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LENNTECH
WATER TREATMENT SOLUTIONS

# Technical Information
# **Liquiline System CA80FE**

Colorimetric analyzer for iron

## Integrated controller with up to 2 measuring channels and digital Memosens technology

### Application

The Liquiline System CA80FE is a wet-chemical analyzer for the almost continuous determination of the concentration of iron in liquid media.

The analyzer is designed for use in the following applications:
- Monitoring of the residual concentration of dissolved iron following precipitation, flocculation and filtration processes
- Monitoring of iron-rich process waters
- Quality control of raw water for the food industry

The "Cabinet, outdoor version" product variant may be set up, mounted and operated outdoors.

### Your benefits

- Easy upgrade to measuring station by connecting up to 4 Memosens sensors
- Two-channel device available
- Digital fieldbuses (e.g. PROFINET, PROFIBUS DP, Modbus TCP, Modbus RS485 and Ethernet IP) and web server
- Simple, tool-free maintenance

Endress+Hauser
People for Process Automation

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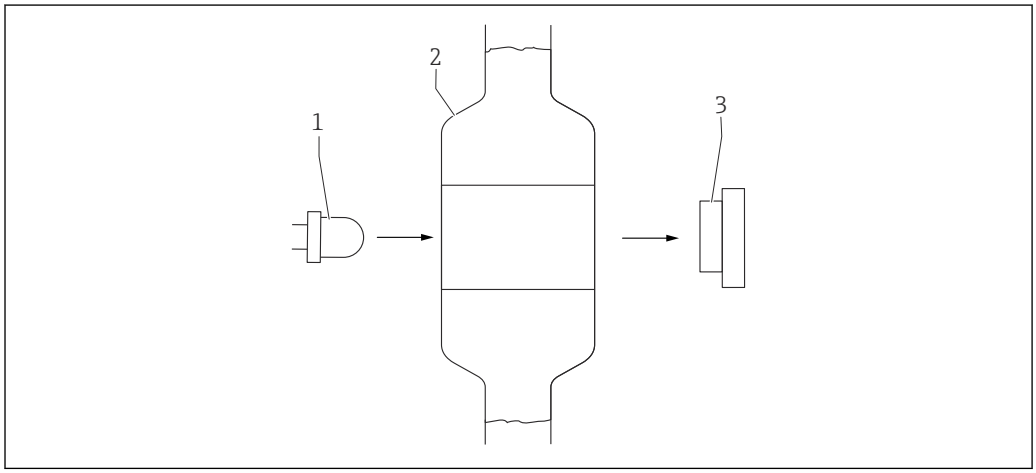
# Function and system design

**Colorimetric measuring principle**

After sample preparation, some of the permeate is pumped into the mixing/reaction chamber. The specific color reagent is metered exactly in a defined mixture ratio. The chemical reaction causes the characteristic change in the color of the sample. The multispectral photometer determines the level of absorption by the sample at defined wavelengths. The analyzed wavelengths, and their relationships to one another, are parameter-specific.

Based on proportionality the amount of light absorption is a direct indicator of the concentration of the parameter under analysis in the sample. In order to compensate for any interference influences, a reference measurement is performed before the actual measurement. This reference signal is subtracted from the measuring signal. The temperature in the photometer is kept constant to ensure a reproducible reaction that takes place within a short period of time.




*1 Colorimetric measuring principle*

*1 Multispectral LED unit (for measurement/reference)*
*2 Cuvette - mixing and reaction vessel*
*3 Detector (for measurement/reference)*

**Iron**

After aluminum, iron is the second most common metal and the fourth most abundant element in the Earth's crust, which explains its omnipresence. Nevertheless, natural bodies of water only contain small concentrations of iron (II) or iron (III) ions. Larger concentrations of iron can enter the surface water through leaching from natural deposits or from industrial wastewater, mining wastewater or pickling discharge. Iron is an important trace element. A normal diet contains enough iron to meet the body's iron needs. The presence of iron in drinking water is more a nuisance than a health hazard. Water that contains iron discolors clothes and porcelain and gives the water a bitter taste if it is present in higher concentrations (0.1 mg/l $Fe^{2+}$ or 0.2 mg/l $Fe^{3+}$). Therefore the limit concentration according to the German Drinking Water Ordinance is 0.2 mg/l Fe.

**Photometric determination of iron**

**Ferrozine method**

The reagent, 3-(2-pyridil)-5,6-bis(4-phenyl sulfonic acid)-1,2,4-triazine, reacts with iron (II) in a solution buffered to pH 4.25 to form a magenta complex. To determine the total dissolved iron in the sample, the reagent also contains a reduction agent that reduces Fe(III) to Fe(II). The absorption is measured at a wavelength of 568 nm. The amount of light absorption is proportional to the concentration of iron in the sample.

**Cross-sensitivity**

The ions listed were checked with the specified concentrations. A summary effect has not been studied. No cross-sensitivities were observed up to the concentration levels indicated.

| | |
|---|---|
| 30 000 mg/l (ppm) | $Cl^-$ |
| 20 000 mg/l (ppm) | $Na^+$ |
| 200 mg/l (ppm) | $Ca^{2+}$ |
| 100 mg/l (ppm) | $SO_4^{2-}$ |
| 40 mg/l (ppm) | $NO_3^-$ |
| 10 mg/l (ppm) | $Al^{3+}$ |

| | |
|---|---|
| 10 mg/l (ppm) | $Cr^{3+}$ |
| 5 mg/l (ppm) | $F^-$ |
| 2 mg/l (ppm) | $Mn^{2+}$ |
| 2 mg/l (ppm) | $Sn^{2+}$ |
| 50 NTU | Turbidity |
| 25 °dH | Hardness |

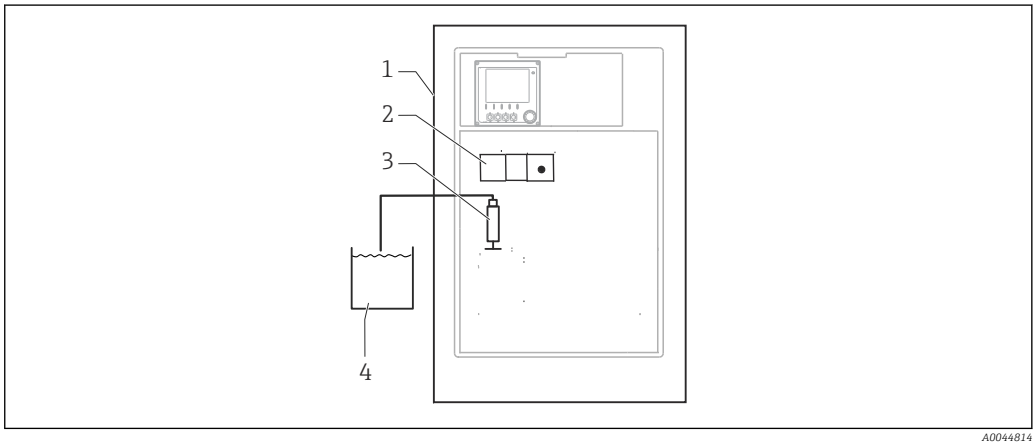
**Measuring system**

A complete measuring system comprises:
- Analyzer Liquiline System CA80FE with the configuration ordered
- Reagent and standard solution (to be ordered separately)
- Sample conditioning Liquiline System CAT8x0 (optional)

Microfiltration (Liquiline System CAT810)
- Function: pressure pipe sampling and filtration
- Sieve filter, 50 µm
- Control via CA80
  Optional: time control via integrated timer
- Backflushing, with compressed air or water
- Panel version or integration into analyzer stand
- Application: drinking water, industrial wastewater

Membrane filtration (Liquiline System CAT820), ceramic filter version
- Function: sampling and filtration
- Ceramic membrane filter cartridge; pore size 0.1 µm or 0.4 µm or plate filter with holder, pore size 0.04 µm
- Communication via Memosens protocol, control via CA80
- Backflushing with compressed air (version with Memosens technology)
- Easy installation with Flexdip CYH112
- Application: aeration, drinking water, industrial wastewater, surface water

Membrane filtration (Liquiline System CAT860)
- Function: sampling and filtration
- Ceramic membrane filter candle; pore size 0.1 µm or 0.4 µm
- Communication via Memosens protocol, control via CA80
- Automatic backflush function with cleaning solution and compressed air
- Easy installation via Flexdip CYH112
- Application: wastewater treatment plant inlet

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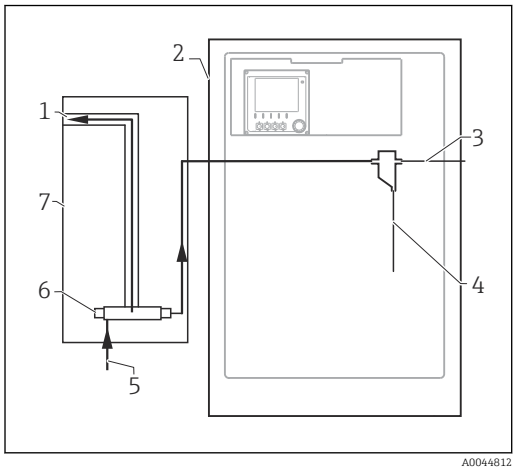
*2 Measuring system with Liquiline System, self-priming*

*1 Liquiline System CA80FE*

*2 Photometer*

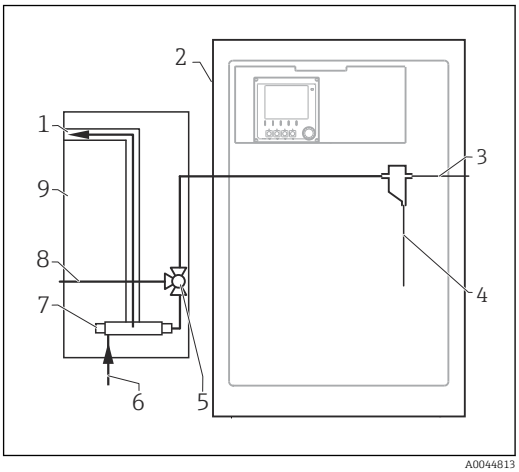
*3 Dosing dispenser*

*4 Particle-free sample*



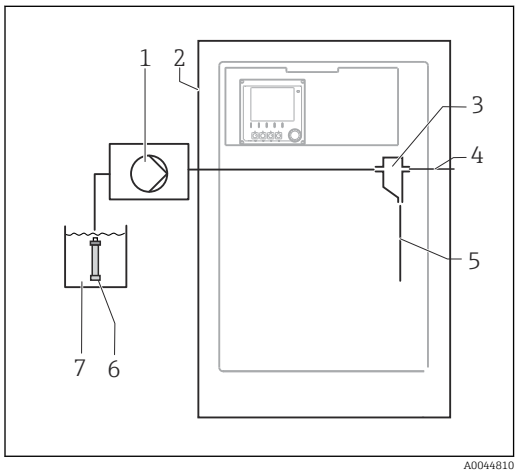

*3 Measuring system with Liquiline System CAT810*

1 *Overflow*
2 *Liquiline System CA80*
3 *Sample collecting vessel overflow*
4 *Sample*
5 *Pressurized sample*
6 *Filter unit*
7 *Liquiline System CAT810*



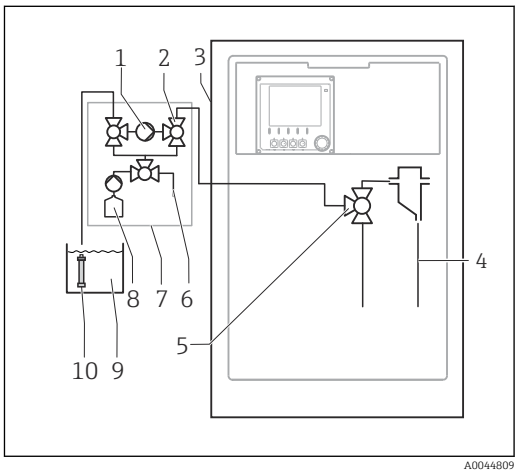

*4 Measuring system with Liquiline System CAT810 and cleaning valve*

1 *Overflow*
2 *Liquiline System CA80*
3 *Sample collecting vessel overflow*
4 *Sample*
5 *Cleaning valve*
6 *Pressurized sample*
7 *Filter unit*
8 *Purge connection (compressed air or water)*
9 *Liquiline System CAT810*



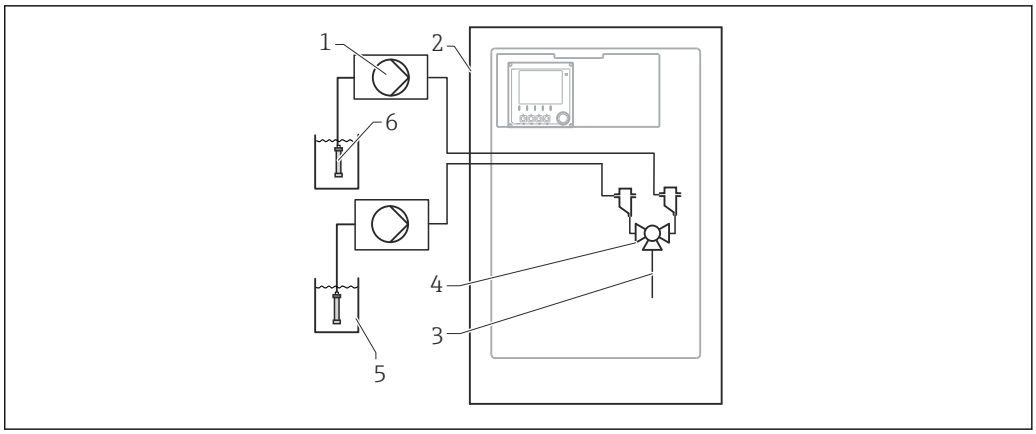

*5 Measuring system with Liquiline System CAT820*

1 *Pump*
2 *Liquiline System CA80*
3 *Sample collecting vessel*
4 *Sample collecting vessel overflow*
5 *Sample*
6 *Filter (ceramic)*
7 *Medium*




*6 Measuring system with Liquiline System CAT860*

1 *Pump*
2 *Valve*
3 *Liquiline System CA80*
4 *Sample*
5 *Valve*
6 *Compressed air*
7 *Liquiline System CAT860*
8 *Cleaning solution*
9 *Medium*
10 *Filter (ceramic)*

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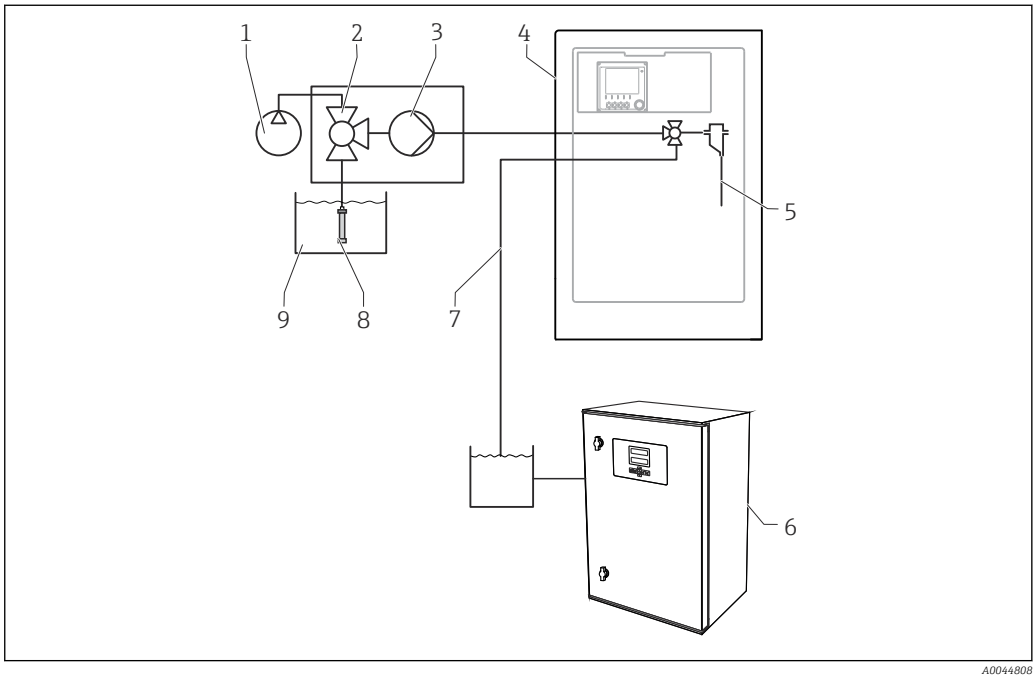
7 *Measuring system with 2x Liquiline System CAT820*

1 *Pump*
2 *Liquiline System CA80*
3 *Sample*
4 *Valve*
5 *Medium*
6 *Filter (ceramic)*

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8 *Measuring system with Liquiline System CA80, Liquiline System CAT820 and second analyzer*

1 *Backflushing with compressed air (optional)*
2 *Valve (optional)*
3 *Pump*
4 *Liquiline System CA80*
5 *Sample*
6 *Second analyzer*
7 *Sample to second analyzer*
8 *Filter (ceramic)*
9 *Medium*

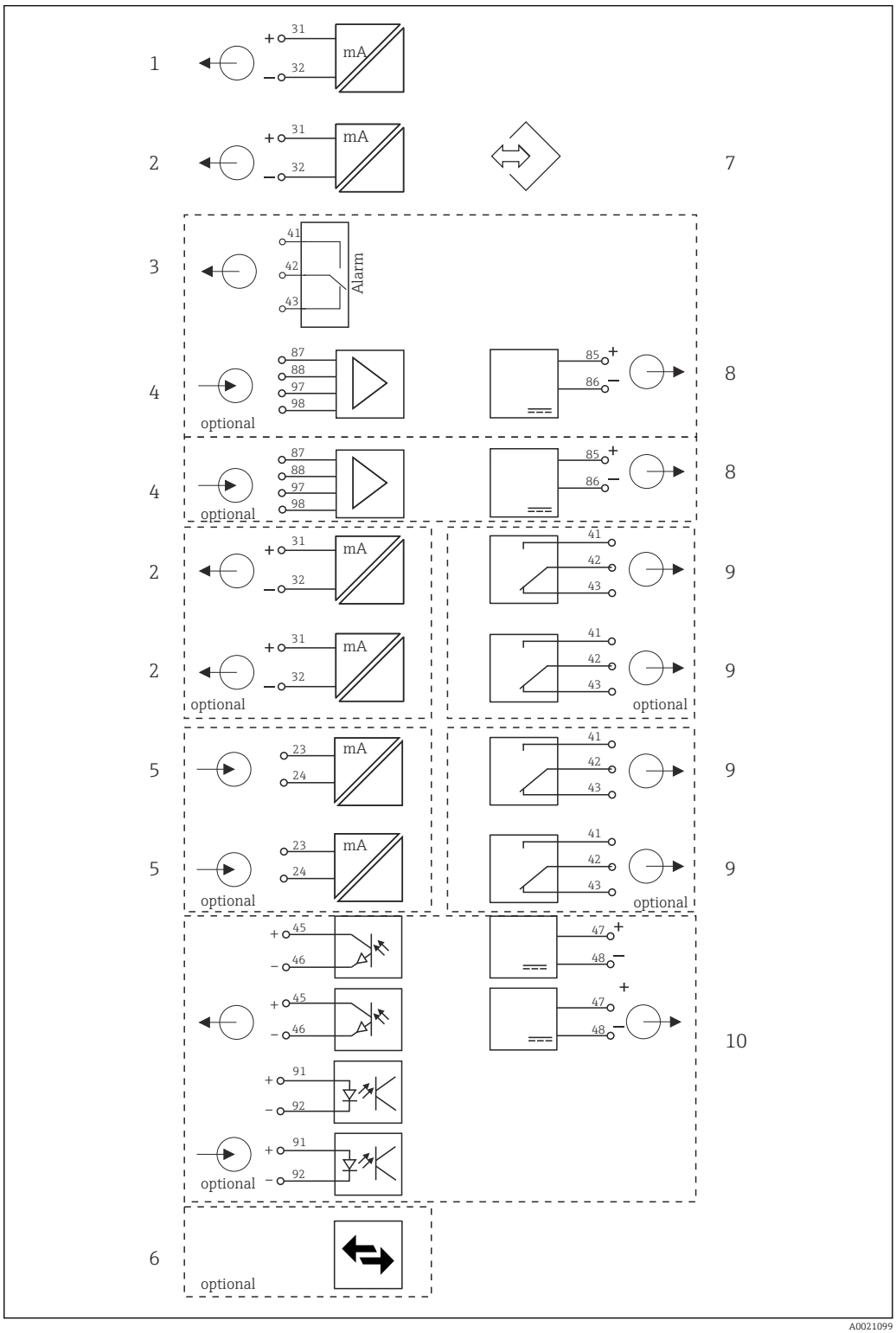
**Customer-specific solution**

Prior to analysis, the sample must be prepared at the customer site so that it is particle-free and homogeneous (representative sample). The sample can either be supplied to an external collecting vessel or pumped directly into the sample collecting vessel of the analyzer. The customer-specific sample preparation system must have its own individual control unit.

The version of the Liquiline System CA80 as a self-priming device does not have a collecting vessel with level detection. For this reason, a continuous supply of sample must be guaranteed on the process side.

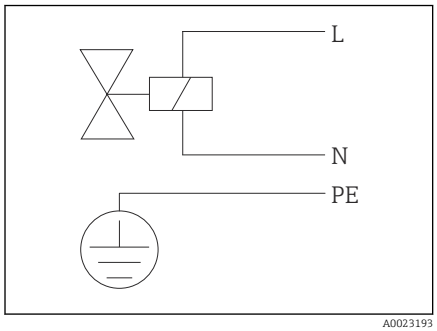
# Device architecture

**Function diagram**

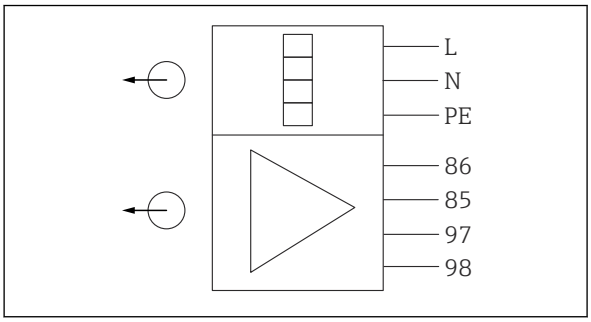



9 *Block diagram CA80*

1 *Current output 1:1*
2 *Current outputs*
3 *Alarm relay*
4 *2 x Memosens input (1 x optional)*
5 *2 x current input (optional)*
6 *Modbus/Ethernet (optional)*
7 *Service interface*
8 *Power supply, fixed cable sensors*
9 *2 or 4 x relays (optional)*
10 *2 digital inputs and outputs (optional)*




10 *Sample preparation block diagram, Liquiline System CAT810 with cleaning valve*



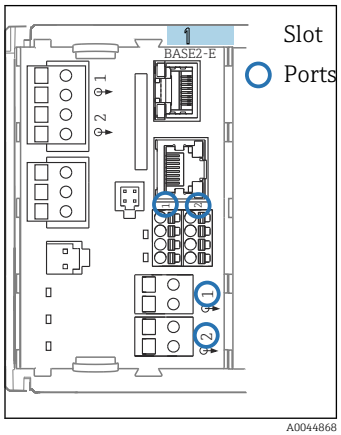

11 *Sample preparation block diagram, Liquiline System CAT820 and CAT860*

*85, 86* *Connection for 24-V power supply*

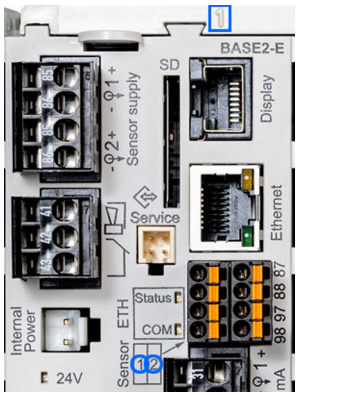
*97, 98* *Communication connection*

*2 x communication via Memosens protocol (1 x optional), hose heating system*

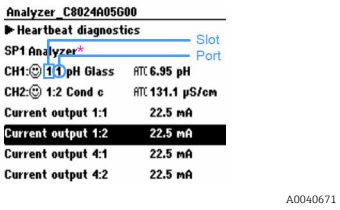
**Slot and port assignment**




12 *Slot and port assignment*




13 *Slot and port assignment*




14 *Slots and ports on the display*

* *Analyzer measured value (parameter-specific)*

- Inputs are assigned to measuring channels in the ascending order of the slots and ports.
  In the example above:
  "CH1: 1:1 pH glass" means:
  Channel 1 (CH1) is slot 1 (basic module) : Port 1 (input 1), pH glass sensor
- Outputs and relays are named according to their function, e.g. "current output", and are displayed in ascending order with the slot and port numbers
- Display shows SP1: analyzer measuring channel 1 with sampling point SP1 (measured value display is parameter-specific; is not illustrated in the example)

# Communication and data processing

**Communication protocols:**

- Fieldbus systems
  - PROFIBUS DP (Profile 3.02)
  - Modbus TCP or RS485
  - PROFINET
  - EtherNet/IP
- Configuration via Ethernet

**Extension module 485DP/485MB and current outputs**

For PROFIBUS DP and Modbus RS485 communication protocols:
A maximum of 2 current outputs can be used in parallel.

**Ethernet functionality via Base2 module and current outputs**

A maximum of 6 current outputs can be used in parallel.

**Bus termination on the device**
- Via slide switch at bus module 485DP/485MB
- Displayed via LED "T" on bus module 485DP/485MB

# Dependability

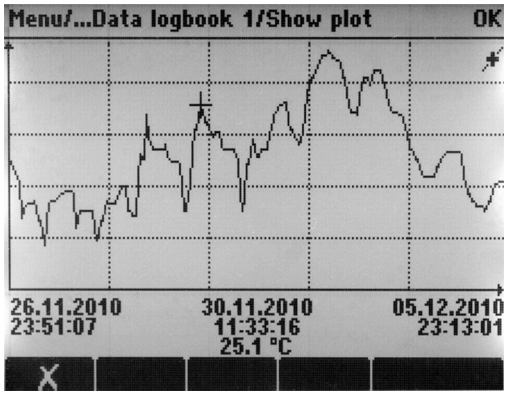
**Reliability thanks to Memosens technology**

**Memosens**
Memosens makes your measuring point safer and more reliable:
- Non-contact, digital signal transmission enables optimum galvanic isolation
- Completely watertight
- Sensor can be calibrated in a lab, thus increasing the availability of the measuring point in the process
- Intrinsically safe electronics mean operation in hazardous areas is not a problem.
- 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

**Ease of maintenance**

**Modular design**
The modular analyzer can be easily adapted to suit your needs:
- Retrofit extension modules for new or extended range of functions, e.g. current outputs, relays and digital communication
- Upgrade from one channel to two channel analyzer
- Upgrade to measuring station with digital sensors with Memosens technology
- Optional: M12 sensor connector for connecting any kind of Memosens sensor

**Data storage**
- Independent, integrated ring memories (FIFO) or stack memories for recording:
  - An analog value (e.g. flow, pH value, conductivity)
  - Events (e.g. power failure)
- Analyzer data logbook
  - Scan time: automatically adjusted to the measuring interval
  - Max. 2 data logbooks
  - 20 000 entries per logbook
  - Graphic display (load curves) or numerical list
  - Factory setting: enabled for all channels, ring memory (FIFO)
- Data logbooks for digital sensors:
  - Adjustable scan time: 1 to 3600 s (1 h)
  - Max. 8 data logbooks
  - 150,000 entries per logbook
  - Graphic display (load curves) or numerical list
- Calibration logbook: max. 75 entries
- Hardware logbook:
  - Hardware configuration and modifications
  - Max. 125 entries
- Version logbook:
  - Software updates among other things
  - Max. 50 entries
- Event logbook
- Analyzer event logbook
  - Analyzer-specific events
  - Max. 19 500 entries, ring memory or fill-up buffer for recording
- Operations logbook: max. 250 entries
- Diagnostic logbook: max. 250 entries

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*15 Data logbook: graphic representation on the display*

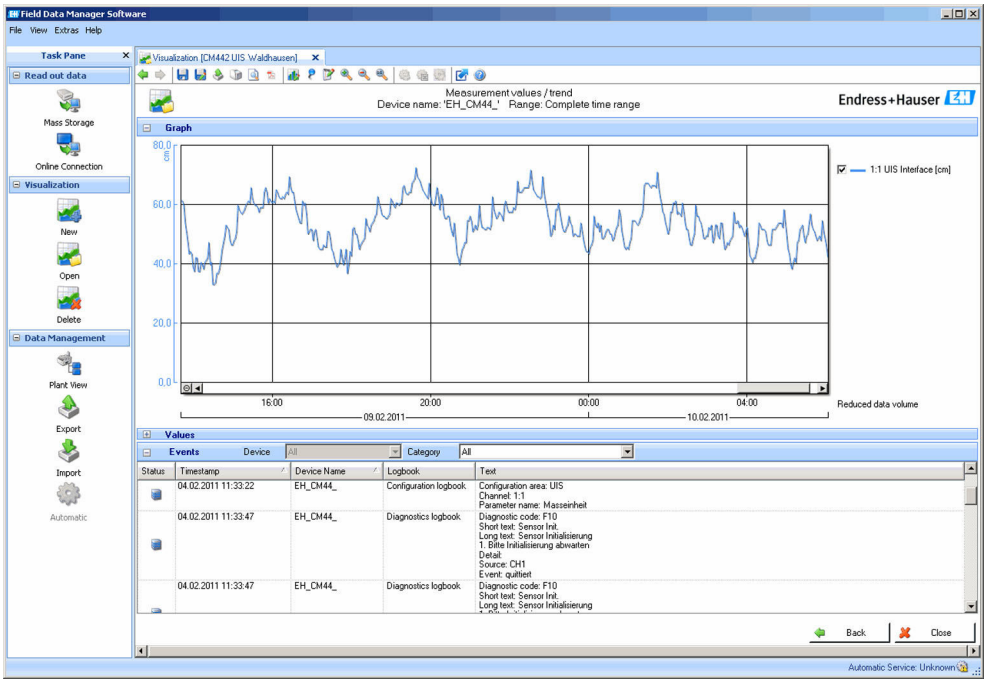
**Mathematical functions (virtual process values)**
In addition to "real" process values, which are provided by connected physical sensors or analog inputs, mathematical functions can be used to calculate a maximum of 6 "virtual" process values.

**The "virtual" process values can be:**
- Output via a current output or a fieldbus
- Used as a controlled variable
- Assigned as a measured variable to a limit switch
- 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 based on the measured values of a pH and an ORP sensor
- Formula editor as a powerful mathematics tool and for Boolean operations with up to 3 measured values

**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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*16 Field Data Manager: load curve display*

**SD card**

The exchangeable storage medium enables:

- Quick and easy software updates and upgrades
- Quick and easy updates and upgrades to measuring parameter lists
- Data storage of internal device memory (e.g. logbooks)
- 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.

## Self-monitoring functions

**Electronics**

- Current inputs are deactivated in the event of overcurrent and reactivated once the overcurrent stops.
- Board voltages are monitored and the board temperature is also measured.

**Counter**

Counters monitor consumables such as reagents or dispensers.

**Photometer**

- Automatic temperature monitoring
- Active monitoring of communication between the photometer module and the analyzer electronics

**Sample preparation (optional)**

- Active monitoring of communication between sample preparation with Memosens communication and the analyzer
- Counter for consumables, such as hoses of the peristaltic pump

**Sample collecting vessel (optional)**

Active monitoring of liquid level in the sample collecting vessel to ensure the supply of liquid to the analyzer

Leak sensor in the housing

## 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.

**IT security**

We only provide a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

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

# Input

**Measured variables**

Dissolved iron Fe [µg/l, mg/l, ppb, ppm]

**Measuring range**

CA80FE-**M2: 0.05 to 2.5 mg/l (ppm) Fe
CA80FE-**M3: 0.1 to 5 mg/l (ppm) Fe

*Order version with dilution function (optional)*

| Measuring range to be configured [mg/l (ppm)] | Dilution factor [1] | Effective measuring range [mg/l (ppm)] |
|---|---|---|
| 0.1 to 5.0 | 1 | 0.1 to 5.0 [2] |
| 0.1 to 5.0 | 5 | 0.5 to 25 |
| 0.1 to 5.0 | 10 | 1 to 50 |
| 0.1 to 5.0 | 20 | 2 to 100 |

1) User configurable
2) Dilution function disabled

**Types of input**

- 1 or 2 measuring channels (analyzer main parameter)
- 1 to 4 digital sensor inputs for sensors with Memosens protocol (optional)
- Analog current inputs (optional)
- Binary inputs (optional)

**Input signal**

Depending on version
2 x 0/4 to 20 mA (optional), passive, potentially isolated

**Current input, passive**

**Span**
> 0 to 20 mA

**Signal characteristic**
Linear

**Internal resistance**
Non-linear

**Test voltage**
500 V

**Cable specification (for optional sensors with Memosens technology)**

**Cable type**
Memosens data cable CYK10 or sensor fixed cable, each with cable end sleeves or M12 round-pin connector (optional)

**Cable length**
Max. 100 m (330 ft)

# Output

**Output signal**

Depending on version:
- 2 x 0/4 to 20 mA, active, potentially isolated (standard version)
- 4 x 0/4 to 20 mA, active, potentially isolated (version with 2 additional analog outputs)
- 6 x 0/4 to 20 mA, active, potentially isolated (version with 4 additional analog outputs)
- Binary outputs

| **PROFIBUS DP/RS485** | |
|---|---|
| Signal encoding | EIA/TIA-485, PROFIBUS DP-compliant acc. to IEC 61158 |
| Data transmission rate | 9.6 kBd, 19.2 kBd, 45.45kBd, 93.75 kBd, 187.5 kBd, 500 kBd, 1.5 MBd, 6 MBd, 12 MBd |
| Galvanic isolation | Yes |
| Connectors | Spring terminal (max. 1.5 mm), bridged internally (T-function), optional M12 |
| Bus termination | Internal slide switch with LED display |

| **Modbus RS485** | |
|---|---|
| Signal encoding | EIA/TIA-485 |
| Data transmission rate | 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200 baud |
| Galvanic isolation | Yes |
| Bus termination | Internal slide switch with LED display |

| **Web server and Modbus TCP** | |
|---|---|
| Signal encoding | IEEE 802.3 (Ethernet) |
| Data transmission rate | 10 / 100 MBd |
| Galvanic isolation | Yes |
| Connection | RJ45, M12 optional |
| IP address | DHCP or configuration using menu |

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

| **PROFINET** | |
|---|---|
| Signal encoding | IEEE 802.3 (Ethernet) |
| Data transmission rate | 100 MBd |
| Galvanic isolation | Yes |
| Connection | RJ45 |
| Name of station | Via DCP protocol using the configuration tool (e.g. Siemens PRONETA) |
| IP address | Via DCP protocol using the configuration tool (e.g. Siemens PRONETA) |

**Signal on alarm**

Adjustable, as per NAMUR Recommendation NE 43
- In measuring range 0 to 20 mA:
  Failure current from 0 to 23 mA
- In measuring range 4 to 20 mA:
  Failure current from 2.4 to 23 mA
- Factory setting for failure current for both measuring ranges:
  21.5 mA

**Load**

Max. 500 Ω

**Transmission behavior**

Linear

## Current outputs, active

**Span**

0 to 23 mA

**Signal characteristic**

Linear

**Electrical specification**

**Output voltage**
Max. 24 V

**Test voltage**
500 V

**Cable specification**

**Cable type**
Recommended: shielded cable

**Cable specification**
Max. 2.5 mm$^2$ (14 AWG)

## Relay outputs

**Electrical specification**

**Relay types**
- 1 single-pin changeover contact (alarm relay)
- 2 or 4 single-pin changeover contacts (optional with extension modules)

**Maximum load**
- Alarm relay: 0.5 A
- All other relays: 2.0 A

**Relay switching capacity**

*Base module (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 |
| 115 V AC, cosΦ = 0.8 to 1 | 0.1 A | 1,000,000 |
| | 0.5 A | 650,000 |
| 24 V DC, L/R = 0 to 1 ms | 0.1 A | 500,000 |
| | 0.5 A | 350,000 |

*Extension module*

| 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 |
| | 2 A | 120,000 |
| 115 V AC, cosΦ = 0.8 to 1 | 0.1 A | 1,000,000 |
| | 0.5 A | 650,000 |
| | 2 A | 170,000 |
| 24 V DC, L/R = 0 to 1 ms | 0.1 A | 500,000 |
| | 0.5 A | 350,000 |
| | 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

**PROFIBUS DP**

| | |
|---|---|
| Manufacturer ID | $11_h$ |
| Device type | $155E_h$ |
| Profile version | 3.02 |
| Device database files (GSD files) | www.endress.com/profibus<br>Device Integration Manager DIM |
| Output variables | 16 AI blocks, 8 DI blocks |
| Input variables | 4 AO blocks, 8 DO blocks |
| Supported features | ▪ 1 MSCY0 connection (cyclical communication, master class 1 to slave)<br>▪ 1 MSAC1 connection (acyclical communication, master class 1 to slave)<br>▪ 2 MSAC2 connections (acyclical communication, master class 2 to slave)<br>▪ Device lock: The device can be locked using the hardware or software.<br>▪ Addressing using DIL switches or software<br>▪ 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 | ▪ Remote-controlled device configuration(1 session)<br>▪ Save/restore device configuration (via SD card)<br>▪ Logbook export (file formats: CSV, FDM)<br>▪ Access to web server via DTM or Internet Explorer<br>▪ Login<br>▪ Web server can be switched off |

**EtherNet/IP**

| | | |
|---|---|---|
| Log | EtherNet/IP | |
| ODVA certification | Yes | |
| Device profile | Generic device (product type: 0x2B) | |
| Manufacturer ID | $0x049E_h$ | |
| Device type ID | 0x109F | |
| 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<br>Measured values:<br>▪ 16 AI (analog input) + Status + Unit<br>▪ 8 DI (discrete input) + Status |
| | Output (O → T) | Actuating values:<br>▪ 4 A0 (analog output) + status + unit<br>▪ 8 DO (discrete output) + Status |

**PROFINET**

| | |
|---|---|
| Protocol | "Application layer protocol for decentral device periphery and distributed automation", PNIO Version 2.34 |
| Communication type | 100 MBit/s |
| Conformance Class | Conformance Class B |
| Netload Class | Netload Class II |
| Baud rate | Automatic 100 Mbps with full-duplex detection |
| Cycle times | From 32 ms |
| Device profile | Application interface identifier 0xF600<br>Generic device |
| PROFINET interface | 1 port, Realtime Class 1 (RT_CLASS_1) |
| Manufacturer ID | $0x11_h$ |
| Device type ID | $0x859F_h$ |
| Device description files (GSD) | Information and files under:<br>▪ www.endress.com<br>On the product page for the device: Documents/Software → Device drivers<br>▪ www.profibus.com<br>On the website under Products/Product Finder |
| Polarity | Auto-polarity for automatic correction of crossed TxD and RxD pairs |
| Supported connections | ▪ 1 x AR (IO Controller AR)<br>▪ 1 x AR (IO-Supervisor Device AR connection allowed)<br>▪ 1 x Input CR (Communication Relation)<br>▪ 1 x Output CR (Communication Relation)<br>▪ 1 x Alarm CR (Communication Relation) |
| Configuration options for measuring device | ▪ Web browser<br>▪ Manufacturer-specific software (FieldCare, DeviceCare)<br>▪ Device master file (GSD), can be read out via the integrated web server of the measuring device |
| Configuration of the device name | DCP protocol |
| Supported functions | ▪ Identification & maintenance<br>Simple device identification via:<br>▪ Process control system<br>▪ Nameplate<br>▪ Measured value status<br>The process variables are communicated with a measured value status<br>▪ Blinking feature (FLASH_ONCE) via the local display for simple device identification and assignment<br>▪ Device operation via operating tools (e.g. FieldCare, DeviceCare) |
| System integration | For information on system integration, see the Operating Instructions<br>▪ Cyclic data transmission<br>▪ Overview and description of the modules<br>▪ Status coding<br>▪ Startup configuration<br>▪ Factory setting |

# Power supply

**Supply voltage**

- 100 to 120 V AC / 200 to 240 V AC
  or 24 V DC (not available for "Outdoor" version)
- 50 or 60 Hz

**Fieldbus connection**

Supply voltage: not applicable

**Power consumption**

**All versions except "Outdoor" version**

130 VA + 660 VA per hose heater, max. 1450 VA

24-V version: max. 105 W

**"Outdoor" version**

680 VA + 660 VA per hose heater, max. 2000 VA (version with cooling system) [1)]

**Fuse**

5 x 20 mm 10 A/250 V fine-wire fuse for hose trace heating system

**Cable entries**

- 4 x bores for M16, G3/8, NPT3/8", Memosens connection [2)]
- 4 x bores for M20, G1/2, NPT1/2"

**Cable specification**

| Cable gland | Permitted cable diameter |
|---|---|
| M16x1.5 mm | 4 to 8 mm (0.16 to 0.32") |
| M12x1.5 mm (for order version M12 socket for Memosens sensors) | 2 to 5 mm (0.08 to 0.20") |
| M20x1.5 mm | 6 to 12 mm (0.24 to 0.48") |
| NPT$^{3}/_{8}$" | 4 to 8 mm (0.16 to 0.32") |
| G$^{3}/_{8}$ | 4 to 8 mm (0.16 to 0.32") |
| NPT½" | 6 to 12 mm (0.24 to 0.48") |
| G½ | 7 to 12 mm (0.28 to 0.48") |

Cable glands mounted at the factory are tightened with 2 Nm.

**Heating for dilution water**

The dilution water and the hose for dilution water must be heated onsite at the place of installation!

**Connecting optional modules**

With extension modules you can purchase additional functions for your device.

NOTICE

**Unacceptable hardware combinations (due to conflicts in power supply)**

Incorrect measurements or total failure of the measuring point as a result of heat build-up or overloading

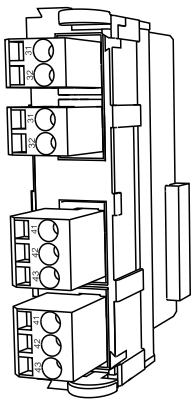
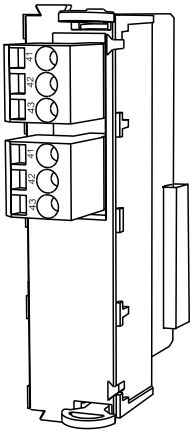
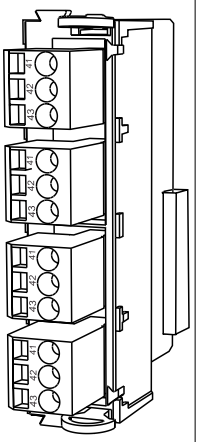
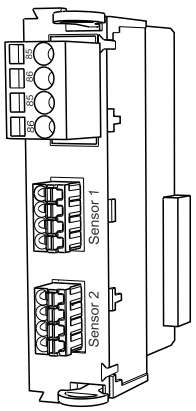
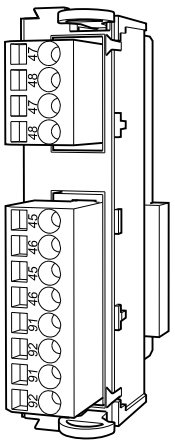
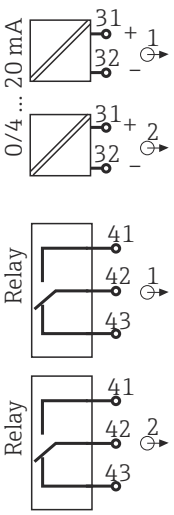
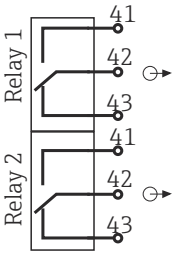
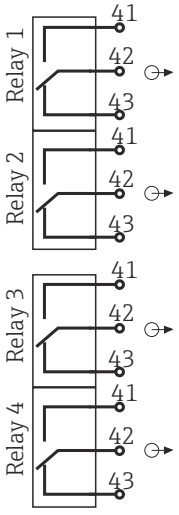
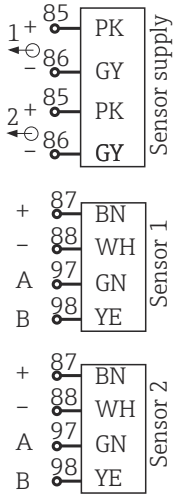
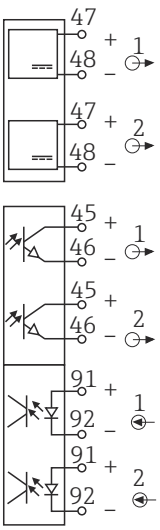
- ▶ Find out if the planned upgrade of your device results in a permitted hardware combination (configurator on www.endress.com/CA80FE).
- ▶ A maximum of eight current inputs and current outputs is permitted.
- ▶ A maximum of two "DIO" modules is permitted.
- ▶ Please contact your Endress+Hauser sales center should you have any questions.

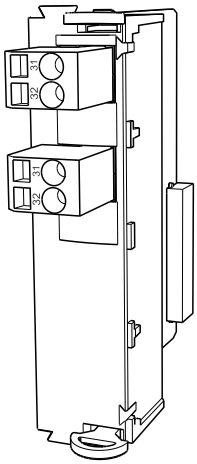
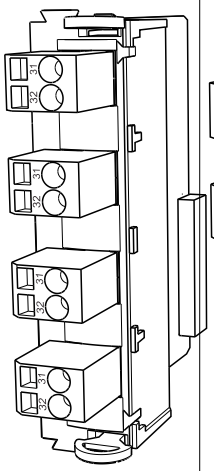
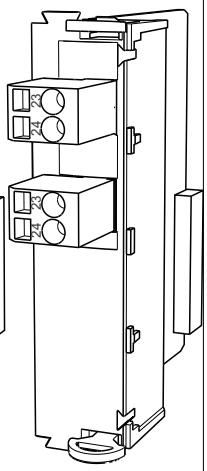
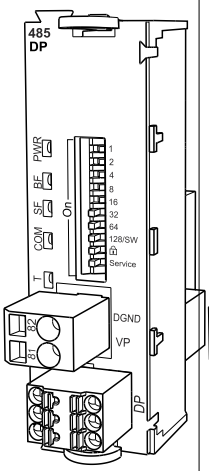
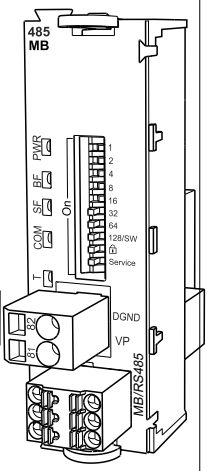
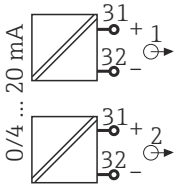
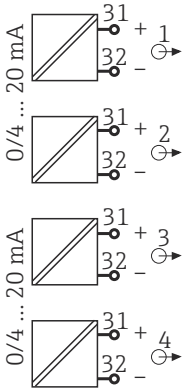
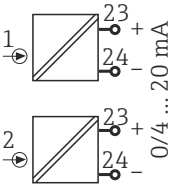
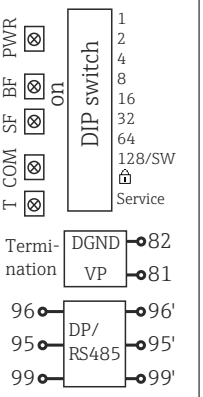
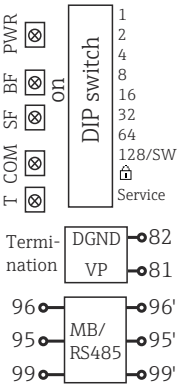
Cable bushings and possible cable diameters

1) The power value indicated on the nameplate refers to the power consumption when commissioning at 5 °C (41 °F) after an operating time of one minute.

2) In the case of the "Outdoor" version, 2 bores are occupied; for this reason only 2 Memosens sensors are possible

*Overview of all the optional modules*

| Module name | | | | |
|---|---|---|---|---|
| **AOR** | **2R** | **4R** | **2DS** | **DIO** |
|  |  |  |   |  |
| ▪ 2 x 0/4 to 20 mA analog outputs<br>▪ 2 relays<br>▪ Order No. 71111053 | ▪ 2 relays<br>▪ Order No. 71125375 | ▪ 4 relays<br>▪ Order No. 71125376 | ▪ 2 digital sensor inputs<br>▪ 2 power supply systems for digital sensors<br>▪ Order No. 71135631 | ▪ 2 digital inputs<br>▪ 2 digital outputs with auxiliary voltage<br>▪ Order No. 71135638 |
|   |   |   |   |   |

| Module name | | | | |
|---|---|---|---|---|
| **2AO** | **4AO** | **2AI** | **485DP** | **485MB** |
|  |  |  |  |  |
| ▪ 2 x 0/4 to 20 mA analog outputs<br>▪ Order No. 71135632 | ▪ 4 x 0/4 to 20 mA analog outputs<br>▪ Order No. 71135633 | ▪ 2 x 0/4 to 20mA analog inputs<br>▪ Order No. 71135639 | ▪ 5V power supply for PROFIBUS DP termination<br>▪ RS485 for PROFIBUS DP<br>▪ Order No. 71575177 | ▪ RS485 for Modbus<br>▪ Order No. 71575178 |
|  |  |  |  |  |

**PROFIBUS DP (module 485DP)**
Contacts 95, 96 and 99 are jumpered in the plug. This ensures that PROFIBUS communication is not interrupted if the connector is disconnected.

**Sensor connection (optional)**

*Sensors with Memosens protocol*

| Sensor types | Sensor cable | Sensors |
|---|---|---|
| Digital sensors **without** additional internal power supply | With plug-in connection and inductive signal transmission | ▪ pH sensors<br>▪ ORP sensors<br>▪ Combined sensors<br>▪ Oxygen sensors (amperometric and optical)<br>▪ Conductivity sensors with conductive measurement of conductivity<br>▪ Chlorine sensors (disinfection) |
| | Fixed cable | Conductivity sensors with inductive measurement of conductivity |
| Digital sensors with additional internal power supply | Fixed cable | ▪ Turbidity sensors<br>▪ Sensors for interface measurement<br>▪ Sensors for measuring the spectral absorption coefficient (SAC)<br>▪ Nitrate sensors<br>▪ Optical oxygen sensors<br>▪ Ion-sensitive sensors |

# Performance characteristics

**Maximum measured error** [3)]

| | | |
|---|---|---|
| CA80FE-AAM2: | 0.05 to 2.5 mg/l (ppm) Fe | 0.04 mg/l (ppm) |
| CA80FE-AAM3: | 0.1 to 5 mg/l (ppm) Fe | 0.1 mg/l (ppm) |

With dilution and dilution factor 5:
additionally 2.0 % of end of measuring range

**Maximum measurement error for sensor inputs**

→ Documentation of the connected sensor

**Maximum measurement error for current inputs and outputs**

Typical measured errors:

< 20 µA (with current values < 4 mA)

< 50 µA (with current values 4 to 20 mA)

at 25 °C (77° F) in each case

Additional measured error depending on the temperature:
< 1.5 µA/K

**Repeatability** [3)]

- < 0.25 mg/l (ppm): ± 0.02 mg/l (ppm) Fe
- 0.25 to 0.50 mg/l (ppm): ± 0.03 mg/l (ppm) Fe
- > 0.50 mg/l (ppm): ± 0.06 mg/l (ppm) Fe

With dilution and dilution factor 5:
Additionally 1.0 % of end of measuring range

**Repeatability of sensor inputs**

→ Documentation of the connected sensor

**Measuring interval**

Continuous (approx. 5 min), adjustable 10 min to 24 h

**Sample requirement**

Without dilution module
22 ml (0.74 fl oz)/measurement

3) According to ISO 15839 with standard solutions. Measurement errors include all the uncertainties of the analyzer. They do not include the uncertainties from the standard solutions used as a reference.

With dilution module
- Sample: 11 to 15 ml (0.37 to 0.51 fl oz)/measurement (depends on dilution factor)
- Dilution water: 17 to 21 ml (0.57 to 0.71)/measurement (depends on dilution factor)
  Use demineralized water for expected sample concentrations of < 50 mg/l (ppm).

**Reagent requirement**
- Approx. 65 µl per measurement
- 280 ml reagent per month, given a measuring interval of 10 min the reagent will last for approx. 3.5 months

**Standard requirement**
Given a calibration interval of 48 h approx. 310 ml (10.48 fl.oz) per month

**Calibration interval**
1 h to 90 days, depending on the application and ambient conditions

**Maintenance interval**
Every 3 to 6 months, depending on the application

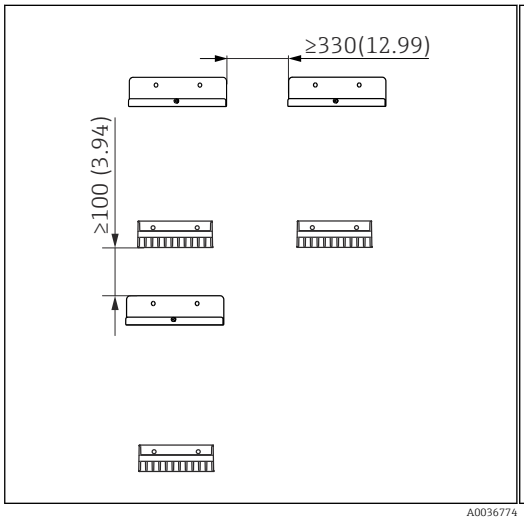
**Maintenance effort**
- Weekly: visual inspection
- Quarterly: 1 hour

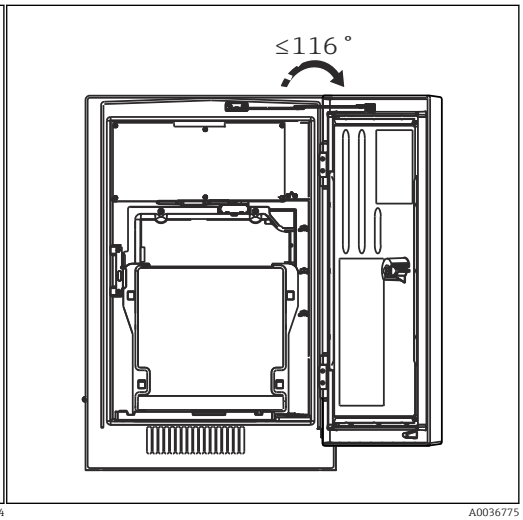
# Mounting

**Mounting location**
Note the following when erecting the device:
- ▶ If mounting on a wall, make sure that the wall has sufficient load-bearing capacity and is fully perpendicular.
- ▶ If mounting on a base, set up the device on a level surface. Installing on a base is only permitted indoors.
- ▶ Protect the device against additional heating (e.g. from heaters).
- ▶ Protect the device against mechanical vibrations.
- ▶ Protect the device against corrosive gases, e.g. hydrogen sulfide ($H_2S$) .
- ▶ Make sure to pay attention to the maximum height difference and the maximum distance from the sampling point.
- ▶ Ensure that the unit can drain freely, without any siphoning effects.
- ▶ Make sure air can circulate freely at the front of the housing.
- ▶ Open analyzers (i.e. analyzers that are supplied without a door) may only be set up in closed areas or in a protective cabinet or similar facility.
- ▶ "Outdoor" version only: Post mounting is recommended for outdoor installation.

**Installation instructions**
The device can be installed in the following ways:
- Mounted on a wall
- Mounted on a base
- Post mounting / on a post (accessory)

*Spacing required for installing analyzer*

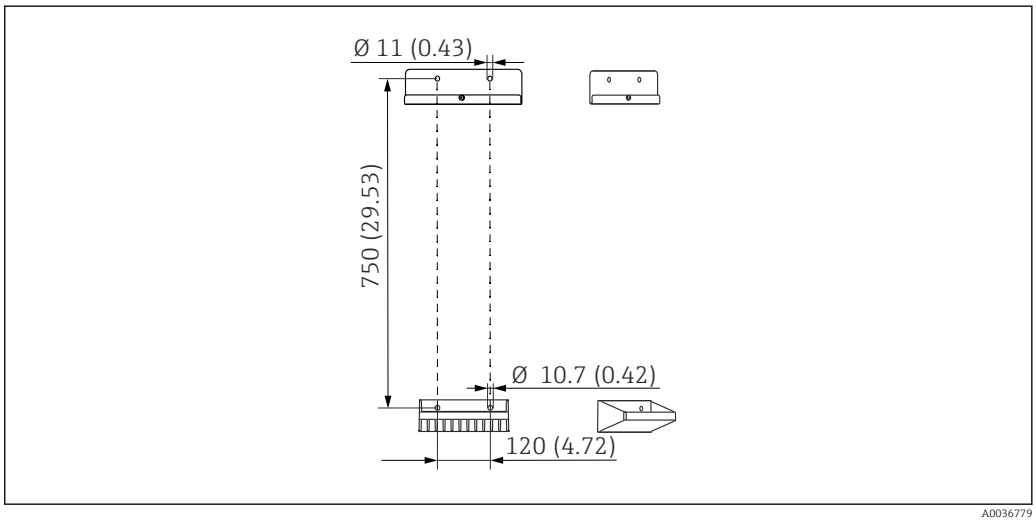



*17 Minimum spacing required for mounting. Engineering unit mm (in).*

*18 Maximum opening angle*

*Spacing required for installing wall-mount version*




*19 Holder unit dimensions. Engineering unit mm (in)*

# Environment

| | |
|---|---|
| **Ambient temperature range** | **All housing versions with the exception of the outdoor version**<br>+5 to +40 °C (41 to 104 °F)<br><br>**Outdoor version**<br>-20 to +40 °C (-4 to 104 °F) |
| **Storage temperature** | –20 to 60 °C (–4 to 140 °F) |
| **Relative humidity** | 10 to 95 %, non-condensing |
| **Degree of protection** | IP55 (cabinet, analyzer stand), TYPE 3R (cabinet, analyzer stand) |

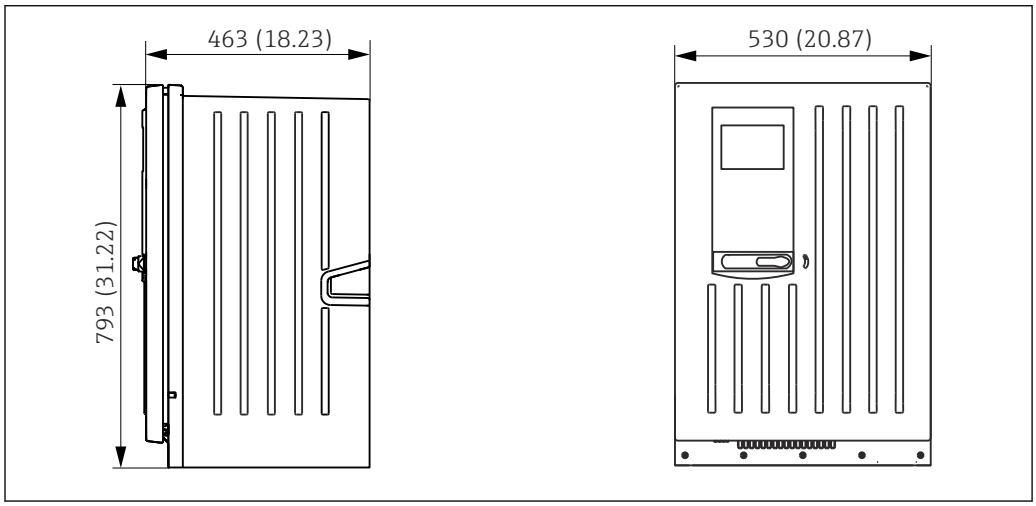
| | |
|---|---|
| **Electromagnetic compatibility** [4] | Interference emission and interference immunity as per EN 61326-1, class A for industrial areas |
| **Electrical safety** | According to EN/IEC 61010-1:2010, Class I equipment<br>Low voltage: overvoltage category II<br>For installations up to 2000 m (6500 ft) above MSL |
| **Pollution degree** | Pollution level 2 |

## Process

| | |
|---|---|
| **Sample temperature** | 4 to 40 °C (39 to 104 °F) |
| **Consistency of the sample** | Low solids content (turbidity < 50 NTU), aqueous, homogenized |
| **Sample supply** | Unpressurized |

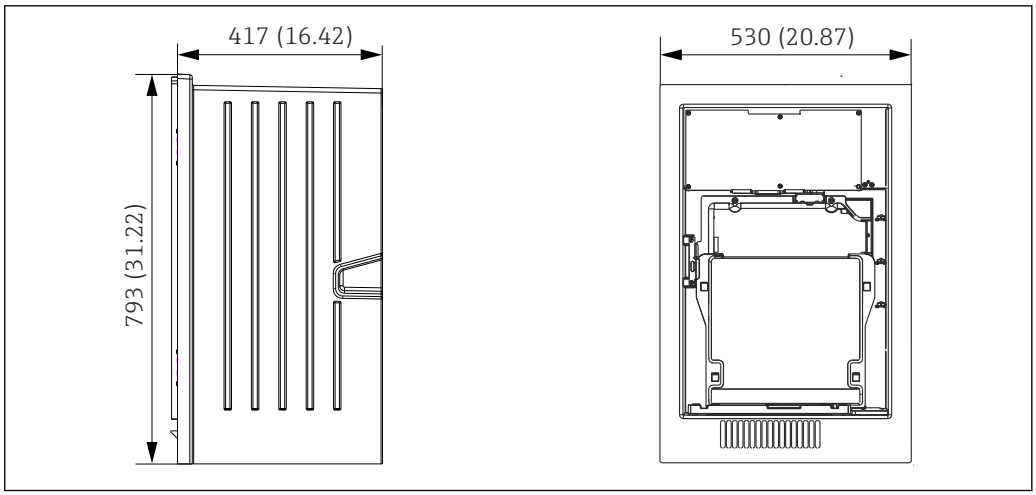
## Mechanical construction

**Dimensions**

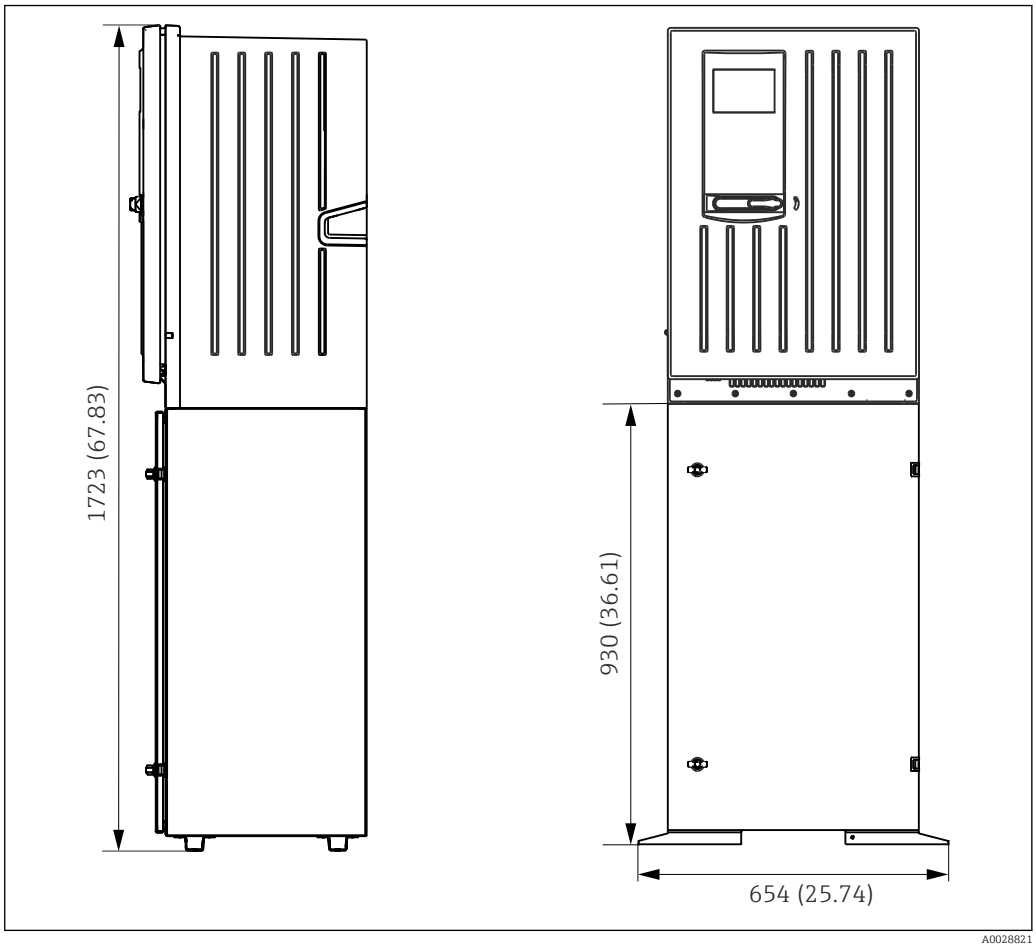



*20 Liquiline System CA80 closed version, dimensions in mm (in)*

4) Sufficient mains quality is required to operate the product as intended.




*21 Liquiline System CA80 open version, dimensions in mm (in)*




*22 Liquiline System CA80 with base, dimensions in mm (in)*

**Weight**

| Order | Weight |
|---|---|
| Cabinet version | 39.5 kg (87.1 lbs) |
| Open installation | 31.5 kg (69.45 lbs) |
| Analyzer stand | 72.5 kg (159.8 lbs) |

**Materials**

| Parts not in contact with medium | |
|---|---|
| Cabinet version, exterior cover | ASA + PC |

| | |
|---|---|
| Open installation, exterior cover | |
| Cabinet version, interior lining | PP |
| Open installation, interior lining | |
| Window | Safety glass, coated |
| Reagent container | PP |
| Insulation | EPP (extruded PP) |
| Base, analyzer stand | Powder-coated sheet steel |

| **Parts in contact with medium** | |
|---|---|
| Dispenser body<br>Piston seal | PP<br>TPE |
| Liquid Manager housing<br>Liquid Manager seal | PP<br>FKM |
| Hoses | C-Flex (TPE), NORPRENE (PP) |
| Optical window | Borosilicate glass |
| Form seal, cuvette | FFKM |
| Drain pipe<br>Outflow hose | PP<br>EPDM |
| Sample collecting vessel (optional)<br>▪ Beaker<br>▪ Cover<br>▪ Level detector pins<br>▪ Seal, solenoid valve<br>▪ Seal for sample collecting vessel valve | <br>▪ PMMA<br>▪ PP<br>▪ Stainless steel 1.4404 (V4A)<br>▪ EPDM<br>▪ FKM |
| Valve on sample collecting vessel (optional)<br>▪ Housing<br>▪ Seal | <br>▪ PEEK<br>▪ FKM |

**Process connection**

Sample inlet:
- With sample collecting vessel: Plug-in connector for rigid hoses with OD 4 mm
- Without sample collecting vessel: Hose barb for flexible hoses with ID 1.6 mm

Dilution water: Hose barb for flexible hoses with ID 3.2 mm

Outlet: Hose barb for flexible hoses with ID 13 mm

**Hose entries**

4 x bores for M32 for sample inflow and outflow

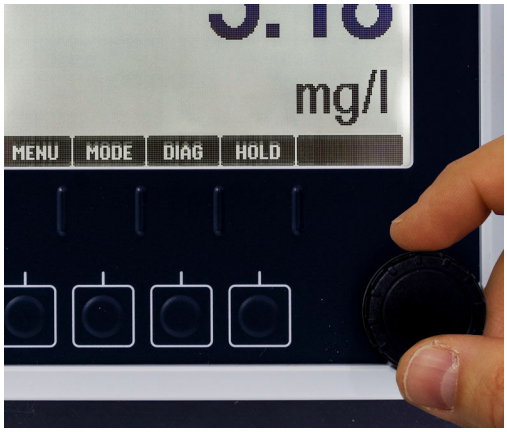
**Hose specification (self-priming)**

- Clearance: max. 1.0 m (3.3 ft)
- Height: max. 0.5 m (1.6 ft)
- Hose ID: 1.6 mm ($^{1}/_{16}$ in)

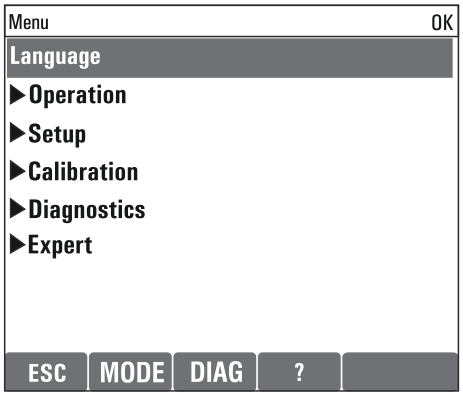
# Operability

**Operation 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




23 *Easy operation*



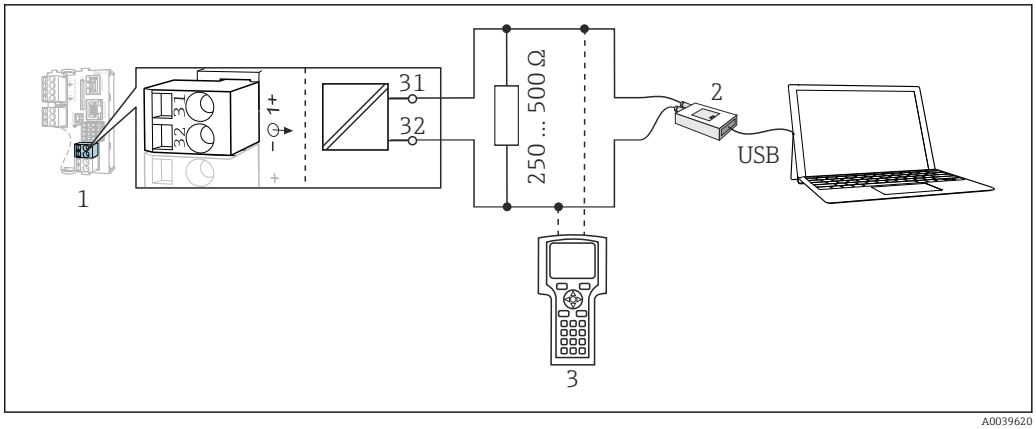

24 *Plain-text menu*

**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

**Remote operation**

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

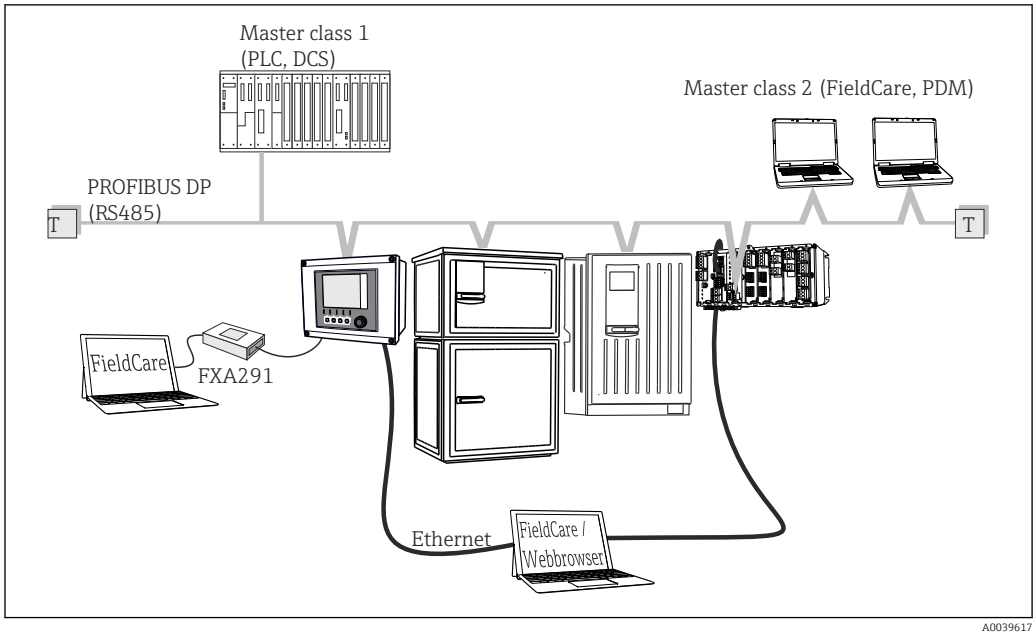



25 *HART using modem*

*1 Device module Base2-E: current output 1 with HART*
*2 HART modem for connection to PC, e.g. Commubox FXA191 (RS232) or FXA195 [1] (USB)*
*3 HART handheld terminal*

[1] Switch position "on" (substitutes the resistor)

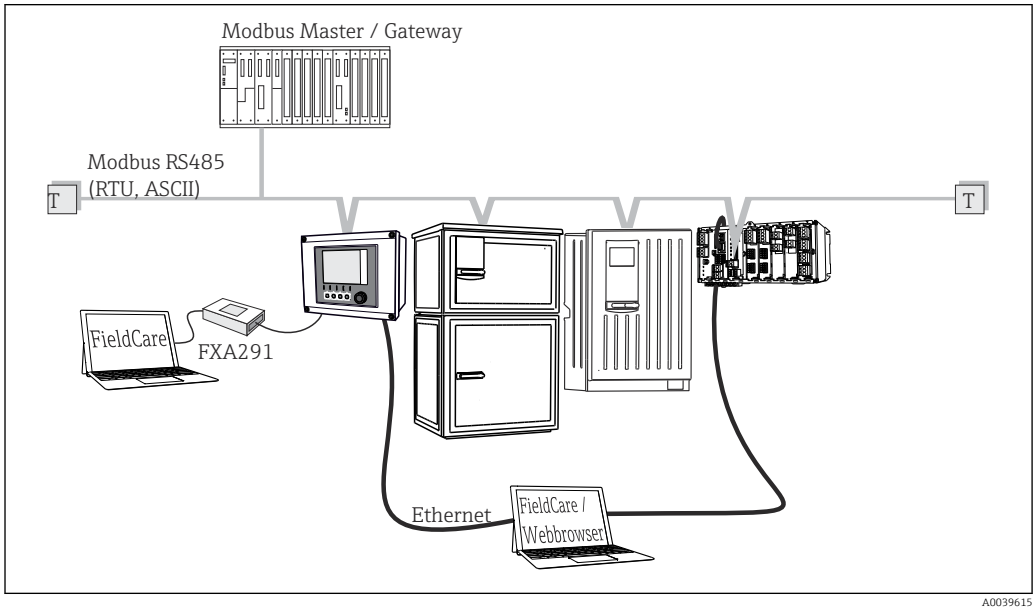
### Via PROFIBUS DP




*26 PROFIBUS DP*

*T Terminating resistor*

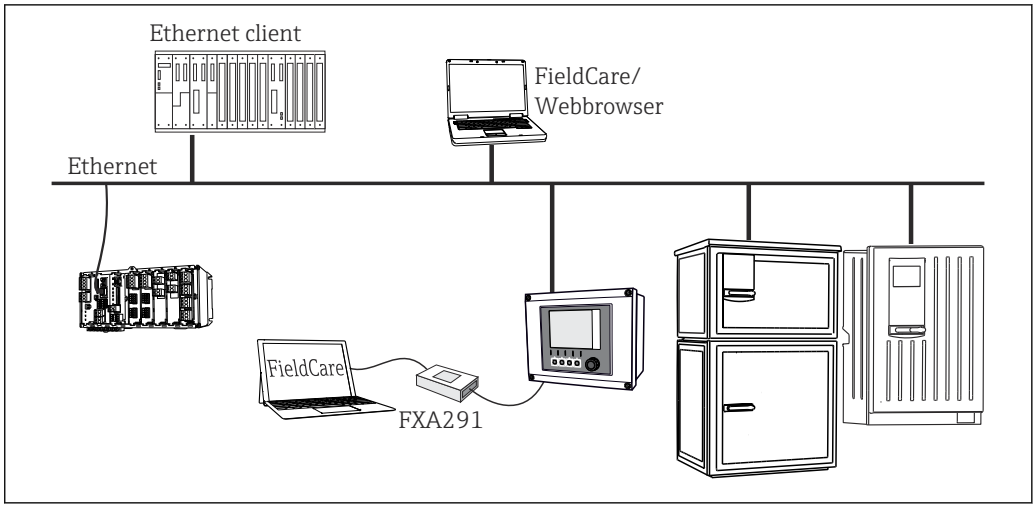
### Via Modbus RS485




*27 Modbus RS485*

*T Terminating resistor*

**Via Ethernet: web server/Modbus TCP/PROFINET/Ethernet/IP**




28 *Modbus TCP or EtherNet/IP or PROFINET*

**Language packages**

The language selected in the product structure is the operating language preset at the factory. All other languages can be selected using the menu.

- English (US)
- German
- Chinese (Simplified, PR China)
- Czech
- Dutch
- French
- Italian
- Japanese
- Polish
- Portuguese
- Russian
- Spanish
- Turkish
- Hungarian
- Croatian
- Vietnamese

The availability of other languages can be checked via the product structure at www.endress.com/ca80fe.

# Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

# Order information

**Product page**

www.endress.com/ca80fe

**Product Configurator**

1. **Configure**: Click this button on the product page.

2. Select **Extended selection**.
   ↳ The Configurator opens in a separate window.
3. Configure the device according to your requirements by selecting the desired option for each feature.
   ↳ In this way, you receive a valid and complete order code for the device.
4. **Accept**: Add the configured product to the shopping cart.

For many products, you also have the option of downloading CAD or 2D drawings of the selected product version.

5. **CAD**: Open this tab.
   ↳ The drawing window is displayed. You have a choice between different views. You can download these in selectable formats.

**Scope of delivery**

The scope of delivery comprises:
- 1 analyzer in the version ordered with optional hardware
- 1 x Brief Operating Instructions (hard copy)
- 1 x Maintenance Manual
- Optional accessories

# Accessories

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

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

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

**Device-specific accessories**

**Sample preparation**

**Liquiline System CAT810**
- Pressure pipe sampling and microfiltration
- Product Configurator: www.endress.com/cat810)

Technische Information Liquiline System CAT810, TI01138C

**Liquiline System CAT820**
- Sampling and membrane filtration
- Product Configurator: www.endress.com/cat820)

Technical Information Liquiline System CAT820, TI01131C

**Liquiline System CAT860**
- Sampling and membrane filtration
- Product Configurator: www.endress.com/cat860)

Technical Information Liquiline System CAT860, TI01137C

The Liquiline System CAT860 can only be operated with a Liquiline System CA80 single-channel device.

**Installation accessories**

Kit, post with bracket CA80, outd.
- Post 60 x 60 x 1800 mm, stainless steel 1.4571
- Post mount clamp CA80xx
- Kit installation instructions
- Order No. 71458285

### Consumables

1. https://portal.endress.com/webapp/SparePartFinder
2. Specify the serial number or product code.

The following consumables are available:
- Reagents and standard solutions CY80FE
- Cleaner CY820 (for hoses of sample preparation system and of sample collecting vessel)
- CAC880, inlet and outlet hoses for CA80

### Maintenance kit CAV800

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

**Standard**
- Dispensers, 2 x 2.5 ml and 4 x 10 ml, including mounted adapter
- Hoses
- Silicone grease, medium-viscosity, tube 2 g
- Plug
- Sealing caps
- Filter mats

**Optional**
- Inlet and outlet hoses
- Liquid Manager without motor
- Collecting vessel, beaker (2 pcs.)

### Upgrade kits CAZ800

Kit for upgrade with sample collecting vessel
- Sample collecting vessel with level monitoring, pre-fitted on mounting bracket
- Hoses, connection adapters
- Activation code
- Order No. CAZ800-MMA1

Kit for upgrade to two-channel device
- Valve for switching sample flow
- Two sample collecting vessels with level monitoring, pre-fitted on mounting bracket
- Hoses, connection adapters
- Activation code
- Order No. CAZ800-MMA2

Kit for upgrade for second, downstream analyzer [5)]
- Valve for switching sample flow
- Hoses, connection adapters
- Activation code
- Order No. CAZ800-MMM1

Kit for upgrading the dilution function
- Hose with identification marking
- Modified cable gland
- Activation code
- Order No. CAZ800-MMN5

### Sensors

*pH glass electrodes*

**Memosens CPS11E**
- pH sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps11e

Technical Information TI01493C

5) Not for analyzers operated with CAT860 and not for two-channel versions.

**Memosens CPS41E**
- pH sensor for process technology
- With ceramic junction and KCl liquid electrolyte
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps41e

Technical Information TI01495C

**Memosens CPS71E**
- pH sensor for chemical process applications
- With ion trap for poison-resistant reference
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps71e

Technical Information TI01496C

**Memosens CPS91E**
- pH sensor for heavily polluted media
- With open aperture
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps91e

Technical Information TI01497C

**Memosens CPS31E**
- pH sensor for standard applications in drinking water and swimming pool water
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps31e

Technical Information TI01574C

**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

**Memosens CPF81E**
- pH sensor for mining operations, industrial water and wastewater treatment
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cpf81e

Technical Information TI01594C

*ORP electrodes*

**Memosens CPS12E**
- ORP sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps12e

Technical Information TI01494C

**Memosens CPS42E**
- ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps42e

Technical Information TI01575C

**Memosens CPS72E**
- ORP sensor for chemical process applications
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps72e

Technical Information TI01576C

**Memosens CPS92E**
- ORP sensor for use in heavily polluted media
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps92e

Technical Information TI01577C

**Memosens CPF82E**
- ORP sensor for mining operations, industrial water and wastewater treatment
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cpf82e

Technical Information TI01595C

*Conductivity sensors with inductive measurement of conductivity*

**Indumax CLS50D**
- High-durability inductive conductivity sensor
- For standard and hazardous area applications
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cls50d

Technical Information TI00182C

*Conductivity sensors with conductive measurement of conductivity*

**Memosens CLS21E**
- Digital conductivity sensor for media with medium or high conductivity
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls21e

Technical Information TI01528C

*Oxygen sensors*

**Memosens COS51E**
- Amperometric oxygen sensor for water, wastewater and utilities
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cos51e

Technical Information TI01620C

**Memosens COS81E**
- Hygienic optical oxygen sensor with maximum measurement stability over multiple sterilization cycles
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cos81e

Technical Information TI01558C

**Memosens COS22E**
- Hygienic amperometric oxygen sensor with maximum measurement stability over multiple sterilization cycles
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cos22e

Technical Information TI01619C

*Chlorine dioxide and chlorine sensors*

**Memosens CCS50E**
- Membrane-covered amperometric sensor for chlorine dioxide
- With Memosens technology
- Product Configurator on the product page: www.endress.com/ccs50e

Technical Information TI01353C

**Memosens CCS51E**
- Sensor for measuring free available chlorine
- Product Configurator on the product page: www.endress.com/ccs51e

Technical Information TI01423C

*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

**Turbimax CUS52D**
- Hygienic Memosens sensor for turbidity measurement in drinking water, process water and in utilities
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cus52d

Technical Information TI01136C

*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**
- Immersion sensor for interface measurement
- Ultrasonic interface sensor
- Product Configurator on the product page: www.endress.com/cus71d

Technical Information TI00490C

**Cable junction with Velcro strip**
- 4 pieces, for sensor cable
- Order No. 71092051

## Communication-specific accessories

**Additional functionality**

▶ Always quote the serial number of your device when ordering activation codes.

| Order code | Communication; software |
|---|---|
| 51516983 | Commubox FXA291 (hardware) |
| 71127100 | SD card with Liquiline Firmware, 1 GB, Industrial Flash Drive |
| XPC0018 | Activation code for EtherNet/IP + web server |
| XPC0020 | Activation code for Modbus TCP + web server |
| XPC0021 | Activation code for web server for BASE2 |

| Order code | Communication; software |
|---|---|
| XPC0022 | Activation code for PROFINET + web server for BASE2 |
| XPC0024 | Activation code for Profibus DP for module 485 |
| XPC0025 | Activation code for Modbus RS485 for module 485 |
| 71249548 | Kit CA80: activation code for 1st digital sensor input |
| 71249555 | Kit CA80: activation code for 2nd digital sensor input |

| | Retrofit kits |
|---|---|
| 71136999 | Kit CSF48/CA80: retrofit service interface (CDI flange connector, counter nut) |
| 71111053 | Kit module AOR: 2 x relay, 2 x analog output 0/4 to 20 mA |
| 71125375 | Kit module 2R: 2 x relay |
| 71125376 | Kit module 4R: 4 x relay |
| 71135632 | Kit module 2AO: 2 x analog output 0/4 to 20 mA |
| 71135633 | Kit module 4AO: 4 x analog output 0/4 to 20 mA |
| 71135631 | Kit module 2DS: 2 x digital sensor, Memosens |
| 71135634 | Kit module 485: PROFIBUS DP or Modbus RS485. This requires an additional activation code which can be ordered separately. |
| 71135638 | Kit module DIO: 2 x digital input; 2 x digital output; auxiliary power supply for digital output |
| 71135639 | Kit module 2AI: 2 x analog input 0/4 to 20 mA |
| 71140888 | Upgrade kit module 485 + Profibus DP |
| 71140889 | Upgrade kit module 485 + Modbus RS485 |
| 71141366 | Kit, extension backplane module |

### Software

**Memobase Plus CYZ71D**
- PC software to support laboratory calibration
- Visualization and documentation of sensor management
- Sensor calibrations stored in database
- Product Configurator on the product page: www.endress.com/cyz71d

Technical Information TI00502C

**Field Data Manager Software MS20/21**
- PC software for central data management
- Visualization of series of measurements and logbook events
- SQL database for secure data storage

## System components

### Measuring cables

**Memosens data cable CYK10**
- For digital sensors with Memosens technology
- Product Configurator on the product page: www.endress.com/cyk10

Technical Information TI00118C

**Memosens data cable CYK11**
- Extension cable for digital sensors with Memosens protocol
- Product Configurator on the product page: www.endress.com/cyk11

Technical Information TI00118C

### SD card

- Industrial Flash Drive, 1 GB
- Order number: 71110815

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Endress+Hauser
People for Process Automation