Technical Information
Liquicontrol CDC80

The perfect formula for your wastewater treatment plant: efficiency up, costs down

Application

- Wastewater industry
- Regulation of the blower to eliminate nitrogen in biological treatment stages
- Regulation of precipitant dosage for chemical phosphate elimination in biological treatment stages

Your benefits

- Quick and easy integration into existing systems
- Modular system, easily extensible even after installation
- Energy and precipitant savings drive down operating costs
- Signal validation ensures reliable outlet values
- Process optimization with load-dependent control strategies
- Up to four control loops for nitrogen elimination
- Up to four control loops for phosphate elimination
- Data management, recording and visualization
- Remote access to all relevant data
- Predictive maintenance and process analysis with Memosens
- Software support

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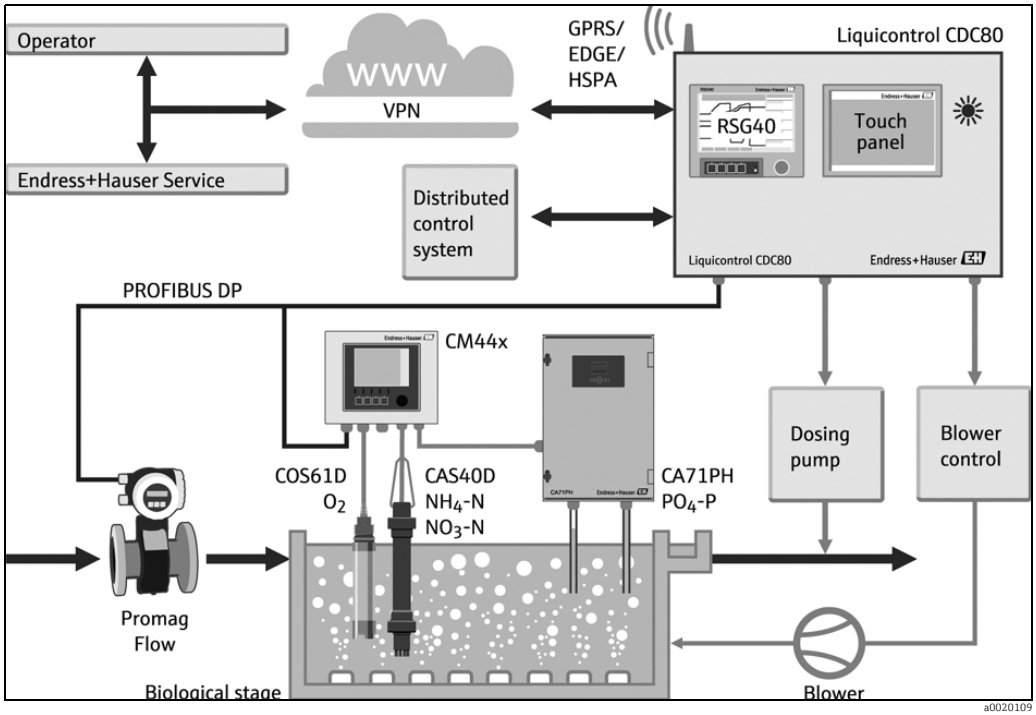
Function and system design

Measuring principle

Liquicontrol CDC80 is a smart interface between the actuators and the measuring devices in the biological stages of wastewater treatment plants. This end-to-end solution enables the load-dependent elimination of nitrogen and phosphate. It can be operated as a self-contained unit or integrated into a network.



Overview

By measuring oxygen, ammonium and nitrate, the system analyzes the behavior of the biological treatment stage and controls aeration depending on the load.

Intermittent operation:

If the load in the inlet increases, the system automatically approaches the set maximum oxygen target value. If the situation is the reverse, the system approaches the minimum target value. The oxygen control range can be individually adjusted by the operator at any time.

Continuous operation:

Depending on the installation, up to two independent measuring points can be used for control purposes. Predictive load analysis allows preparatory steps to be taken in the biological stage before a load stage is reached.

Attenuation and filter stages enable smooth blower start-up, thereby minimizing maintenance and repair costs.

Chemical phosphate elimination:

Additional chemical phosphate elimination is possible by combining flow and phosphate measurement. Here flocculant is added depending on the specific load in order to avoid excessive feed of flocculant.

Modes of operation:
- Automatic
- Manual

Manual operation or base load operation can be activated optionally at any time during the process. This is possible for all active control loops, regardless.

Operating options:
- With onsite touch panel
- With desktop computer or smartphone

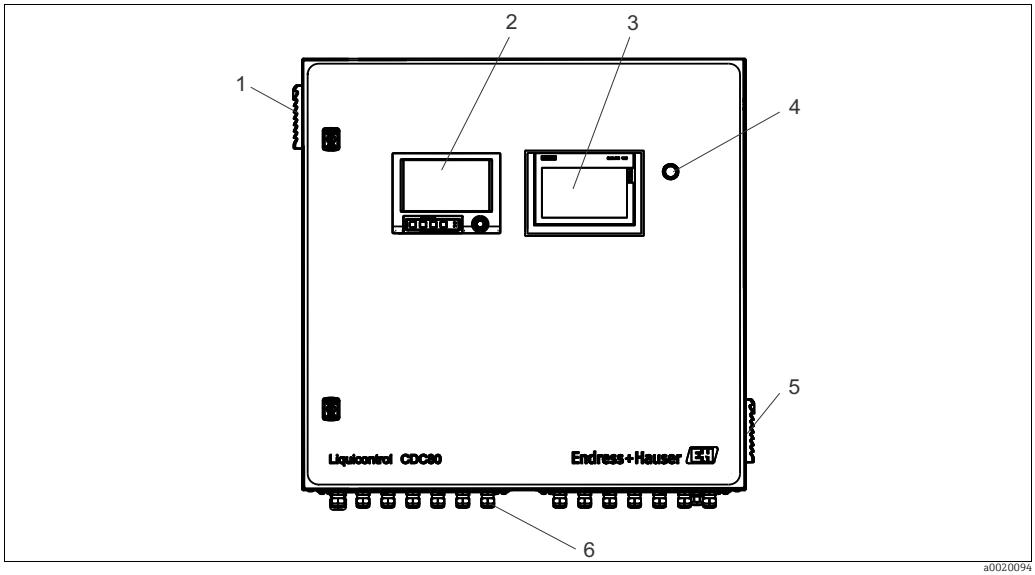
The process data are saved per active zone, can be displayed as a graphic and managed using the Field Data Manager software.

Housing versions

Four different housing versions are available for the CDC80:

- Compact version
  This version contains all the relevant components for up to four zones in one housing
- Main unit without a connection unit
  The main unit can only communicate via a fieldbus.
- Main unit in one housing and connection unit for up to four zones in a separate housing.
  The connection unit contains components for connecting analog and digital control and measuring signals.
- Main unit in one housing and connection units for up to four zones, each located in a separate housing.

A zone can be an entire basin or an area in a basin. A basin can also be split into several zones.



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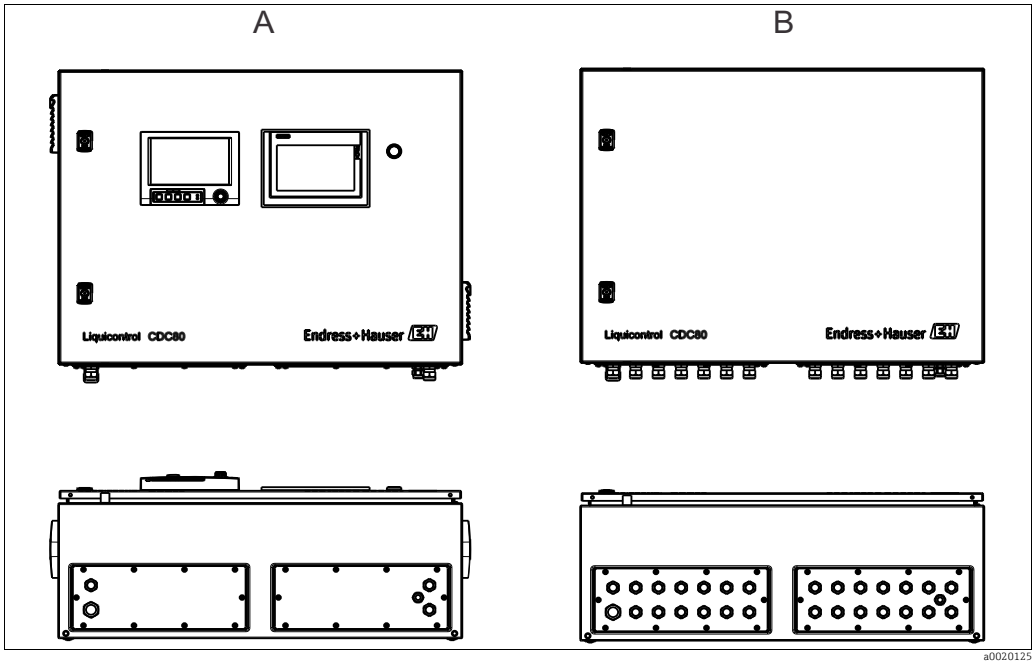
Elements of the compact version

1 Housing fan
2 Data recorder
3 Touch panel
4 Status lamp
5 Air filter
6 Cable glands



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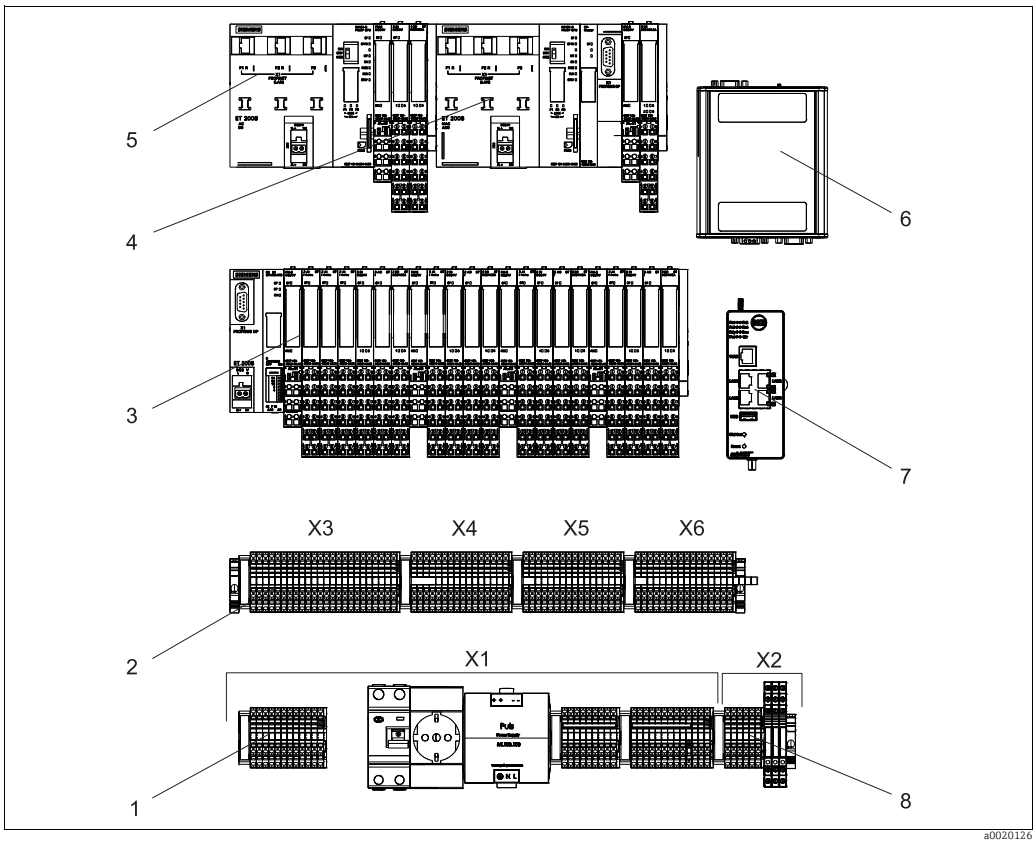
Main and connection unit

A Main unit
B Connection unit

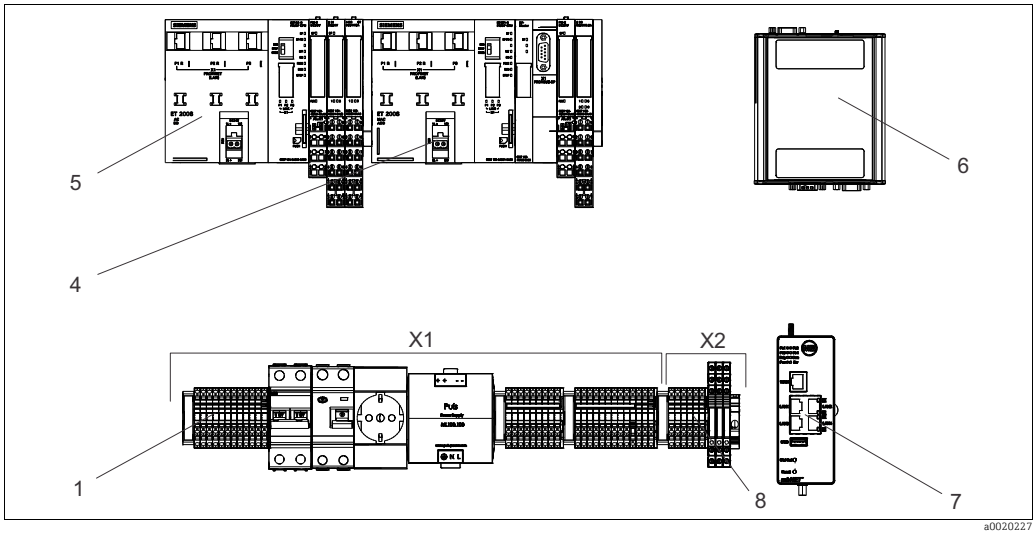
Elements of the compact version



Elements of the mounting plate (compact version)

1 Terminal block, power supply / fuses (X1)
2 Terminal blocks for zone 1 to 4 (X3, X4; X5, X6)
3 Remote I/O interface
4 Gateway PLC
5 Main PLC
6 Fieldbus coupler (PROFIBUS DP slave / slave)
7 Modem / switch
8 Status and enable signals (X2)

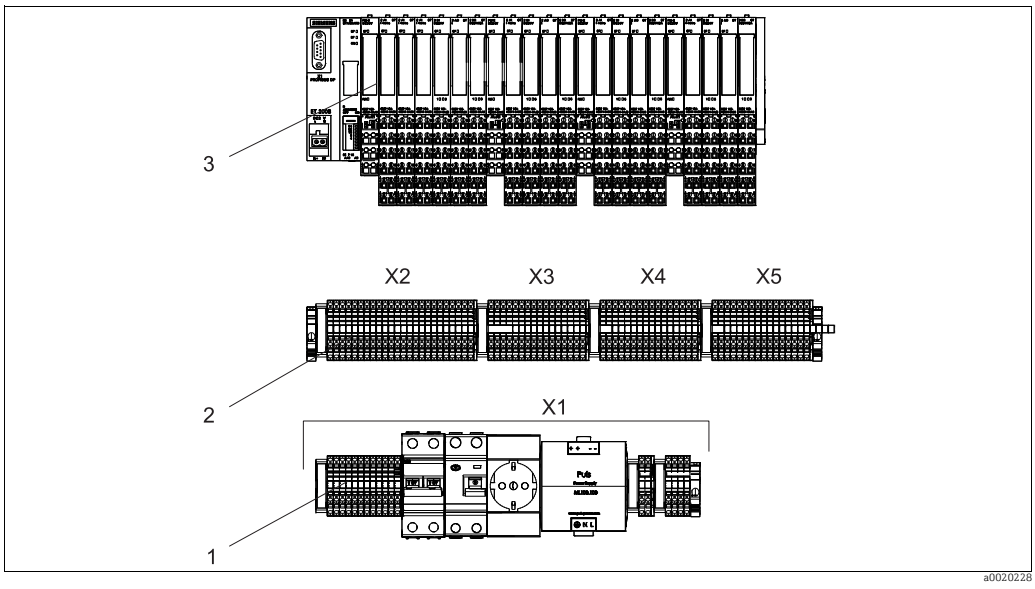
Elements of the main unit



Elements of the mounting plate (main unit)

1 Terminal block, power supply / fuses (X1)
4 Gateway PLC
5 Main PLC
6 Fieldbus coupler (PROFIBUS DP slave / slave)
7 Modem / switch
8 Status and enable signals (X2)

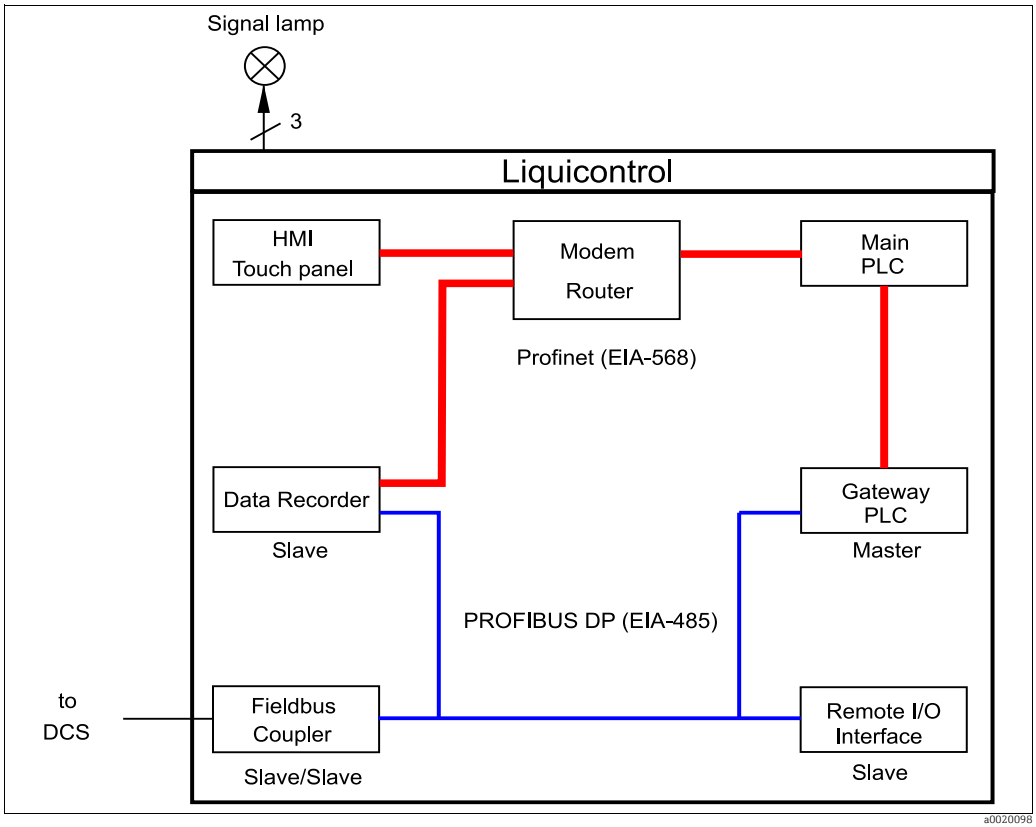
Elements of the connection unit



Elements of the mounting plate (connection unit)

1 Terminal block, power supply / fuses (X1)
2 Terminal blocks for zone 1 to 4 (X2, X3; X4, X5)
3 Remote I/O interface

System architecture



System architecture

Liquicontrol CDC80 uses well-known fieldbus technology for internal communication:
- PROFIBUS DP at application level
- Industrial Ethernet / Profinet at process control level

HMI touch panel
The HMI offers an intuitive menu structure for editing all the relevant parameters and signal values. It acts as the main interface between the operator and the control system.

Main PLC
The main PLC contains the E+H control technology and communicates all the main signals from and to the gateway PLC for up to four biological zones. It controls nitrogen and phosphate elimination.

Gateway PLC
The gateway PLC is the central collection point for all the relevant information and signals that are communicated to and from Liquicontrol. It is the interface to the application and process control level and provides sensor information, control signals or the status of a particular source, depending on the configuration of the system.

Fieldbus coupler
The fieldbus coupler is the interface between Liquicontrol and the fieldbus of a wastewater treatment plant that is already fitted with PROFIBUS DP. To keep integration work to a minimum, the fieldbus coupler, the gateway PLC and the existing master PLC of a system primarily need to be configured. This eliminates the need to restructure the system architecture.

Remote I/O interface
If classic communication methods (current inputs/outputs) with measuring technology and actuators are needed, the remote I/O interface provides all the necessary interfaces for wiring. Signals via the remote I/O interface can also be communicated via the fieldbus coupler depending on the system features.

Data recorder
The data recorder saves all the measuring and control signals of the particular zone, including nitrogen and phosphate elimination. It contains the tools for data management and visualization, and makes all the information available by remote access via a modem.

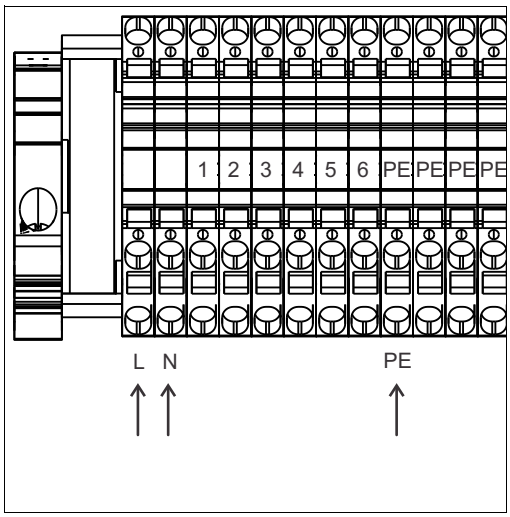
Modem / router
Depending on the modem version, it is able to communicate with Liquicontrol through desktop computers or smartphones via cable WAN connections or wireless mobile networks. All the signal and sensor information available can be retrieved. It is also possible to configure control parameters remotely.

Power supply (all versions)

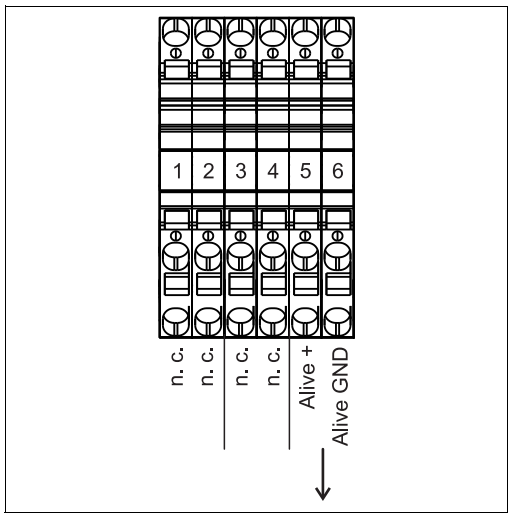
Supply voltage	100 to 120 / 220 to 240 VAC, 47 to 63 Hz
Power consumption	Approx. 100 VA
Equipment class	⏚ Class I equipment

Power supply for compact version

Terminal block X1 and X2



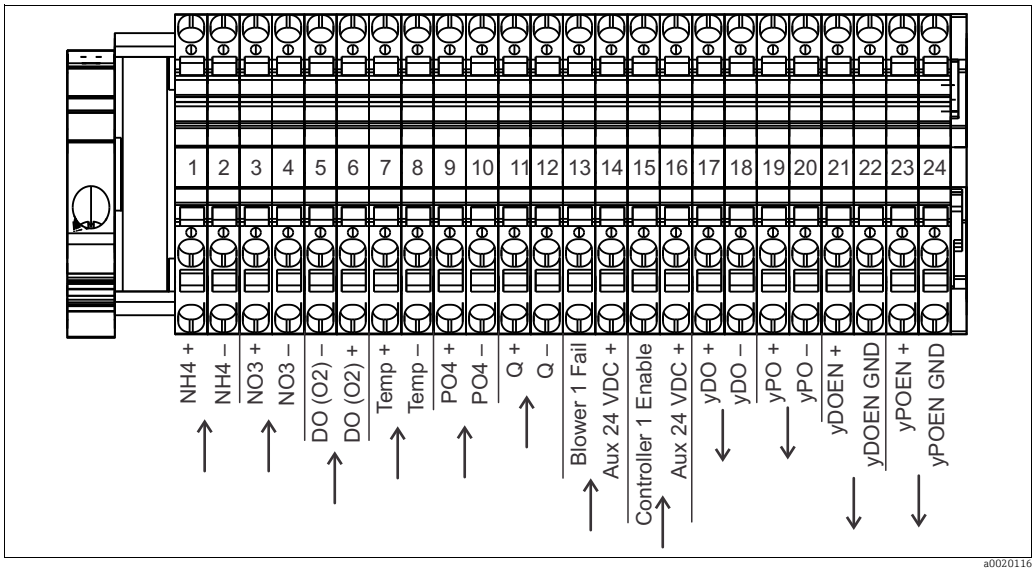
Terminal block X1 (mains connection)



Terminal block X2

Terminal	Signal	Input/output	Source/target
L (X1)	115/230 VAC	Input	Supply voltage
N (X1)	115/230 VAC	Input	Supply voltage
PE (X1)	Protective ground	Input	Supply voltage
1 & 2 (X2)	n. c.		
3 & 4 (X2)	n. c.		
5 & 6 (X2)	Alive (watchdog function)	Output 24 VDC	Status CDC80

Terminal block X3 for zone 1

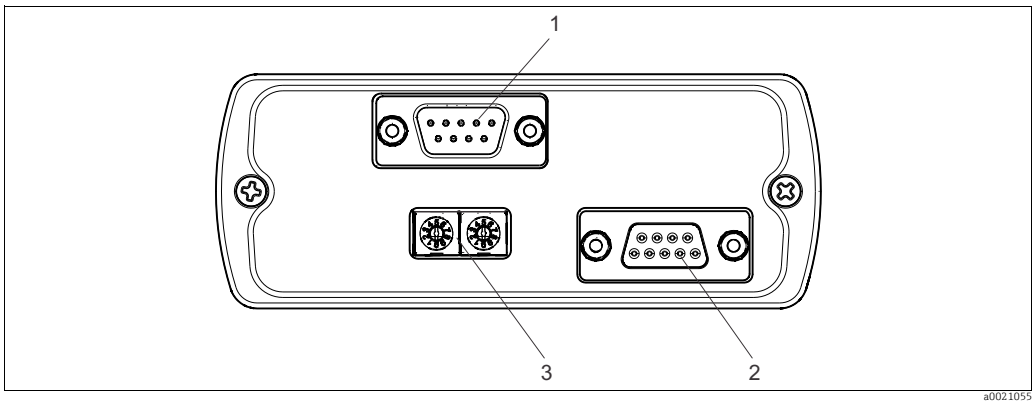


Terminal block X3 for zone 1

Terminal	Signal	Input/output	Source/target
1 & 2	Ammonium NH_4^+ (NH_4-N)	Input (4 to 20 mA)	Transmitter
3 & 4	Nitrate NO_3^- (NO_3-N	Input (4 to 20 mA)	Transmitter
5 & 6	Oxygen O_2	Input (4 to 20 mA)	Transmitter
7 & 8	Temperature	Input (4 to 20 mA)	Transmitter
9 & 10	Phosphate PO_4^{3-} (PO_4-P)	Input (4 to 20 mA)	Analyzer
11 & 12	Flow Q	Input (4 to 20 mA)	Flowmeter
13 & 14	Blower fail	Input 24 VDC	Blower electronics
15 & 16	Controller enable	Input 24 VDC	Higher-level controller
17 & 18	Blower actuating variable yDO	Output (4 to 20 mA)	Blower electronics
19 & 20	Dosing pump actuating variable yPO	Output (4 to 20 mA)	Dosing pump electronics
21 & 22	Blower enable yDOEN	Output 24 VDC	Blower electronics
23 & 24	Dosing pump enable yPOEN	Output 24 VDC	Dosing pump electronics

The yDO and yPO actuating variables only become effective when the individual enable signals yDOEN and yPOEN are active.

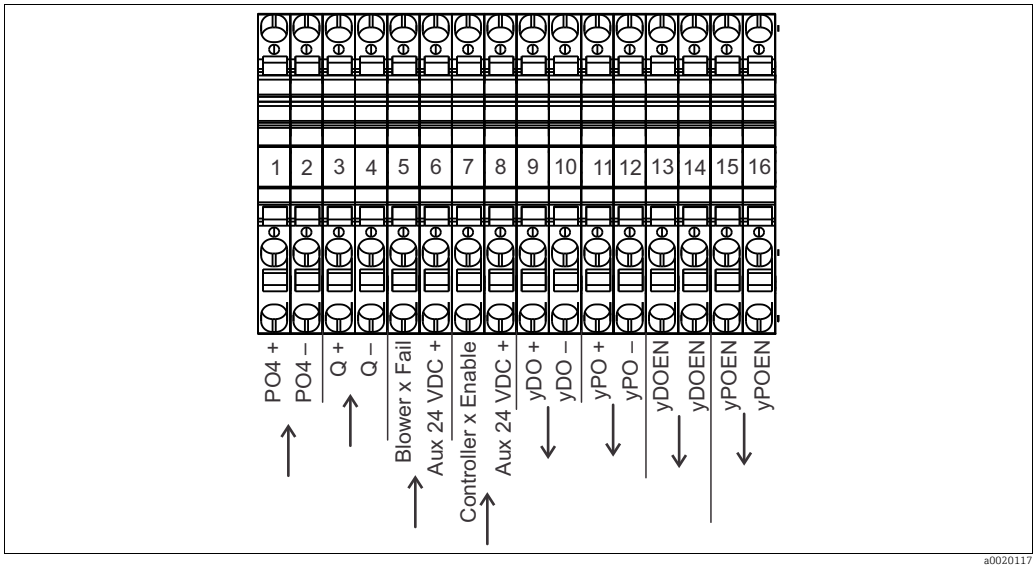
Fieldbus coupler



Fieldbus coupler (bottom view)

1 Serial interface (RS-232) for configuration
2 Connector base for external fieldbus (PROFIBUS DP)
3 Switches for client address

Terminal block X4 for zone 2



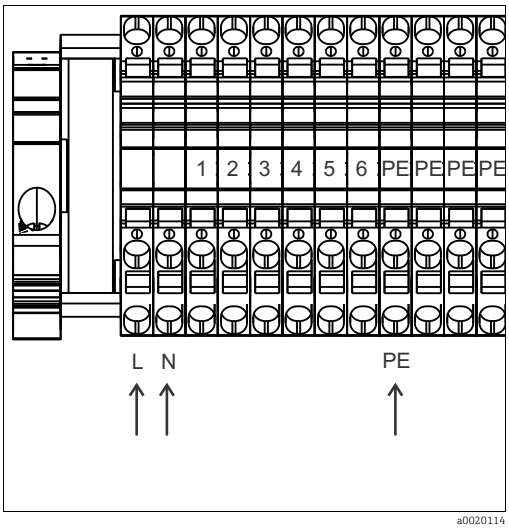
Terminal block X4 for zone 2 (identical to X5 and X6 for zones 3 and 4)

Terminal	Signal	Input/output	Source/target
1 & 2	Phosphate PO_4	Input (4 to 20 mA)	Analyzer
3 & 4	Flow Q	Input (4 to 20 mA)	Flowmeter
5 & 6	Blower fail	Input 24 VDC	Blower electronics
7 & 8	Controller enable	Input 24 VDC	Higher-level controller
9 & 10	Blower actuating variable yDO	Output (4 to 20 mA)	Blower electronics
11 & 12	Dosing pump actuating variable yPO	Output (4 to 20 mA)	Dosing pump electronics
13 & 14	Blower enable yDOEN	Output 24 VDC	Blower electronics
15 & 16	Dosing pump enable yPOEN	Output 24 VDC	Dosing pump electronics

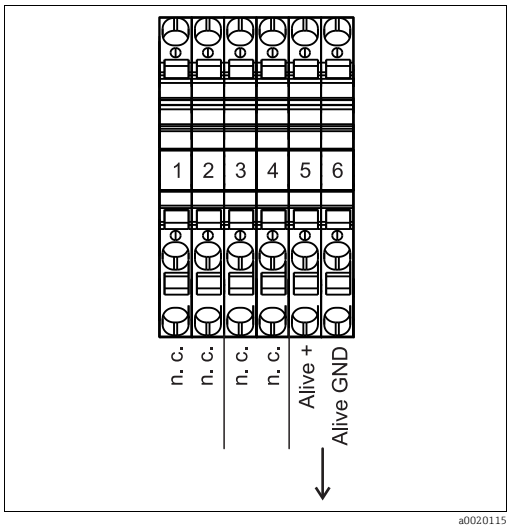
The signal assignment of terminal block X4 for zone 2 also applies for terminal blocks X5 and X6 for zones 3 and 4.

Power supply for main unit

Terminal block X1 and X2



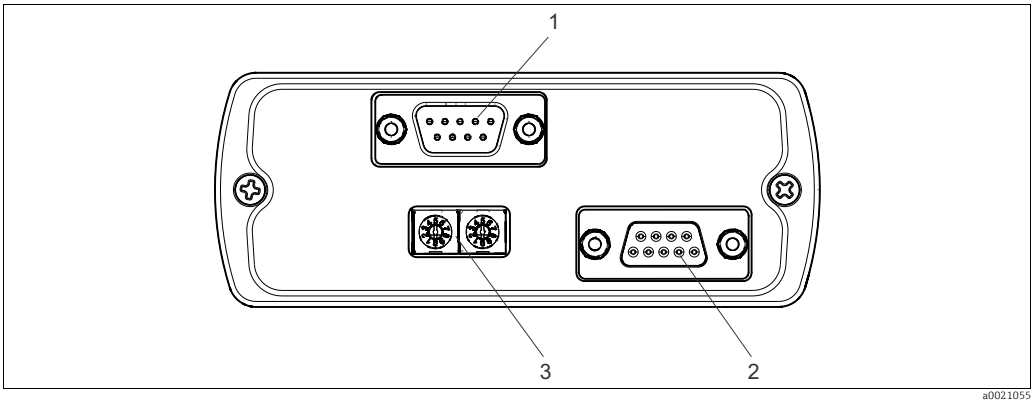
Terminal block X1 (mains connection)



Terminal block X2

Terminal	Signal	Input/output	Source/target
L (X1)	115/230 VAC	Input	Supply voltage
N (X1)	115/230 VAC	Input	Supply voltage
PE (X1)	Protective ground	Input	Supply voltage
1 & 2 (X2)	n. c.		
3 & 4 (X2)	n. c.		
5 & 6 (X2)	Alive (watchdog function)	Output 24 VDC	Status CDC80

Fieldbus coupler

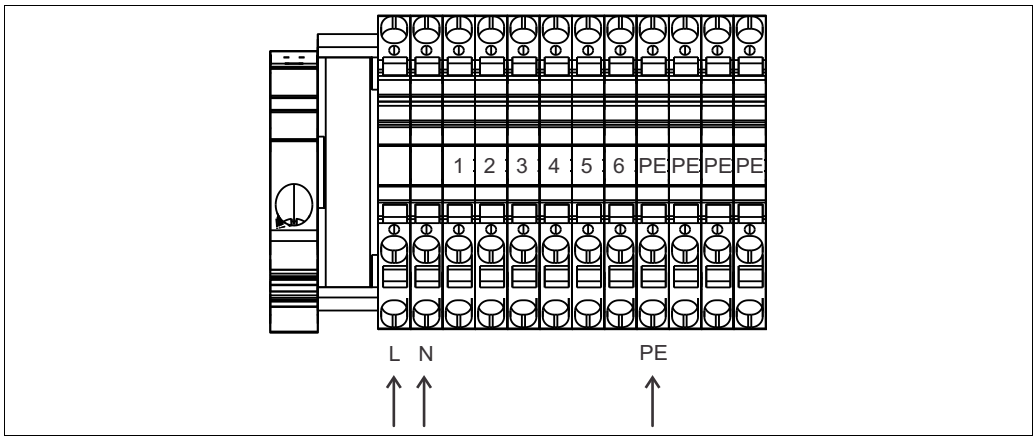


Fieldbus coupler (bottom view)

1 Serial interface (RS-232) for configuration
2 Connector base for external fieldbus (PROFIBUS DP)
3 Switches for client address

Power supply for connection unit

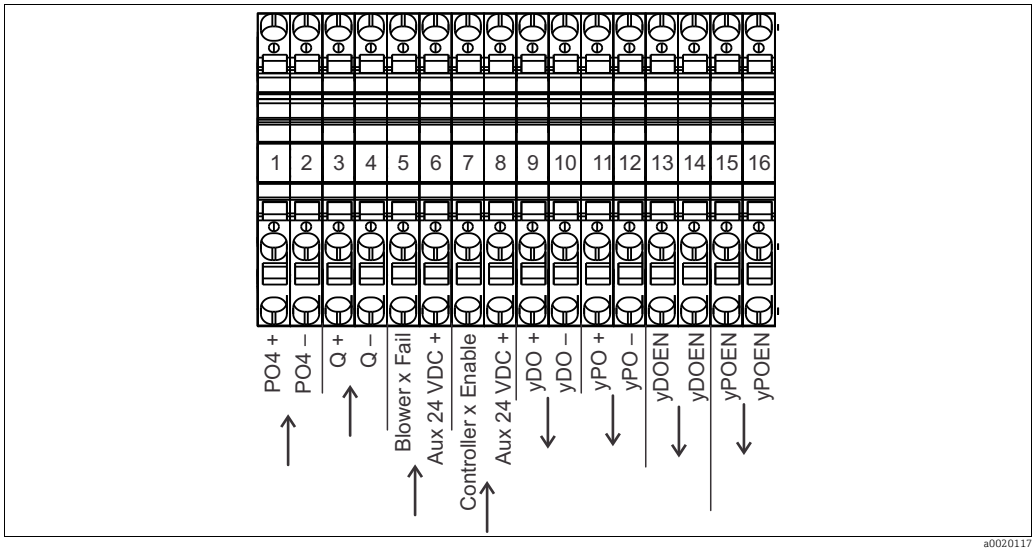
Terminal block X1



Terminal block X1 (mains connection)

Terminal	Signal	Input/output	Source/target
L	115/230 VAC	Input	Supply voltage
N	115/230 VAC	Input	Supply voltage
PE	Protective ground	Input	Supply voltage

Terminal block X3 for zone 2

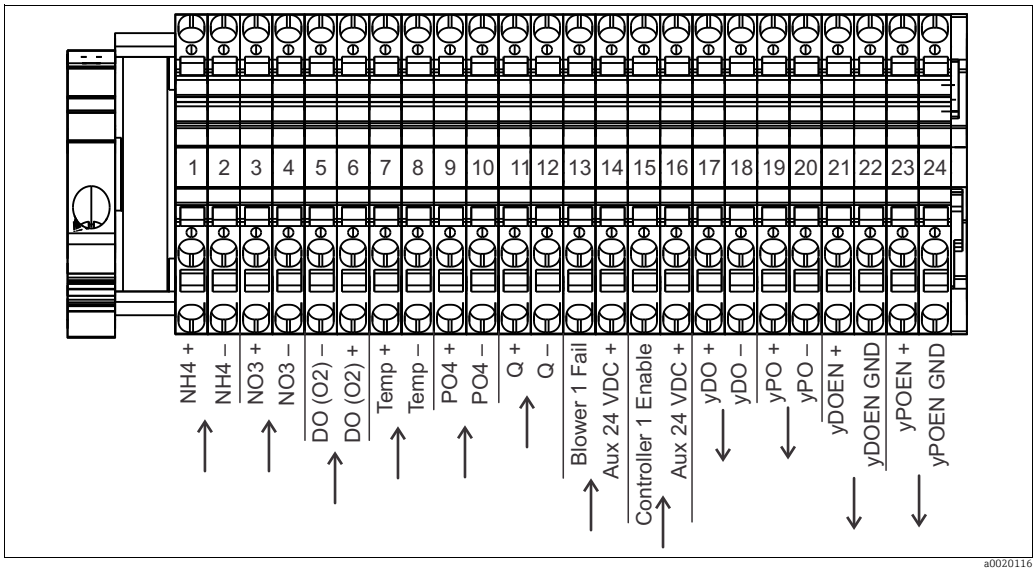


Terminal block X3 for zone 2 (identical to X4 and X5 for zones 3 and 4)

Terminal	Signal	Input/output	Source/target
1 & 2	Phosphate PO_4	Input (4 to 20 mA)	Analyzer
3 & 4	Flow Q	Input (4 to 20 mA)	Flowmeter
5 & 6	Blower fail	Input 24 VDC	Blower electronics
7 & 8	Controller enable	Input 24 VDC	Higher-level controller
9 & 10	Blower actuating variable yDO	Output (4 to 20 mA)	Blower electronics
11 & 12	Dosing pump actuating variable yPO	Output (4 to 20 mA)	Dosing pump electronics
13 & 14	Blower enable yDOEN	Output 24 VDC	Blower electronics
15 & 16	Dosing pump enable yPOEN	Output 24 VDC	Dosing pump electronics

The signal assignment of terminal block X3 for zone 2 also applies for terminal blocks X4 and X5 for zones 3 and 4.

Terminal block X2 for zone 1



Terminal block X2 for zone 1

Terminal	Signal	Input/output	Source/target
1 & 2	Ammonium NH_4	Input (4 to 20 mA)	Transmitter
3 & 4	Nitrate NO_3	Input (4 to 20 mA)	Transmitter
5 & 6	Oxygen O_2	Input (4 to 20 mA)	Transmitter
7 & 8	Temperature	Input (4 to 20 mA)	Transmitter
9 & 10	Phosphate PO_4	Input (4 to 20 mA)	Analyzer
11 & 12	Flow Q	Input (4 to 20 mA)	Flowmeter
13 & 14	Blower fail	Input 24 VDC	Blower electronics
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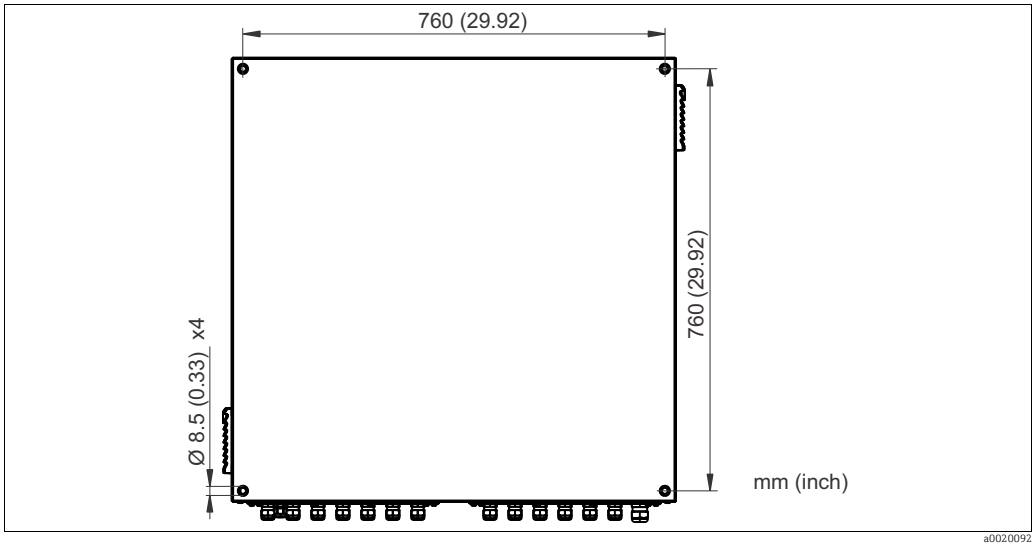
21 & 22	Blower enable yDOEN	Output 24 VDC	Blower electronics
23 & 24	Dosing pump enable yPOEN	Output 24 VDC	Dosing pump electronics

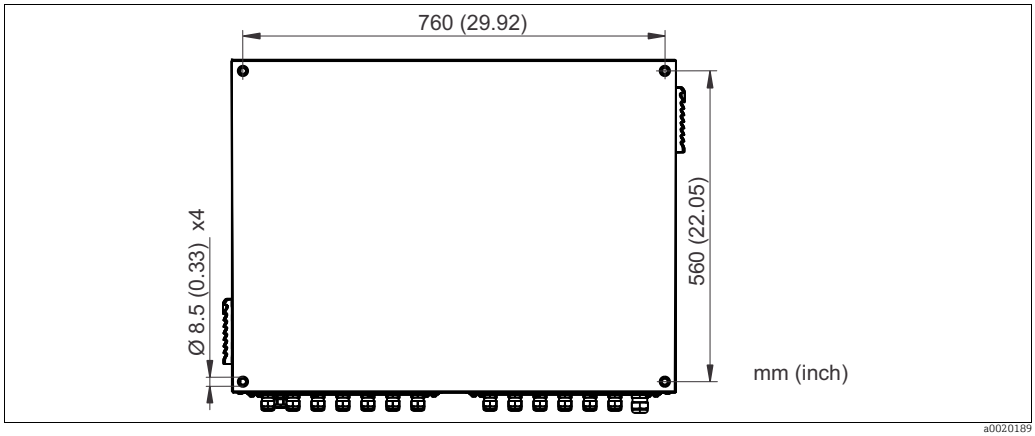
Installation

Installation conditions

Liquicontrol CDC80 is designed for indoor use.
The device is secured to the wall. Two people are needed to mount the device.



Drilling dimensions of the compact version



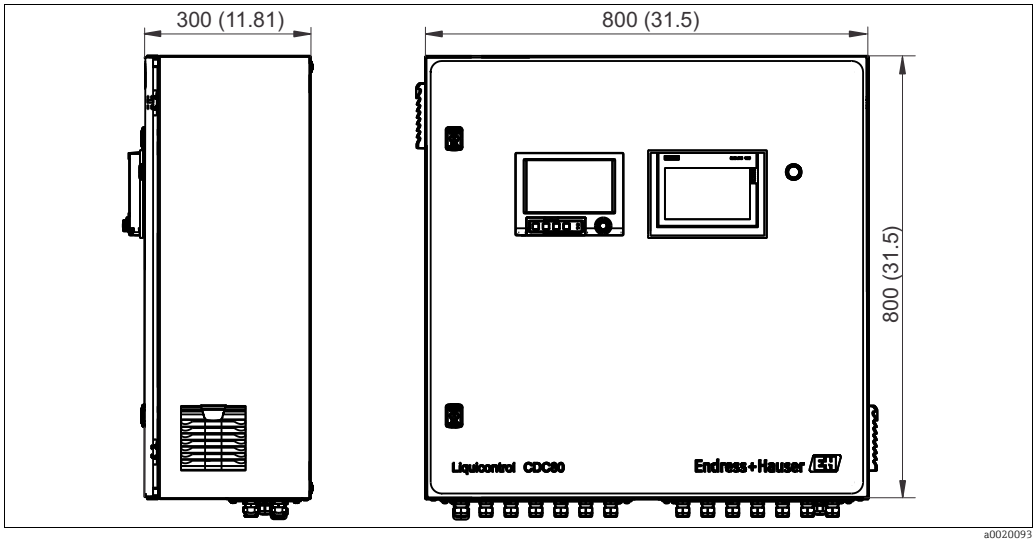
Drilling dimensions of the main and connection unit

Environment

Ambient temperature range	0 to 50 °C (32 to 122 °F)
Humidity	0 to 90 %, non-condensing
Degree of protection	IP 54

Mechanical construction

Dimensions



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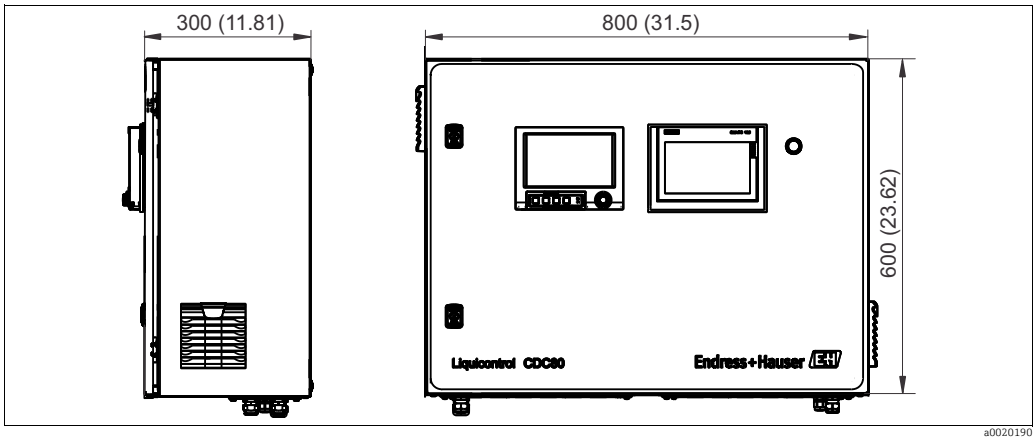
Dimensions of the compact version



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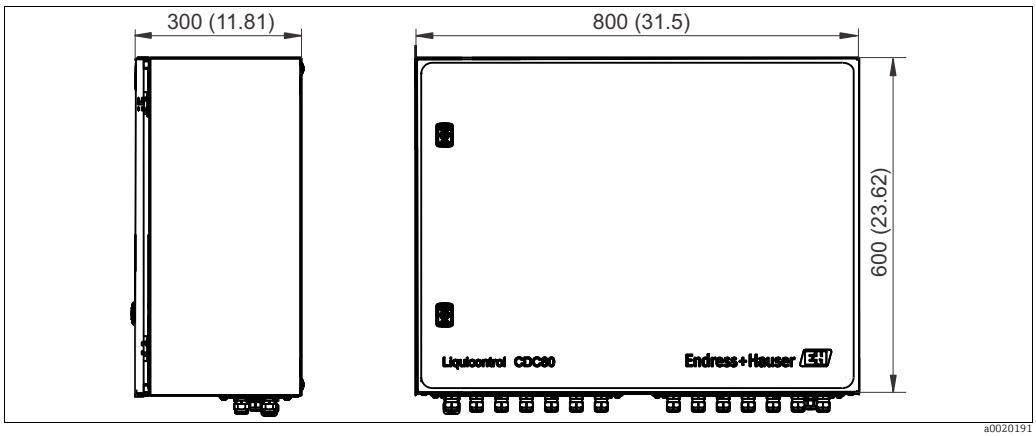
Dimensions of the main unit



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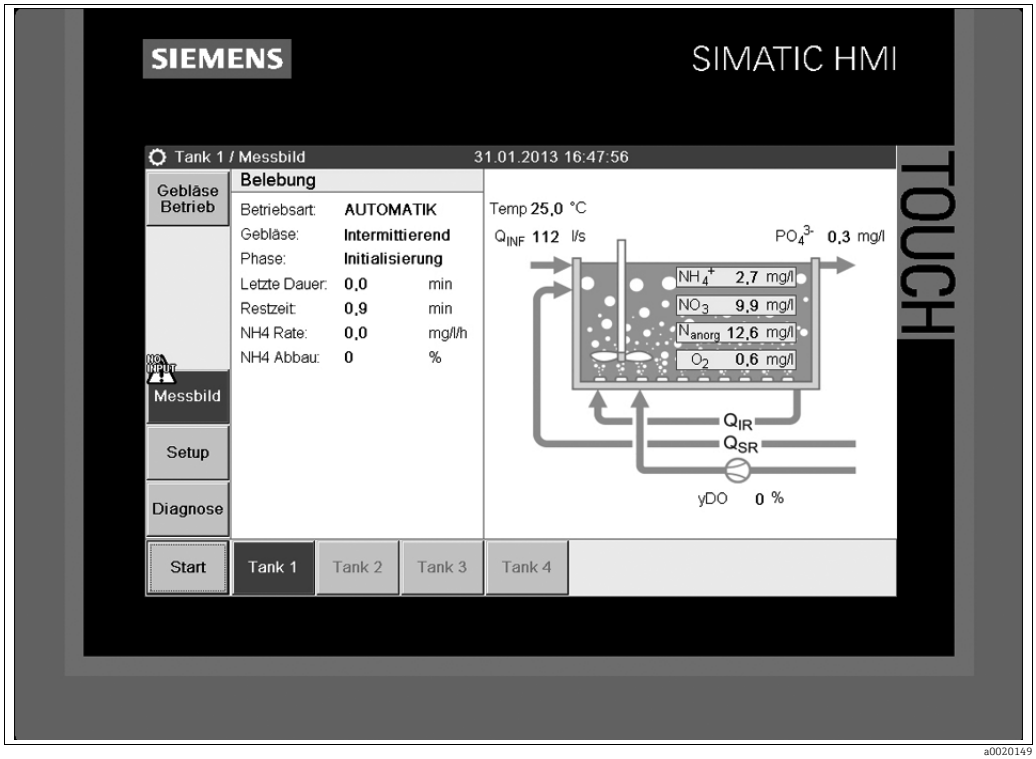
Dimensions of the connection unit

Weight	Compact version Main unit Connection unit	Approx. 55 kg (121 lbs) Approx. 40 kg (88 lbs) Approx. 35 kg (77 lbs)
Material	Housing	Sheet steel, painted

Operability

Local operation

Local operation is via a touch panel and the Memograph M RSG40 data recorder



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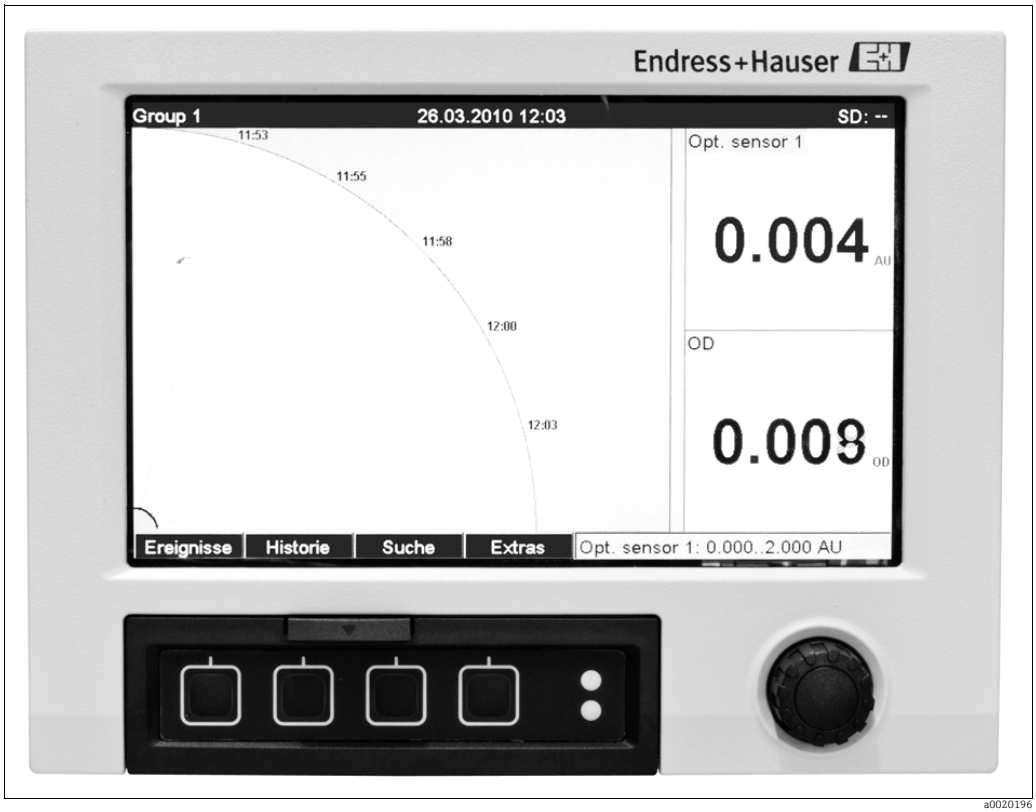
Touch panel



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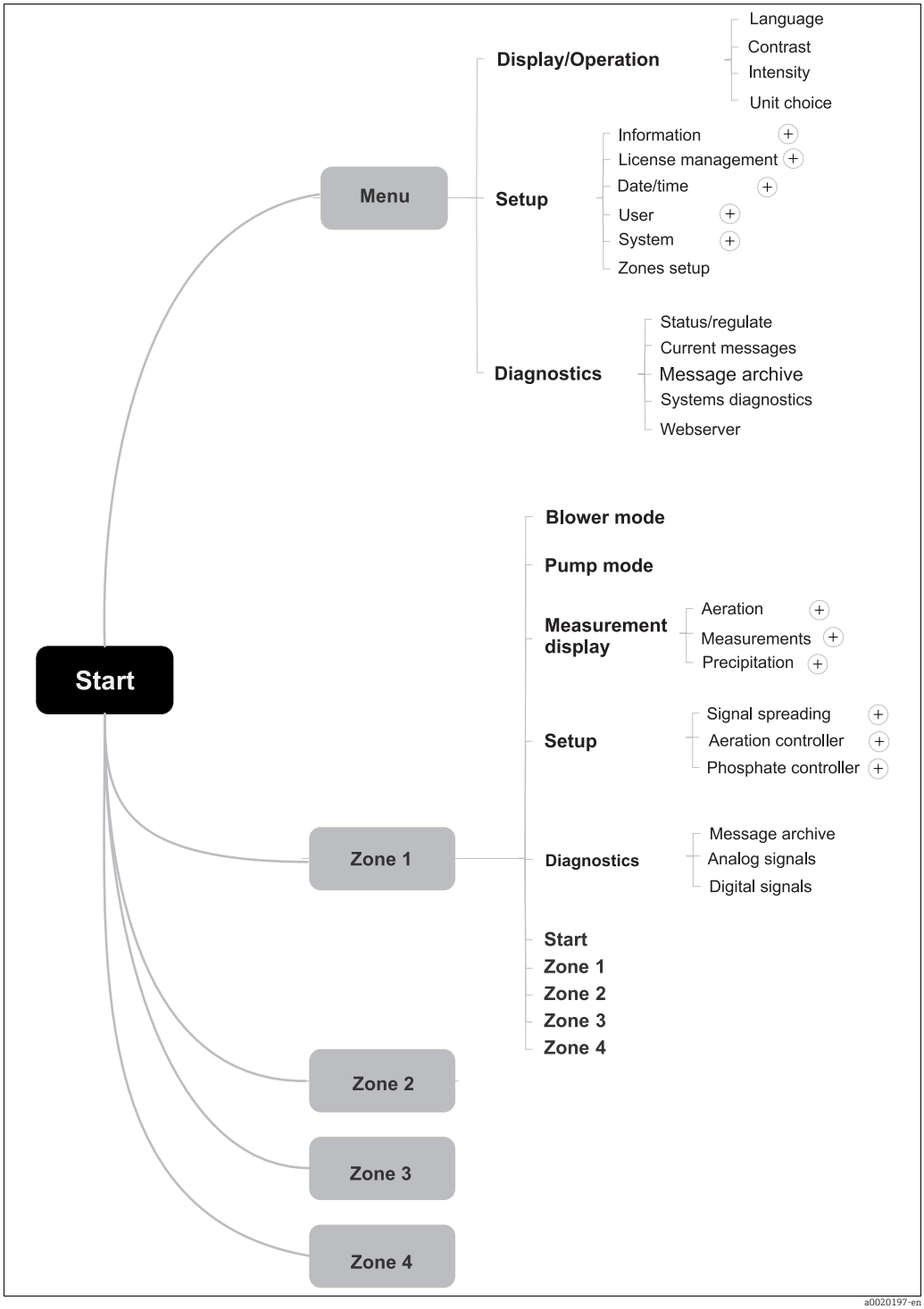
Memograph M RSG40 data recorder

Menu structure

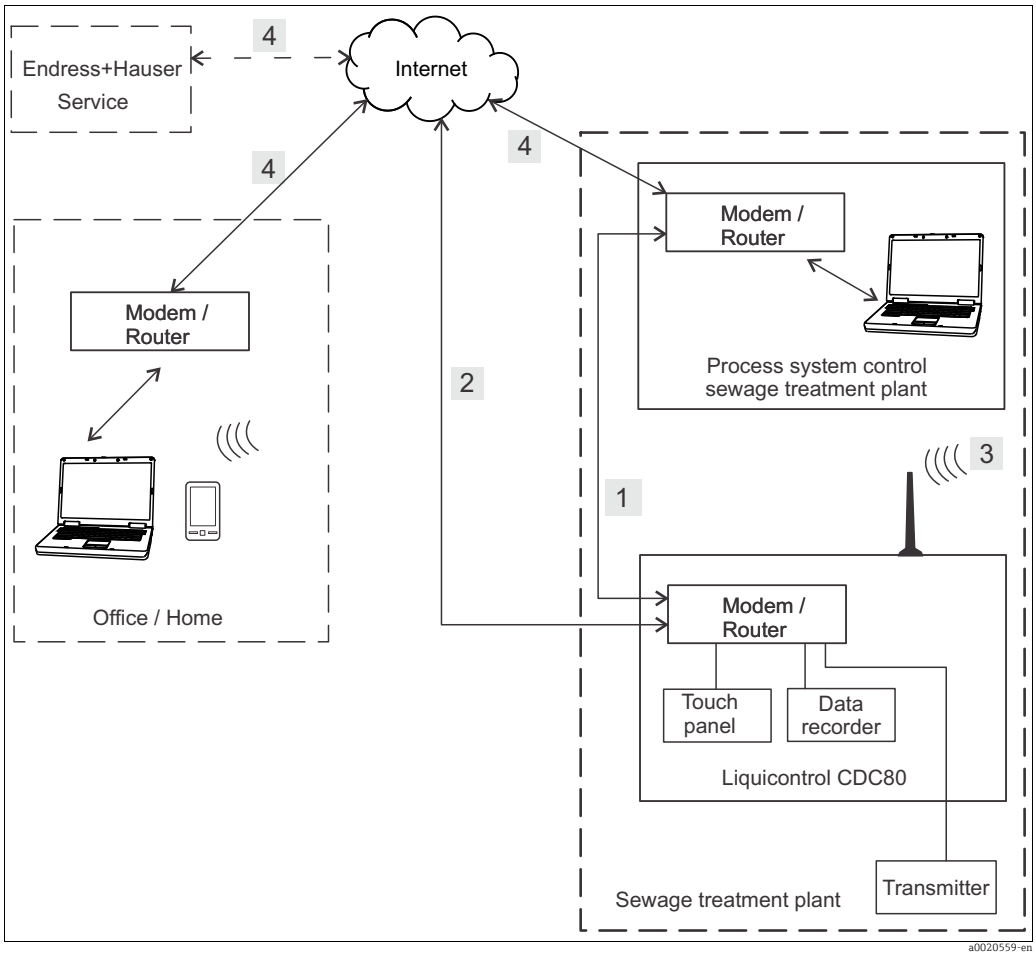


Menu structure

The menu structure of zone 1 is the same as the menu structures for zones 2-4.

Remote operation

Liquicontrol can easily be operated remotely. Its interface flexibility enables different communication channels.



Remote operation options

The following remote operation options are available:
- Ethernet connection to process control system (1)
- Cable connection to process control system via Internet (2 and 4)
  Can also be operated from office/home via Internet (2 and 4)
- Mobile connectivity to process control system via Internet (3 and 4)
  Can also be operated from office/home via Internet (3 and 4)

Ethernet connection
Liquicontrol is integrated into the existing ethernet (TCP/IP networks) of the process control system. In this way it is possible to access Liquicontrol from a desktop computer.
If the process control system has an Internet connection, this can also be used to access Liquicontrol without the need to establish an additional data connection via 2 or 3.

Internet connection
The Internet connection can be established via a telephone line (WAN / DSL) or via mobile connectivity (GPRS / EDGE / HSDPA).
The operator can choose between permanent remote availability and modem dial-in and dial-out following activation by a software switch in the touch panel menu structure.

Software
The function scope of data transmission includes access to the data recorder and the control unit via touch panel. This is accomplished using common Internet browsers (port 80) or via the following software packages that are available as accessories:

- Remote Desktop Connection
  The menu interface of the touch panel is presented on your desktop computer. Click the mouse to make changes conveniently from the desktop.
- Field Data Manager software
  The data signals and measured values of the data recorder can be downloaded via a visualization and analysis tool. As the files can be converted to Microsoft Office file formats, users can easily process the data further.

Ordering information

Ordering information

For ordering information please contact your local Endress+Hauser sales organization.

www.addresses.endress.com

Scope of delivery

The following items are included in the delivery:
- 1 Liquicontrol CDC80 in the version ordered
- Documentation
- License accessories
- Mounting material
- Magnet antenna
- Control cabinet key

Accessories

Software

Field Data Manager Software MS30
- PC software for central data management
- Visualization of series of measurements and logbook events
- SQL database for secure storage
- Order No. 71129799

Smart Access Software
- The licensed software enables the remote operation and maintenance of Liquicontrol CDC80
- From any workstation, worldwide
- Order No. 71203837

Interface module

Actuating variable converter
- Interface for the adaption of multiple blowers per control unit, for ON/OFF operation
- Up to 8 blowers per zone can be controlled with an actuating variable converter.
- Order No. 71201211

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