
- Sterilizable and autoclavable ISFET sensor with Memosens technology
- For the food and pharmaceutical industries, 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 media with low conductivity, 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 diaphragm for media with high dirt load
- Order as per product structure (→ online Configurator, www.products.endress.com/cps491d)
- Technical Information TI377C/07/EN
Inductively measuring conductivity sensors

Indumax CLS50D
- High-stability inductive conductivity sensor 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

Conductively measuring conductivity sensors

Condumax CLS15D
- Conductive conductivity sensor for measurement in pure and ultrapure water and in Ex applications
- Order as per product structure (→ online Configurator, www.products.endress.com/cls15d)
- Technical Information TI109C/07/EN

Condumax CLS16D
- Hygienic conductivity sensor for measurement in pure and ultrapure water and in Ex applications
- With EHEDG and 3A certificates
- Order as per product structure (→ online Configurator, www.products.endress.com/cls16d)
- Technical Information TI227C/07/EN

Condumax CLS21D
- Two-electrode sensor in fixed cable and plug-in head version
- Order as per product structure (→ online Configurator, www.products.endress.com/cls21d)
- Technical Information TI085C/07/EN

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 TI413C/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

Oxymax COS22D
- Sterilizable sensor for dissolved oxygen
- Order as per product structure (→ online Configurator, www.products.endress.com/cos22d)
- Technical Information TI446C/07/EN

Chlorine sensors

CCS142D
- Membrane-covered amperometric sensor for free 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

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

Turbidity sensors

Turbimax CUS51D
- For nephelometric measurements of turbidity and solids in wastewater
- 4-beam scattered light method
- With Memosens protocol
- Order as per product structure (→ online Configurator, www.products.endress.com/cus51d)
- Technical Information TI461C/07/EN
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

Interface sensors

Turbimax CUS71D
- Immersion sensor for interface measurement
- Ultrasonic interface sensor
- Order as per product structure [→ online Configurator, www.products.endress.com/cus71d]
- Technical Information TI490C/07/EN

Measuring cables

CYK10 Memosens data cable
- For digital sensors with Memosens technology
  - pH, redox, oxygen (amperometric), chlorine, conductivity (conductive)
- Ordering as per product structure [→ online Configurator, www.products.endress.com/cyk10]

CYK81 measuring cable
- Unterminated cable for extending the sensor cables (e.g. Memosens)
  - 2x2 wires, twisted with shield and PVC sheath (2 x 2 x 0.5 mm² + shield)
  - Goods sold by meter, order no.: 51502543