Technical Information
Liquiline System CAT860

Automatic sample conditioning system for supplying process measuring devices with filtered sample from the inlet or sludge activation phase of a wastewater treatment plant



Application

Liquiline System CAT860 enables the fully automatic collection and filtration of aqueous samples. Thanks to the modular concept, the sample preparation system can be adapted to various different process conditions. There are various order options available for this purpose. For installing the filter in the process medium, various assemblies are available as accessories. The heated version of the hoses and of the housing mean that the system can be used at temperatures as low as -20 °C.

The device is designed for use in the following applications:
- Collection of aqueous samples from industrial processes
- Communal and industrial wastewater treatment plants

Your benefits

- Robust and reliable:
  - Peristaltic pump, sampling takes place free from interference
  - Samples free from particles and algae thanks to membrane filtration
  - Automatic filter backflushing with cleaner
  - Filter backflushing with air
  - Optional hose trace heating system
- Simple and user-friendly:
  - Control via a CA80 analyzer
  - Installation compatible with the Flexdip CYH112
- Cleaning and maintenance:
  Replacement of pump hoses and filter without using tools

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Function and system design

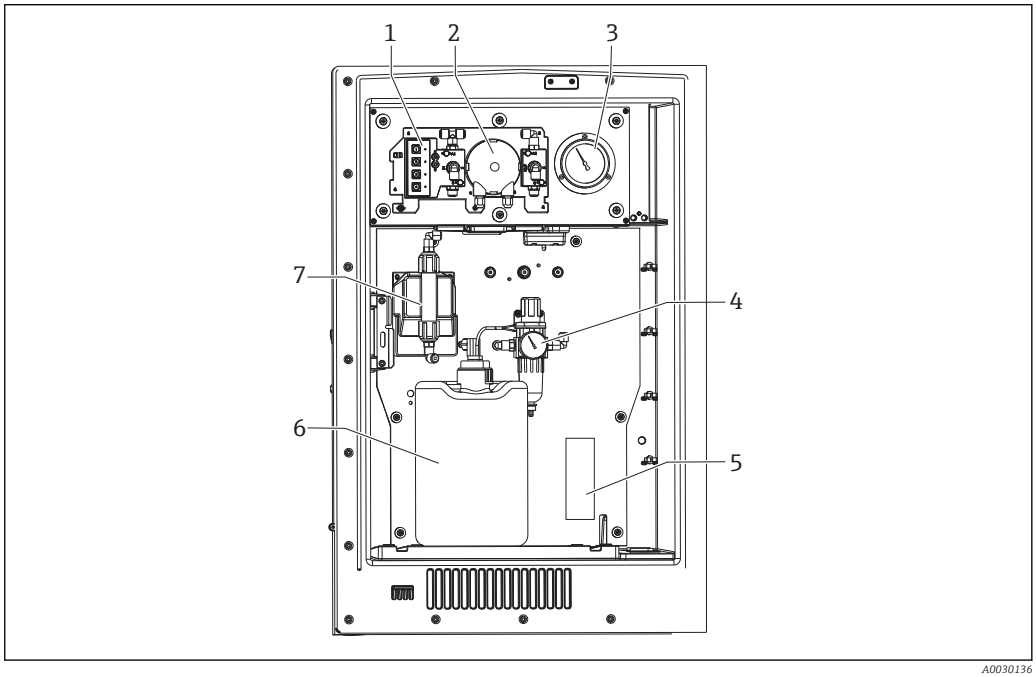
Function

A peristaltic pump is used to take the sample. The sample is drawn in via the filter element, filtered and fed to the analyzer. The automatic cleaning function backflushes the filter and the sample hoses with a cleaning solution. Backflushing with a cleaning solution is performed using a vacuum pump. The cleaning valve is switched for this purpose. It is also possible to backflush the filter and the sample hoses with compressed air.

Measuring system

A complete sample conditioning system comprises:

- Liquiline System CAT860 sample preparation system
- Local operation with soft keys and status LEDs
- Filter unit with filter and assembly in the configuration ordered
- Automatic cleaning function with compressed air (external compressed air supply necessary)
- Peristaltic pump for pumping the sample
- Vacuum pump for the automatic chemical cleaning function
- Housing heating (optional)
- Sample hose, filter to pump in the configuration ordered, optionally heated
- Sample hose, pump to analyzer in the configuration ordered, optionally heated
- Cleaner (to be ordered separately)



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1 CAT860 sample preparation system

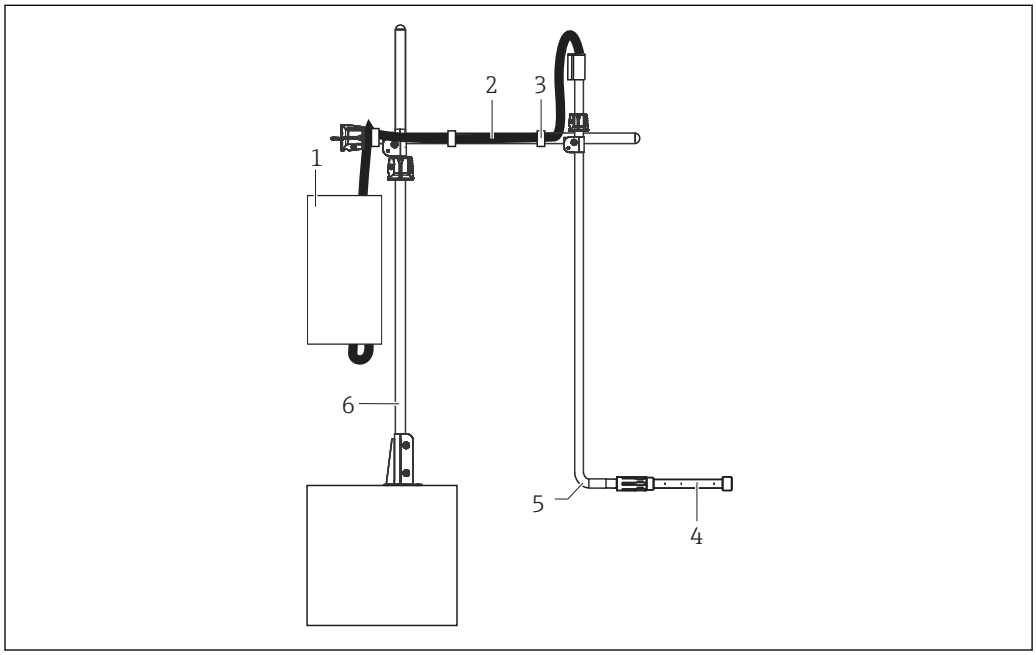
1 Soft keys
2 Peristaltic pump
3 Pressure gauge
4 Pressure-reducing valve for compressed air
5 Housing heating (optional)
6 Cleaner
7 Vacuum pump

Installation examples

Installation example 1: inlet measurement, CAT860 with Memosens technology, wall installation, filter with immersion tube

- Liquiline System CA80 analyzer
- Liquiline System CAT860 with Memosens communication, heated, with compressor
- Filter cartridge, membrane, 0.1 µm, ceramic
- Immersion tube 1200 x 40 mm, stainless steel
- Connecting bracket G1, 90 °C, stainless steel
- Quick release fastener, filter, G1

- Hose, filter to pump, 3 m (10 ft), heated
- Hose, pump to analyzer, 2 m (7 ft), heated
- Flexdip CYH112 holder, to be ordered separately

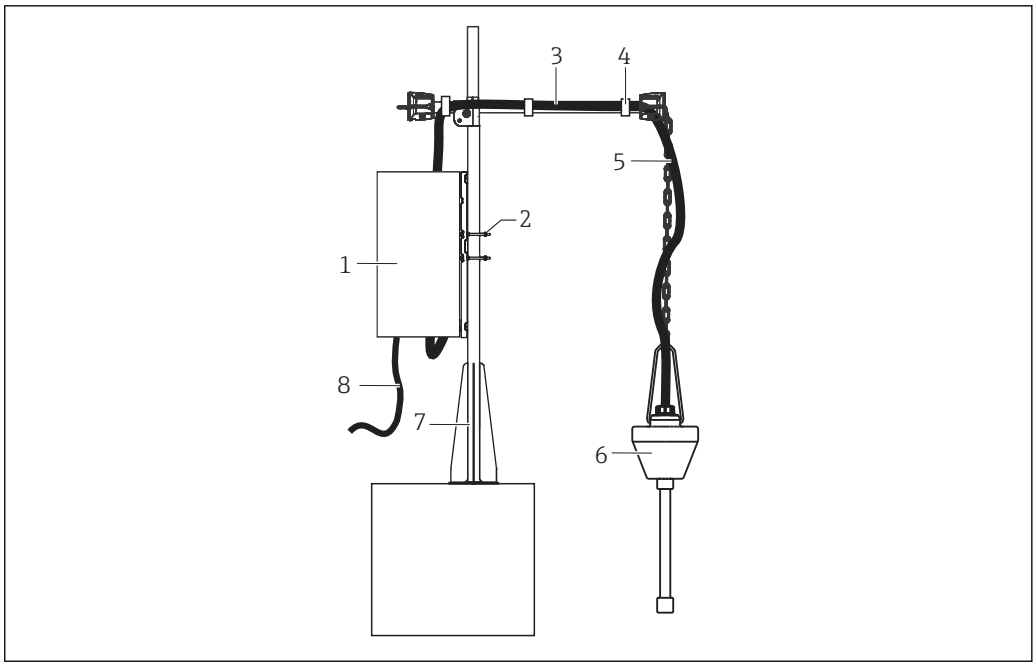


2 Installation with Liquiline System CA80, CAT860 with quick-release fastener and filter (ceramic)

1 Liquiline System CAT860 (wall mounting)
2 Hose, filter to pump, heated
3 Hook-and-loop tape
4 Filter (ceramic) with quick release fastener, immersion tube 1200 x 40 mm, stainless steel
5 Connecting bracket G1, 90°, stainless steel
6 Holder CYH112

Installation example 2: measurement in the aeration basin, CAT860 with Memosens technology, installation with post and post fastening set, filter with float

- Liquiline System CA80 analyzer
- Liquiline System CAT860 with Memosens technology, heated, with compressed air connection for external compressed air line
- Post, stainless steel, reinforced
- Post fastening set
- Filter cartridge, membrane, 0.1 µm, ceramic
- Float, filter adapter
- Hose, filter to pump, 3 m (10 ft)
- Hose, pump to analyzer, 2 m (7 ft)
- Flexdip CYH112 holder, to be ordered separately

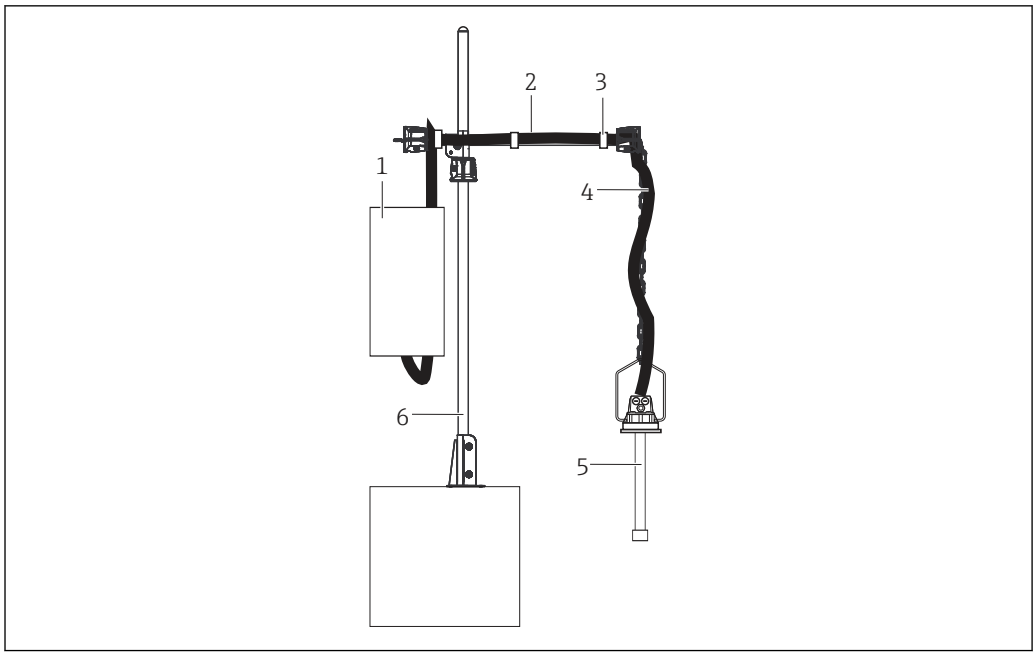


3 Installation with Liquiline System CA80, CAT860 with float and filter (ceramic)

1 Liquiline System CAT860
2 Post fastening set
3 Hose, filter to pump, 3 m
4 Hook-and-loop tape
5 Chain
6 Filter (ceramic) with float, filter adapter
7 Post, stainless steel, reinforced
8 Compressed air connection for onsite compressed air line

Installation example 3: inlet measurement, CAT860 with Memosens technology, wall installation, filter with chain retainer

- Liquiline System CA80 analyzer
- Liquiline System CAT860 with Memosens communication, heated, with compressor
- Filter cartridge, membrane, 0.1 µm, ceramic
- Chain retainer 600 x 40 mm, PVC, adapter G1
- Quick release fastener, filter, G1
- Hose, filter to pump, 3 m (10 ft), heated
- Hose, pump to analyzer, 2 m (7 ft), heated
- Flexdip CYH112 holder, to be ordered separately

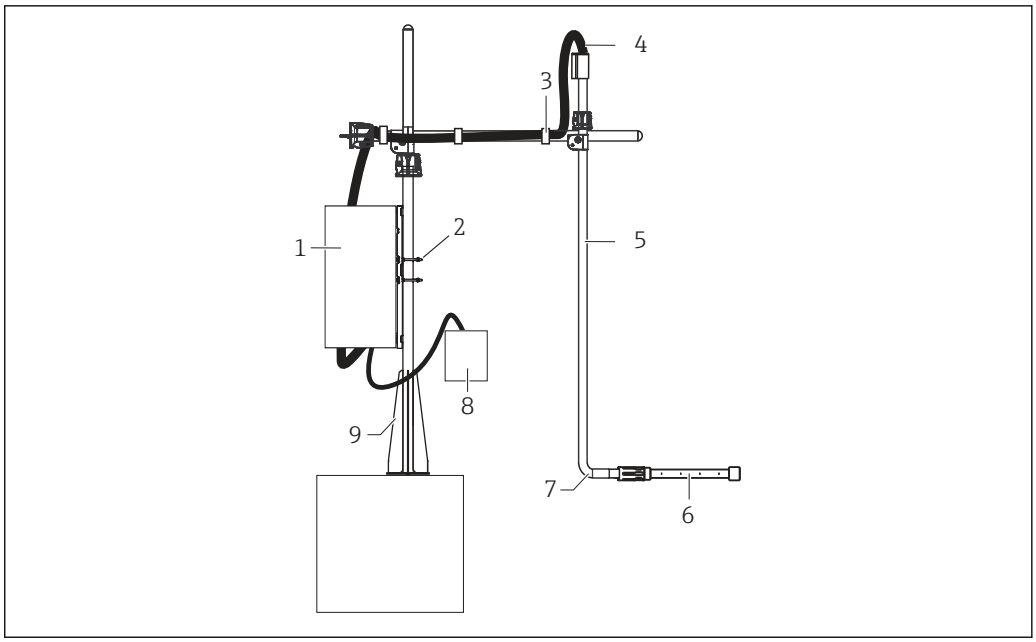


4 Installation with Liquiline System CA80, CAT860 with chain retainer and filter (ceramic)

1 Liquiline System CAT860 (wall mount)
2 Hose, filter to pump, 5 m, heated
3 Hook-and-loop tape
4 Chain
5 Filter (ceramic) with chain retainer, 600 x 40 mm, PVC
6 Holder CYH112

Installation example 4: CAT860 with Memosens technology, installation with post and post fastening set, filter with immersion tube

- Liquiline System CA80 analyzer
- Liquiline System CAT860 with Memosens communication, heated, with compressor
- Post, stainless steel, reinforced
- Post fastening set
- Filter cartridge, membrane, 0.1 µm, ceramic
- Immersion tube 1200 x 40 mm, stainless steel
- Connecting bracket G1, 90 °C, stainless steel
- Quick release fastener, filter, G1
- Hose, filter to pump, 3 m (10 ft), heated
- Hose, pump to analyzer, 2 m (7 ft), heated
- Flexdip CYH112 holder, to be ordered separately

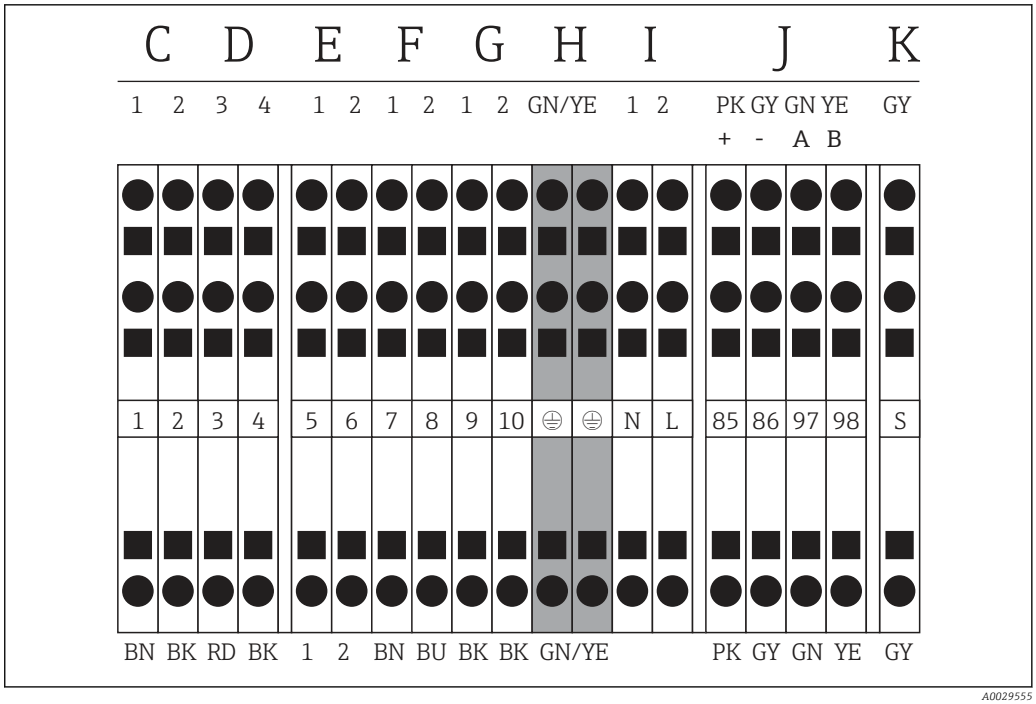


5 *Installation with Liquiline System CA80, CAT860 with immersion tube, filter (ceramic) and compressor*

1 *Liquiline System CAT860*
2 *Post fastening set*
3 *Hook-and-loop tape*
4 *Hose, filter to pump, 3 m, heated*
5 *Immersion tube 1200 x 40 mm, stainless steel*
6 *Filter (ceramic) with quick release fastener*
7 *Connecting bracket G1, 90 °, stainless steel*
8 *Compressor + compressed air hose*
9 *Post, stainless steel, reinforced*

Equipment architecture

Terminal assignment



6 *Terminal assignment*

C *Level monitoring* *H* *Grounding*

D	*Valve 3*	*I*	*Supply voltage*
E	*Pump*	*J*	*Memosens*
F	*Liquiline System CA80*	*K*	*Shielding*
G	*Sample*		

Communication and data processing

Controller

The Liquiline System CAT810 sample preparation system is controlled by a Liquiline System CA80 using Memosens technology.

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
  - Filter service life
  - Operating hours of vacuum pump
  - Operating times of pump hoses

Maintainability

Modular design
The sample preparation system can be adapted to suit your needs:
- Upgrade from unheated to heated hoses
- Outdoor temperature sensor and housing heater upgrades

Temperature inputs

Type of input

Pt1000

Accuracy

± 2.5 K

Power supply

Electrical connection of

--> For detailed wiring diagram, see Operating Instructions for the Liquiline System CAT860

Supply voltage

- 100 to 120 V AC / 200 to 240 V AC
- 50 or 60 Hz

NOTICE

The device does not have a power switch
- ▶ The customer must provide a protected circuit breaker in the vicinity of the device.
- ▶ The circuit breaker must be a switch or power switch, and you must label it as the circuit breaker for the device.

To install heated hoses, a supply voltage of 200 to 240 V AC or 100 to 120 V AC is required. It is not possible to install heated hoses with the 24-volt version.

Cable entries

Depending on order version:
- 2 x M32 cable gland (assigned internally)
- 1 x M20 cable gland (1 x assigned internally)
- 1 x M12 (temperature sensor, optional)

Permitted cable diameter:
M20 x 1.5 mm: 7 to 13 mm (0.28 to 0.51")

Power consumption of

300 VA (with housing heating)

Fuse

5x20 mm, 250 V, 3.15 A slow-blow (T3.15A)

Performance characteristics

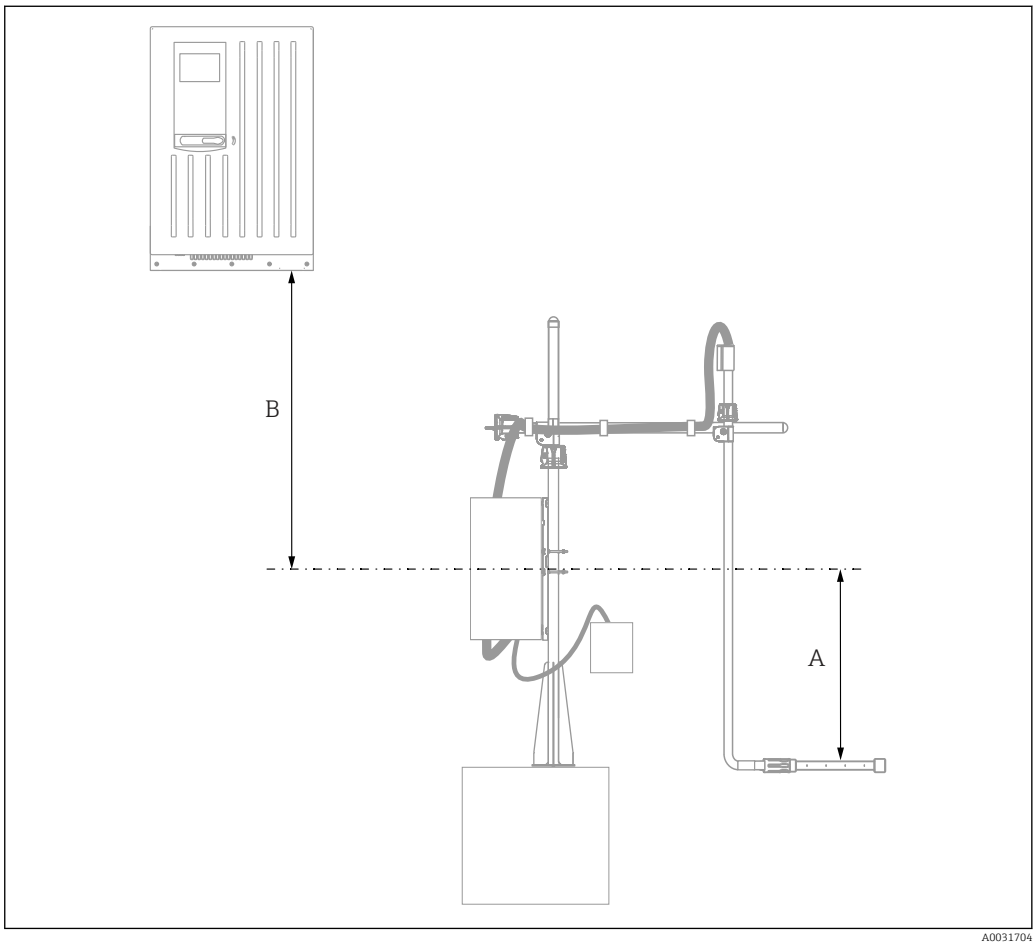
Sampling method	Control unit, Liquiline System CA80 analyzer
Filtrate quantity	Version with Memosens technology: ▪ 5.5 to 16.5 ml/min ▪ Factory setting: 8.25 ml/min All the values have been determined with new filters.
Suction height of peristaltic pump	Max. 5 m (16 ft)
Hose length, filter to pump	Max. 5 m (16 ft)
Hose length, pump to analyzer	Max. 30 m (98 ft)

Installation

Installation instructions

Suction height

The maximum permitted suction height is:



A0031704

Item number	permitted suction height
A	between filter and sample preparation: Max. 5 m (16.41 ft)
A+B	between filter and analyzer: ▪ max. total of 10 m (31.81 ft) ▪ however: A must **always be 5 m max.**, the following examples are possible: – A = 0.5 m, B = 9.5 m – A = 5 m, B = 5m

Mounting conditions

- **Incorrect**
  The sample preparation system should never be mounted in a place where it is exposed to aggressive gases.
- **Incorrect**
  When routing the inlet pipe ensure siphoning effects do not occur.
- **Incorrect**
  The inlet pipe must never be routed with an upward gradient to the sampling point.

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

Environment

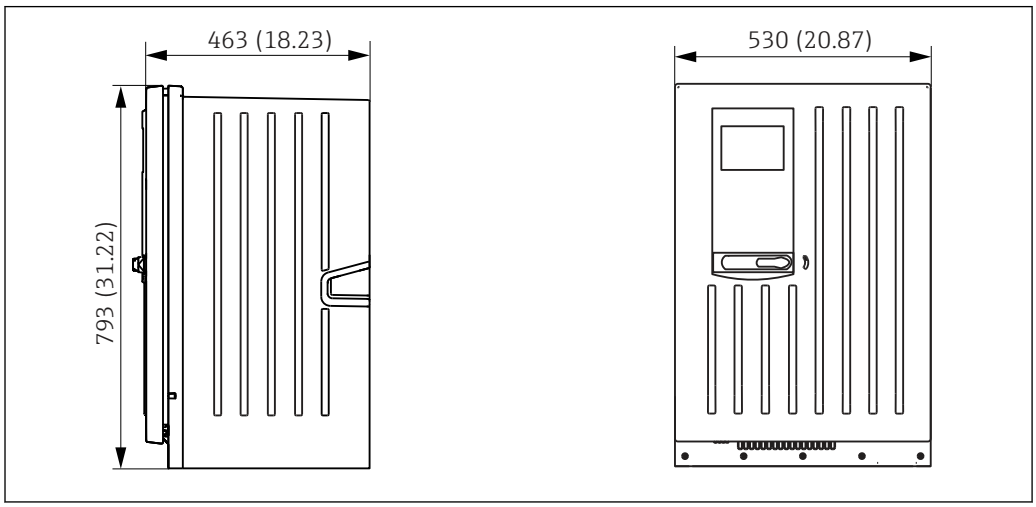
Ambient temperature range	Unheated +5 to +50 °C (41 to 122 °F) Heated -20 to +50 °C (-4 to +122 °F)
Storage temperature	-20 to +60 °C (-4 to 140 °F)
Humidity	10 to 95%, not condensing
Degree of protection	IP55
Electromagnetic compatibility	Interference emission and interference immunity as per EN 61326-1:2006, class A for industrial sectors
Electrical safety	IEC 61010-1, Class I equipment Low voltage: overvoltage category II Environment < 2000 m (< 6562 ft) above MSL
Degree of contamination	The product is suitable for pollution degree 2.

Process

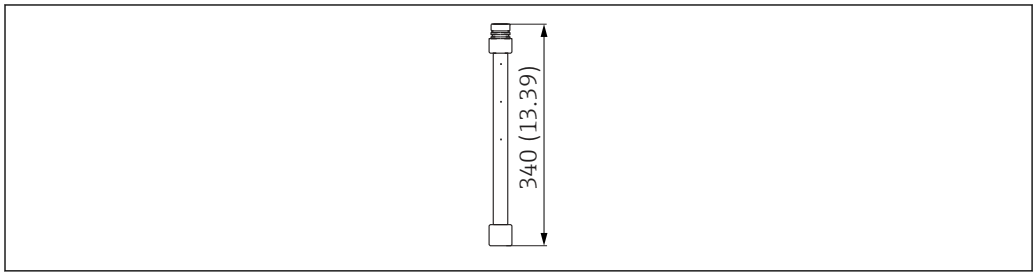
Sample temperature	4 to 40 °C (39 to 104 °F)
Consistency of the sample	TS < 8 g/l
pH value of the sample	pH 4 to 14
Salt content of the sample	NaCl concentration < 10,000 mg/l (ppm)
Process pressure	Unpressurized
Compressed air	2 to 4 bar (29 to 58 psi)

Mechanical construction

Dimensions



7 Liquiline System CAT860, dimensions in mm (in)



8 Filter, dimensions in mm (in)

Weight

33 kg (73 lbs)

Materials

Housing material	
Housing exterior cover	Plastic ASA+PC
Housing inner lining	Plastic PP

Parts in contact with medium	
Filter (ceramic) End caps	Al_2O_3, coated PVC
Hose, sample preparation	PTFE
Couplings, peristaltic pump Nut + sleeve	PP
Hose, peristaltic pump	PHARMED
Coupling, solenoid valve and T-section	POM
Solenoid valve on sample collecting vessel	PVDF
Seal, solenoid valves	EPDM
Seal, valve sample collecting vessel	FKM
Solenoid valve for backflushing	PEEK
Hose from solenoid valve to sample collecting vessel	NORPRENE

Parts in contact with medium	
Cleaning solution canister	PE
Conductivity detection before valve ▪ Double nipple ▪ Sleeve	 ▪ PP ▪ Stainless steel 1.4571 (AISI 316Ti)

Hoses and cables

Hose, filter to pump
- Lengths: 3 m (9.8 ft), 5 m (16.4 ft)
- Spiral hose:
  - PVC material
  - OD 21.6 mm (0.85")
  - ID 16 mm (0.63")
- Sample hose 1 / 2:
  - PTFE material
  - OD 4 mm (0.16")
  - ID 2 mm (0.08")
  - Color: blue/black
- Heated version:
  - Hose heating: 115V/230V (connection inside sample preparation system)
  - Heating capacity 17 Watt per meter, self-limiting

If a 2400 mm immersion pipe is used, a 5 m hose must be selected from the filter to the pump.

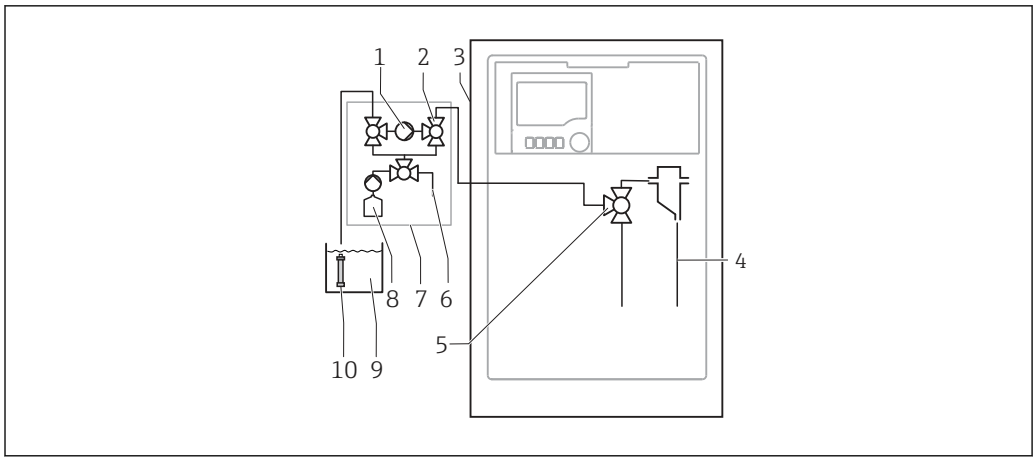
Hose, pump to analyzer
- Lengths: 2 m (6.6 ft), 5 m (16.4 ft), 10 m (32.8 ft), 15 m (49.2 ft), 20 m (65.6 ft), 30 m (98.4 ft)
- Spiral hose:
  - PVC material
  - OD 24.6 mm (0.97")
  - ID 19 mm (0.75")
- Memosens cable
- Sample hose 1 / 2:
  - PTFE material
  - OD 4 mm (0.16")
  - ID 2 mm (0.08")
  - Color: blue/black
- Heated version:
  - Hose heating: 115V/230V (connection to CA80 or CA71; in the case of CA71, connection kit for CA71 heated hose version required)
  - Heating capacity 17 Watt per meter, self-limiting

Compressed air hoses
- Outer diameter: 6 mm
- Permitted hose lengths: 5 m (16.4 ft)(included in delivery), 10 m (32.8 ft), 15 m (49.2 ft), 20 m (65.6 ft), 30 m (98.4 ft), 50 m (164.0 ft)

Operability

Operating concept

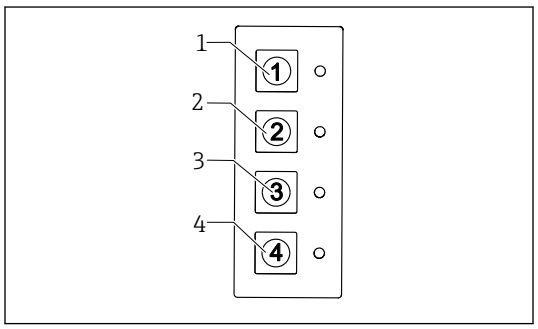
Operation via the Liquiline System CA80



9 *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)

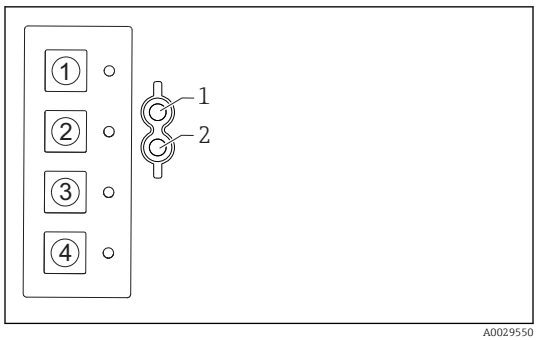
Local operation



1 Local control system
2 Sample pump forwards
Sample pump backwards (press for longer)
3 Backflush filter with air
4 Backflush filter with cleaner

Key assignment

Press once:	Function 1	= LED on
Press for longer:	Function 2	= LED flashes
Press twice:	Stop button	= LED off



1 Green LED on: device in operation
2 Red LED on: fault, Category F diagnostic message
Red LED flashing: Category M, C or S diagnostic message
(Messages are divided into different error categories in accordance with NAMUR NE 107)

Detailed diagnostic messages are displayed on the Liquiline System CA80.

Certificates and approvals

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

CE mark

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

EAC

The product has been certified according to guidelines TP TC 004/2011 and TP TC 020/2011 which apply in the European Economic Area (EEA). The EAC conformity mark is affixed to the product.

Ordering information

Product page

www.endress.com/cat860

Product Configurator

On the product page there is a "Configuration" button to the right of the product image.

1. Click this button.
   ↳ The Configurator opens in a separate window.
2. Select all the options to configure the device in line with your requirements.
   ↳ In this way, you receive a valid and complete order code for the device.
3. Export the order code as a PDF or Excel file. To do so, click the appropriate button on the right above the selection window.

For many products you also have the option of downloading CAD or 2D drawings of the selected product version. To do so, click the "CAD" tab and select the desired file type using drop-down lists.

Scope of delivery

The scope of delivery comprises:
- 1 Liquiline System CAT860 in the version ordered
- 1 copy of the Operating Instructions (in the desired language on selection of the order option)
- 1 CD-ROM with Operating Instructions in all available languages
- Optional accessories

Accessories

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

www.addresses.endress.com

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