

# Technical Information

## Liquiline System CA80COD

Analyzer for determining chemical oxygen demand (COD)



### Integrated controller with digital Memosens technology

#### Application

The Liquiline System CA80COD is a wet-chemical analyzer for the almost continuous determination of the chemical oxygen demand (COD) in liquid media.

The analyzer is designed for use in the following applications:

- Monitoring of the wastewater treatment plant inlet
- Control of municipal wastewater treatment
- Monitoring of industrial wastewater
- Control of industrial wastewater treatment

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

#### Your benefits

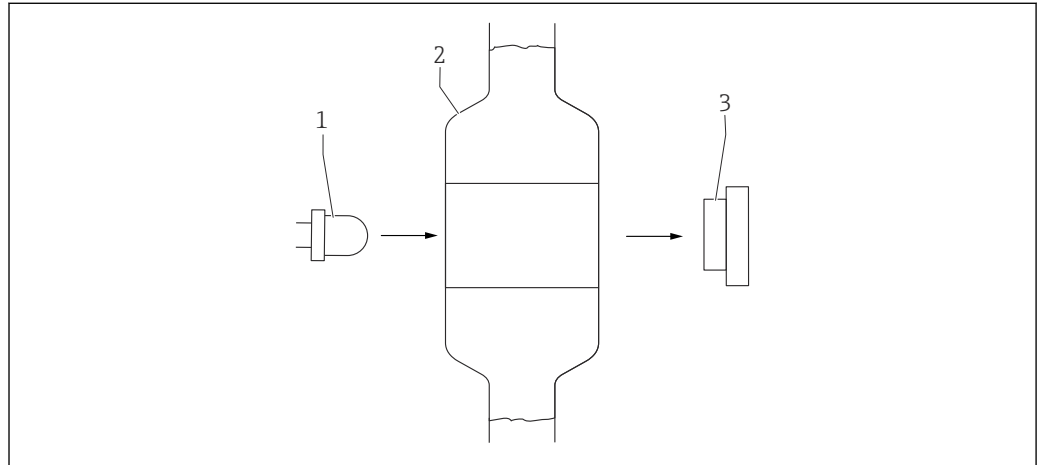
- Easy upgrade to measuring station by connecting up to 4 Memosens sensors
- High-precision dosing unit
- Automatic measuring range switching within 10 to 5000 mg/l O<sub>2</sub>
- Digital fieldbuses (e.g. PROFINET, PROFIBUS DP, Modbus TCP, Modbus RS485 and Ethernet IP) and web server

## Function and system design

### Measuring principle for chemical oxygen demand

As a sum parameter, the chemical oxygen demand, or COD, describes the amount of oxygen that is needed to fully oxidize all the oxidizable substances in a sample.

To determine the chemical oxygen demand, the chloride ions in the sample must first be removed as they would interfere with the measurement result. This is done by adding mercuric sulfate. Once the chloride ions have been removed, the sample is digested at a temperature of 175 °C by adding sulfuric acid, silver sulfate and potassium dichromate. Silver sulfate acts as the catalyst here. The high temperature and potassium dichromate - a very strong oxidizing agent - ensure that the sample is digested quickly and completely. The digestion time required can be additionally shortened by the pressure reactor of the CA80COD.



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1 Measuring cell

1 LED unit (for measurement/reference)

2 Photometer cuvette - mixing and reaction vessel

3 Detector (for measurement/reference)

The oxidizing agent itself is reduced from  $\text{Cr}^{6+}$  to  $\text{Cr}^{3+}$  during the chemical reaction. This is associated with the color of the solution changing from orange to green. The reduction of the chromate and the color change are directly proportional to the concentration of oxidizable substances in the sample. The optical quantification of the reduced chromate amount can therefore be used as an indicator of the chemical oxygen demand of 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.

20 000 mg/l (ppm)

$(\text{NH}_4)_2\text{SO}_4$

5000 mg/l (ppm)

NaCl

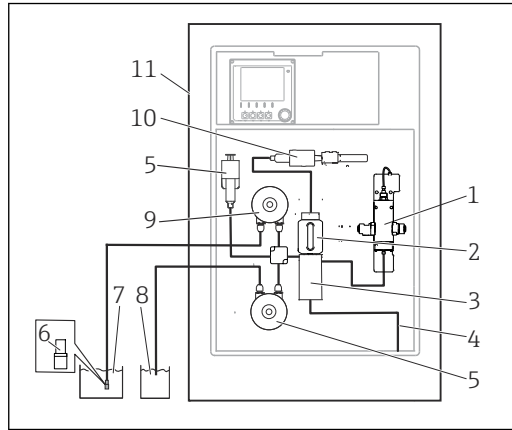
### Oxidizable substances

The substances oxidized by the COD method are primarily organic carbon compounds. Alongside this some inorganic compounds, such as iodide and nitrite, are also oxidized.

### Measuring system

A complete measuring system comprises:

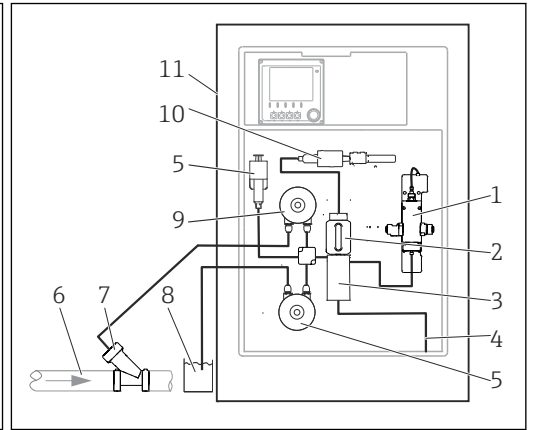
- Analyzer Liquiline System CA80COD with the configuration ordered
- Reagents and standard solutions (to be ordered separately)
- Suction strainer or optional Y strainer with process connection



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2 Measuring system with Liquiline System CA80COD and suction strainer

- 1 Pressure reactor
- 2 Dosing unit
- 3 Valve manifold
- 4 Outlet
- 5 Dilution module (optional)
- 6 Suction strainer
- 7 Medium
- 8 Water for optional dilution module
- 9 Peristaltic pump
- 10 Dispenser
- 11 Liquiline System CA80COD



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3 Measuring system with Liquiline System CA80COD and Y strainer

- 1 Pressure reactor
- 2 Dosing unit
- 3 Valve manifold
- 4 Outlet
- 5 Dilution module (optional)
- 6 Medium
- 7 Y strainer (optional)
- 8 Water for optional dilution module
- 9 Peristaltic pump
- 10 Dispenser
- 11 Liquiline System CA80COD

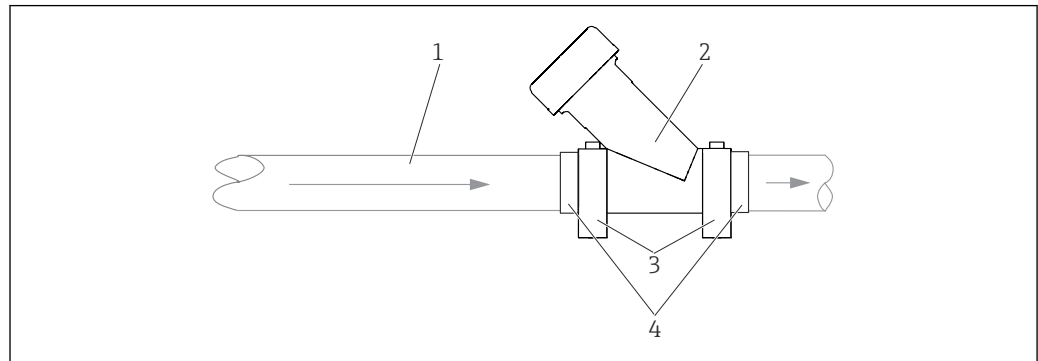
**Customer-specific solution**

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

**i** 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.

**Y strainer (optional)**

With the Y strainer it is possible to directly take samples containing particles from the pipes. It is therefore also suitable for the COD analysis procedure where particles up to a certain size must also be included in the analysis.

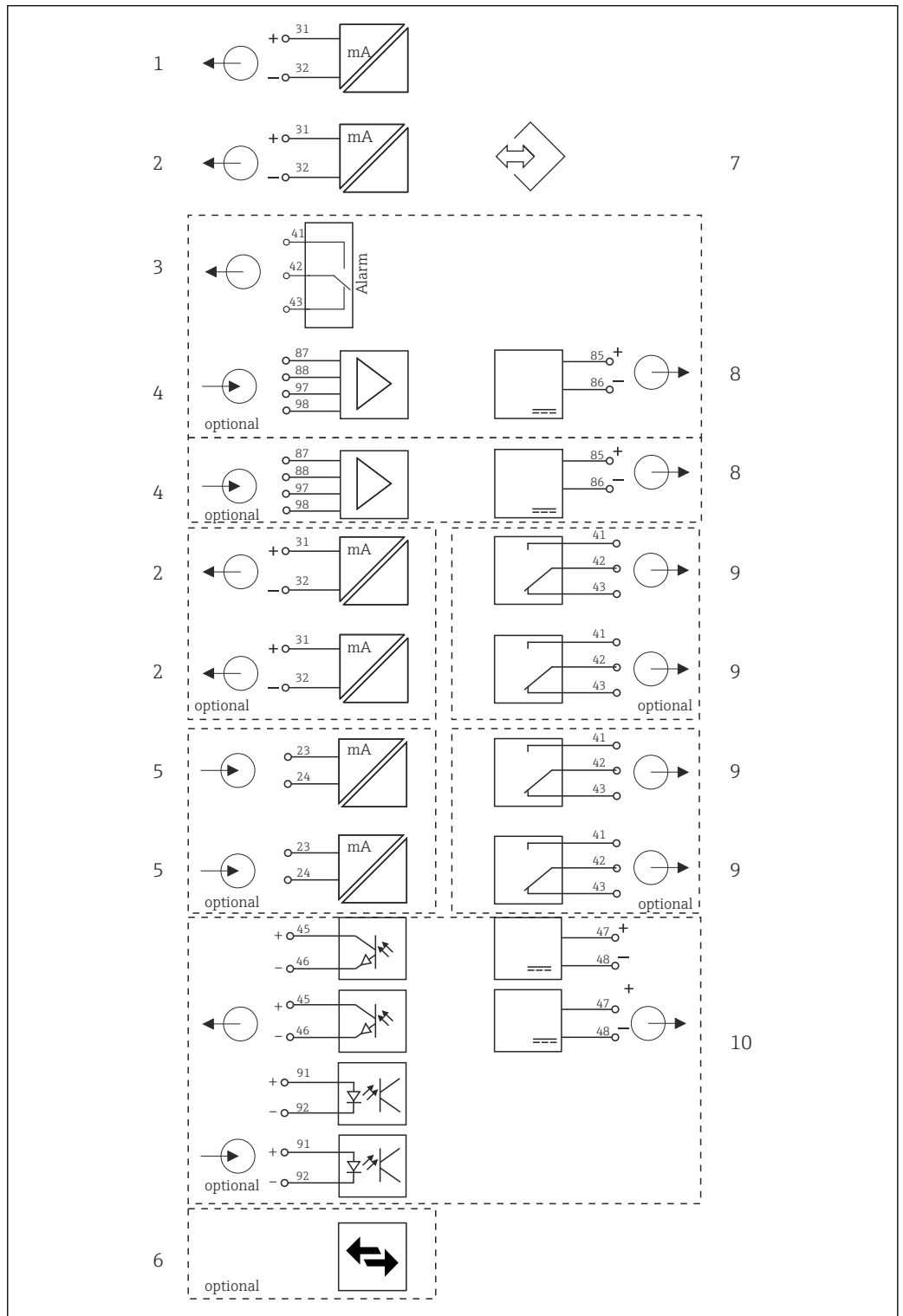


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- 1 Medium
- 2 Y strainer
- 3 Pipe clamps
- 4 Adhesive fittings ID 40 mm, straight

## Device architecture

### Function diagram



4 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

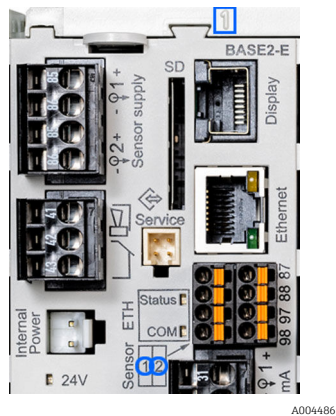
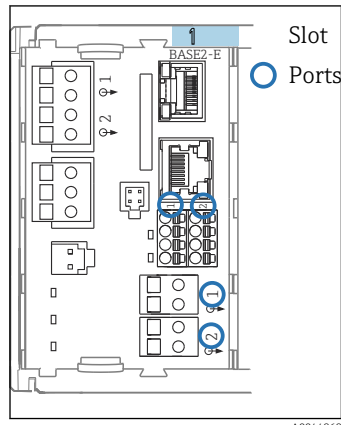
8 Power supply, fixed cable sensors

9 2 or 4 x relays (optional)

10 2 digital inputs and outputs (optional)

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## Slot and port assignment



Analyzer_C8024A05600	
▶ Heartbeat diagnostics	
SP1 Analyzer*	Slot Port
CH1: 1:1 pH Glass	ATC 6.95 pH
CH2: 1:2 Cond e	ATC 131.1 µS/cm
Current output 1:1	22.5 mA
Current output 1:2	22.5 mA
Current output 4:1	22.5 mA
Current output 4:2	22.5 mA

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5 Slot and port assignment

6 Slot and port assignment

7 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

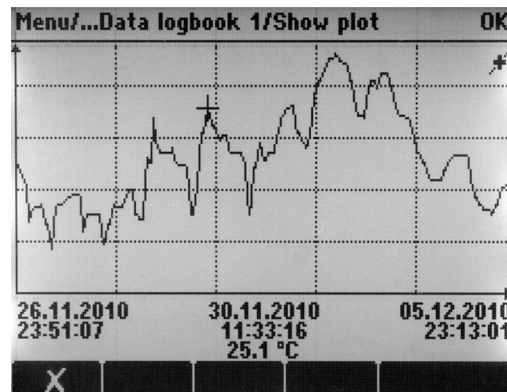
**Ease of maintenance****Modular design**


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 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



 8 Data logbook: graphic representation on the display

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**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**

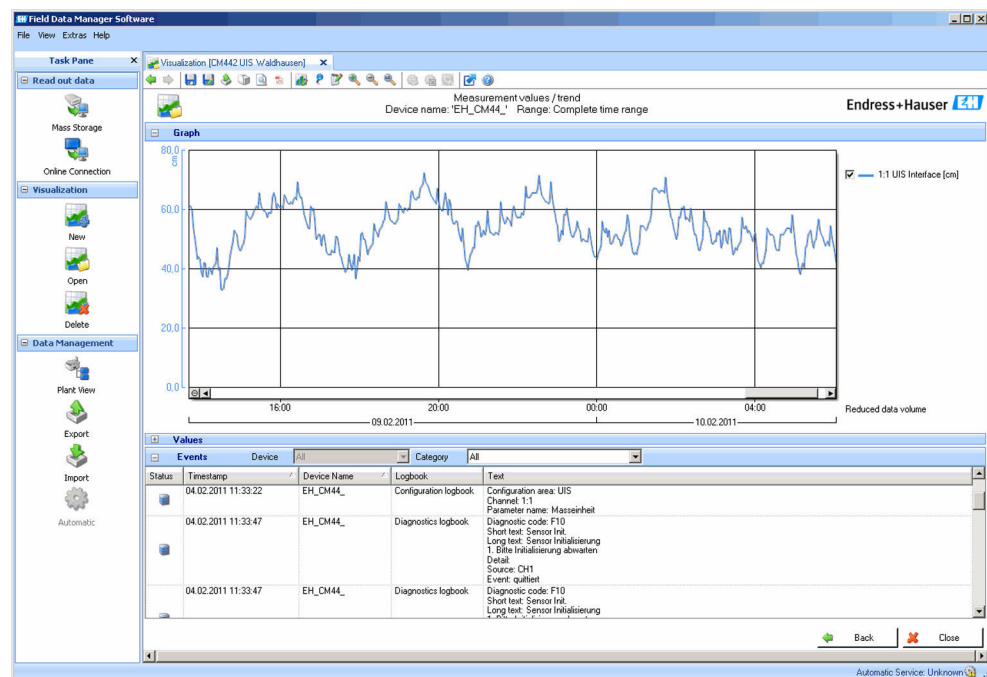
Configuration and asset management software based on FDT/DTM technology

- 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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9 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.



<b>Self-monitoring functions</b>	<p><b>Electronics</b></p> <ul style="list-style-type: none"> <li>▪ Current inputs are deactivated in the event of overcurrent and reactivated once the overcurrent stops.</li> <li>▪ Board voltages are monitored and the board temperature is also measured.</li> </ul> <p><b>Counter</b></p> <ul style="list-style-type: none"> <li>▪ Counters monitor consumables such as reagents, pump and valve hoses or dispensers.</li> <li>▪ Waste volume</li> </ul> <p><b>Photometer</b></p> <ul style="list-style-type: none"> <li>▪ Automatic temperature monitoring</li> <li>▪ Active monitoring of communication between the photometer module and the analyzer electronics</li> </ul> <p>Leak sensor in the housing</p>
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<b>Data security</b>	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.
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<b>IT security</b>	<p>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.</p> <p>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.</p>
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## Input

<b>Measured variables</b>	CSB <sub>cr</sub> O <sub>2</sub> [mg/l, ppm]						
<b>Measuring range</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">CA80COD-**C4:</td> <td style="border: none;">0 to 500 mg/l O<sub>2</sub>, automatic measuring range switching</td> </tr> <tr> <td style="border: none;">CA80COD-**C5:</td> <td style="border: none;">0 to 5000 mg/l O<sub>2</sub>, automatic measuring range switching</td> </tr> <tr> <td style="border: none;">CA80COD-**C6:</td> <td style="border: none;">0 to 5000 mg/l O<sub>2</sub> + dilution module (1:4)</td> </tr> </table>	CA80COD-**C4:	0 to 500 mg/l O <sub>2</sub> , automatic measuring range switching	CA80COD-**C5:	0 to 5000 mg/l O <sub>2</sub> , automatic measuring range switching	CA80COD-**C6:	0 to 5000 mg/l O <sub>2</sub> + dilution module (1:4)
CA80COD-**C4:	0 to 500 mg/l O <sub>2</sub> , automatic measuring range switching						
CA80COD-**C5:	0 to 5000 mg/l O <sub>2</sub> , automatic measuring range switching						
CA80COD-**C6:	0 to 5000 mg/l O <sub>2</sub> + dilution module (1:4)						
<b>Types of input</b>	<ul style="list-style-type: none"> <li>▪ 1 measuring channel (analyzer main parameter)</li> <li>▪ 1 to 4 digital sensor inputs for sensors with Memosens protocol (optional)</li> <li>▪ Analog current inputs (optional)</li> <li>▪ Binary inputs (optional)</li> </ul>						
<b>Input signal</b>	<p>Depending on version</p> <p>2 x 0/4 to 20 mA (optional), passive, potentially isolated</p>						
<b>Current input, passive</b>	<p><b>Span</b></p> <p>&gt; 0 to 20 mA</p> <p><b>Signal characteristic</b></p> <p>Linear</p> <p><b>Internal resistance</b></p> <p>Non-linear</p> <p><b>Test voltage</b></p> <p>500 V</p>						
<b>Cable specification (for optional sensors with Memosens technology)</b>	<p><b>Cable type</b></p> <p>Memosens data cable CYK10 or sensor fixed cable, each with cable end sleeves or M12 round-pin connector (optional)</p> <p><b>Cable length</b></p> <p>Max. 100 m (330 ft)</p>						

## 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)

<b>Signal on alarm</b>	Adjustable, as per NAMUR Recommendation NE 43 <ul style="list-style-type: none"> <li>■ In measuring range 0 to 20 mA: Failure current from 0 to 23 mA</li> <li>■ In measuring range 4 to 20 mA: Failure current from 2.4 to 23 mA</li> <li>■ Factory setting for failure current for both measuring ranges: 21.5 mA</li> </ul>
<b>Load</b>	Max. 500 Ω
<b>Transmission behavior</b>	Linear

## Current outputs, active

<b>Span</b>	0 to 23 mA
<b>Signal characteristic</b>	Linear
<b>Electrical specification</b>	<b>Output voltage</b> Max. 24 V  <b>Test voltage</b> 500 V

<b>Cable specification</b>	<b>Cable type</b> Recommended: shielded cable  <b>Cable specification</b> Max. 2.5 mm <sup>2</sup> (14 AWG)
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## Relay outputs

<b>Electrical specification</b>	<b>Relay types</b> <ul style="list-style-type: none"> <li>■ 1 single-pin changeover contact (alarm relay)</li> <li>■ 2 or 4 single-pin changeover contacts (optional with extension modules)</li> </ul> <b>Maximum load</b> <ul style="list-style-type: none"> <li>■ Alarm relay: 0.5 A</li> <li>■ All other relays: 2.0 A</li> </ul> <b>Relay switching capacity</b>
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*Base module (Alarm relay)*

Switching voltage	Load (max.)	Switching cycles (min.)
230 V AC, $\cos\Phi = 0.8$ to 1	0.1 A	700,000
	0.5 A	450,000
115 V AC, $\cos\Phi = 0.8$ 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, $\cos\Phi = 0.8$ to 1	0.1 A	700,000
	0.5 A	450,000
	2 A	120,000
115 V AC, $\cos\Phi = 0.8$ 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 <sub>h</sub>
Device type	155E <sub>h</sub>
Profile version	3.02
Device database files (GSD files)	<a href="http://www.endress.com/profibus">www.endress.com/profibus</a> Device Integration Manager DIM
Output variables	16 AI blocks, 8 DI blocks
Input variables	4 AO blocks, 8 DO blocks
Supported features	<ul style="list-style-type: none"> <li>▪ 1 MSCYO connection (cyclical communication, master class 1 to slave)</li> <li>▪ 1 MSAC1 connection (acyclical communication, master class 1 to slave)</li> <li>▪ 2 MSAC2 connections (acyclical communication, master class 2 to slave)</li> <li>▪ Device lock: The device can be locked using the hardware or software.</li> <li>▪ Addressing using DIL switches or software</li> <li>▪ GSD, PDM DD, DTM</li> </ul>

**Modbus RS485**

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

**Modbus TCP**

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

**Web server**

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

TCP port	80
Supported features	<ul style="list-style-type: none"> <li>▪ Remote-controlled device configuration(1 session)</li> <li>▪ Save/restore device configuration (via SD card)</li> <li>▪ Logbook export (file formats: CSV, FDM)</li> <li>▪ Access to web server via DTM or Internet Explorer</li> <li>▪ Login</li> <li>▪ Web server can be switched off</li> </ul>

**EtherNet/IP**

Log	EtherNet/IP	
ODVA certification	Yes	
Device profile	Generic device (product type: 0x2B)	
Manufacturer ID	0x049E <sub>h</sub>	
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 Measured values: <ul style="list-style-type: none"> <li>▪ 16 AI (analog input) + Status + Unit</li> <li>▪ 8 DI (discrete input) + Status</li> </ul>
	Output (O → T)	Actuating values: <ul style="list-style-type: none"> <li>▪ 4 AO (analog output) + status + unit</li> <li>▪ 8 DO (discrete output) + Status</li> </ul>

**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 Generic device
PROFINET interface	1 port, Realtime Class 1 (RT_CLASS_1)
Manufacturer ID	0x11 <sub>h</sub>
Device type ID	0x859F <sub>h</sub>
Device description files (GSD)	Information and files under: <ul style="list-style-type: none"> <li>▪ <a href="http://www.endress.com">www.endress.com</a> On the product page for the device: Documents/Software → Device drivers</li> <li>▪ <a href="http://www.profibus.com">www.profibus.com</a> On the website under Products/Product Finder</li> </ul>
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs
Supported connections	<ul style="list-style-type: none"> <li>▪ 1 x AR (IO Controller AR)</li> <li>▪ 1 x AR (IO-Supervisor Device AR connection allowed)</li> <li>▪ 1 x Input CR (Communication Relation)</li> <li>▪ 1 x Output CR (Communication Relation)</li> <li>▪ 1 x Alarm CR (Communication Relation)</li> </ul>
Configuration options for measuring device	<ul style="list-style-type: none"> <li>▪ Web browser</li> <li>▪ Manufacturer-specific software (FieldCare, DeviceCare)</li> <li>▪ Device master file (GSD), can be read out via the integrated web server of the measuring device</li> </ul>
Configuration of the device name	DCP protocol
Supported functions	<ul style="list-style-type: none"> <li>▪ Identification &amp; maintenance Simple device identification via: <ul style="list-style-type: none"> <li>▪ Process control system</li> <li>▪ Nameplate</li> </ul> </li> <li>▪ Measured value status The process variables are communicated with a measured value status</li> <li>▪ Blinking feature (FLASH_ONCE) via the local display for simple device identification and assignment</li> <li>▪ Device operation via operating tools (e.g. FieldCare, DeviceCare)</li> </ul>
System integration	For information on system integration, see the Operating Instructions <ul style="list-style-type: none"> <li>▪ Cyclic data transmission</li> <li>▪ Overview and description of the modules</li> <li>▪ Status coding</li> <li>▪ Startup configuration</li> <li>▪ Factory setting</li> </ul>

**Power supply**


**Supply voltage**                   ▪ 100 to 120 V AC / 200 to 240 V AC  
  ▪ 50 or 60 Hz

**Fieldbus connection**           Supply voltage: not applicable

<b>Power consumption</b>	<p><b>All versions except "Outdoor" version</b></p> <p>250 VA</p> <p><b>"Outdoor" version</b></p> <p>250 VA + 650 VA per hose heater, max. 900 VA (version with cooling) <sup>1)</sup></p>
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<b>Cable entries</b>	<ul style="list-style-type: none"> <li>■ 4 x bores for M16, G3/8, NPT3/8", Memosens connection <sup>2)</sup></li> <li>■ 4 x bores for M20, G1/2, NPT1/2"</li> </ul>
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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 <sup>3</sup> / <sub>8</sub> "	4 to 8 mm (0.16 to 0.32")
	G <sup>3</sup> / <sub>8</sub>	4 to 8 mm (0.16 to 0.32")
	NPT <sup>1</sup> / <sub>2</sub> "	6 to 12 mm (0.24 to 0.48")
	G <sup>1</sup> / <sub>2</sub>	7 to 12 mm (0.28 to 0.48")

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


**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

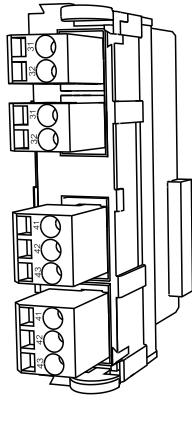
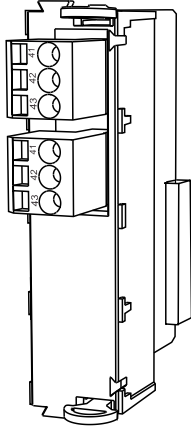
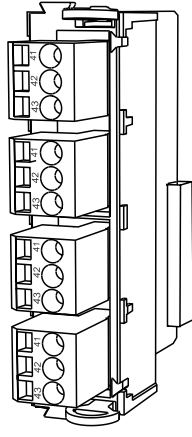
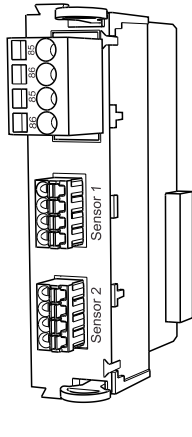
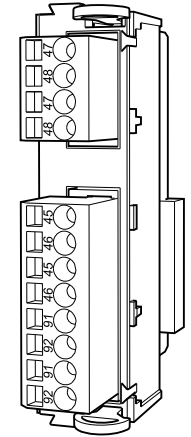
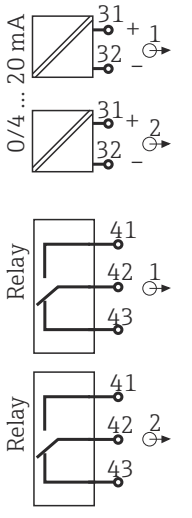
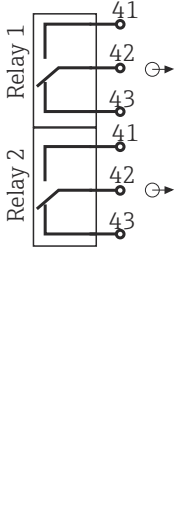
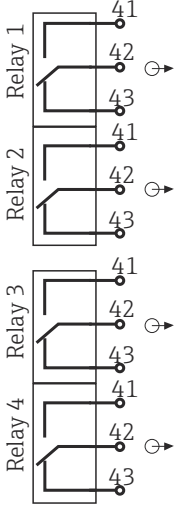
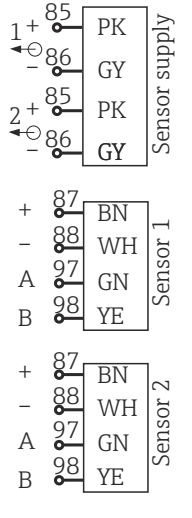
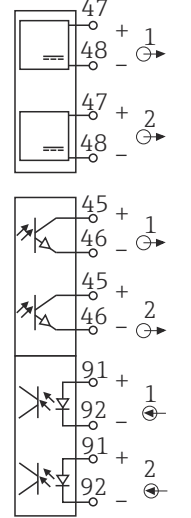
- ▶ Find out if the planned upgrade of your device results in a permitted hardware combination (configurator on [www.endress.com/CA80COD](http://www.endress.com/CA80COD)).
- ▶ A maximum of eight current inputs and current outputs is permitted.
- ▶ A maximum of two "DIO" modules is permitted.
- ▶ Please 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
				
<ul style="list-style-type: none"> <li>2 x 0/4 to 20 mA analog outputs</li> <li>2 relays</li> <li>Order No. 71111053</li> </ul>	<ul style="list-style-type: none"> <li>2 relays</li> <li>Order No. 71125375</li> </ul>	<ul style="list-style-type: none"> <li>4 relays</li> <li>Order No. 71125376</li> </ul>	<ul style="list-style-type: none"> <li>2 digital sensor inputs</li> <li>2 power supply systems for digital sensors</li> <li>Order No. 71135631</li> </ul>	<ul style="list-style-type: none"> <li>2 digital inputs</li> <li>2 digital outputs with auxiliary voltage</li> <li>Order No. 71135638</li> </ul>
				



Module name				
2AO	4AO	2AI	485DP	485MB
<ul style="list-style-type: none"> <li>2 x 0/4 to 20 mA analog outputs</li> <li>Order No. 71135632</li> </ul>	<ul style="list-style-type: none"> <li>4 x 0/4 to 20 mA analog outputs</li> <li>Order No. 71135633</li> </ul>	<ul style="list-style-type: none"> <li>2 x 0/4 to 20mA analog inputs</li> <li>Order No. 71135639</li> </ul>	<ul style="list-style-type: none"> <li>5V power supply for PROFIBUS DP termination</li> <li>RS485 for PROFIBUS DP</li> <li>Order No. 71575177</li> </ul>	<ul style="list-style-type: none"> <li>RS485 for Modbus</li> <li>Order No. 71575178</li> </ul>



**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 <b>without</b> additional internal power supply	With plug-in connection and inductive signal transmission	<ul style="list-style-type: none"> <li>▪ pH sensors</li> <li>▪ ORP sensors</li> <li>▪ Combined sensors</li> <li>▪ Oxygen sensors (amperometric and optical)</li> <li>▪ Conductivity sensors with conductive measurement of conductivity</li> <li>▪ Chlorine sensors (disinfection)</li> </ul>
	Fixed cable	Conductivity sensors with inductive measurement of conductivity
Digital sensors with additional internal power supply	Fixed cable	<ul style="list-style-type: none"> <li>▪ Turbidity sensors</li> <li>▪ Sensors for interface measurement</li> <li>▪ Sensors for measuring the spectral absorption coefficient (SAC)</li> <li>▪ Nitrate sensors</li> <li>▪ Optical oxygen sensors</li> <li>▪ Ion-sensitive sensors</li> </ul>

## Performance characteristics

<b>Maximum measured error</b> <sup>3)</sup>	<i>According to potassium hydrogen phthalate test</i>	
	0 to 30 mg/l (ppm)	1.5 mg/l (ppm) <sup>1)</sup>
	> 30 to 50 mg/l (ppm)	3 mg/l (ppm) <sup>1)</sup>
	> 50 to 100 mg/l (ppm)	6 mg/l (ppm) <sup>2)</sup>
	> 100 to 200 mg/l (ppm)	8 mg/l (ppm) <sup>2)</sup>
	> 200 to 400 mg/l (ppm)	4% of reading
	> 400 to 5000 mg/l (ppm)	3% of reading
	1) Calibrated at 50 mg/l (ppm)	
	2) Calibrated at 500 mg/l (ppm)	

<b>Maximum measurement error for sensor inputs</b>	→ Documentation of the connected sensor
--	---

<b>Maximum measurement error for current inputs and outputs</b>	<p>Typical measured errors:</p> <p>&lt; 20 µA (with current values &lt; 4 mA)</p> <p>&lt; 50 µA (with current values 4 to 20 mA)</p> <p>at 25 °C (77° F) in each case</p> <p>Additional measured error depending on the temperature:</p> <p>&lt; 1.5 µA/K</p>
---	---

<b>LOQ (limit of quantification)</b>	15 mg/l (ppm) O <sub>2</sub>
--------------------------------------	------------------------------

<b>Repeatability</b> <sup>3)</sup>	± 5 % of measured value
------------------------------------	-------------------------

<b>Repeatability of sensor inputs</b>	→ Documentation of the connected sensor
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<b>Measuring interval</b>	Continuous (approx. 55 min), adjustable 30 min to 24 h
---------------------------	--

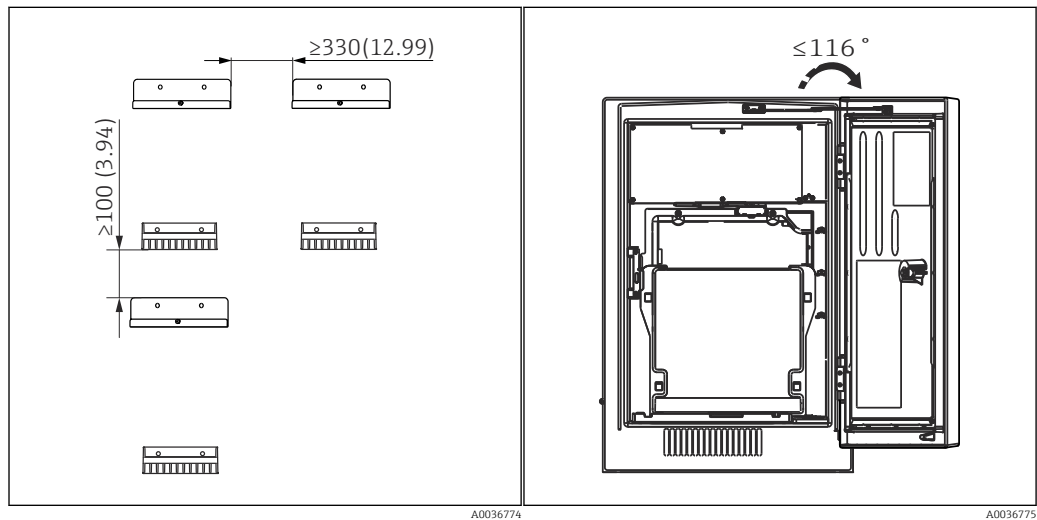
3) Measured with CA80COD-AAxxxx according to HJ 377-2019. Measurement errors include all the uncertainties of the analyzer. They do not include the uncertainties from the standard solutions used as a reference.

<b>Digestion time</b>	3 to 120 min
<b>Sample requirement</b>	8 ml (0.27 fl oz)/measurement
<b>Reagent requirement</b>	Given a measuring interval of 1 hour, one set of reagents lasts for 50 days
<b>Standard requirement</b>	<ul style="list-style-type: none"> <li>▪ Zero standard: given a calibration interval of 48 h, a cleaning interval of 24 h and a sample hose length of 3 m (9.84 ft) approx. 500 ml (16.9 fl.oz) per month (without dilution module)</li> <li>▪ Standard 1: given a calibration interval of 48 h approx. 90 ml (3.04 fl.oz) per month (without dilution module)</li> </ul>
<b>Dilution water requirement</b>	<p>Approx. 20 ml (0.68 fl.oz) per measurement</p> <p>Demineralized water is recommended for expected sample concentrations of &lt; 50 mg/l (ppm).</p>
<b>Calibration interval</b>	1 h to 90 days, depending on the application and ambient conditions
<b>Maintenance interval</b>	Once weekly, depending on the application
<b>Maintenance effort</b>	<ul style="list-style-type: none"> <li>▪ Weekly: visual inspection</li> <li>▪ Monthly: 1 hour</li> </ul>

## Mounting

<b>Mounting location</b>	<p>Note the following when erecting the device:</p> <ul style="list-style-type: none"> <li>▶ If mounting on a wall, make sure that the wall has sufficient load-bearing capacity and is fully perpendicular.</li> <li>▶ If mounting on a base, set up the device on a level surface. Installing on a base is only permitted indoors.</li> <li>▶ Protect the device against additional heating (e.g. from heaters).</li> <li>▶ Protect the device against mechanical vibrations.</li> <li>▶ Protect the device against corrosive gases, e.g. hydrogen sulfide (H<sub>2</sub>S) .</li> <li>▶ Make sure to pay attention to the maximum height difference and the maximum distance from the sampling point.</li> <li>▶ Ensure that the unit can drain freely, without any siphoning effects.</li> <li>▶ Make sure air can circulate freely at the front of the housing.</li> <li>▶ 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.</li> <li>▶ "Outdoor" version only: Post mounting is recommended for outdoor installation.</li> </ul>
<b>Installation instructions</b>	<p>The device can be installed in the following ways:</p> <ul style="list-style-type: none"> <li>▪ Mounted on a wall</li> <li>▪ Mounted on a base</li> <li>▪ Post mounting / on a post (accessory)</li> </ul>

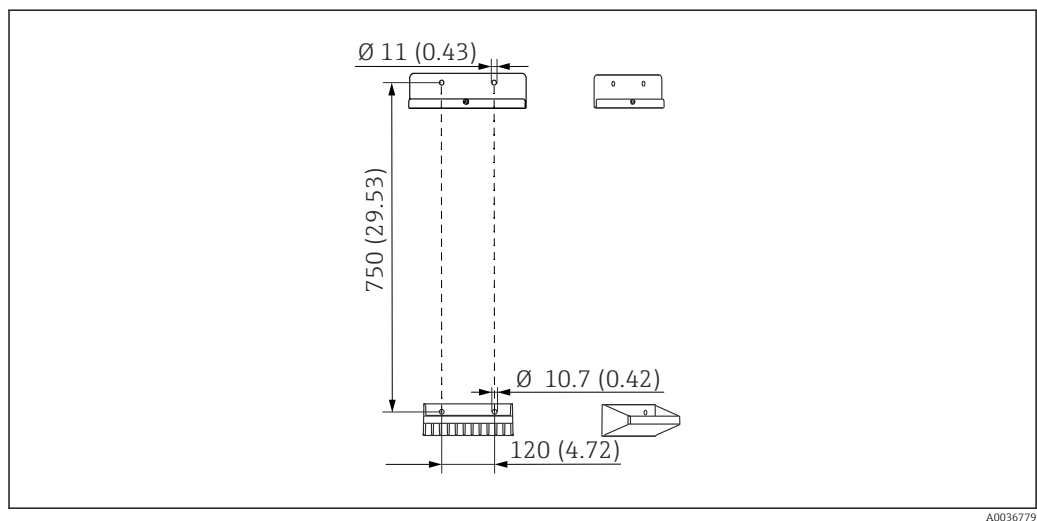
Spacing required for installing analyzer



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

11 Maximum opening angle

Spacing required for installing wall-mount version



12 Holder unit dimensions. Engineering unit mm (in)

## Environment

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

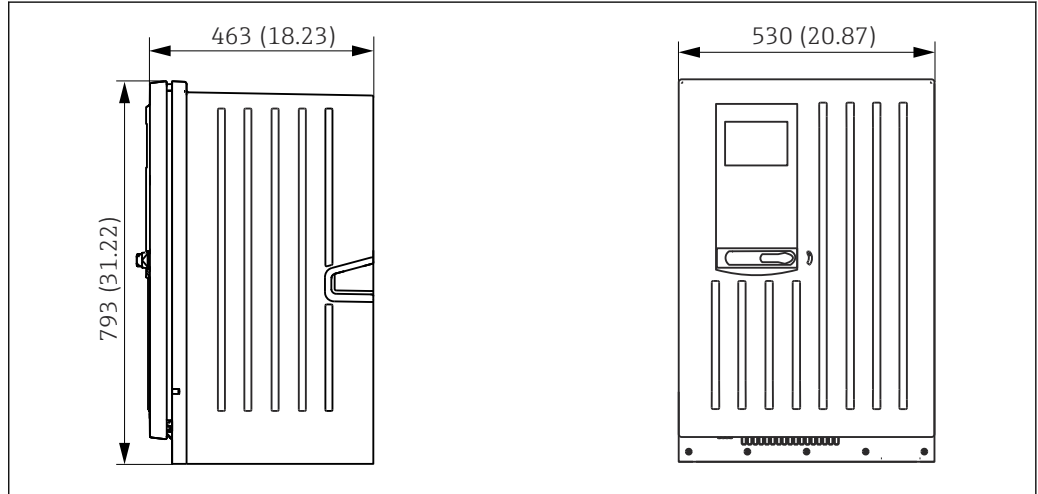
<b>Electromagnetic compatibility</b> <sup>4)</sup>	Interference emission and interference immunity as per EN 61326-1, class A for industrial areas
<b>Electrical safety</b>	According to EN/IEC 61010-1:2010, Class I equipment Low voltage: overvoltage category II For installations up to 2000 m (6500 ft)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

## Process

<b>Sample temperature</b>	4 to 40 °C (39 to 104 °F)
<b>Consistency of the sample</b>	Low solids content, aqueous, homogenized
<b>Sample supply</b>	<p><b>Analyzer (without optional Y strainer):</b> Unpressurized</p> <p><b>Y strainer (optional):</b></p> <ul style="list-style-type: none"> <li>■ Permitted pressure range: max. 4 bar (58.01 psi)</li> <li>■ Flow: ensure sufficient flow for a Y strainer that is completely filled<sup>5)</sup></li> </ul>

## Mechanical construction

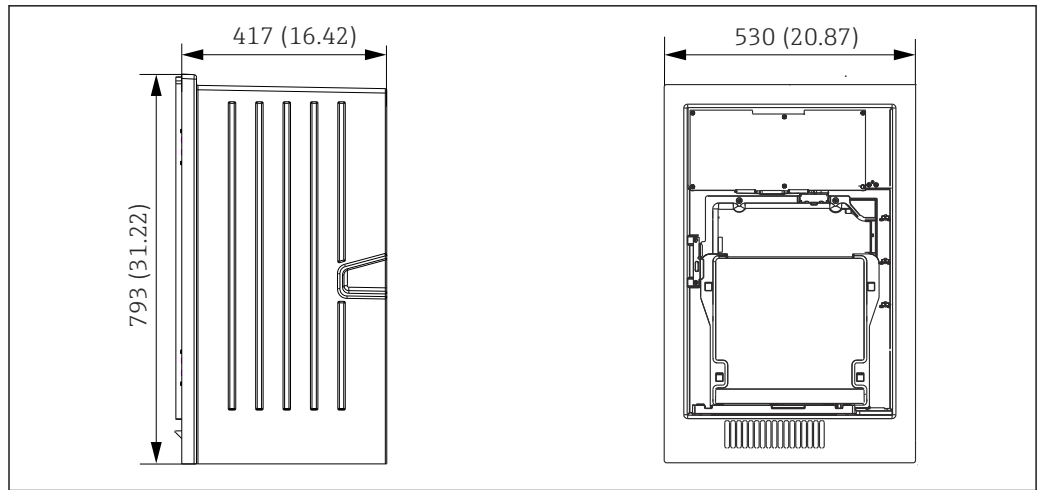
### Dimensions



13 Liquiline System CA80 closed version, dimensions in mm (in)

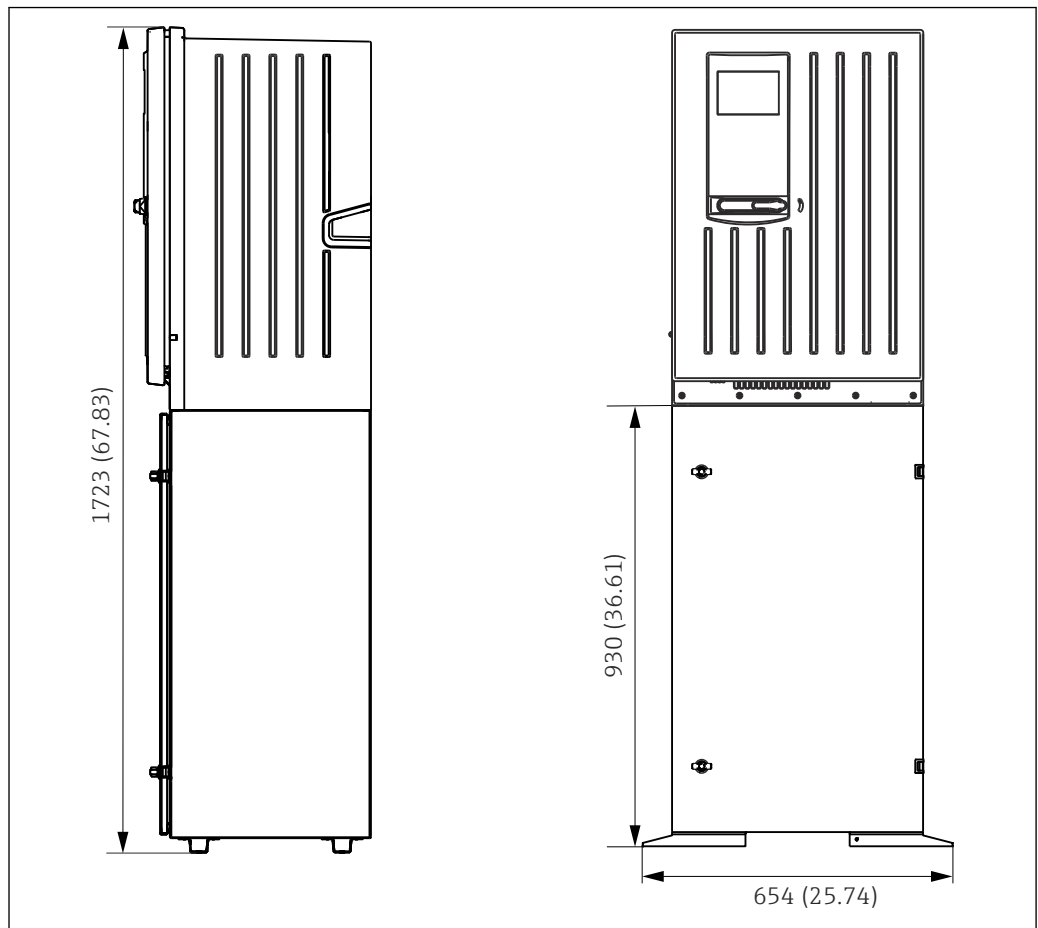
A0028820

4) Sufficient mains quality is required to operate the product as intended.  
5) The greater the flow the greater the self-cleaning effect of the suction line. Preferred: > 1 m<sup>3</sup>/h



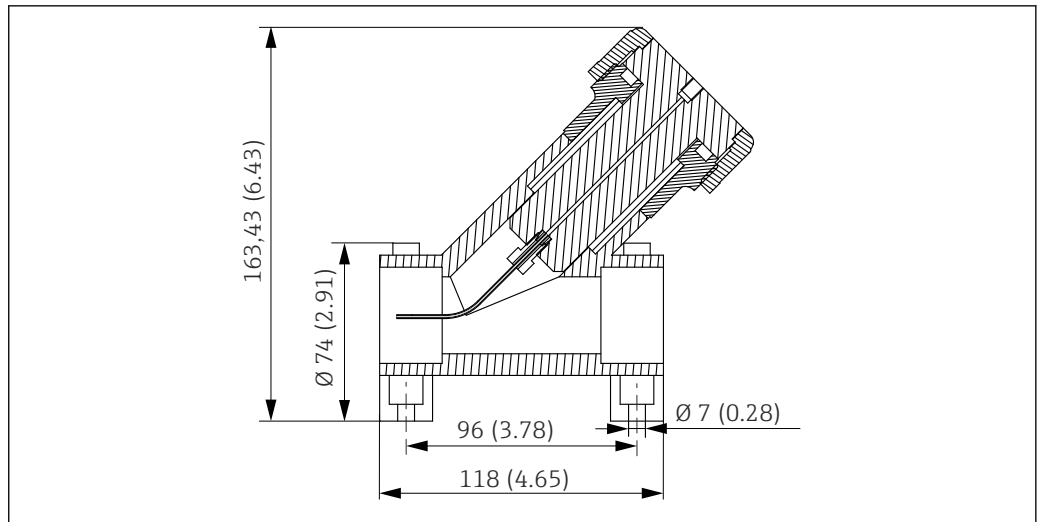
A0030419

14 Liquiline System CA80 open version, dimensions in mm (in)



A0028821

15 Liquiline System CA80 with base, dimensions in mm (in)



16 Y strainer (optional), dimensions in mm (inch)

**Weight** Approx. 40 kg (88 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	PP
Piston seal	TPE
Dosing unit	<ul style="list-style-type: none"> <li>▪ ETFE</li> <li>▪ FKM</li> <li>▪ Borosilicate glass</li> </ul>
<ul style="list-style-type: none"> <li>▪ Valve manifold</li> <li>▪ Valve seals</li> <li>▪ Optical tube</li> </ul>	
Hoses	
Reactor	<ul style="list-style-type: none"> <li>▪ PVDF</li> <li>▪ Borosilicate glass</li> <li>▪ FFKM</li> </ul>
<ul style="list-style-type: none"> <li>▪ Reactor valves</li> <li>▪ Optical tube</li> <li>▪ Seal</li> </ul>	
Dilution vessel (optional)	
Y strainer	PVC-U

**Process connection**

Sample inlet:	Hose gland for rigid hoses with OD 3.2 mm	
Dilution water:	Hose gland for rigid hoses with OD 3.2 mm	
Outlet:	Hose gland for rigid hoses with OD 6 mm	

**Hose entries** 4 x bores for M32 for sample inflow and outflow

**Hose specification**

**Analyzer:**

- Clearance: max. 5.0 m (16.4 ft)
- Height: max. 3 m (9.8 ft)
- Hose ID: 1.6 mm ( $1/16$  in)

**Y strainer (optional):**

- Hose to analyzer:
  - ID 1.6 mm ( $1/16$  in)
  - OD 3.2 mm ( $1/8$  in)
- Hose to process:
  - ID 0.8 mm ( $1/32$  in)
  - OD 1.6 mm ( $1/16$  in)

**Process connection, optional Y strainer** Adhesive fitting, ID 40 mm, straight

## 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



Fig. 17 Easy operation

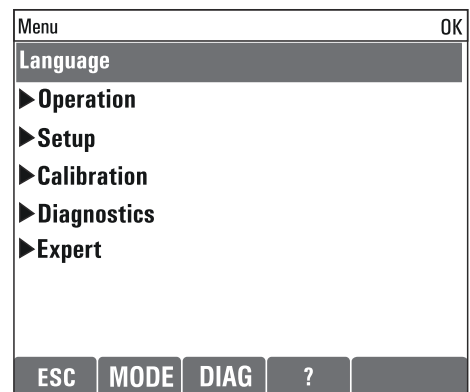


Fig. 18 Plain-text menu

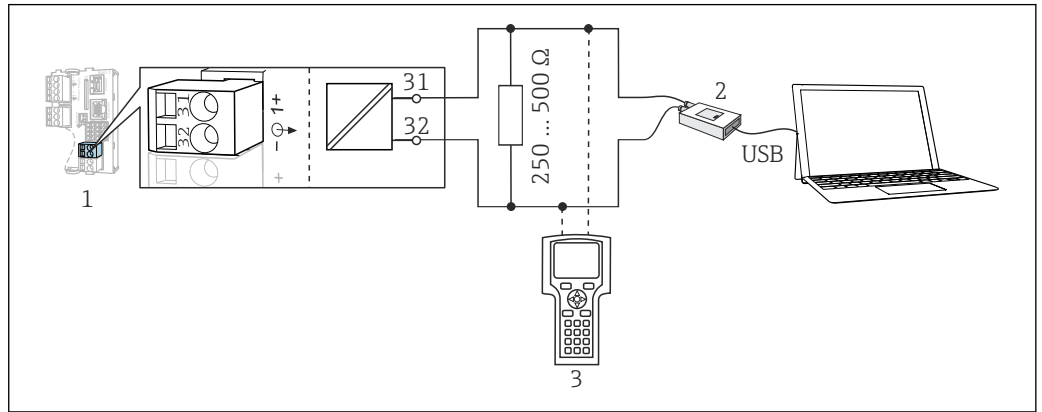
**Display** Graphic display:

- 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)

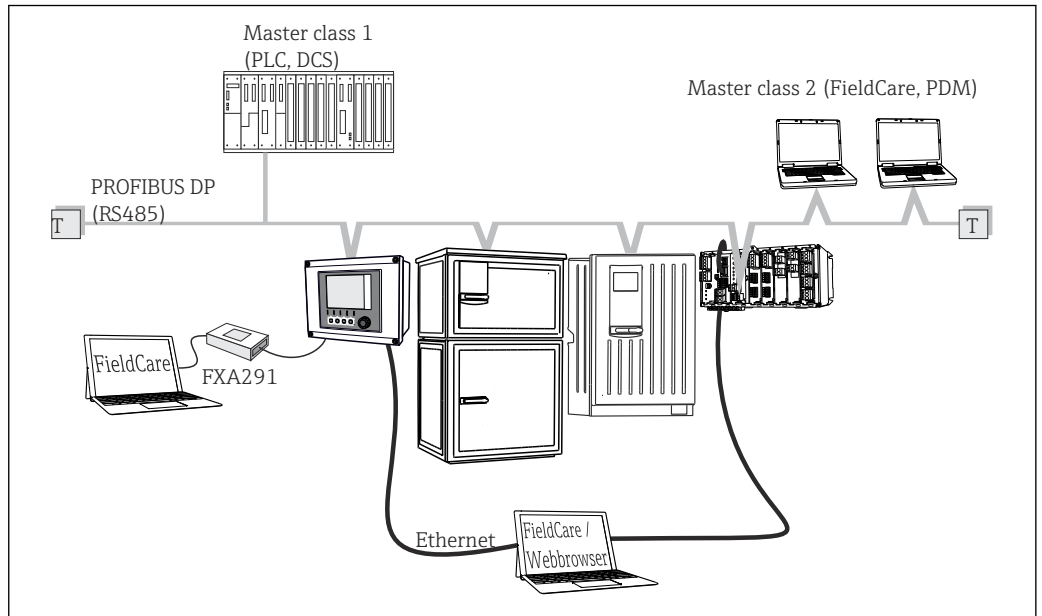


A0039620

19 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 <sup>1)</sup> (USB)
  - 3 HART handheld terminal
- 1) Switch position "on" (substitutes the resistor)

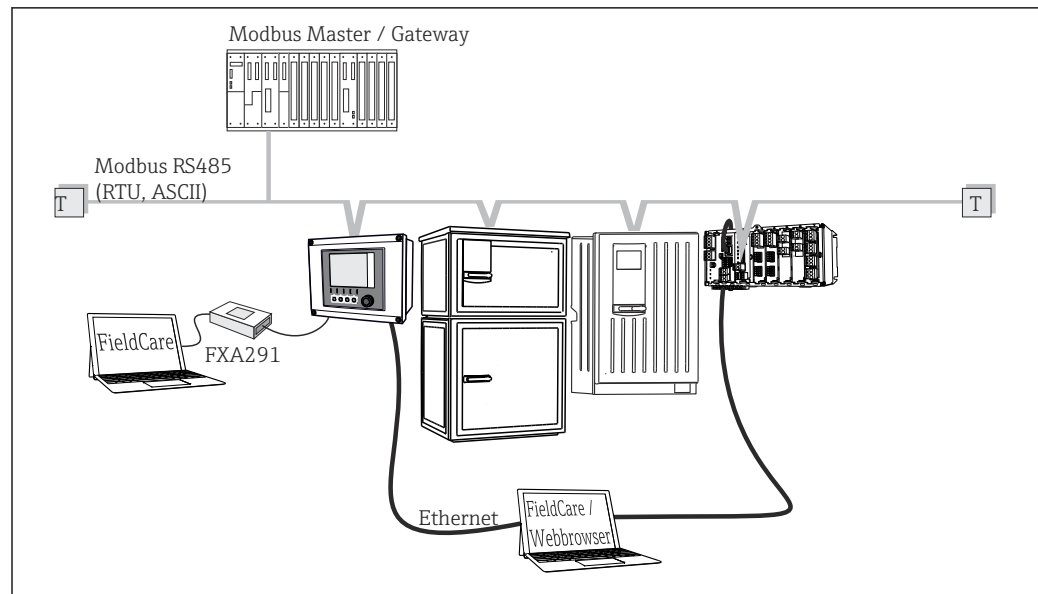
Via PROFIBUS DP



A0039617

20 PROFIBUS DP

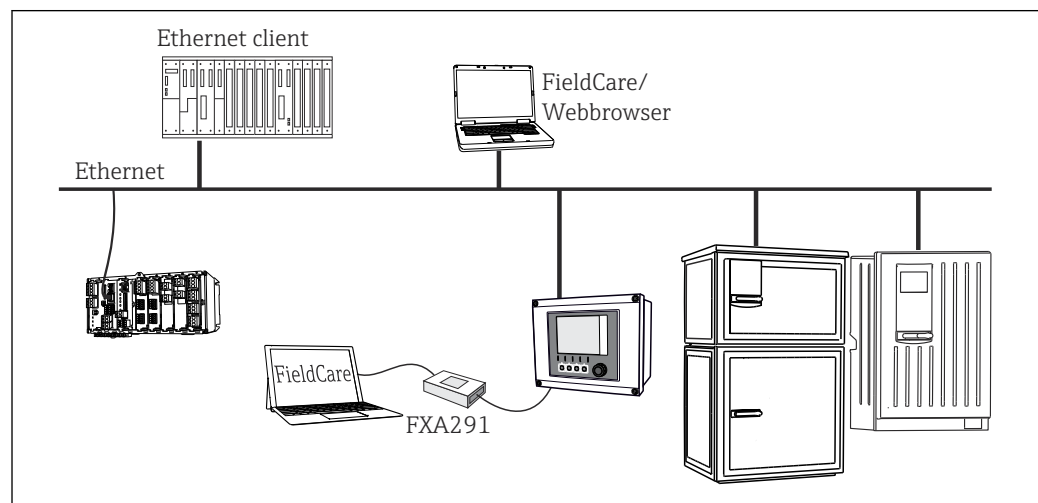
T Terminating resistor

**Via Modbus RS485**

A0039615

21 Modbus RS485

T Terminating resistor

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

A0039616

22 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/ca80cod](http://www.endress.com/ca80cod).

## Certificates and approvals

Current certificates and approvals for the product are available at [www.endress.com](http://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

<b>Product page</b>	<a href="http://www.endress.com/ca80cod">www.endress.com/ca80cod</a>
<b>Product Configurator</b>	<ol style="list-style-type: none"> <li>1. <b>Configure:</b> Click this button on the product page.</li> <li>2. Select <b>Extended selection</b>. <ul style="list-style-type: none"> <li>↳ The Configurator opens in a separate window.</li> </ul> </li> <li>3. Configure the device according to your requirements by selecting the desired option for each feature. <ul style="list-style-type: none"> <li>↳ In this way, you receive a valid and complete order code for the device.</li> </ul> </li> <li>4. <b>Accept:</b> Add the configured product to the shopping cart.</li> </ol> <p> For many products, you also have the option of downloading CAD or 2D drawings of the selected product version.</p> <ol style="list-style-type: none"> <li>5. <b>CAD:</b> Open this tab. <ul style="list-style-type: none"> <li>↳ The drawing window is displayed. You have a choice between different views. You can download these in selectable formats.</li> </ul> </li> </ol>
<b>Scope of delivery</b>	<p>The scope of delivery comprises:</p> <ul style="list-style-type: none"> <li>▪ 1 analyzer in the version ordered with optional hardware</li> <li>▪ 1 x Brief Operating Instructions (hard copy)</li> <li>▪ 1 x Maintenance Manual</li> <li>▪ Suction strainer</li> <li>▪ Cleaning brush for the dosing unit</li> <li>▪ Optional accessories</li> </ul>

## 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****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 CY80COD
- CAC880, inlet and outlet hoses for CA80

**Maintenance kit CAV880**

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

Maintenance kit for CA80 for 1 year

**Standard**

- Waste valve hose (PharMed)
- Complete pump head, excluding motor
- Dispenser with dispenser holder, 2 x 10 ml
- Coupling with cone
- O-ring set, reactor
- O-ring of cleaning opening
- Filter mats (2x)
- Inlet hose (PTFE, black)
- Tubing cutter

**Additionally for the wide measuring range**

- Hose for dilution water (PTFE, black)
- Dilution valve hose (PharMed)
- Complete pump head, excluding motor
- Coupling with cone
- Dilution vessel with plug

**Optional**

- O-ring set, dosing unit
- In-process hoses (PTFE, white)
- Hose connector
- Reactor cuvette with heating wire, O-rings, T-sensor
- Dosing tubes with O-rings

**Upgrade kits CAZ880**

Kit for upgrade with dilution module for high measuring range

- Carrier board with dilution module
- Activation code
- Order No. CAZ880-CCCC

Kit for upgrade for low measuring range

- Activation code
- Order No. CAZ880-CCCB

**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](http://www.endress.com/cps11e)



Technical Information TI01493C

**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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://www.endress.com/cyk11)



Technical Information TI00118C

### SD card

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



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