OPERATING MANUAL

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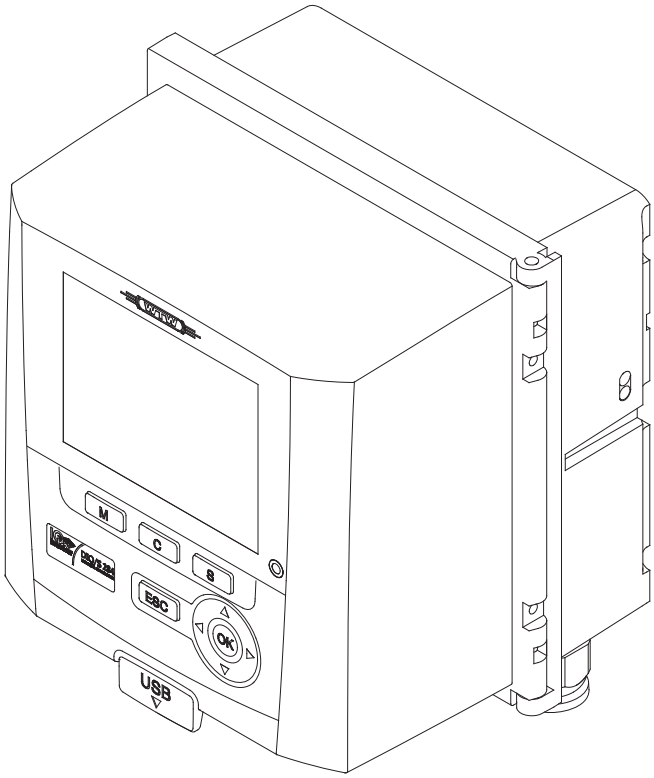


DIQ/S 282
DIQ/S 284

IQ SENSOR NET SYSTEM 28X FOR 2 OR 4 DIGITAL IQ SENSORS

WTW

a xylem brand

Contents

1 Overview

1.1 Structure and function

The IQ SENSOR NET System 28X is a modular measuring system for online analysis.

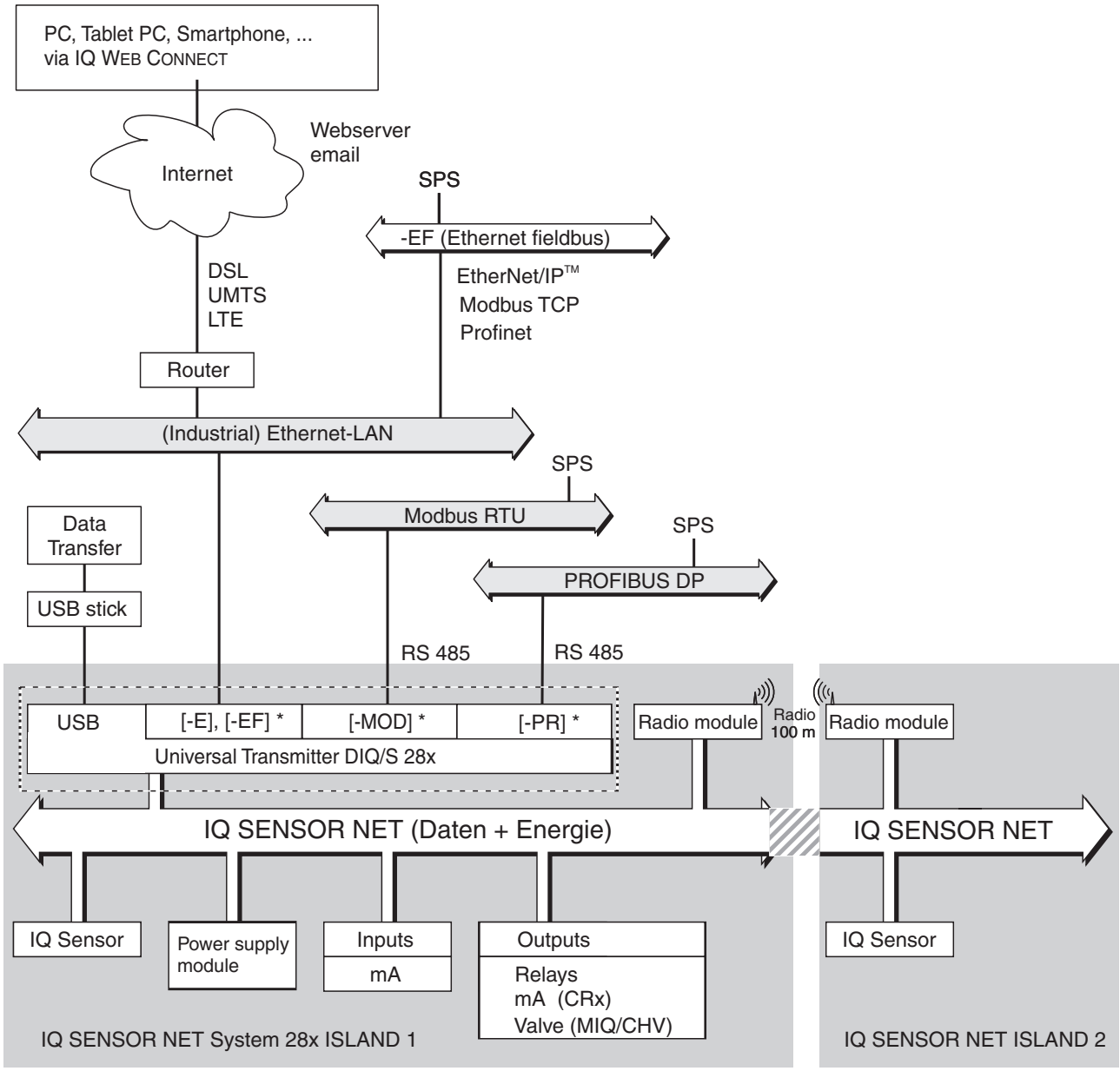


Fig. 1-1 Functional units of the IQ SENSOR NET System 28X
** depending on the variant, one of these interfaces is available at the system*

The functional units are connected with one another via a common line. The line consists of two wires and a shield. It transports digital information between the

Universal Transmitter and the other modules. At the same time it is used for the power supply of all components.

Sensors

All main and secondary measured parameters of the sensors connected can be displayed and administrated. Each sensor is automatically recognized after being connected and immediately starts measuring.

Universal Transmitter

The Universal Transmitter DIQ/S 28X[-XX] provides the core functions of the IQ SENSOR NET system (power supply, controller, terminal, relays).

The variants of the Universal Transmitters DIQ/S 28X enhance the IQ SENSOR NET System 28X by additional functions and interfaces.

Overview IQ SENSOR NET System 28X

	Function	DIQ/S 28X Variant(s)
Line power variants	Supply voltage 100 ... 240 V	[-XX]
	24 V	[-XX]/24V
Basic functions	Terminal	[-XX]
	Controller	[-XX]
	Power supply module	[-XX]
	Relay	[-XX]
	USB interface	[-XX]
	SENSORNET interface	[-XX]
Extended functions	Current outputs	-CR3[-XX], -CR6[-XX]
More interfaces	Ethernet interface	[-CRx]-E, -EF
	Fieldbus interface for connection to existing process control systems:	
	● Modbus	-MOD
	● Profibus	PR
	● Ethernet fieldbuses	-EF
Sensors	Max. 2 sensors	DIQ/S 282 [-XX]
	Max. 4 sensors	DIQ/S 284 [-XX]

Components to extend the system?

	Function	Component
Passive components	Power supply module	MIQ/PS
	Radio link (with power supply unit)	MIQ/WL PS
	Branching (interfaces for sensors)	DIQ/JB, MIQ/JB
Active components	Relay	DIQ/CR3, MIQ/CR3, MIQ/R6
	Current outputs	DIQ/CR3, MIQ/CR3, MIQ/C6
	Current inputs	MIQ/IC2
More components	Valve output	DIQ/CHV, MIQ/CHV Plus

Maximum extensibility of the system:

- Passive components: no limitation
- Valve outputs: maximum 1 output per sensor
- Active components: 2
  Example:
  The variant DIQ/S 284-CR6[-XX] already contains one active component (DIQ/CR3). The system can still be extended by one active component.

Branches

To be able to connect more sensors than there are SENSORNET connections available at a Universal Transmitter DIQ/S 28X, use the branching module DIQ/JB (accessory). The DIQ/JB branching module is a simple passive module for the branching of IQ SENSOR NET lines.

Relay and current outputs

The relay and current outputs can be linked with sensors. Linked outputs can be used to monitor sensors and for the output of measured values.

A relay output can be programmed as:

- Monitoring relay
- Limit monitor
- Proportional output of measured values (pulse width or frequency output)
- Control unit of a sensor cleaning system driven by compressed air.

A current output (system variant or extra component -CR3 or -CR6) is programmable as:

- Analog output
- PID controller

For quick orientation, the states of all relay and current outputs are clearly indicated on the display.

Compressed air-driven cleaning system

The DIQ/S 28X Universal Transmitter is prepared for the compressed air-driven, time-controlled sensor cleaning function. For this, a DIQ/CHV valve module and if necessary a CH cleaning head is required per sensor (both available as accessories). The cleaning procedure is controlled by the Universal Transmitter. The Universal Transmitter provides the supply voltage and control relay for the compressed air valve in the DIQ/CHV valve module. This enables a simple setup and uncomplicated wiring.

Alternatively, the MIQ/CHV PLUS valve module can be installed in the system. It combines the relay, valve and valve power supply in one MIQ enclosure. Thus, no additional wiring is required, which makes installation easier especially if the distance between the Universal Transmitter and sensor is great.

If necessary, an additional power pack can be added to supply sensors with high power consumption (e.g. UV/VIS sensor).

Example of a simple system

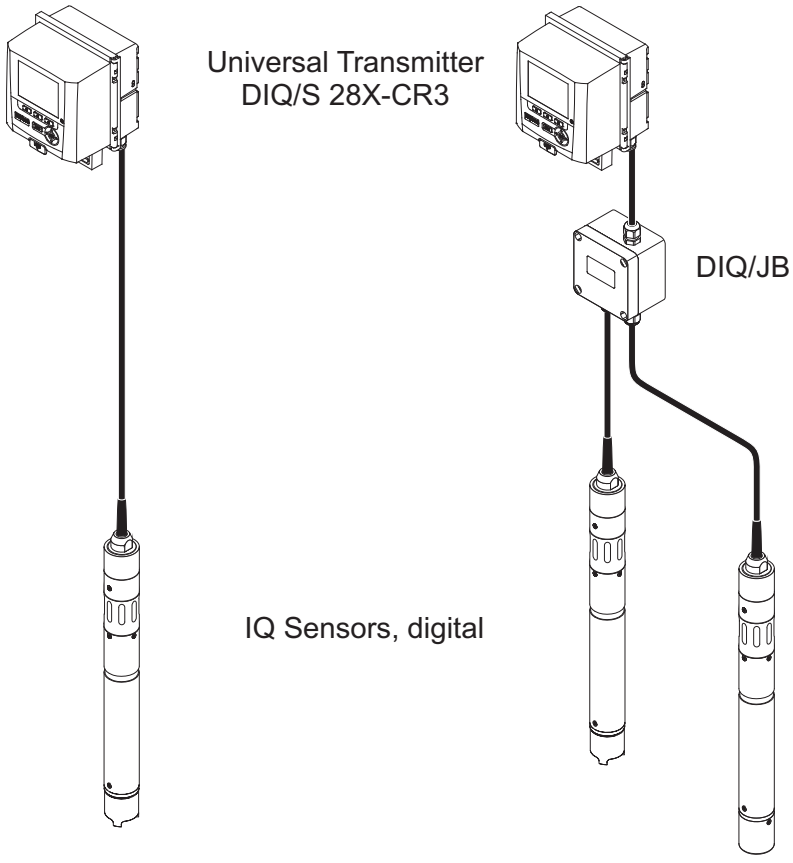


Fig. 1-2 Simple systems with one and two sensors

1.2 Functions in the IQ SENSOR NET

The functions of the IQ SENSOR NET are provided by the system (DIQ/S 28X) and the retrofitting components. Details on the functions listed can be found in the relevant system or components operating manuals.

Function	Operating manual
Alarm messages	System
Analog output	System
Data logging	System
Data logging	IQ WEB CONNECT
Data transmission	IQ WEB CONNECT
Data communication (Profibus DP, Modbus RTU, Profinet, Modbus TCP, EtherNet/IP)	Fieldbus linking
Data communication Ethernet	System, fieldbus linking
Data logger	System
Webserver, Email server	System
Frequency output	System, relay output module
Limit monitor	System, relay output module
Calibration history	System
List of outputs, list of sensors	System
Log book	System
Log book (messages from components)	IQ Sensor, output module
Measured value representation (4 types)	System
Password	System
PID controller	System, current output module
Pulse-width output	System, relay output module
Sensor cleaning	System, relay output module Valve module, Cleaning Air Box
Local settings	System
Daily load diagram, weekly load diagram, monthly load diagram	System
Monitoring functions (sensors, system)	System, current or relay output module, fieldbus linking

1.3 Interfaces

1.3.1 USB interface

The USB interface of the DIQ/S 28X provides the following functions:

- Connection of a USB memory for the transfer of data (see section 4.9)
  - Measured data
  - Calibration data
  - Configuration data
  - Log book
  - IQ LabLink data
- Connection of a USB memory device to be used as an electronic key for simple access to the system when access control is switched on (see section 5.3.3)
- Connection of a USB hub for the reproduction of the USB interface.

NOTE:
The USB interface is designed for USB memory devices with a maximum power consumption of 1 watt. USB memory devices with a higher power consumption have to be supplied with power by an extra power supply. If these instructions are not complied with, the availability of the system can be adversely affected.

The USB interface is equipped with a protective cover.
Only remove the protective cover when you want to connect a USB device. Immediately close the USB connection again when you have removed the USB device.
When the USB connection is open, there is a danger of corrosion.

1.3.2 Ethernet interface (DIQ/S 28X-E[F])

The Ethernet interface of the DIQ/S 28X -E[F] provides the following functions:

- Integration into an Ethernet network (see section 6)
- Monitoring and remote control via the Internet (IQ WEB CONNECT)
- E-mail feature

1.3.3 Fieldbus interface (DIQ/S 28X -MOD, -PR, -EF)

The following variants of the DIQ/S 28X have a fieldbus interface:

DIQ/S 28X variant	Fieldbus connection
DIQ/S 28XPR	PROFIBUS DP
DIQ/S 28X-MOD	Modbus RTU/RS 485
DIQ/S 28X[-CRx]-EF	Ethernet fieldbuses (EtherNet/IP™, Profinet, Modbus TCP)

1.4 Behaviour of the system to a power failure

- The system configuration is permanently retained. It consists of the following settings:
  - Sensor settings
  - Settings and links of the relay outputs
  - Settings and links of the current outputs
  - System settings (display language, air pressure/altitude, passwords etc.)
- Linked relay outputs switch to the non active condition (open).
- Linked current outputs switch to the non active condition (0 mA).
- A restart is carried out automatically when the power returns. The continues working with the settings of the time prior to the power failure.
  If the power failure lasted several hours the system clock has to be reset.

2 Safety

2.1 Safety information

2.1.1 Safety information in the operating manual

This operating manual provides important information on the safe operation of the product. Read this operating manual thoroughly and make yourself familiar with the product before putting it into operation or working with it. The operating manual must be kept in the vicinity of the product so you can always find the information you need.

Important safety instructions are highlighted in this operating manual. They are indicated by the warning symbol (triangle) in the left column. The signal word (e.g. "CAUTION") indicates the level of danger:

WARNING
indicates a possibly dangerous situation that can lead to serious (irreversible) injury or death if the safety instruction is not followed.

CAUTION
indicates a possibly dangerous situation that can lead to slight (reversible) injury if the safety instruction is not followed.

NOTE
indicates a situation where goods might be damaged if the actions mentioned are not taken.

2.1.2 Safety signs on the product

Note all labels, information signs and safety symbols on the product. A warning symbol (triangle) without text refers to safety information in this operating manual.

2.1.3 Further documents providing safety information

The following documents provide additional information, which you should observe for your safety when working with the measuring system:

- Operating manuals of other components of the IQ SENSOR NET system (power supply modules, accessories)
- Safety datasheets of calibration and maintenance equipment (e.g. cleaning solutions).

2.2 Safe operation

2.2.1 Authorized use

The authorized use of the DIQ/S 28X Universal Transmitter consists of its use in online analysis. Only the operation and running of the sensor according to the instructions and technical specifications given in this operating manual is authorized (see chapter 10 TECHNICAL DATA). Any other use is considered unauthorized.

2.2.2 Requirements for safe operation

Note the following points for safe operation:

- The product may only be operated according to the authorized use specified above.
- The product may only be operated under the environmental conditions mentioned in this operating manual.
- The product may only be supplied with power by the energy sources mentioned in this operating manual.
- The product may only be opened if this is explicitly described in this operating manual (example: connecting electrical lines to the terminal strip).

2.2.3 Unauthorized use

The product must not be put into operation if:

- it is visibly damaged (e.g. after being transported)
- it was stored under adverse conditions for a lengthy period of time (storing conditions, see chapter 10 TECHNICAL DATA).

2.3 User qualification

Target group

The IQ SENSOR NET System 28X was developed for online analysis. Some maintenance activities, e.g. changing the membrane caps in D.O. sensors, require the safe handling of chemicals. Thus, we assume that the maintenance personnel is familiar with the necessary precautions to take when dealing with chemicals as a result of their professional training and experience.

Special user qualifications

The following installation activities may only be performed by a qualified electrician:

- Connection of the DIQ/S 28X to the power supply.
- Connection of external, line voltage-carrying circuits to relay contacts (see module manual of the relay output module).

3 Installation

3.1 Scopes of delivery

The following parts are included in the scope of delivery:

- DIQ/S 28X Universal Transmitter
- Accessory kit with:
  - Contact carrier with screws
  - ISO cap nuts with screws and ring washers
  - Cable glands with sealing gaskets
- Operating manual.

3.2 Basic principles of installation

3.2.1 Requirements of the measurement location

The measurement location must meet the environmental conditions specified in section 10.1 DIQ/S 282, DIQ/S 284.

Controlled environmental conditions

Work on the open instrument (e.g. during mounting, installation, maintenance) may only be carried out under controlled environmental conditions:

Temperature	+ 5 °C ... + 40 °C (+ 41 ... +104 °F)
Relative humidity	≤ 80 %

3.3 Safety requirements of the electrical installation

Electrical equipment (such as motors, contactors, cables, lines, relays, switches, instruments) must meet the following requirements:

- Compliance with national regulations (e.g. NEC, VDE and IEC)
- Suitability for the electrical conditions at the place of installation
  - Maximum operational voltage
  - Maximum operational current
- Suitability for the ambient conditions at the place of installation
  - Temperature resistance (minimum and maximum temperature)
  - Stability against UV light in the case of outdoor usage
  - Protection against water and dust (IP type of protection).
- Suitable fuse protection of the electrical circuit
  - Overcurrent protection devices

(according to the technical data of the instrument input or output)

– Overvoltage limitations of overvoltage category II

- Suitable external separator (e.g. switch or circuit-breaker) for the power supply of permanently installed instruments with separate power connection
  – compliant with the following regulations
    - IEC 60947-1
    - IEC 60947-3
  – in the vicinity of the instruments (recommendation)
- Flame resistant (cable and lines),
  compliant with the following regulations
  – UL 2556 VW-1 (for USA, Canada)
  – IEC 60332-1-2 (outside the USA, Canada)

3.4 Installation guidelines for lightning protection

During the use of the DIQ/S 28X universal transmitter, particularly in outdoor areas, adequate protection against (electrical) surges must be provided. A surge is a summation phenomenon of surge voltage and surge current. It is generated through the indirect effect of a lightning event or switching operation in the mains, in the grounding system and in information technology lines.

To be adequately protected against the damaging effects of surges, an integrated concept of the following protective measures is required:

- internal device-related protective measures and
- external protective measures of the installation environment.

The internal device-related protective measures are already integrated in the WTW online instrumentation as so-called 'lightning protection' (see chapter 10 TECHNICAL DATA).

The external protective measures of the installation environment can be carried out with respect to the following guidelines:

1 All lines of systems must be
  a) installed inside (or else close to) the grounded metallic mounting constructions, e.g. handrails, pipes and posts if possible
  b) or, particularly in the case of longer lines, laid in the ground.

  Background: The formation of highly lightning hazardous inductive loops between the cables and ground is avoided through the low clearance of the grounded metal construction or by installation in the ground.

2 Only IQ cable material may be used. This cable material is an important prerequisite for the hazard-free discharging of the surge without inadmissibly high overvoltages developing along the line at the same time that could have a damaging effect on the individual components.

3 All metallic mounting constructions (handrails, pipes, posts etc.) on which

DIQ modules are installed must be connected to the local potential equalization system and the grounding system or must be individually sufficiently grounded locally according to the codes of practice.
For the individual grounding of the measuring point the mounting construction must be solidly connected by means of a large-area auxiliary electrode with the measuring medium.
Metallic control shafts/pipes and other large-area metallic bodies that reach into the measuring medium are, for example, ideal for use in the grounding of the mounting construction.
This creates a set path for the main surge. As a result it is possible to avoid the surge being discharged via the cable and via the valuable sensor in the measuring medium.

4 It is recommended to attach a metallic or nonmetallic sun shield to each outside location of the DIQ modules. Sun shields protect the electric field lines in the area of the DIQ module due to an advantageous development of the electrical field lines in the area of the MIQ module and promote the dissipation of the surge via the mounting construction.

5 The line voltage for the supply of the IQ SENSOR NET must comply with overvoltage category II. Generally this is ensured through the public operator of the power supply networks. In company-owned networks, e.g. in all power supply systems owned by wastewater treatment plants, this must be kept separate by a potential equalization and a surge protection system for the plant.

6 One part of the safety and lightning protection concept is based on high-grade protective insulation of the IQ SENSOR NET. It does not have or require any protective ground conductor or earth terminal. Avoid any direct contact of any SENSOR connections or the metallic sensor enclosures with the local grounding or potential equalization system and with metallic construction elements (see point 8).

7 Additional external lightning protection measures, e.g. the use of overvoltage surge arresters, are not necessary for protection against the indirect effects of lightning and could possibly result in malfunctions.

8 For the realization of the internal lightning protection of the system (e.g. wastewater treatment plant control stands) and for the protection of external resources, cable entry points into buildings or distributions coming from the DIQ/S 28X must be carried out as follows:

– The shield of SNCIQ or SNCIQ-UG cables can be connected to the local potential equalization with a gas overvoltage arrester. Use shield clamps for the contacting of the shield. The shield of the cable must not be opened under any circumstances.

– 0/4-20 mA interfaces must be realized with shielded cables. The cable shield must be connected directly to the potential equalization(s) provided. If plant potential equalization systems are provided on both sides, the shield must also be connected on both sides. The inner conductors must have no contact with the potential equalization.

– Relay lines should be connected to the local potential equalization in order

to provide general and consistent protection via gas overvoltage surge arresters.

3.5 Drawing up the power rating

General information

The IQ SENSOR NET supplies all components with low voltage as well as digital communication via a shielded 2-wire line.

Because of this characteristic the energy consumption of all components must be taken into account (power rating) when planning an IQ SENSOR NET system. The energy consumption determines whether an additional power module is necessary.

Only IQ SENSOR NET products may be used in the IQ SENSOR NET.

Power rating - why?

All components in the system require a specific level of electrical power for operation. Thus, it is necessary to draw up a power rating after selecting the desired components. At the same time, this can determine whether the entire power requirement of all components (consumers) is covered by the internal power supply module of the Universal Transmitter. If this is not the case, the power available in the system must be increased by further MIQ power supply modules.

To operate the DIQ/S 28X safely, the power rating must meet the following condition for continuous operation and for power peaks:

Sum of the power requirement (continuous)	≤	Sum of the power delivery (continuous)
Sum of the power requirement (peak)	≤	Sum of the power delivery (peak)

The power rating provides an initial guide value. In specific limiting cases, the power supply may be insufficient despite the positive power rating.

Example: Temperatures above 47 °C (117 ° F) reduce the available power output of the DIQ/S 28X (see TEMPERATURE DEPENDENCY (DEGRADATION) OF THE MAXIMUM ALLOWED P(CONTINUOUS), page 25). The reduced power output may possibly have to be compensated for with further MIQ power supply modules.

Maximum allowed power delivery of IQ SENSOR NET components

The maximum allowed power delivery of the power supply components of the IQ SENSOR NET is given in the following table:

Component	Power delivery [W]	
	Continuous	Peak
IQ sensors		
DIQ/S 28X	6.5	12
MIQ/PS	18	18
MIQ/WL PS	7	7

The power requirement of the individual components is listed in the following table:

Power requirement of IQ SENSOR NET components

Component	Power requirement [W]	
	Continuous	Peak
IQ sensors		
SensoLyt® 700 IQ (SW)	0.2	0.2
TriOxmatic® 70x IQ (SW)	0.2	0.2
FDO® 70x IQ (SW)	0.7	0.7
TetraCon® 700 IQ (SW)	0.2	0.2
VisoTurb® 700 IQ (SW)	1.5	1.5
ViSolid® 700 IQ (SW)	1.5	1.5
AmmoLyt® *Plus* 700 IQ	0.2	0.2
NitraLyt® *Plus* 700 IQ	0.2	0.2
VARiON® *Plus* 700 IQ	0.2	0.2
Spectral sensors XXXVis® 7YY IQ (e.g. NiCaVis® 705 IQ)	3.5	8
UV 70x IQ NOx	3.5	8
UV 70x IQ SAC	3.5	8
IFL 700 IQ	3.0	5.5
IFL 701 IQ	3.0	3.0
P 700 IQ (MIQ/WCA 232)	0.5	0.5
MIQ modules		
MIQ/JB	0.1	0.1
MIQ/CR3	2.3	3.0
DIQ/CR3	2.3	3.0
MIQ/C6	2.0	3.0
MIQ/R6	1.2	1.5

Component	Power requirement [W]	
	Continuous	Peak
MIQ/IC2	0.2 + 2.2 W per connected WG 21 A7 power supply/isolator	0.2 + 2.2 W per connected WG 21 A7 power supply/isolator
DIQ/CHV	2.2 x rel. turn-on duration *	2.2 x rel. turn-on duration *
MIQ/CHV PLUS	0.2 + 2.3 x TD (rel. turn-on duration) *	2.5
MIQ/WL PS	0.6	0.6

* The following text informs about allowing for the relative turn-on duration (TD)

Allowing for the relative on-time in valves

Valves usually switch on periodically for a limited time and then require the nominal power. Crucial for the load on the power unit of the DIQ/S 28X is the time averaged (effective) power requirement that depends on the relative on-time, OT:

Relative on-time OT = t_{On} / (t_{On} + t_{Off})

The effective power requirement is the product of the nominal power of the valve component and the relative on-time:

P = $P_{nominal}$ * OT

Since OT is always < 1, the effective power requirement is always smaller than the nominal power of the valve component.

For the control of sensor cleaning systems operated by compressed air, a relative on-time of max. 0.1 has been adopted in practice.

Determining the number of additional MIQ power supply modules

From the value determined for the power requirement, determine the number of the MIQ power supply modules as follows:

Total power requirement P		Number of additionally required MIQ/PS power supply modules
P (continuous)	P (peak)	
P(c) ≤ 6.5 W	P(p) ≤ 12 W	-
P(c) ≤ 6.5 W	P(p) > 12 W	1
P(c) > 6.5 W		1

Calculation example:

Example configuration 1	**Power requirement [W] (component)**	
	Continuous	**Peak**
+ 1 FDO® 700 IQ	0.7	0.7
NitraVis® 705 IQ	3.5	8
MIQ/CHV PLUS (TD = 0.9)	2.27 (= 0.2 + 2.3 x 0.9)	2.45 (= 0.2 + 2.5 x 0.9)
Total power requirement P [W] (sum of the components)	**P (continuous): 6.47**	**P (peak): 11.15**

Result:
Total power requirement P (continuous) < 6.5 W
Total power requirement P (peak) < 12 W

No additional power supply module is required.

Example configuration 2	**Power requirement [W] (component)**	
	Continuous	**Peak**
+ DIQ/CR3 also as element of the DIQ/S 284-CR6[-XX]	2.3	3.0
+ 1 FDO® 700 IQ	0.7	0.7
NitraVis® 705 IQ	3.5	8
MIQ/CHV PLUS (OT = 0.9)	2.27 (= 0.2 + 2.3 x 0.9)	2.45 (= 0.2 + 2.5 x 0.9)
Total power requirement P [W] (sum of the components)	**P (continuous): 8.77**	**P (peak): 14.15**

Result:
Total power requirement P (continuous) > 6.5 W
Total power requirement P (peak) > 12 W

An additional power supply module is required.

Temperature dependency (degradation) of the maximum allowed P(continuous)

If the DIQ/S 28X is operated at an ambient temperature below 47 °C (117 °F), the operator has to make sure that the total power requirement P (continuous) is not more than 6.5 W.

If the DIQ/S 28X is operated at an ambient temperature above 47 °C (117 °F), the allowed total power requirement P (continuous) is linearly reduced to 0.7 W at 55 °C (131 °F).

For the short-term total power requirement P (peak), no temperature dependency has to be taken into account.

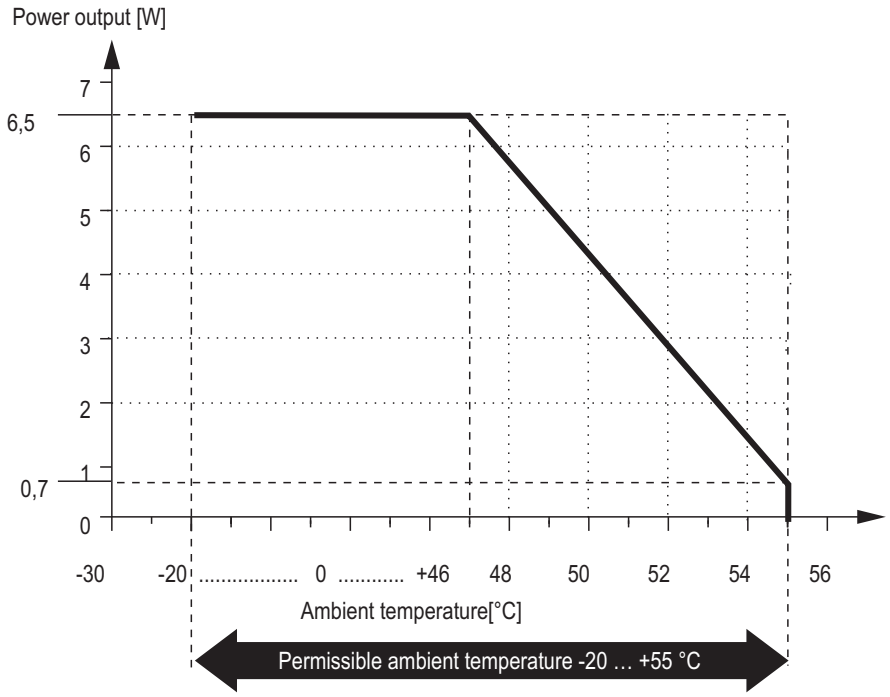


Fig. 3-1 Degradation line of the line power variant DIQ/S 28X[-XX]

If the DIQ/S 28X [-XX]/24V is operated at an ambient temperature below 47 °C (117 °F), the operator has to make sure that the total power requirement P (continuous) is not more than 6.5 W.

If the DIQ/S 28X[-XX]/24V is operated at an ambient temperature above 47 °C (117 °F), the allowed total power requirement P (continuous) is linearly reduced to 4 W at 55 °C (131 °F).

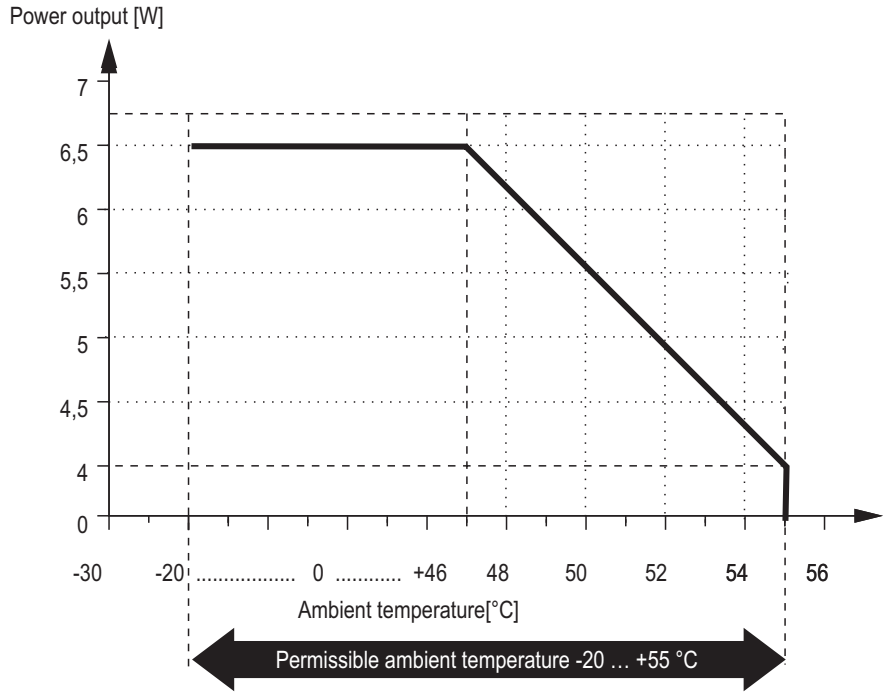


Fig. 3-2 Degradation line of the 24V variant DIQ/S 28X[-XX]/24V

3.6 Connecting the sensor

The sensors are connected to a SENSORNET connector of the DIQ/S 28X.

General installation instructions

Lines must always be installed separately at a minimum distance of 20 cm from other lines that carry a voltage greater than 60 V.

The free end of the sensor cable was stripped in the factory and all the wires are fitted with wire end sleeves.

Tools

- Phillips screwdriver
- Small screwdriver.

NOTE

The sensor cable may only be connected to the SENSORNET connections. No wire of the cable may be connected with an external electrical potential. Otherwise, malfunctions could occur.

1 On the left-hand side of the DIQ/S 28X, remove the two countersunk screws and open the enclosure.

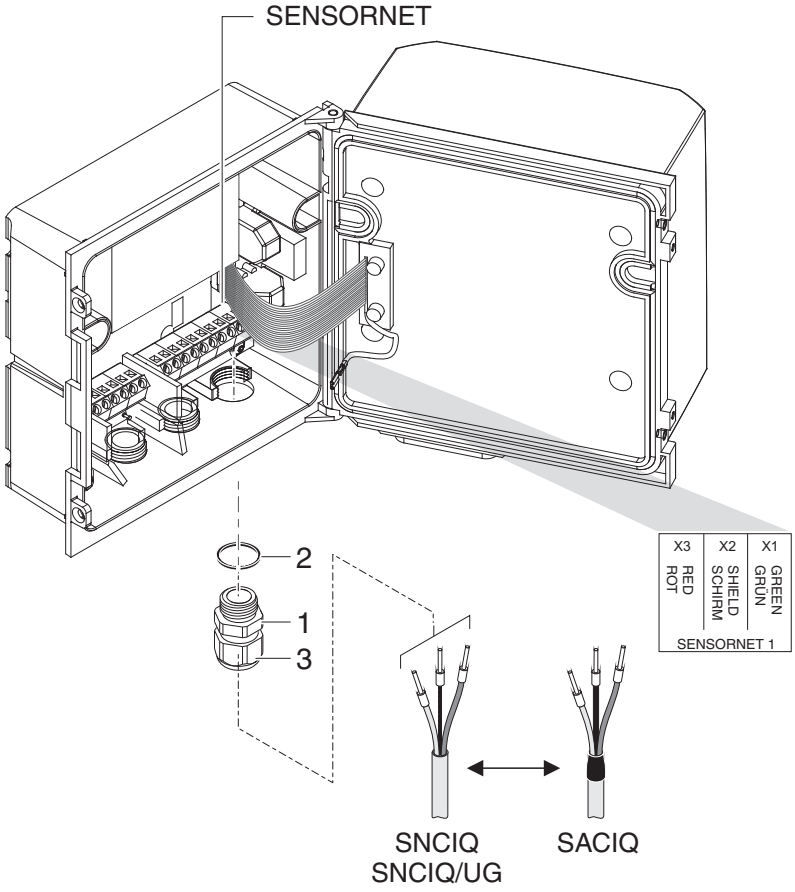


Fig. 3-3 Connecting the cable (example DIQ/S 28XCR3)

2 Screw the cable gland (no. 029 212, pos. 1 in Fig. 3-3) with the sealing (pos. 2) into the housing at the mounting position for the SENSORNET connection (see label on the bottom of the housing)

3 Loosen the cap nut (pos. 3 in Fig. 3-3).

4 Feed the sensor cable through the cable gland into the enclosure.

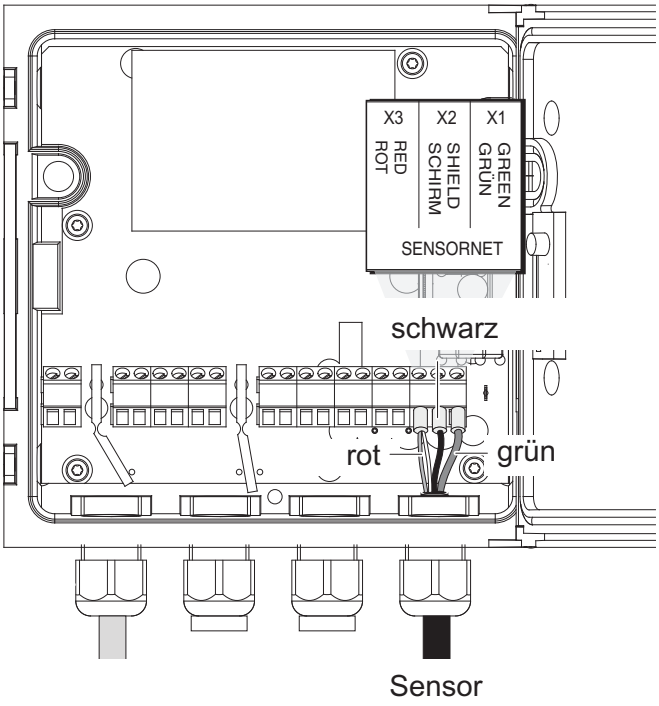


Fig. 3-4 SENSORNET connector (example DIQ/S 28X CR3)

5 Connect the cable ends to the terminal strip. At the same time, look out for the designations of the terminals (red / shield / green).

6 Tighten the cap nut (pos. 3 in Fig. 3-3).

7 Close the enclosure.

The complete assignment of the terminal strip is shown in section 3.13.

For further instructions on the mounting of the sensor at the application location, please refer to the relevant manual (immersion depth, etc.).

3.7 On-site mounting of the DIQ/S 28X

3.7.1 General information

The universal transmitter DIQ/S 28X is designed for stationary installation. With the aid of mounting accessories, the setup can be adjusted to meet various requirements.

NOTE
Components installed outside must always be protected by a sun shield against the effects of the weather (snow, ice and direct solar radiation). Otherwise, malfunctions can result. Always mount the universal transmitter in an upright position. Do not under any circumstances install the universal transmitter without rain protection with the lid facing upwards (danger of retained humidity and penetration of moisture).

NOTE
No contact base may be mounted on the back of the module (danger of short-circuit!) if the module is mounted on a wall, a sun shield, or a top hat rail.

Installation options

The most important types of installation for the universal transmitter are described in the following chapters:

- **Mounting with sun shield SSH/IQ:**
  (see section 3.7.2).
- **Mounting to the sun shield SD/K 170**
  The sun shield SD/K 170 provides room for the universal transmitter. The sun shield can be mounted to round or square section pipes (e.g. rails) with the aid of the MR/SD 170 mounting kit (section 3.7.3).
- **Wall mounting:**
  The universal transmitter is permanently fixed to a wall. For wall mounting, use the WMS/IQ mounting set (see chapter 11 ACCESSORIES AND OPTIONS).
- **Panel mounting:**
  The universal transmitter is mounted in the aperture of a switch panel. The dimensions of the aperture are 138 mm x 138 mm. The panel may not be thicker than 10 mm (section 3.7.5).
  To install the interface (MOD, PR, E, EF) of the DIQ/S 28X [-MOD], [-PR], [-E(F)] behind the panel, use the PMS/IQ-X accessory (see section 11).
- **Top hat rail mounting:**
  The universal transmitter is mounted on a 35 mm top hat rail with the aid of a bracket, e.g. in a control cabinet. The connection can be released again with one simple movement (section 3.7.4).

The following chapters describe the mounting of the universal transmitter.

3.7.2 Mounting on a mounting stand with the SSH/IQ sun shield

Materials and tools required

- SSH/IQ sun shield (see chapter 11 ACCESSORIES AND OPTIONS).
- 4 mm set screw wrench
- Phillips screwdriver.

Mounting the sun shield on a mounting stand

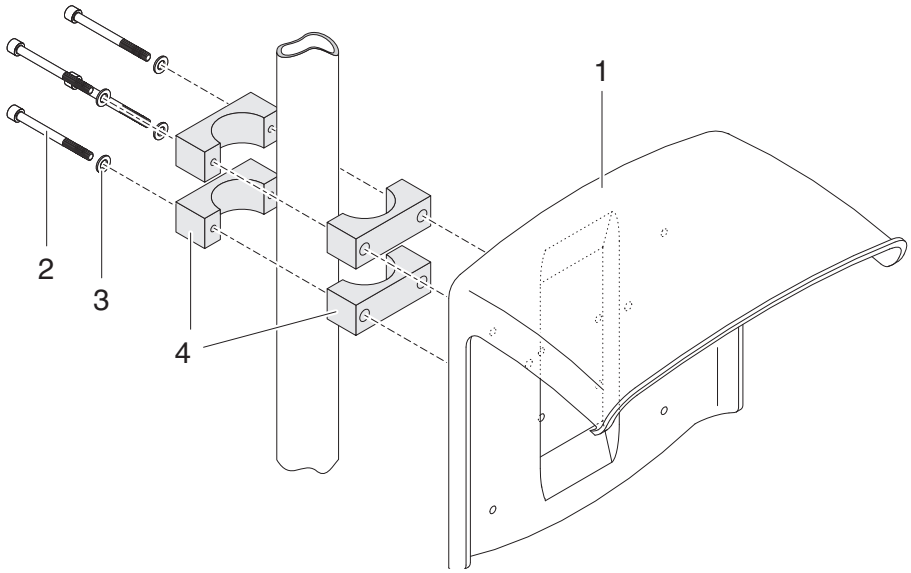


Fig. 3-5 Mounting the SSH/IQ sun shield on a mounting stand

1 Screw the sun shield (pos. 1 in Fig. 3-5) with the four hexsocket head screws (pos. 2), the washers (pos. 3) and the clamps (pos. 4) at the required height on the mounting stand from the back.

Premounting the ISO blind nuts

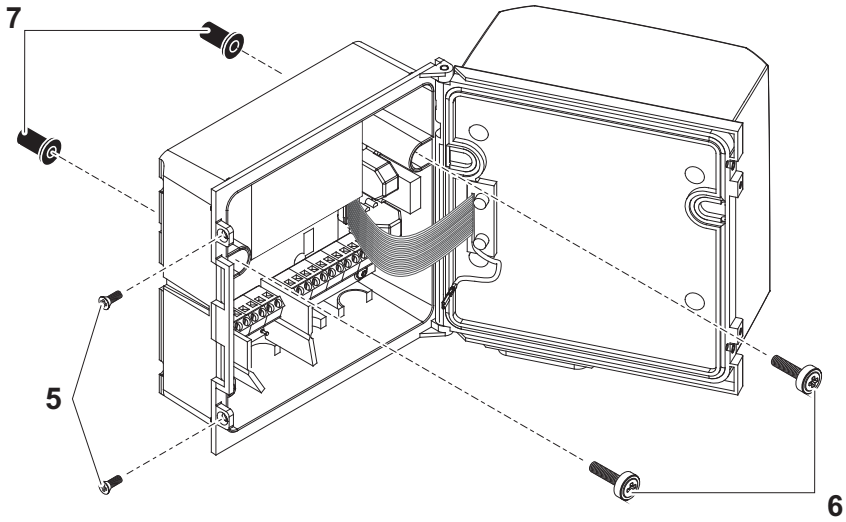


Fig. 3-6 Mounting the sun shield: Premounting the ISO blind nuts

2 Remove the two countersunk screws (pos. 5 in Fig. 3-6) and swing open the lid.

3 Insert the cheese-head screws (pos. 6 in Fig. 3-6) with the plastic washers in the drilled mounting holes and loosely screw in the ISO blind nuts (pos. 7).

Mounting the DIQ/S 28X on the sun shield

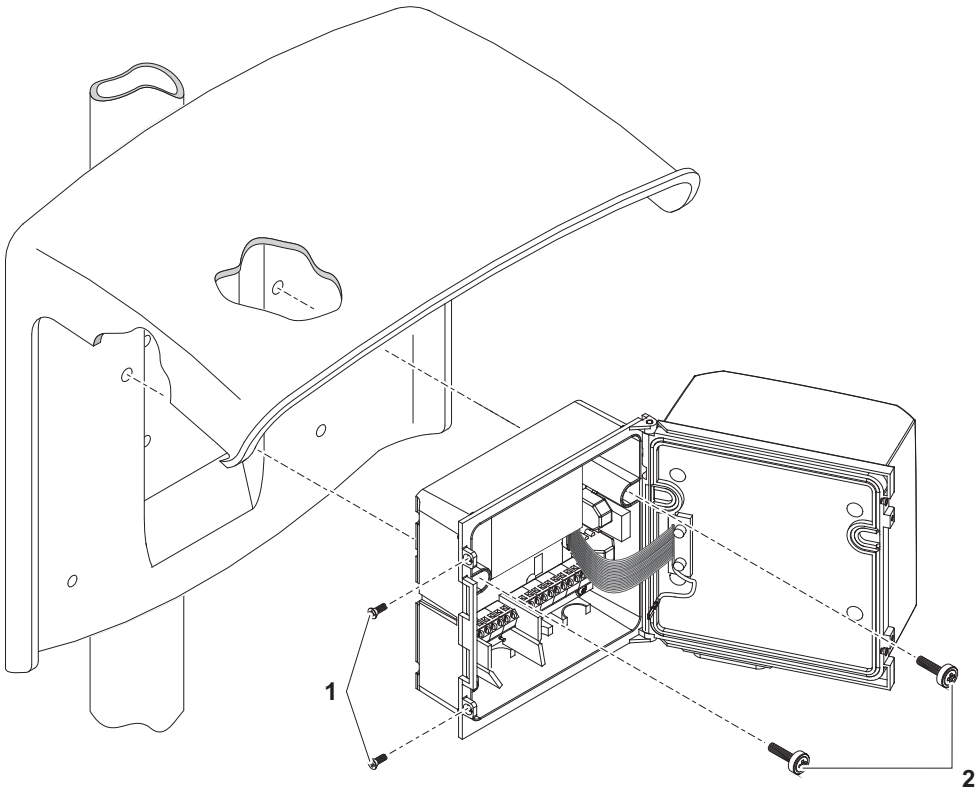


Fig. 3-7 Mounting the *DIQ/S 28X* on the sun shield SSH/IQ

4 Position the universal transmitter on the sun shield and fix it into place with the two screws (pos. 6 in Fig. 3-6).

5 Close the lid and fix it with the two countersunk screws (pos. 5 in Fig. 3-6).

3.7.3 Mounting under the SD/K 170 sun shield

The SD/K 170 sun shield can be mounted directly on a wall, on a mounting stand or on a railing. The MR/SD 170 mounting kit is also required for mounting on a mounting stand or railing.

How to mount the sun shield at the installation location is described in the instructions for the sun shield or mounting kit.

Materials required

- SD/K 170 sun shield (see chapter 11 ACCESSORIES AND OPTIONS)
- The MR/SD 170 mounting kit is also required for mounting the sun shield on a mounting stand or railing (see chapter 11 ACCESSORIES AND OPTIONS).

Tools

- Phillips screwdriver.

Mounting the DIQ/S 28X with sun shield

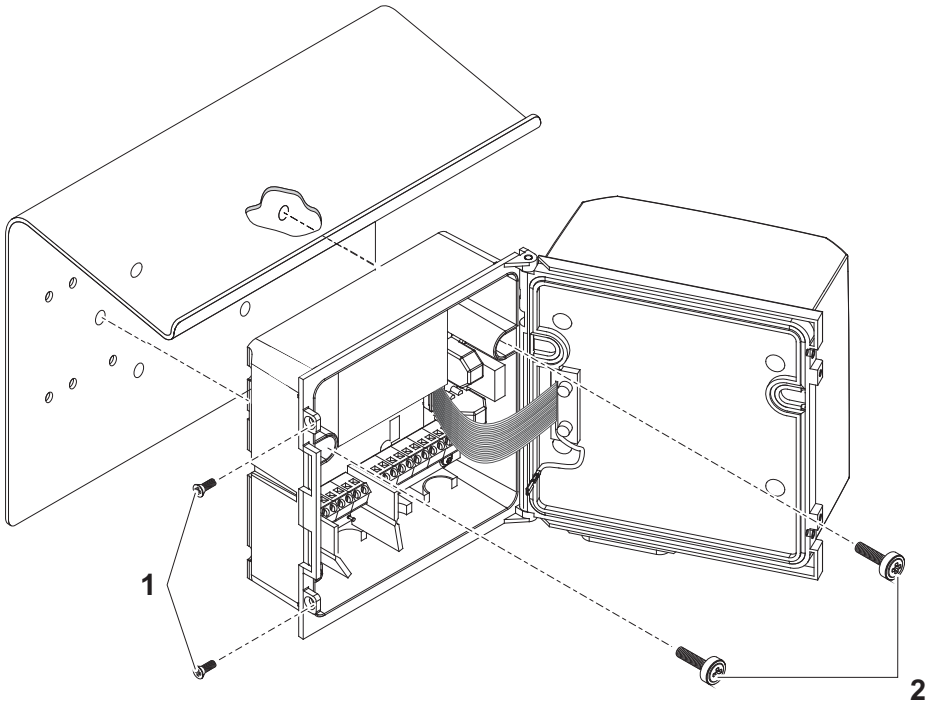


Fig. 3-8 Mounting the DIQ/S 28X with sun shield SD/K 170

1 Remove the two countersunk screws (pos. 1 in Fig. 3-8) and swing open the module lid.

2 Position the universal transmitter on the sun shield and fix it into place with the two screws (pos. 2 in Fig. 3-8).

3 Close the lid and fix it with the two countersunk screws (pos. 1 in Fig. 3-8).

3.7.4 Top hat rail mounting

Materials required

- THS/IQ kit for top hat rail mounting (see chapter 11 ACCESSORIES AND OPTIONS).

Tools

- Phillips screwdriver.

Mounting the DIQ/S 28X on a top hat rail

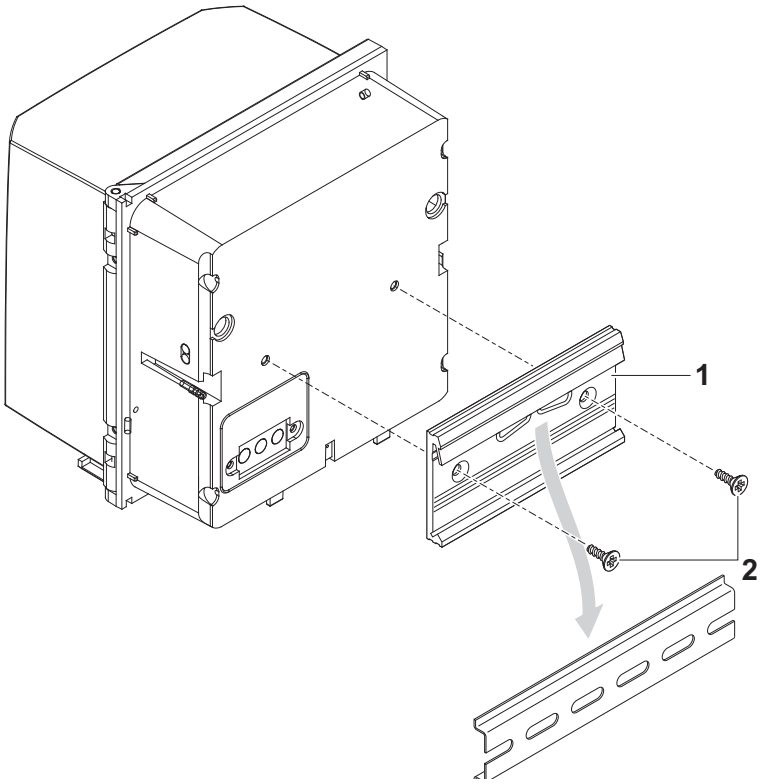


Fig. 3-9 Mounting the DIQ/S 28X on a top hat rail

1 Screw the clamping assembly (pos. 1 in Fig. 3-9) on the back of the universal transmitter with the two plastic tapping screws (pos. 2).

2 Attach the universal transmitter to the top hat rail from above using the clamping assembly and press against the rail until the clamping assembly clicks into place. The universal transmitter can be moved sideways afterwards.

3 To unhook the universal transmitter, press it downward and pull it forward at the bottom.

3.7.5 Panel mounting

Variants of the DIQ/S 28X without fieldbus or Ethernet interface can be mounted to a switch panel with the PMS/IQ mounting set.

For variants of the DIQ/S 28X with fieldbus or Ethernet interface, we recommend using the PMS/IQ-X mounting set. It enables to mount the DIQ/S 28X in the switch panel so that the fieldbus or Ethernet interface is accessible behind the switch panel.

Switch panel mounting sets

Variant DIQ/S 28X	Switch panel mounting set	Switch panel aperture	Max. thickness of the switch panel
DIQ/S 28X[CRx]	PMS/IQ	138 x 138 mm	10 mm
DIQ/S 28X-PR, -MOD	PMS/IQ-X	186 x 186 mm	8 mm
DIQ/S 28X[-CRx]-E(F)	PMS/IQ-X	186 x 186 mm	5 mm

Switch panel mounting with PMS/IQ-X

Details on panel mounting with the PMS/IQ-X mounting set are given in the operating manual of the PMS/IQ-X.

Switch panel mounting with PMS/IQ

Panel mounting with the PMS/IQ mounting set is described below:

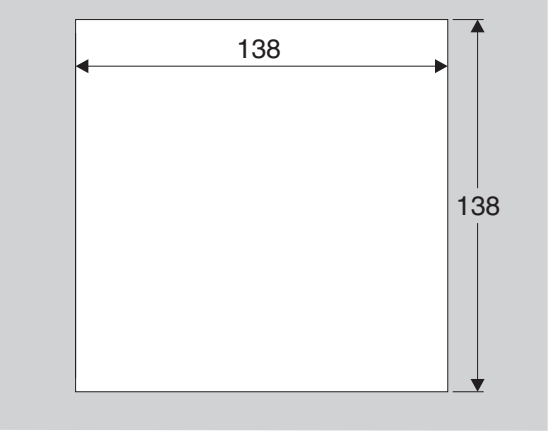
Materials required

- PMS/IQ kit for panel mounting (see chapter 11 ACCESSORIES AND OPTIONS).

Tools

- 3 mm set screw wrench (contained in the panel installation kit).

Switch panel aperture



Maximum thickness
10 mm

Fig. 3-10 Mounting aperture in the switch panel (dimensions in mm)

Mounting the DIQ/S 28X in a switch panel

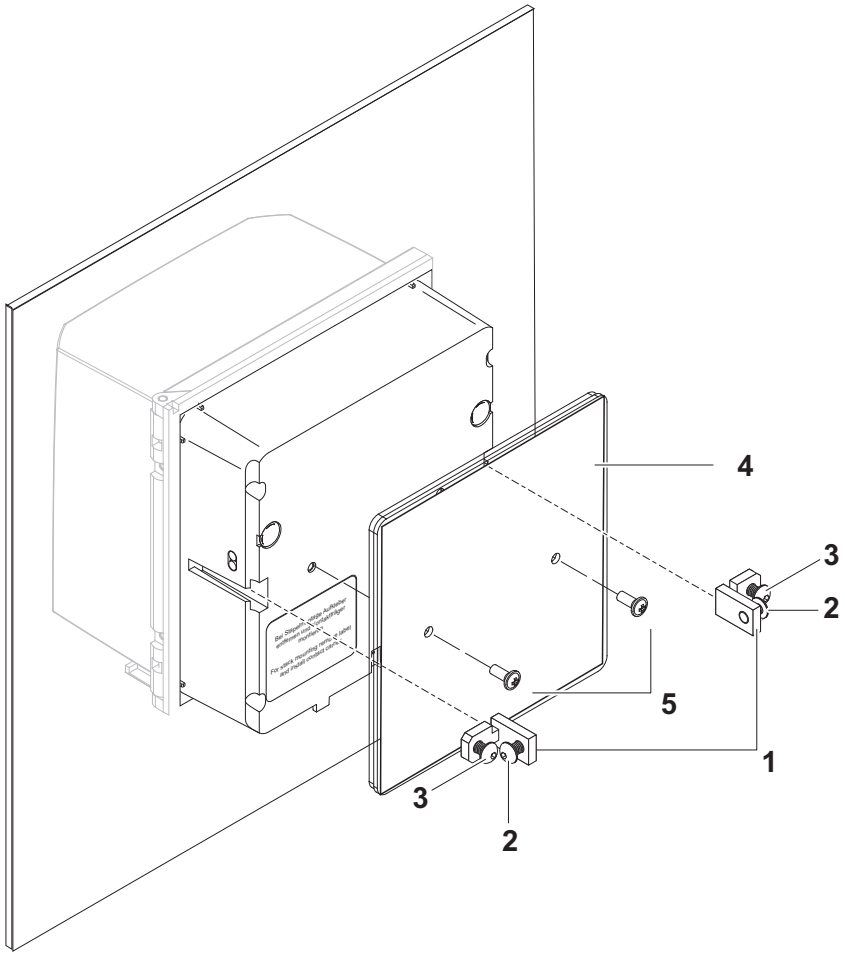


Fig. 3-11 Mounting the DIQ/S 28X in Fig. 3-11

1 Angle bracket
2 Bolts
3 Bolts
4 Impact protection plate
5 Bolts to fix the impact protection plate

1 Insert the universal transmitter in the panel aperture from the front.

2 Slightly unscrew the bolts (pos. 2 and 3) of the two angle brackets (pos. 1 in Fig. 3-11), but do not remove them.

3 Push in the two angle brackets - as shown in Fig. 3-11 - into the lateral guides of the universal transmitter up to the stop.

4 Tighten the bolts (pos. 2).

5 Screw in the bolts (pos. 3) until the bolts rest snugly against the panel.

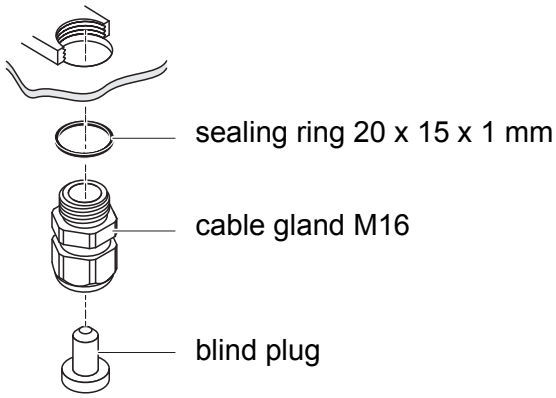
6 Fix the impact protection plate (Pos. 4) to the back of the DIQ/S 28X with the bolts (Pos. 5).

3.8 Electrical connections: General instructions

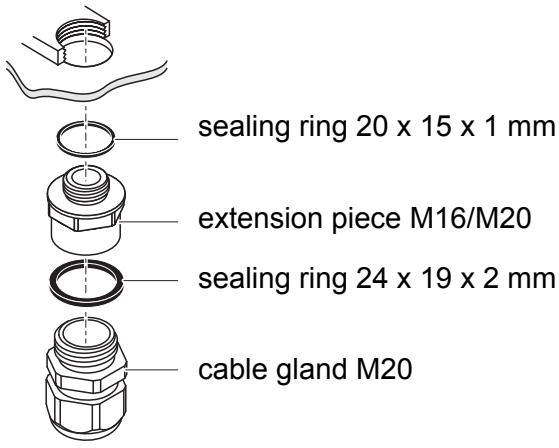
Cable glands

All electric cables are fed from below through openings prepared in the enclosure of the DIQ/S 28X and the DIQ modules. Cable glands with different clamping ranges are included with the DIQ/S 28X to provide sealing between the cable and enclosure as well as for strain relief. Select the suitable cable gland for the relevant cable type and cable diameter:

- **Small**, clamping range 4.5 to 10 mm.
  This cable gland is suitable for all cables (earth cable after stripping the outer insulation, see section 3.7) and sensor connection cables.



- **Large**, clamping range 7 to 13 mm.
  This cable gland is required for cable sheaths with an outside diameter of more than 10 mm and is screwed into the enclosure via an extension piece.



If necessary, you can order more big cable glands (see chapter 11 ACCESSORIES AND OPTIONS).

General installation instructions

Observe the following points when attaching connecting wires to the terminal strip

- Shorten all wires to be used to the length required for the installation
- Always fit all the ends of the wires with wire end sleeves before connecting them to the terminal strip
- Any wires that are not used and project into the enclosure must be cut off as closely as possible to the cable gland.
- Screw a small cable gland with sealing ring into each remaining free opening and close it with a blind plug.

WARNING

No free wires are allowed to project into the housing. Otherwise, there is a danger that areas safe to contact could come into contact with dangerous voltages. Always cut off any wires that are not in use as closely as possible to the cable gland.

3.9 Connecting the voltage supply

The two following paragraphs describe how to connect both models of the DIQ/S 28X universal transmitter to the voltage supply.

3.9.1 DIQ/S 28X (line power version)

WARNING
If the power supply is connected incorrectly, it may represent a danger to life from electric shock. Pay attention to the following points during installation:

- **The DIQ/S 28X universal transmitter may only be connected by a trained electrician.**
- **The connection of the DIQ/S 28X universal transmitter to the power supply may only be carried out when it is not carrying any voltage.**
- **The power supply must fulfill the specifications given on the nameplate and in chapter 10 TECHNICAL DATA.**
- **When installed in a building, a switch or power switch must be provided as an interrupt facility for the DIQ/S 28X.**
  The interrupt facility must
  - **be installed in the vicinity of the DIQ/S 28X universal transmitter, easily accessible by the user, and**
  - **be labeled as the interrupt facility for the DIQ/S 28X universal transmitter.**
- **After the DIQ/S 28X universal transmitter has been installed, it may only be opened if the line voltage has been switched off beforehand.**

Materials required

- Wire end sleeves, suitable for the power line, with suitable crimping tool
- 1 x cable gland with sealing ring (included in scope of delivery of the DIQ/S 28X).

Tools

- Cable stripping knife
- Wire stripper
- Phillips screwdriver
- Small screwdriver.

Preparing the power cable

1. Cut off the cable to the required length.
2. Strip the cable insulation for approx. 45 mm.
3. Bare the wires of phases L and N and fit them with wire end sleeves.
4. If present, cut off the ground wire at the end of the cable sheath.

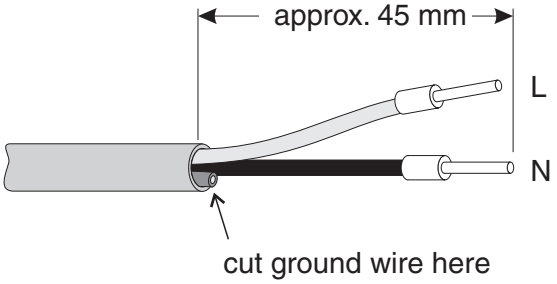


Fig. 3-12 Prepared power cable.

NOTE
The ground wire must not project into the enclosure. Otherwise, malfunctions could occur.

Connecting the power line

5 On the left-hand side of the DIQ/S 28X, remove the two countersunk screws and open the enclosure.

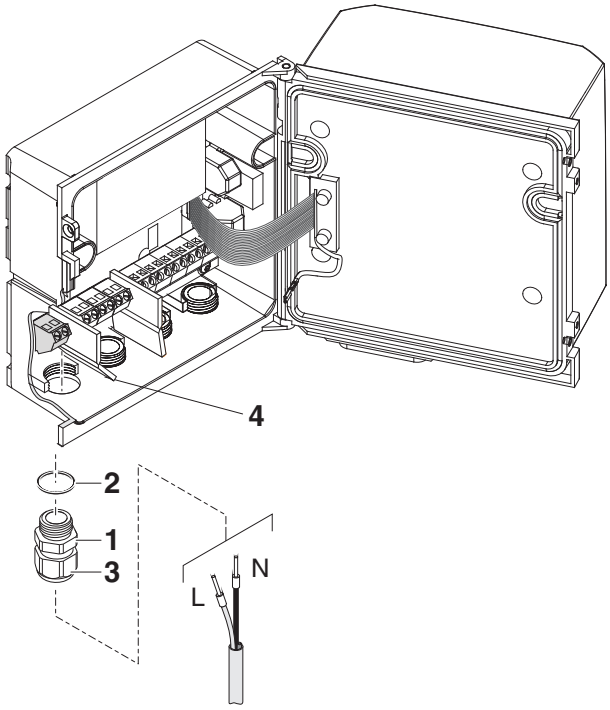


Fig. 3-13 Inserting the supply line.

6 Screw a cable gland (pos. 1 in Fig. 3-13) with sealing ring (pos. 2) into the enclosure below the power supply connection.

7 Loosen the coupling ring (pos. 3).

8 Feed the power line through the cable gland into the enclosure. When doing so bend the flexible divider (pos. 4) to the right.

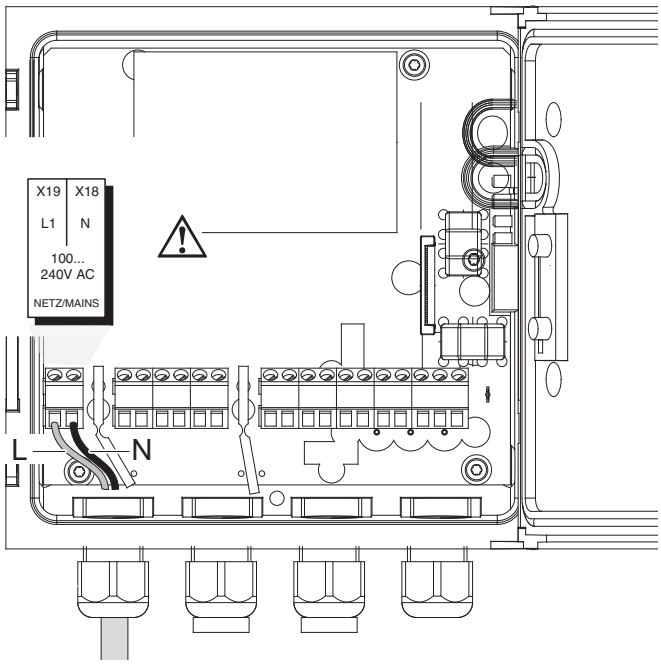


Fig. 3-14 Line power connection.

The complete assignment of the terminal strip is shown in section 3.13.

9 Connect phases L and N to the terminal strip. Make sure that the cable assignment agrees with the specification on the terminal label under the terminal strip.

10 Tighten the cap nut (pos. 3 in Fig. 3-13).

WARNING
No free wires are allowed to project into the housing. Otherwise, there is a danger that areas safe to contact could come into contact with dangerous voltages. Always cut off any wires that are not in use as closely as possible to the cable gland.

11 Close the enclosure of the DIQ/S 28X.

3.9.2 DIQ/S 28X[-XX]/24V (24 V version)

WARNING

If the 24 V AC/DC supply is connected incorrectly, it may represent a danger to life from electric shock. Pay attention to the following points during installation:

- **The DIQ/S 28X universal transmitter may only be connected by a trained electrician.**
- **The 24 V AC/DC supply must meet the specifications quoted on the name plate and in chapter 10 TECHNICAL DATA** (protective low voltage SELV).
- **The connection of the DIQ/S 28X universal transmitter to the power supply may only be carried out when it is not carrying any voltage.**
- **When installed in a building, a switch or power switch must be provided as an interrupt facility for the universal transmitter DIQ/S 28X.**
  The interrupt facility must
  - be installed in the vicinity of the DIQ/S 28X universal transmitter, easily accessible by the user, and
  - be labeled as the interrupt facility for the DIQ/S 28X universal transmitter.

Rechargeable battery systems should have a deep discharge protection. The DIQ/S 28X[-XX]/24V does not have any built-in deep discharge protection.

Materials required

- Wire end sleeves, suitable for the 24 V AC/DC feed line, with suitable crimping tool
- 1 x cable gland with sealing ring (included in scope of delivery of the DIQ/S 28X).

Tools

- Cable stripping knife
- Wire stripper
- Phillips screwdriver
- Small screwdriver.

Preparing the 24 V AC/DC line

1 Cut off the cable to the required length.

2 Strip the cable insulation for approx. 45 mm.

3 Bare the wires 1 and 2 and fit them with wire end sleeves.

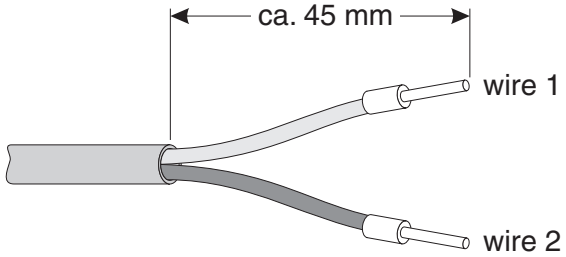


Fig. 3-15 Prepared 24 V AC/DC line.

Connecting the 24 V AC/DC line

4 On the left-hand side of the DIQ/S 28X, remove the two countersunk screws and open the enclosure.

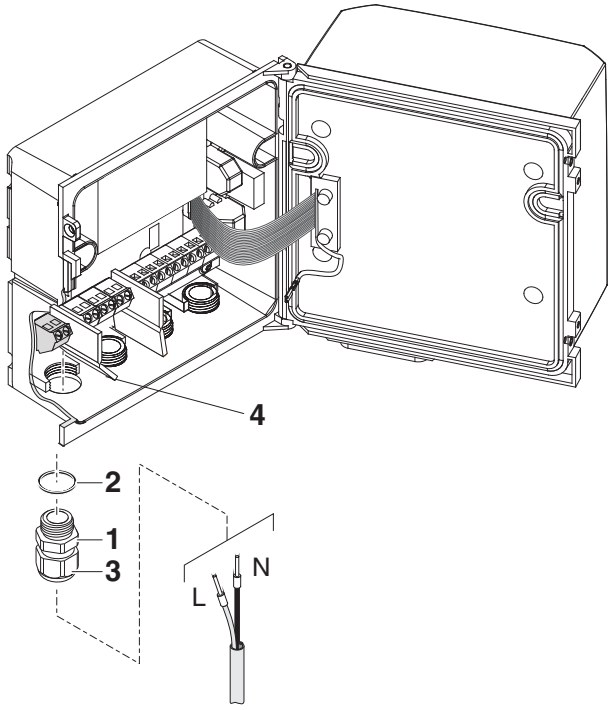


Fig. 3-16 Inserting the 24V AC/DC line

5 Screw a cable gland (pos. 1 in Fig. 3-16) with sealing ring (pos. 2) into the enclosure below the 24 V AC/DC connection.

6 Loosen the coupling ring (pos. 3).

7 Feed the 24 V AC/DC line through the cable gland into the enclosure. When doing so bend the flexible divider (pos. 4) to the right.

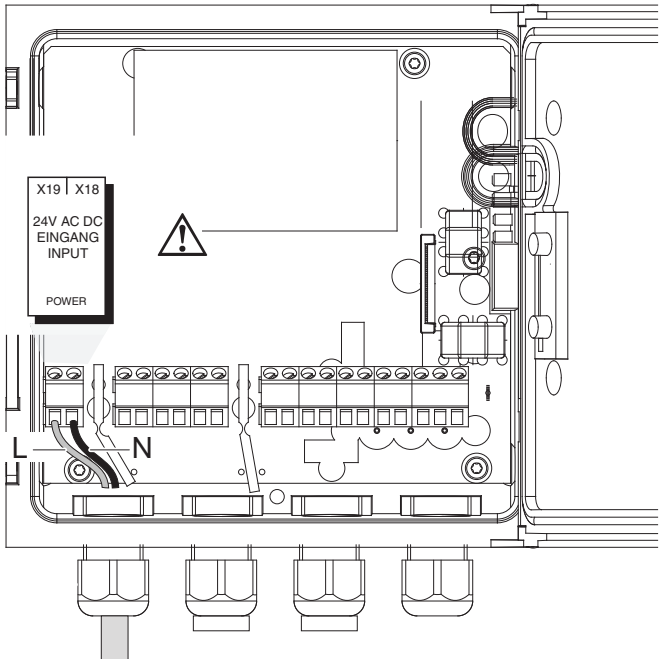


Fig. 3-17 24 V AC/DC connection.

The complete assignment of the terminal strip is shown in section 3.13.

8 Connect wires 1 and 2 to the terminal strip. Make sure that the cable assignment agrees with the specification on the terminal label under the terminal strip.

9 Tighten the cap nut (pos. 3 in Fig. 3-16).

NOTE
No free wires are allowed to project into the housing. Otherwise there is the danger of short circuits that can cause a fire. Always cut off any wires that are not in use as closely as possible to the cable gland.

10 Close the enclosure of the DIQ/S 28X.

3.10 Connections to the relay and current outputs

3.10.1 General installation instructions

WARNING

If external electrical circuits that are subject to the danger of physical contact are incorrectly connected to the relay contacts, there may be a danger of life threatening electric shock. Electrical circuits are regarded to be subject to the danger of physical contact when there are voltages higher than the Safety Extra Low Voltage (SELV).

Pay attention to the following points during installation:

- **Electrical circuits subject to the danger of physical contact may only be connected by a qualified electrician.**
- **Electrical circuits subject to the danger of physical contact may only be connected when they are voltage-free.**
- **If electrical circuits subject to the danger of physical contact are switched with a relay, no circuit that is not subject to this danger (e. g. the DIQ/CHV module) may be operated on the further relays.**
- **Switching voltages and switching currents on the relay contacts must not exceed the values specified in chapter 10 TECHNICAL DATA. Protect electrical circuits against currents that are too high with an electrical fuse.**
- **Only single-phase consumers can be switched with the relays. Under no circumstances may multiphase consumers be switched with the aid of several relays (example: three-phase current driven pumps). Always switch multiphase consumers via a protective relay.**
- **After the Universal Transmitter DIQ/S 28X has been installed, it may only be opened if all external voltages have been switched off beforehand.**

Materials required

- Wire end sleeves, suitable for the connecting wires, with suitable crimping tool
- 4 x cable gland with sealing ring (scope of delivery of the DIQ/S 28X)

Tools

- Cable stripping knife
- Wire stripper
- Phillips screwdriver
- Small screwdriver

Connecting lines to the terminal strip

1 On the left-hand side of the DIQ/S 28X, remove the two countersunk screws and open the enclosure.

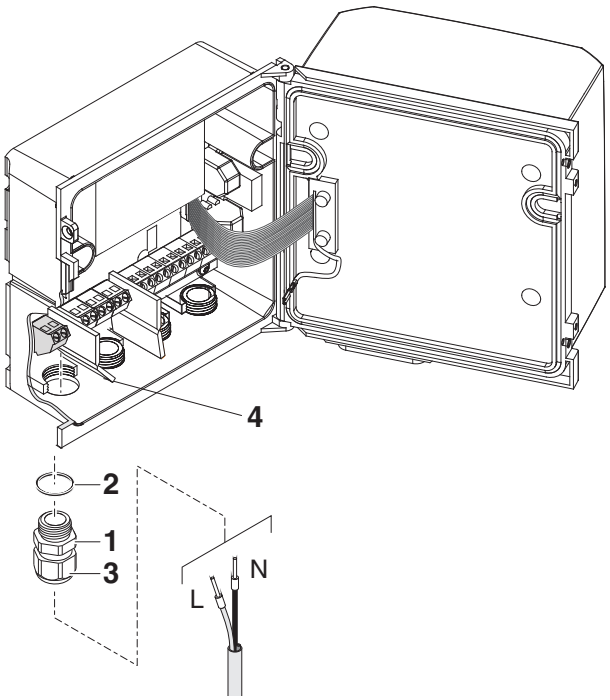


Fig. 3-18 Inserting lines

The complete assignment of the terminal strip is shown in section 3.13.

2 Screw a cable gland (pos. 1 in Fig. 3-18) with the sealing ring (pos. 2) into the enclosure below the respective connections.

3 Loosen the coupling ring (pos. 3).

4 Feed the line through the cable gland in the enclosure.

5 Connect the wires to the terminal strip. While doing so, pay attention to the specifications on the label located under the terminal strip.

6 Tighten the coupling ring (pos. 3).

WARNING
No free wires are allowed to project into the housing. Otherwise, there is a danger that areas safe to contact could come into contact with dangerous voltages. This could result in life threatening electric shock when working with the universal transmitter DIQ/S 28X. Always cut off any wires that are not in use as closely as possible to the cable gland.

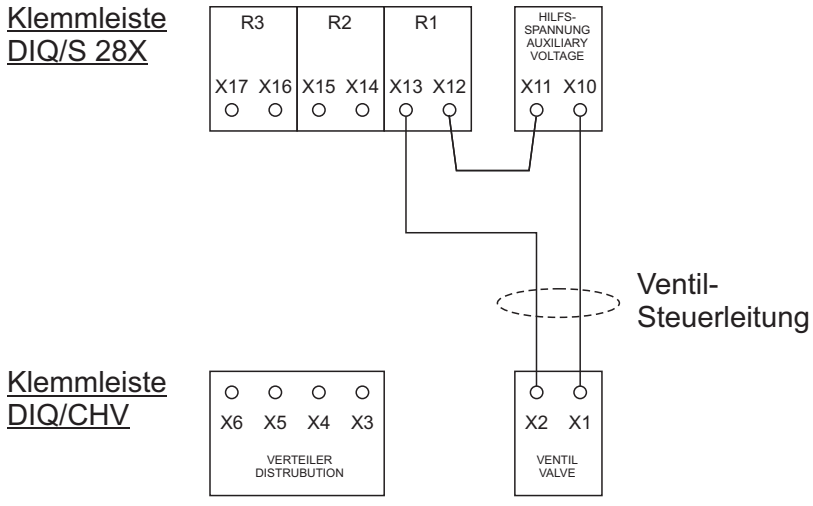
7 Close the enclosure of the DIQ/S 28X.

3.10.2 Usage of the auxiliary voltage

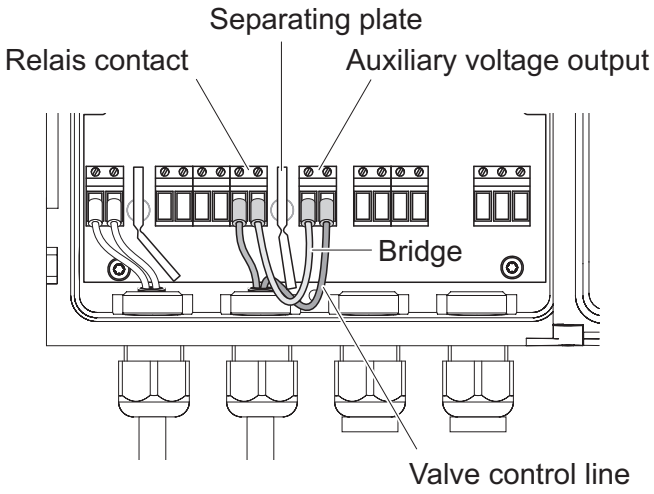
The universal transmitter DIQ/S 28X has a 24 V output (designation HILFSSPANNUNG or AUXILIARY VOLTAGE on the terminal strip). You can use this auxiliary voltage for the relay-controlled opening of the valve in a DIQ/CHV valve module for the compressed air-driven sensor cleaning function. To do so, you have to connect the auxiliary voltage output, a free relay contact and the valve connection in the DIQ/CHV in series. Bridge a terminal of the auxiliary voltage output with a terminal of a relay output and run a control line from the remaining terminals to the valve module.

NOTE
The auxiliary voltage must not be used for other purposes.

Connection scheme for one sensor with compressed air cleaning



NOTE
Run the bridge below the divider so the bridge does not bump against the circuit board in the lid when the enclosure is closed.



3.11 Commissioning

Start checklist and system start

Before starting the system, carry out the system check using the following checklist. Always carry out the check:

- before the initial commissioning
- before any further commissioning if the system has been previously extended or modified.

Start checklist:

1 Are all components correctly connected with each other (see section 3.6, if necessary, section 3.7)?

2 Is the universal transmitter correctly connected to the power supply (see section 3.9)?

3 Do the line voltage and line frequency agree with the data on the name plate of the universal transmitter?

4 Is the sensor ready for measuring, e.g. a D.O. sensor filled with electrolyte solution?

Starting the system

Switch on the power supply of the DIQ/S 28X. As soon as the system is successfully initialized, the measured value display appears. With a sensor not yet providing any measurement values, "Init" appears temporarily:

Select your system language during the first system start. The selected system language can be changed in the *Einstellungen/ Settings* menu at any time.

Initial start phase

The Universal Transmitter is initialized during the first start phase. All IQ SENSOR NET components are automatically registered with the Universal Transmitter DIQ/S 28X. The system then performs a self test. This process can take several seconds. During this period, the following display appears:

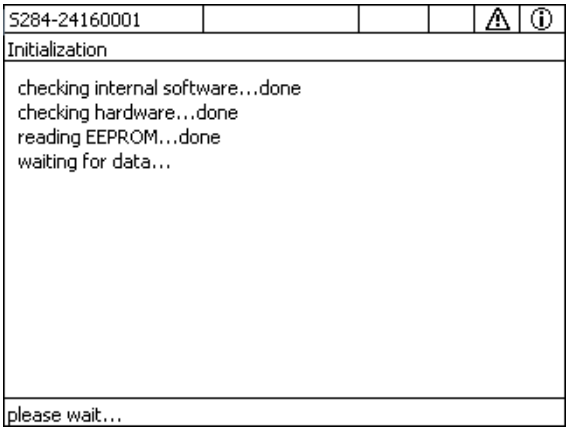


Fig. 3-19 Display during the initialization process

Second start phase

As soon as the Universal Transmitter is successfully initialized, the measured value display appears (fourfold display). In the case of IQ sensors that are not yet providing measured values, "Init" appears temporarily

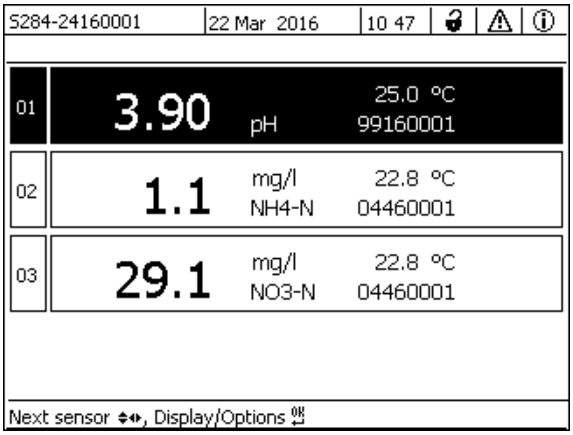


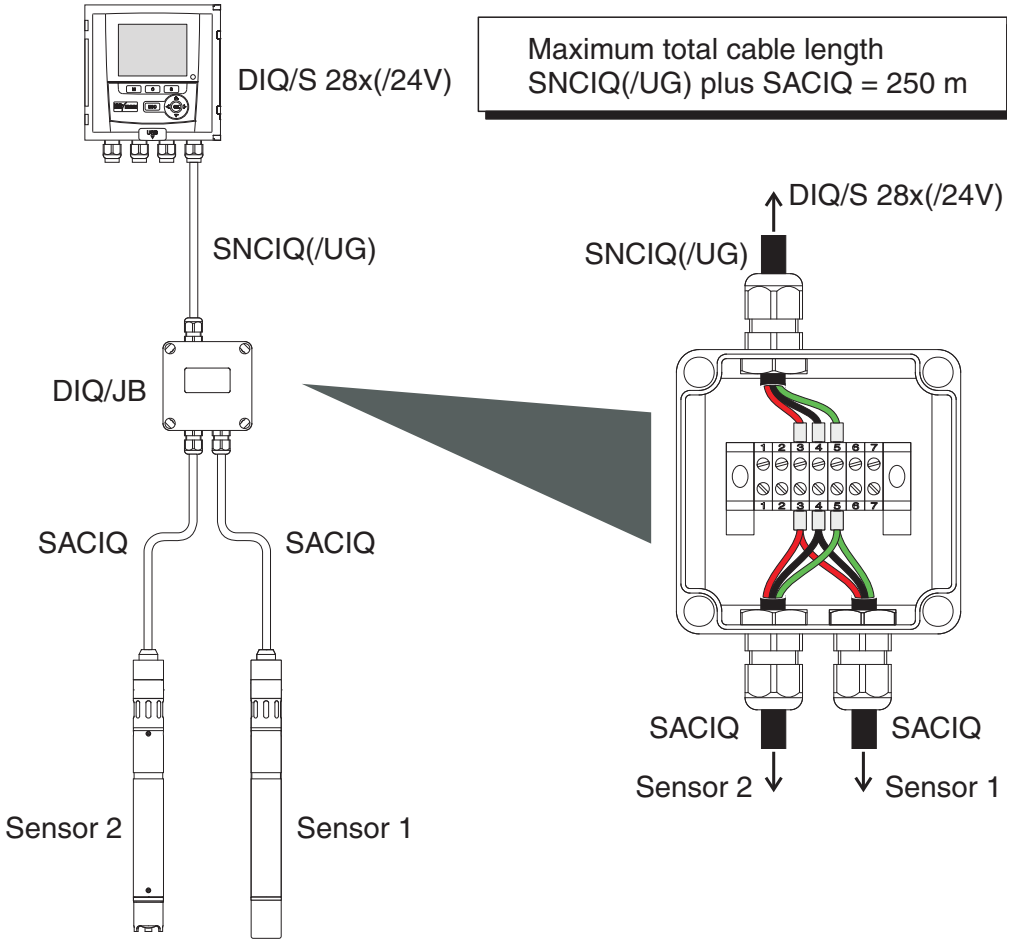
Fig. 3-20 Display after initialization of the terminal

Assign a name to each IQ sensor after putting it into operation for the first time so you can identify it more easily. How to assign a sensor name is described in section 5.4.1 on page 5-87.

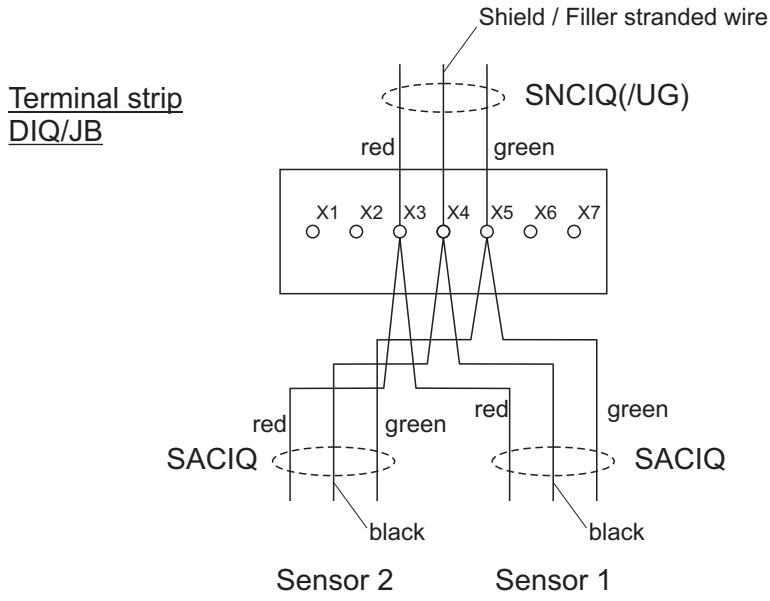
If the system start failed, see chapter 9 WHAT TO DO IF ....

3.12 Installation examples

3.12.1 Connecting two sensors without compressed air cleaning

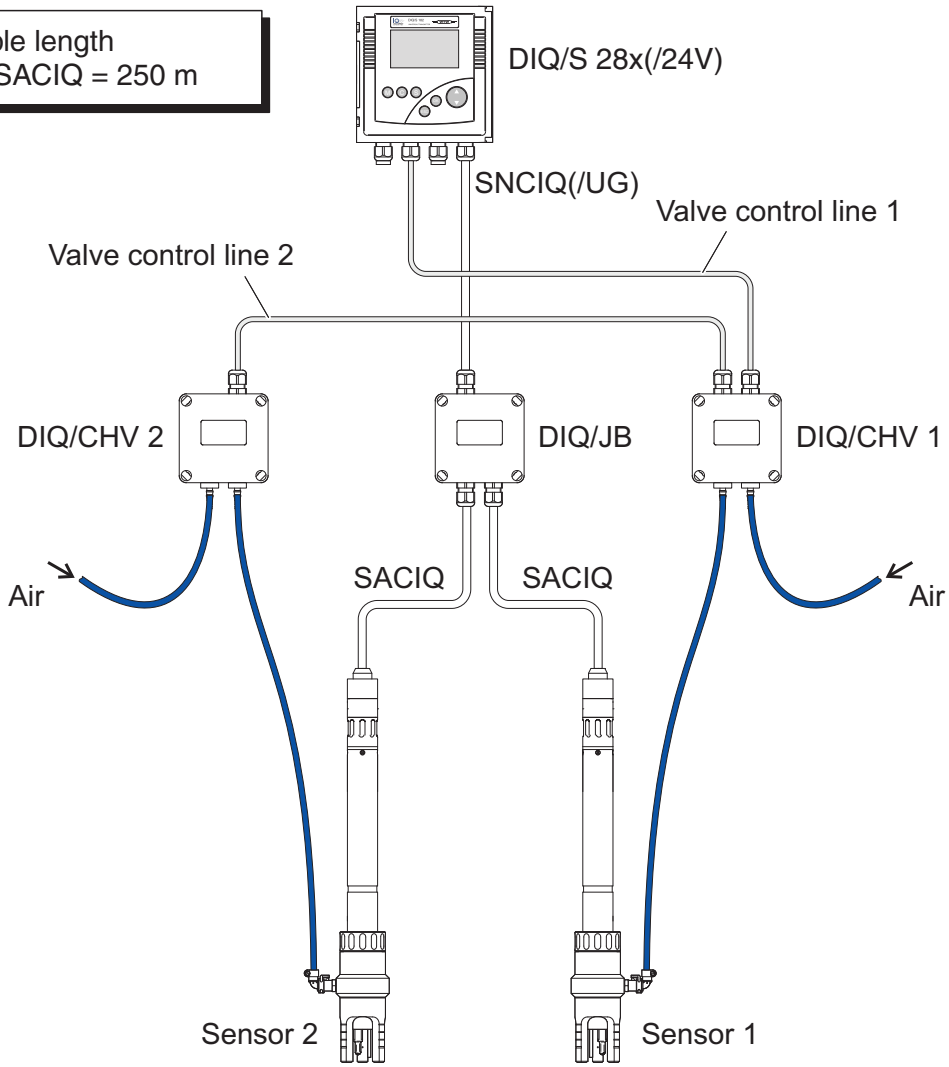


Connection scheme of the DIQ/JB



3.12.2 Connecting two sensors with compressed air cleaning

Maximum total cable length
SNCIQ(/UG) plus SACIQ = 250 m



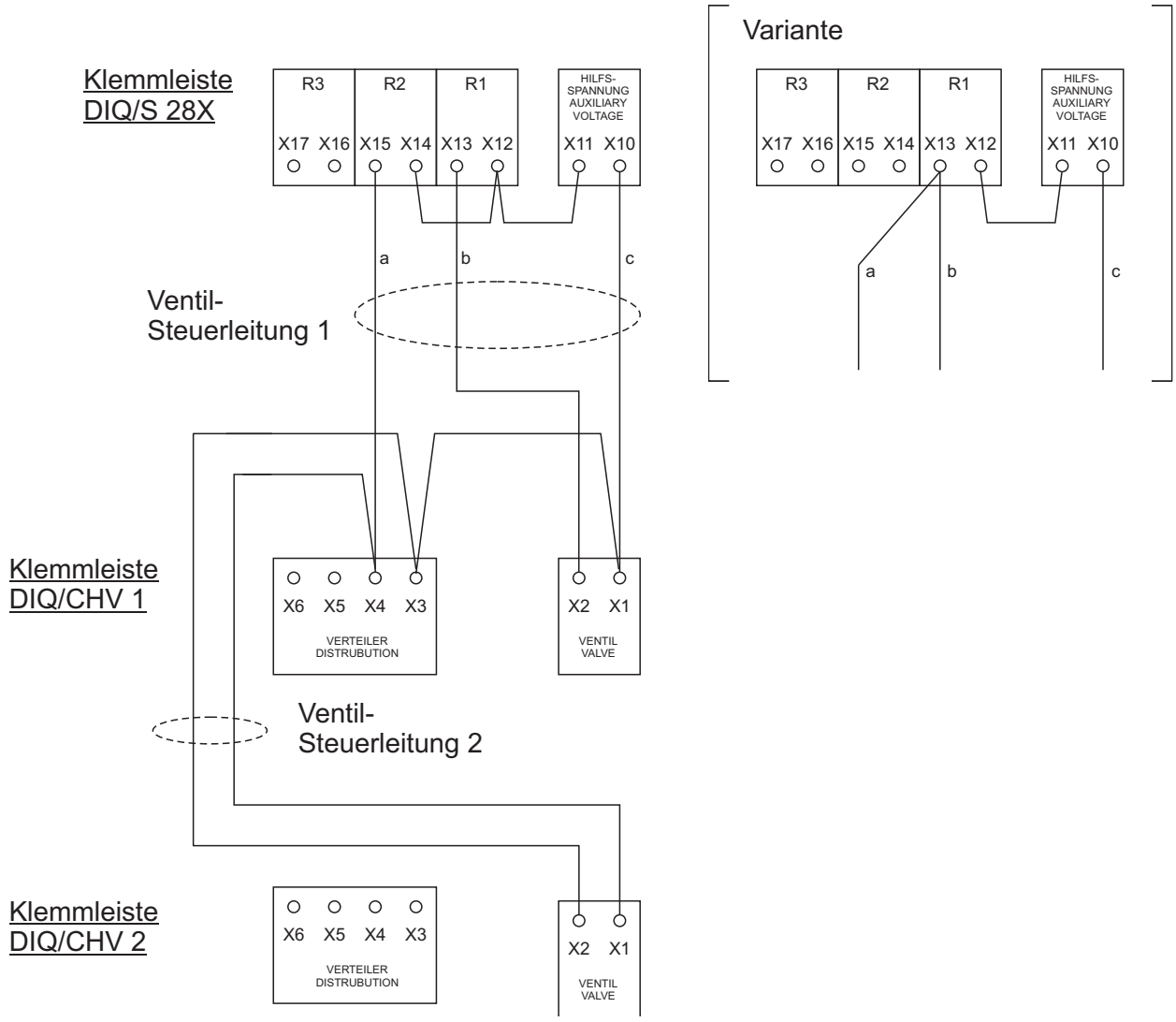
Connection scheme of valve control

Example:
Relay 1 controls the cleaning of sensor 1.
Relay 2 controls the cleaning of sensor 2.

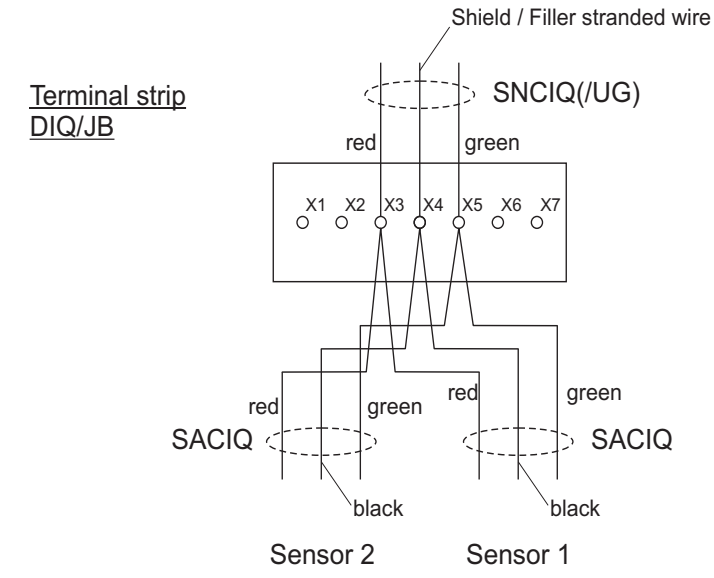
Variant: Relay 1 controls the cleaning of both sensors. Cleaning of both sensors is carried out with the same settings.

NOTE
In this configuration, the free switching contact (here: R3) may be used to switch SELV voltages only.

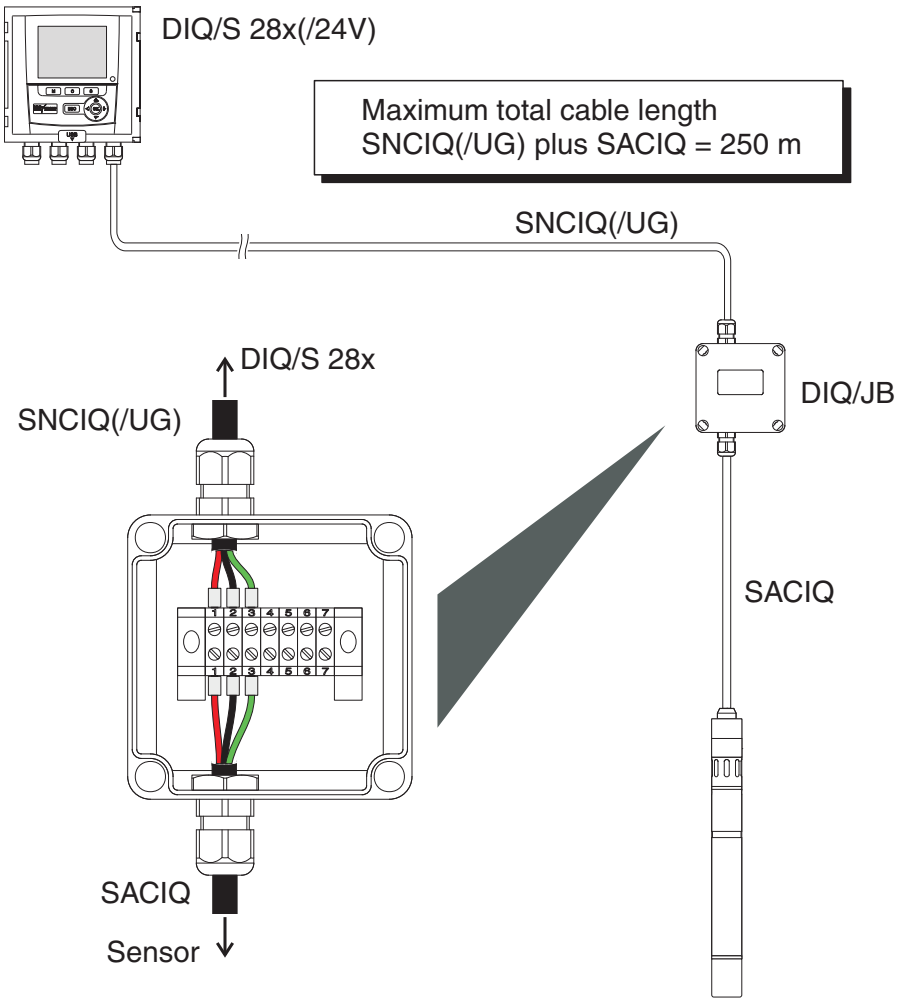
No free wires are allowed to project into the housing. Otherwise, there is a danger that areas safe to contact could come into contact with dangerous voltages. Always cut off any wires that are not in use as closely as possible to the cable gland.



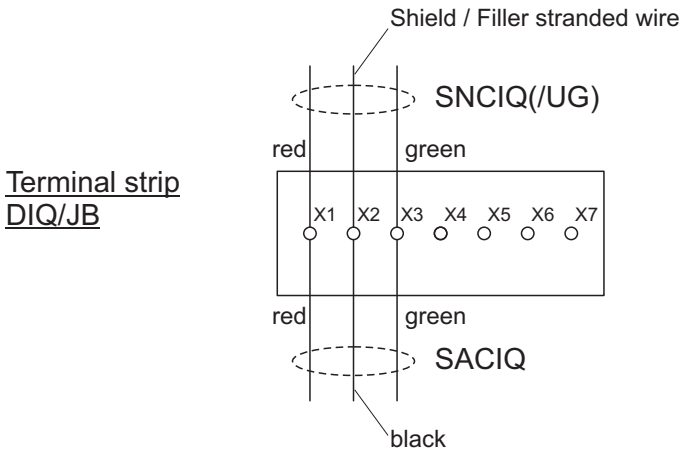
Connection scheme of the DIQ/ JB



3.12.3 Connection of a sensor that is located at a distance (without compressed air cleaning)

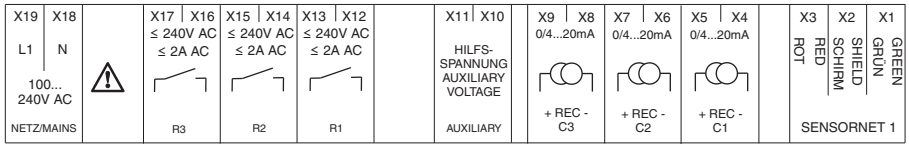


Connection scheme of the DIQ/JB

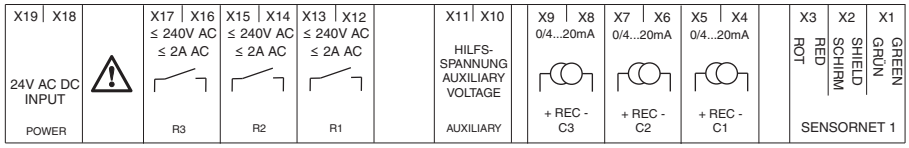


3.13 Figures of the terminal strips

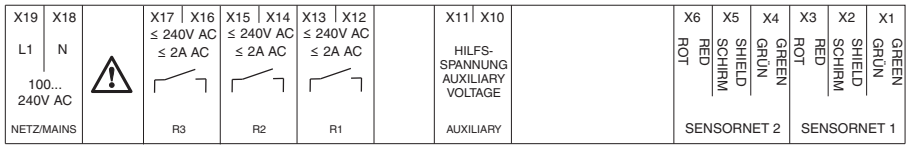
DIQ/S 28X -CR3[-E]



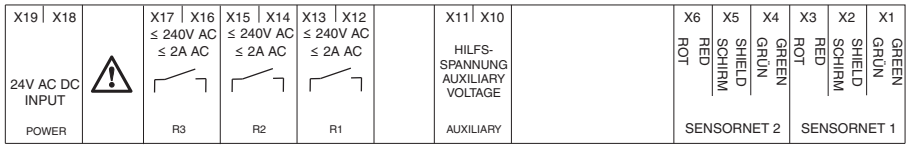
DIQ/S 28X -CR3[-E] /24V



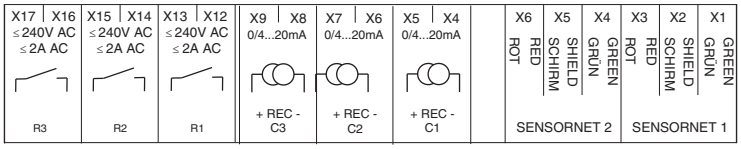
DIQ/S 28X -MOD, -PR, -EF



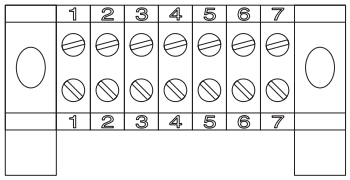
DIQ/S 28X -MOD, -PR, -EF /24V



DIQ/CR3 (component of the DIQ/S 284-CR6 [-XX])



DIQ/JB



(7 passive, potential-free terminals for line extension)

DIQ/CHV

4 Operation

4.1 Operating elements

4.1.1 Overview of the operating elements

The Universal Transmitter is equipped with a large display for the clear presentation of current measured values, the graph of measured values, status displays and message texts.

The 5 keys **<M>**, **<C>**, **<S>**, **<ESC>**, **<OK>** and the arrow keys **<▲ ▼ ◀ ▶ >** are used to operate the IQ SENSOR NET system.

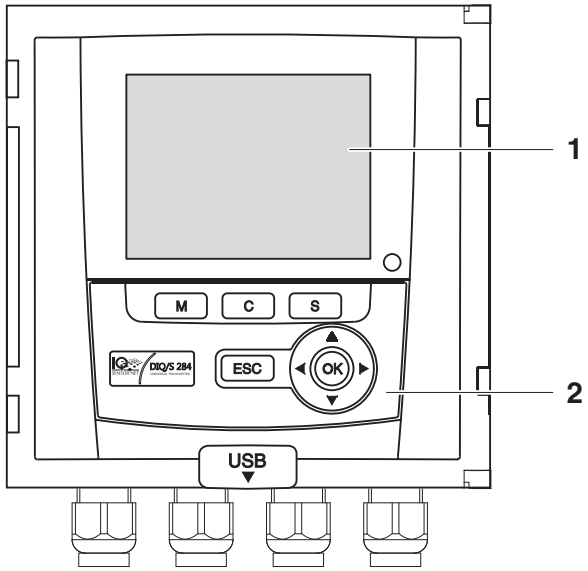


Fig. 4-1 Operating elements of the DIQ/S 28X

1 Display (see section 4.1.2 DISPLAY)

2 Keypad
Arrow keys and 5 keys **<M>**, **<C>**, **<S>**, **<ESC>**, **<OK>** (see section 4.1.3 KEYS)

4.1.2 Display

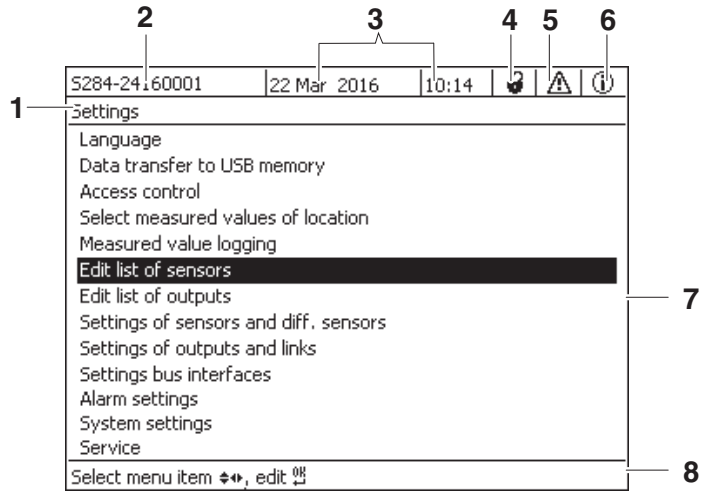


Fig. 4-2 Display

1 Name of the display indication (is skipped in the measured value display)

2 Name and series number (e.g. S284-16160001) of the instrument Under this name the DIQ/S 28X[-xx]-E(F) can be addressed in an Ethernet network (see section 6)

3 Date, time

4 User right (details see below)

5 Error symbol ⚠:
If the error symbol flashes, a new or unacknowledged error message is present in the log book that requires immediate action (see section 4.5.3).

6 Info symbol ⓘ:
If the info symbol flashes, new or unacknowledged information is present in the log book (see section 4.5.3).

7 Display range for measured values, menus, lists, etc.

8 Help line with operating instructions

Detail on the user right (4)

	Lock open: No access control, settings released System settings can be changed
	Crown: Administrator authorization Configuration and running operation of the system
	Tool: Maintenance authorization Running operation of the system and maintenance activities
	Eye: Monitoring permission Only read permission, no operation of the system

Measured value display

The measured value display contains the following information for each IQ sensor:

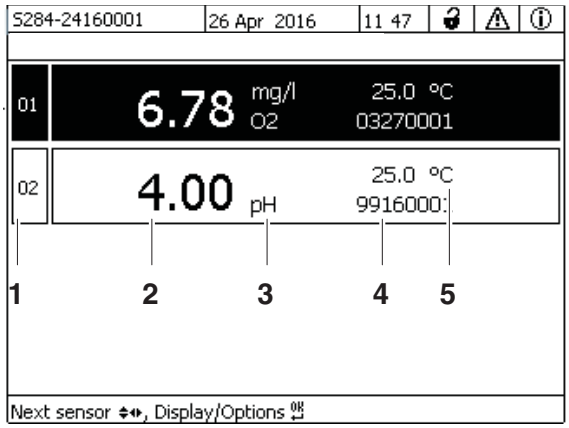


Fig. 4-3 Display - measured value display

1 Consecutive numbering of the measured values
2 Main measured value
3 Unit and parameter of the main measured value
4 Name of the sensor (to enter name: see section 5.4.1
5 User right (details see below)
6 Adjoining measured value with unit

Special displays

Init	Sensor is being initialized ● during commissioning or ● if a new IQ sensor is recognized that is not yet giving measured values
----	Invalid measured value
Cal	Sensor is being calibrated
Clean	Cleaning system active, sensor is offline
Error	Sensor is inactive or defective
OFL	Measuring range undercut or exceeded (overflow)
Display flashes	Sensor in maintenance condition

4.1.3 Keys

Key	Function
<M>	Display measured values
<C>	Start calibration of the IQ sensor selected in the measured value display
<S>	Open the *Einstellungen/Settings* menu
<ESC>	Change to the higher menu levels or abort entries without storing them
<OK>	Confirm selection
<▲ ▼ ◀ ▶> (arrow keys)	Highlight and select: ● Menu items ● Entries ● Columns or fields ● Letters or numerals

The selection highlighted with the arrow keys is displayed as white text on a black background (reverse video).

4.2 General operating principles

The operation of the IQ SENSOR NET is standardized and user-friendly.

- Select an item with the arrow keys **<▲ ▼ ◀ ▶ >**
  - Highlight individual elements in menus, lists and tables, e.g. menu entries, list elements, columns or fields
  - Select a setting in selection fields
  - Select a character in text entry fields
- Confirm a selection with the **<OK>** key.
- Break off an action and change to the next higher level with the **<ESC>** key.
- Start a calibration procedure with the **<C>** key.
- Switch to the settings with the **<S>** key.
- Change to the measured value display and break off current actions with the **<M>** key.

Short operating instructions are given in the help lines on the display.

Examples of the operating principles are given below:

- Navigation in menus, lists and tables (see chapter 4.2.1)
- Entering text and numerical values (see chapter 4.2.2)

If two or more terminals are used in an IQ SENSOR NET, access to the functions **<C>** and **<S>** is blocked when the functions are already being used on another terminal.

4.2.1 Navigating in menus, lists and tables

1 Open the *Einstellungen/Settings* menu with **<S>**.
Menus appear in the form of a list on the display, e.g. the *Einstellungen/Settings* menu shown here.

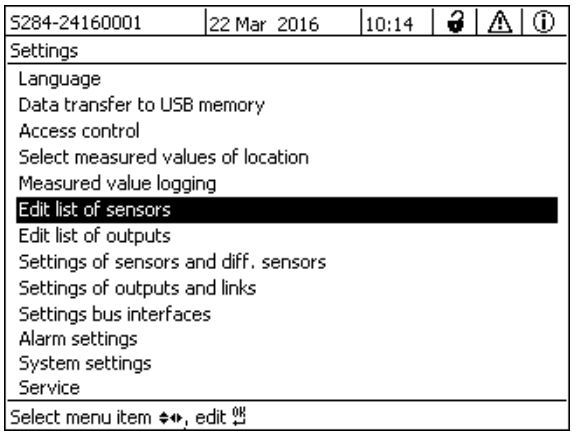


Fig. 4-4 Einstellungen/Settings

2 Select a menu item (e.g. *System settings*) with **<▲ ▼ ◀ ▶ >**.
Move the highlighting (reverse video display, black background) in the list of menu items with the arrow keys **<▲ ▼ ◀ ▶ >**.

3 Confirm the menu item (e.g. *System settings*) with **<OK>**.
The display (e.g. *System settings*) opens.
Confirm the selection and move to a new display by pressing the **<OK>** key.

4 Return to a higher level with **<ESC>**.
or:
Switch to the measured value display with **<M>**.

4.2.2 Entering texts or numerals

You can assign names to IQ sensors and MIQ output modules. Example: Entering a sensor name:

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Select the *Edit list of sensors* menu item with **<▲ ▼ ◀ ▶ >**.

3 Confirm the *Edit list of sensors* menu item with **<OK>**.
The *Edit list of sensors* display opens. A column is highlighted.

4 Select the *Sensor name* column with **<▲ ▼ ◀ ▶ >**.

5 Confirm the *Sensor name* column with **<OK>**.
A sensor name is highlighted.

6 Select a sensor name with **<▲ ▼ ◀ ▶ >**.

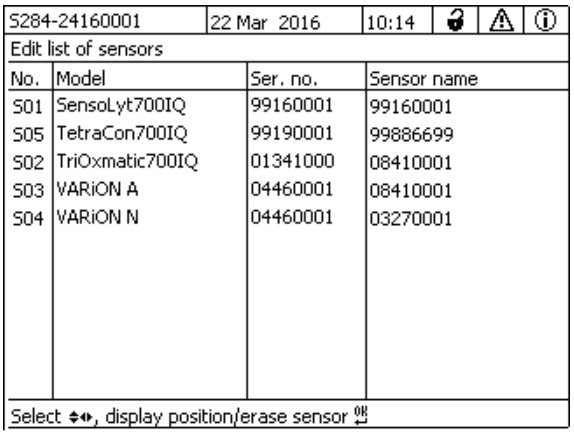


Fig. 4-5 Edit list of sensors

7 Confirm the selection with **<OK>**.
The name of the selected sensor is edited.

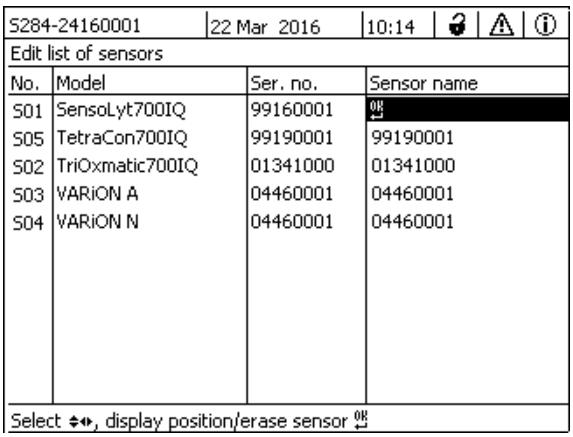


Fig. 4-6 Edit list of sensors

The following letters, numerals and special characters can be entered: **AaBb..Zz0..9µ%&/()+-=><!?_ °**.

8 Select a letter or numeral with **<▲ ▼ ◀ ▶ >**.

9 Confirm the letter with **<OK>**.
The character OK appears behind the last letter.

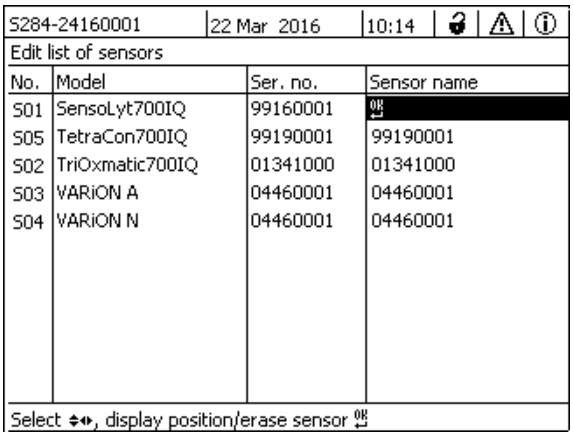


Fig. 4-7 Edit list of sensors

10 ● Add a new character
Select the character to be added with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.

or

● Delete the last character
Select the character with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.

or

● Adopt the name
Select the character with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.

11 Repeat steps 8 to 10 until the whole name has been entered.

You can break off entering the name with **<ESC>**. The old name is retained.

4.3 Access to the IQ SENSOR NET with active access control

Access control is switched off in the delivery condition. No login to the IQ SENSOR NET is required.

As soon as an access control of any type is enabled, access to the IQ SENSOR NET is protected completely or partly.

Access to the system is enabled as follows:

- Connecting the electronic key to the USB interface (Universal Transmitter), if the administrator has enabled this function
- Entering a password

Extended access control:

In the *Display/Options* / *Change user rights* menu, enter the password with the arrow keys and confirm with OK.

Extended access control with instrument block:

Press the any button.
In the password query, enter the password with the arrow keys and confirm with OK.

Further details on access control (see section 5.3)

4.4 Display of current measured values

Several options can be selected for displaying the measured values:

- *Measured values (1 sensor)*
  The measured value is shown numerically and as a bar graph on the *Measured values (1 sensor)* display (see section 4.4.1)
- *Measured values (4 sensors)*
  The *Measured values (4 sensors)* display provides an overview of a maximum of four IQ sensors (see section 4.4.2)
- *Measured values (8 sensors)*
  The *Measured values (8 sensors)* display provides an overview of a maximum of eight IQ sensors (see section 4.4.3)

Switch between the different types of display as follows:

1 Call up the measured value display with **<M>**.

2 Open the *Display/Options* menu with **<OK>**.

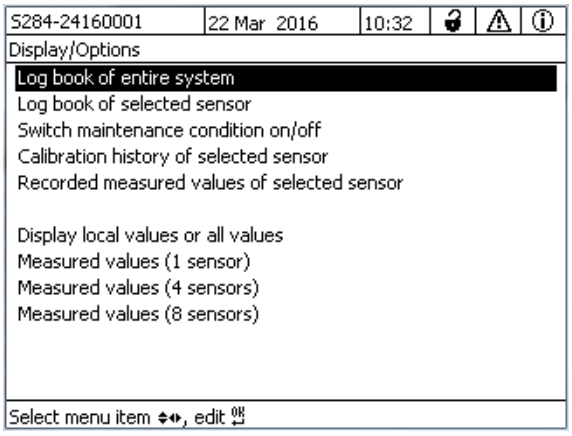


Fig. 4-8 Display/Options

3 Select and confirm a display type with **<▲ ▼ ◀ ▶ >** and **<OK>**.The selected display is activated.

4.4.1 Displaying a single measured value

The measured value is shown numerically and as a bar graph on the *Measured values (1 sensor)* display.

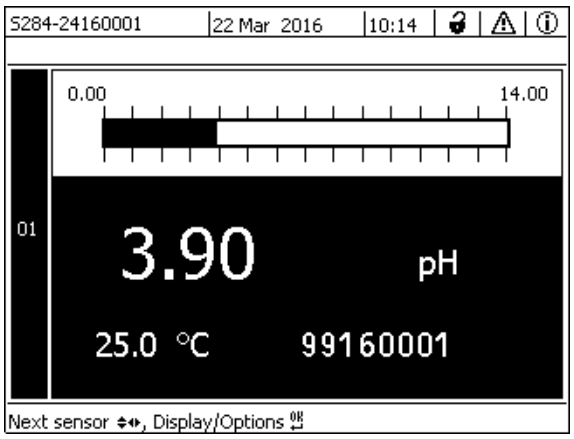


Fig. 4-9 Values: location -> Measured values (1 sensor)

4.4.2 Displaying four measured values

Up to four measured values of IQ sensors are shown on the display at the same time.

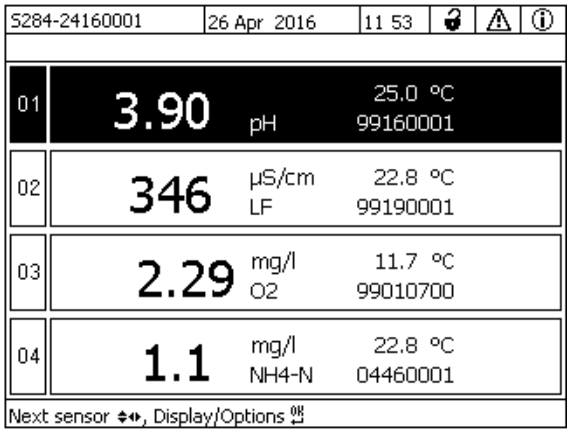


Fig. 4-10 Values: location -> Measured values (4 sensors)

4.4.3 Displaying eight measured values

Up to eight measured values of IQ sensors are shown on the display at the same time.

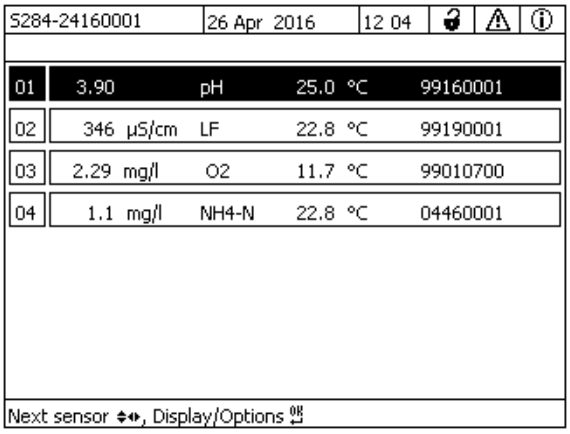


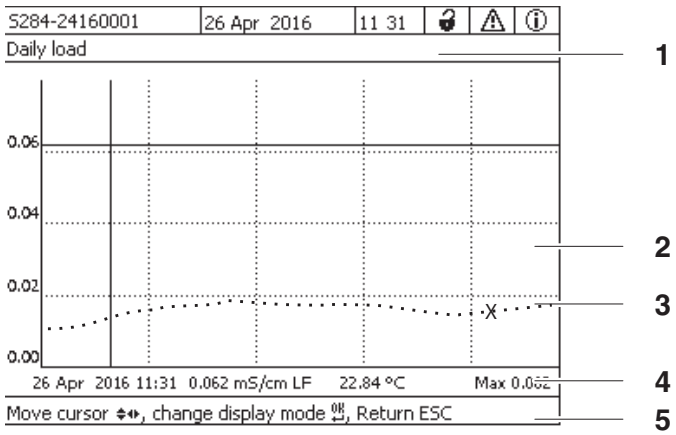
Fig. 4-11 Values: location -> Measured values (8 sensors)

4.4.4 Displaying recorded measured values

If the measured value recording has been activated for an IQ sensor (see section 5.10), the temporal course of the recorded measured values can be displayed numerically and graphically.

The following display options are possible:

- *Monthly load of selected sensor* (graphic display)
- *Weekly load of selected sensor* (graphic display)
- *Daily load of selected sensor* (graphic display)
- *Measured value list of selected sensor* (numerical display)



1 Display

2 Range of the graphical display
The time range (x-axis) corresponds to the selected type of display (1 day, 1 week, 1 month).
The value range of the y-axis is automatically adjusted to min and max values

3 Position of the cursor (X)

4 Data on the position of the cursor (X)
(date, time, main and secondary measured value)

5 Navigation instructions

Fig. 4-12 Daily load of selected sensor (example)

Displaying recorded measured values

1 Switch to the measured value display with **<M>**.

2 Select an IQ sensor with **<▲ ▼ ◀ ▶ >**.

3 Open the *Display/Options* menu with **<OK>**.

4 Select one of the display types with **<▲ ▼ ◀ ▶ >**
- *Monthly load of selected sensor*
- *Weekly load of selected sensor*
- *Daily load of selected sensor*
- *Measured value list of selected sensor*

and confirm with **<OK>**.
The selected option is displayed.

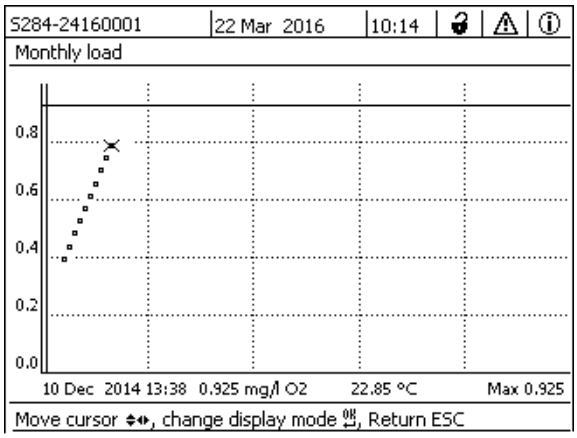


Fig. 4-13 Monthly load of selected sensor (example)

5 Move the cursor (X) along the measured value curve with **<▲ ▼ ◀ ▶ >**. The cursor (X) marks the selected measured value.

6 Switch to the next display option with a shorter display period with **<OK>**.
or
Switch to the next display option with a longer display period with **<ESC>**.

4.4.5 Transmitting recorded measurement data to a PC

Recorded measured values can be transmitted to a PC via the Ethernet interface. For details on data transmission, see section 6.

4.5 Messages and log book

The IQ SENSOR NET continuously monitors the status of the entire system. If the IQ SENSOR NET identifies system changes, a message appears. New messages can be recognized by the flashing information symbol or error symbol on the display.

All messages are recorded in the log book.

4.5.1 Message types

The system differentiates two types of messages:

- **Error ⚠**
  Indicates a critical status in the system or an individual system component that requires immediate action.

In the case of new error messages, the error symbol flashes on the display.

- **Information** ⓘ
  Information that does not require immediate action.
  In the case of new information, the info symbol flashes on the display.

In the case of errors, immediately open the detailed message text in the log book and perform the recommended actions. If the actions have been performed, mark the message as read (see section 4.5.3).

4.5.2 Log book

The log book is a list with all the messages from all modules. The log book contains up to 1000 entries. If there are more than 1000 messages, the oldest entries are deleted.

New messages can be recognized by the flashing information symbol or error symbol. The log book always contains the latest message in the first position. They do not yet have a checkmark in the status field.

The flashing of the info or error symbol only stops after all detailed message texts in the log book have been opened and marked with a checkmark (✔) (see section 4.5.3).

Structure of the log book

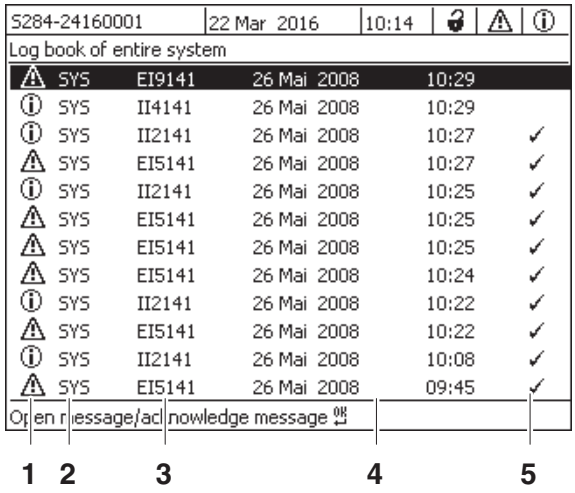


Fig. 4-14 Log book of entire system

1 Message category (error or info symbol)

2 Module that triggered the message.
SYS System (Universal Transmitter, controller)
S01 IQ sensor (number 01)
S?? IQ sensor (inactive, dataset erased)
D01 DIQ output module (number 01)
D?? DIQ output module (inactive, dataset erased)

3 Message code

4 Date and time of the message

5 Status field of the message
✔ Message was acknowledged
No checkmark Message was not acknowledged

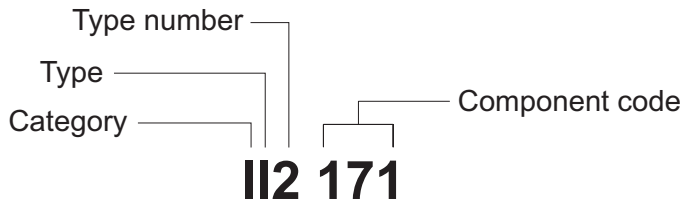
The system provides the following log books:

- *Log book of entire system*:
  List of all messages from all modules
- *Log book of selected sensor*:
  List of all messages from a single IQ sensor.

There is a detailed message text for each message of a module that is ready for operation. The detailed message text on each message is given in the log book (see section 4.5.3) and in the operating manual of the registering module.

Structure of the message code

The message code consists of 6 characters and can contain numerals and letters, e.g.: II21171.



Position	Information	Explanation
1 - 3	Short message form	The short form of the message contains the following information of the message: Category, type and type number
	1: possible categories	● Info message (I) ● Error message (E)
	2: possible types	● Calibration data (C) ● Installation and commissioning (I) ● Instructions for service and repair (S) ● Application instructions (A)
	3: Type number	Each type contains subtypes (0..9A..Z)
4 - 6	Module code	The three-digit module code designates the module that generated the message. The module code can be found in the chapter LISTS of the respective component operating manual.

Example: Message code II2171

The "171" module (Universal Transmitter DIQ/S 284) sends a message with the short message form "II2".
This is an info message (I) of the type Installation (I) with the type number (2).
The detailed message text of the short form message (II2) can be found in the log book and in the operating manual of the component that sent it.

The detailed message text in the log book contains a precise description of the message code and, if required, any further actions.

The detailed message texts can also be found in the component operating manuals of the individual components.

The log book shows the current status at the point of time it was opened. If new messages arrive while a log book is open, these do not appear in the log book. As usual, you are informed of new messages by flashing info or error symbols. The current log book with the new messages can be viewed by closing and reopening the log book.

4.5.3 Viewing detailed message texts

1 Switch to the measured value display with **<M>**.

2 Open the *Display/Options* menu with **<OK>**.

3 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and open the *310 - Log book of entire system*.
A list of log book entries appears.

4 Using **<▲ ▼ ◀ ▶ >** and **<OK>** select and confirm a new log book entry (unchecked).
The message text with further information on the selected log book entry appears.

S284-24160001	22 Mar 2016	10:14			
Log book of entire system					
⚠	SYS	EI9141	26 Mai 2008	10:29	
ⓘ	SYS	II4141	26 Mai 2008	10:29	
ⓘ	SYS	II2141	26 Mai 2008	10:27	✓
⚠	SYS	EI5141	26 Mai 2008	10:27	✓
ⓘ	SYS	II2141	26 Mai 2008	10:25	✓
⚠	SYS	EI5141	26 Mai 2008	10:25	✓
⚠	SYS	EI5141	26 Mai 2008	10:25	✓
⚠	SYS	EI5141	26 Mai 2008	10:24	✓
ⓘ	SYS	II2141	26 Mai 2008	10:22	✓
⚠	SYS	EI5141	26 Mai 2008	10:22	✓
ⓘ	SYS	II2141	26 Mai 2008	10:08	✓
⚠	SYS	EI5141	26 Mai 2008	09:45	✓
Open message/acknowledge message					

Fig. 4-15 Log book of entire system

5 Acknowledge the message with **<OK>**. A checkmark appears in the log book entry.

6 Exit the message text with **<ESC>**.

Acknowledgment of a new message text in the log book marks the message as read. When all errors or information messages are acknowledged, the symbols no longer flash.

With the *Acknowledge all messages* function you can acknowledge all messages at the same time (see section 4.5.4).

Message texts are stored in the modules that caused them. Therefore, further information on a log book entry for an IQ sensor such as, e.g. calibration messages, instructions and help texts are only accessible in the case of connected components that are ready for operation.

If a message text is not available because, e.g. a module is not connected with the system, you can look up the detailed text of the message as follows:

- Messages of the system are given in this operating manual (see section 12.1).
- Messages of a module are given in the respective component operating manual of the module.

4.5.4 *Acknowledge all messages*

1 Switch to the measured value display with **<M>**.

2 Open the *Einstellungen/Settings* menu with **<S>**.

3 Using **<▲ ▼ ◀ ▶ >**, select the menu item, *Service* and confirm with **<OK>**.

4 Using **<▲ ▼ ◀ ▶ >**, select the menu item, *Acknowledge all messages* and confirm with **<OK>**. A security prompt opens.

5 Using **<▲ ▼ ◀ ▶ >**, select *Acknowledge* and confirm with **<OK>**. All messages are acknowledged. Error symbol and info symbol do no longer flash.

4.6 Calibration data

Details on calibration are given in the operating manual for the IQ sensor.

Each calibration of IQ sensors that are able to be calibrated causes an entry to be made in the log book. Log book entries contain the following information:

- Calibration date
- Calibration successful or not successful.

The detailed calibration data of the last calibrations are integrated in the *Calibration history of selected sensor* overview.

All calibration data are stored in the IQ sensor. In order to view the calibration data of an IQ sensor, the IQ sensor must be connected to the IQ SENSOR NET and must be ready for operation.

4.6.1 Calibration entries in the log book

The date and time of a calibration are entered in the log book. The respective message text contains an indication as to whether a calibration was successful or not. The values determined with calibration can be viewed in the calibration history (see section 4.6.2).

1 Call up the measured value display with **<M>**.

2 Using **<▲ ▼ ◀ ▶ >**, highlight a sensor and confirm with **<OK>**. The *Display/Options* menu opens.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Log book of selected sensor*, and confirm with **<OK>**. Calibration entries in the log book are held in message code (ICxxxx and ECxxxx).

4 Select and open a calibration entry (ECxxxx or ICxxxx) with **<▲ ▼ ◀ ▶ >** and **<OK>**.

5 Exit the *Calibration history of selected sensor* with **<▲ ▼ ◀ ▶ >**.

4.6.2 Calibration history

The calibration history contains the detailed calibration data of the last calibrations.

1 Call up the measured value display with **<M>**.

2 Using **<▲ ▼ ◀ ▶ >**, highlight a sensor and confirm with **<OK>**.
The *Display/Options* menu opens.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Calibration history of selected sensor*, and confirm with **<OK>**.
The calibration history with the results of the last calibration procedures opens.

4 Exit the *Calibration history of selected sensor* overview with **<M>**.

4.7 Status info of sensors and outputs

The display of the instrument status provides a simple overview of the current modes of sensors (sensor info) and outputs in the IQ SENSOR NET.

The status display can be reached in the *Einstellungen/Settings*/*Service*/*List of all components* menu (see section 4.10).

1 Call up the *List of all components* (see section 4.10).

2 Highlight the required component with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.
- Output module: The *Status of output channels* window opens up (for details, refer to the operating manual of the output module).
- Sensor: The sensor info opens up (for details, refer to the operating manual of the selected sensor).

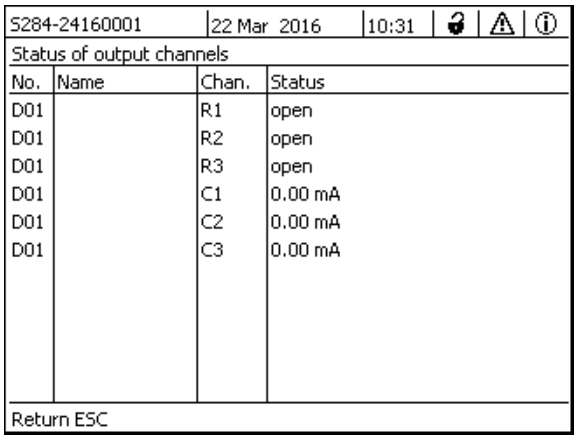


Fig. 4-16 List of all components with sensor info

3 Exit the *Status of output channels* window with **<M>** or **<ESC>**.

4.8 General course when calibrating, cleaning, servicing or repairing an IQ sensor

When an IQ sensor is calibrated, cleaned, serviced or repaired, the maintenance condition for the relevant IQ sensor should always be switched on.

In the maintenance condition

- the system does not react to the current measured value or the condition of the selected IQ sensor
- linked outputs are frozen
- IQ sensor errors do not prompt changes in the conditions of linked outputs.

The maintenance condition for IQ sensors is automatically activated

- during calibration. After calibration the IQ sensor remains in the maintenance condition until the maintenance condition is switched off manually (see section 4.8.3)
- during a compressed air cleaning cycle.

Therefore, keep to the following course when you calibrate, clean, service or repair an IQ sensor.

Outlet

1 Switch on the maintenance condition for the IQ sensor (see section 4.8.2).
The display of the sensor in the measured value display flashes.

2 Pull the sensor out of the sample.

3 Perform the calibration in the laboratory, cleaning, maintenance or repair (removing and replacing) of the sensor (about these topics, see the component operating manual of the corresponding sensor).

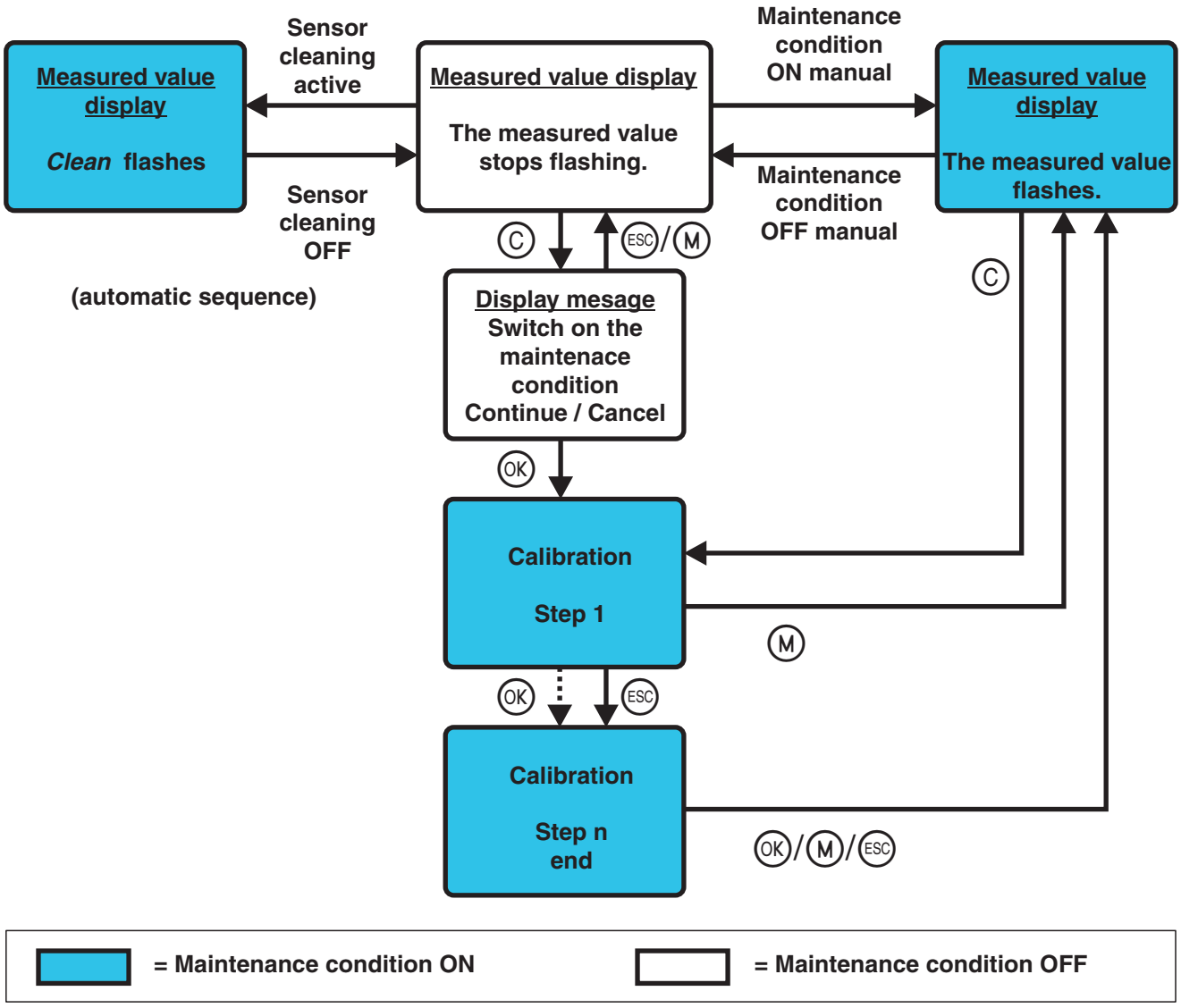
4 Submerse the sensor in the sample again.

5 Wait until the measured value no longer changes.

6 Switch off the maintenance condition for the sensor (see section 4.8.3).
The display of the sensor in the measured value display no longer flashes.

4.8.1 Maintenance condition of IQ sensors

The following diagram gives you an overview of when an IQ sensor is in the maintenance condition.



4.8.2 Switching on the maintenance condition

Switch on the maintenance condition manually when you want to clean, service or repair (remove and replace) an IQ sensor.

1 Press **<M>** to call up the measured value display.

2 Select the sensor you want to switch on the maintenance condition for with **<▲ ▼ ◀ ▶ >**.
The display of the sensor in the measured value display does not flash.

3 Open the *Display/Options* menu with **<OK>**.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Switch maintenance condition on/off*, and confirm with **<OK>**.
A window that informs you about the maintenance condition opens up.

5 Use **<OK>** to confirm *Continue*.
The selected sensor is in the maintenance condition. Linked outputs are frozen.

6 Call up the measured value display with **<M>**.
The display of the sensor in the measured value display flashes.

Subsequently, perform the cleaning, maintenance or repair work (removal and replacement).

When you have finished calibrating, cleaning, servicing or repairing the sensor, switch off the maintenance condition manually (see section 4.8.3).

4.8.3 Switching off the maintenance condition

1 Call up the measured value display with **<M>**.

2 Select the sensor you want to switch off the maintenance condition for with **<▲ ▼ ◀ ▶ >**.
The display of the sensor in the measured value display flashes.

3 Open the *Display/Options* menu with **<OK>**.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Switch maintenance condition on/off*, and confirm with **<OK>**.
A window that informs you about the maintenance condition opens up.

5 Use **<OK>** to confirm *Continue*.
The maintenance condition of the selected sensor is switched off.
Linked outputs are released.

6 Call up the measured value display with **<M>**.
The display of the sensor in the measured value display does not flash.

If a power failure occurs, the outputs automatically are in the non-operative condition (relays: open, current output: 0 A; see component operating manual of the output module). After the end of the power failure the outputs work as defined by the user again.

If a power failure occurs while an IQ sensor that is linked with an output is in the maintenance condition, the current and relay outputs work as defined by the user after the maintenance condition has been switched off only (see section 4.8.3).

4.9 USB interface

The USB interface on the DIQ/S 28X can be used for the following actions:

- Saving data of the IQ SENSOR NET to a USB memory device (see section 4.9.1)
- Transmitting configuration data to the Universal Transmitter (see section 4.9.2)
- Carrying out a software update (see section 4.11)
- Accessing the system with the Electronic Key (see section 4.3)

4.9.1 Saving IQ SENSOR NET data to a USB memory device

You can save the following data types:

- Configuration data (see section 4.9.2)
- Measurement data (see section 4.9.2)
- Log book
- Calibration history

The configuration data can be transferred from the USB memory device back to the IQ SENSOR NET. Thus, you can very easily create systems that are configured identically.

Data backup

1 Switch to the measured value display with **<M>**.

2 Open the *Einstellungen/Settings* menu with **<S>**.

3 Use **<▲ ▼ ◀ ▶ >** and **<OK>** to open the *Data transfer to USB memory* menu.

4 Select the data to be saved with **<▲ ▼ ◀ ▶ >**.
- *Save configuration*
- *Measured data storage*
- *Log book*
- *Calibration history*

and confirm with **<OK>**.

5 The data are prepared for the transfer.

You can cancel the data saving process by highlighting and confirming the Cancel menu item with **<▲ ▼ ◀ ▶ >** and **<OK>**. In this case the data will not be stored to the USB memory device.

6 Press **<▲ ▼ ◀ ▶ >** to highlight the *Save* menu item and confirm with **<OK>**.
The selected data will be stored to the USB memory device.

4.9.2 Restore system configuration

The restoration of a configuration back to the universal transmitter is carried out manually from the USB memory. For this it is useful to save the configuration to a USB memory device manually and regularly.

Manual restoration

To transfer configuration data to the Universal Transmitter, proceed as follows:

1 Open the *Settings* menu with **<S>**.

2 Press **<▲ ▼ ◀ ▶ >** to select the menu item *Data transfer to USB memory* and press **<OK>**.

3 Press **<▲ ▼ ◀ ▶ >** to select the menu item *Retransfer configuration* and press **<OK>**. The process is started.

4 Wait until the restore is terminated.

5 Confirm the concluding message with **<OK>**.

4.10 Info on software versions

The system informs you of the current versions of the software of the individual IQ SENSOR NET components.

1 Call up the measured value display with **<M>**.

2 Open the *Einstellungen/Settings* menu with **<S>**.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Service*, and confirm with **<OK>**. The *Service* dialog window opens.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *List of all components*, and confirm with **<OK>**.
The *List of all components* dialog box opens.

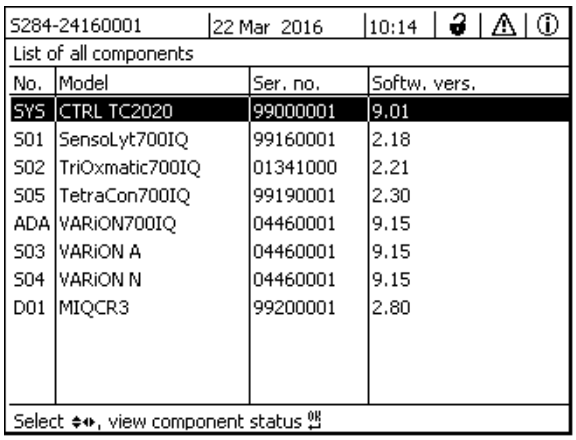


Fig. 4-17 List of all components

5 Exit the *List of all components* dialog box with **<M>** or **<ESC>**.

If the software version of a component is not up-to-date, you can carry out a software update via the USB interface (see section 4.11).

4.11 Software-Update for DIQ/S 28X

With a Software-Update, you maintain the latest state of the instrument software for the Universal Transmitter DIQ/S 28X and all active components.

The update packet with the current instrument software for active IQ SENSOR NET components and detailed instructions on how to proceed are available on the Internet under www.WTW.com.

The instrument software is transferred to the System 28X via the USB port and with the aid of a USB memory device.

A Software-Update does not change the measurement settings, measurement data and calibration data.

You can view the software versions of all components in the dialog box, *List of all components* (see section 4.11).

5 Settings/setup

5.1 Selecting the language

A list shows all the available system languages.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *Language*.
The *Language* display opens.

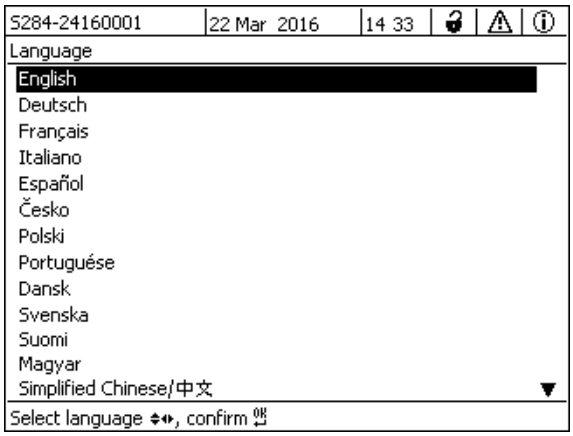


Fig. 5-1 Language

3 Select a language from the list with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.
The active language is marked with a checkmark.

4 Switch to the higher menu level with **<ESC>**.
or:
Switch to the measured value display with **<M>**.

If the selected system language is not available in a component, all indications of this component (e.g. sensor, Universal Transmitter, output module) appear in the standard language, *English*. To activate the selected system language for this component, a software update of the component is required (see section 4.11).

5.2 Terminal settings of the DIQ/S 28X

The terminal settings include:

- *Terminal name*

- *Illumination brightness*
- *Illumination brightness (standby)*

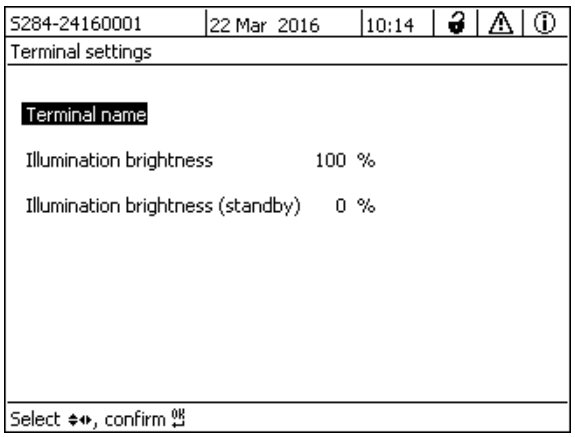


Fig. 5-2 Terminal settings

Setting	Selection/Values	Explanation
Terminal name	AaBb..Zz 0..9µ%&/() +-=><!?_ °	User-defined character string with max. 15 characters
Illumination brightness	AUTO 0 ... 100 %	Brightness of the display during operation of the terminal
Illumination brightness (standby)	AUTO 0 ... 50 %	Brightness of the display during operation if no key is pressed for a longer period of time

5.3 Access control

Use the *Access control* function to define the safety settings for the IQ SENSOR NET.

The DIQ/S 28X provides the following levels of system security:

- Access control
  (4 authorization levels, see section 5.3.1):
  - No access control
  - Administrator authorization
  - Maintenance authorization
  - Read permission

- Access control with instrument block (see section 5.3.2):

Access to the system with active access control (see section 4.3).

Default settings Access control is switched off in the delivery condition.
Any user can carry out all functions.

Saving the password If access control for the IQ SENSOR NET is active and the administrator password is lost, rapid administrator access to the IQ SENSOR NET is no longer possible.

To avoid losing the administrator password, we recommend saving it. This also applies to the use of the electronic key.

To save the administrator password, you can save it on an electronic key, for example, and/or note it down on paper or on a PC. Keep the passwords in a safe place.

If the IQ SENSOR NET is locked and the administrator password lost, you can unlock the system with a master password. Please contact the service department.

The master password is valid for 7 days.

If you have unlocked the IQ SENSOR NET with the master password, we recommend to note down the normal administrator password and keep it in a safe place.

5.3.1 Activating the access control

Access control provides three preconfigured user rights in the system. Each user type can be protected with its own password.

User right The current user right is shown on the display with the following symbols.

Validity	User right	Symbol	User rights
System-wide	Settings are unlocked (access control swiched off)		All functions in the system are accessible to all users

Validity	User right	Symbol	User rights
	Administration		● Access only with password ● Change system settings ● Assign user rights ● Calibration ● Data backup ● Restore configuration ● View measured values ● Carry out software updates
	Maintenance		● Access only with password ● Calibration ● Data backup ● View measured values
	Viewer		● Without instrument block: Access without password ● With instrument block: Access only with password ● Data backup ● View measured values
For the instrument on which the function was activated	Instrument block		● Instrument block switched off: User rights as for *Viewer*. ● Instrument block active: The System 28X is blocked. Only the IQ SENSOR NET logo is displayed. Access only with password.

Switching on the access control

1 Open the *Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *Access control*.
The *Simple access control* dialog window opens.

3 Using **<▲ ▼ ◀ ▶ >**, select the function, *Activate extended access control* and confirm with **<OK>**.
User right and instrument block can be selected.

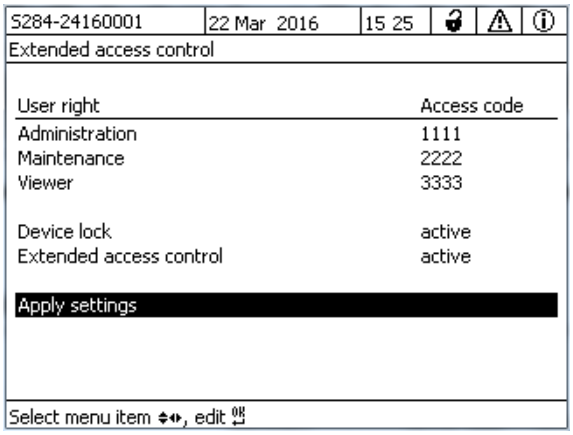


Fig. 5-3 Settings -> Access control -> Extended access control

The instrument automatically generates a password for each user right. This password can be accepted or changed.

4 Press **<▲ ▼ ◀ ▶ >** to select an user right and confirm with **<OK>**.
If necessary, change the password in the selection dialog and/or save the password to a connected USB memory.

5 Note passwords.
For reasons of safety the administrator password at least should be saved in such a way that it can be accessed in an emergency.

6 Press **<▲ ▼ ◀ ▶ >** to select the *Apply settings* function and confirm with **<OK>**.
A security prompt opens.

7 Using **<▲ ▼ ◀ ▶ >**, select *OK* and confirm with **<OK>**.
The settings are adopted.
The *Extended access control* window is still open.
The current passwords are visible.
The *Viewer* user right is active.

Switching off the access control

1 Press **<OK>** to open the *Display/Options* / *Change user rights* menu.
The password query is displayed.

2 Enter and confirm the administrator password with **<▲ ▼ ◀ ▶ >** and **<OK>**.

3 Open the *Settings* menu with **<S>**.
Deactivate the access control.
Take over the setting.

5.3.2 Activating the instrument block

With the function *Device lock* you can protect the Universal Transmitter no only against unauthorized operating bus also against unauthorized reading of the current measured values. By activating the instrument block the password for viewing the measured values is activated.

After a selected interval without user entries, the system is automatically blocked. The display shows only the IQ SENSOR NET logo.

Switching on the instrument block

1 Call up the access control (see section 5.3.1).

2 Press **<▲ ▼ ◀ ▶ >** to select the *Device lock* function and confirm with **<OK>**.
A checkmark appears next to the function.

3 Press **<▲ ▼ ◀ ▶ >** to select the *Apply settings* function and confirm with **<OK>**.
A security prompt opens.

4 Using **<▲ ▼ ◀ ▶ >**, select *OK* and confirm with **<OK>**.
The settings are adopted.
The *Access control* dialog window is still open.
The current passwords are visible.

Switching off the instrument block

1 Press **<OK>** to open the *Display/Options* / *Change user rights* menu.
The password query is displayed.

2 Enter and confirm the administrator password with **<▲ ▼ ◀ ▶ >** and **<OK>**.

3 Open the *Settings* menu with **<S>**.
Deactivate the access control.
Take over the setting.

5.3.3 Electronic key

The administrator can simplify access to the IQ SENSOR NET by saving the password to USB memory. The USB memory thereby becomes an electronic key.

When the electronic key is connected to the System 28X, the user right stored there with the relevant password is automatically read out. The user of the electronic key is logged on to the system with his user right without any further password prompt.

When the electronic key is disconnected, the IQ SENSOR NET automatically switches to the lowest user right.

Passwords for different IQ SENSOR NET systems can be saved to every electronic key.
For each IQ SENSOR NET system only one password can be saved to each electronic key.

Saving a password to an electronic key

1 Connect the USB memory to the USB-A interface.

2 Open the *Settings* menu with **<S>**.

3 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *Access control*.
The *Access control* dialog window opens.

4 Press **<▲ ▼ ◀ ▶ >** to select an authorization level and confirm with **<OK>**.

5 Using **<▲ ▼ ◀ ▶ >**, select the menu item, *Save access code on USB memory* and confirm with **<OK>**.
The password for the system settings is saved to the USB memory.

5.3.4 Access to the IQ SENSOR NET with active access control

Simple access control

- Administrator access after entering the password in order to take over a changed setting:
  The protection is automatically reactivated after the one setting was changed.
- Administrator access through connecting the electronic key: The protection is restored by disconnecting the electronic key

Access control (with instrument block):

- Administrator access through entering the password:
  - After 10 minutes without key-pressing, the highest protection level is automatically activated.
  - Select the menu *Display/Options* / *Viewing only*.
    The highest level of protection is activated.
- Administrator access through connecting the electronic key: The protection is restored by disconnecting the electronic key

5.4 Editing the list of sensors

The *Edit list of sensors* display provides an overview of all IQ sensors and inactive datasets (see section 9.3.2).

In the *Edit list of sensors* display, you can:

- assign sensor names (see section 5.4.1)
- delete inactive datasets (see section 5.4.1)
- change the order of the display of measured values on the measured value display (see section 5.4.2).

5.4.1 Entering / editing a name for an IQ sensor

For the easier identification of the IQ sensors you can assign an individual name to each IQ sensor.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Edit list of sensors*.
The *Edit list of sensors* display opens.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the *Sensor name* column. Confirm with **<OK>**.

4 Using, **<▲ ▼ ◀ ▶ >** highlight the name of a sensor and confirm with **<OK>**.

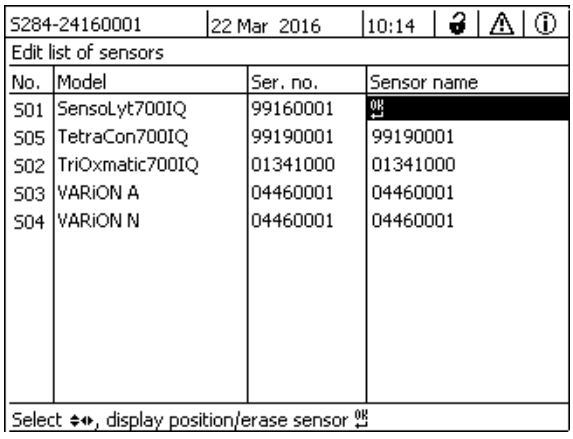


Fig. 5-4 Edit list of sensors

5 Enter the name with **<▲ ▼ ◀ ▶ >** and **<OK>** and confirm with **<OK>** (see section 5.4.1).

5.4.2 Changing the display position

The numbering of the sensors is generated by the system. The order of the sensors in the measured value display and in the *Edit list of sensors* overview can be individually determined.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Edit list of sensors*.
The *Edit list of sensors* display opens.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the *Model* column. Confirm with **<OK>**.

4 Press **<▲ ▼ ◀ ▶ >** to highlight a *Model* and confirm with **<OK>**.
A dialog window opens.

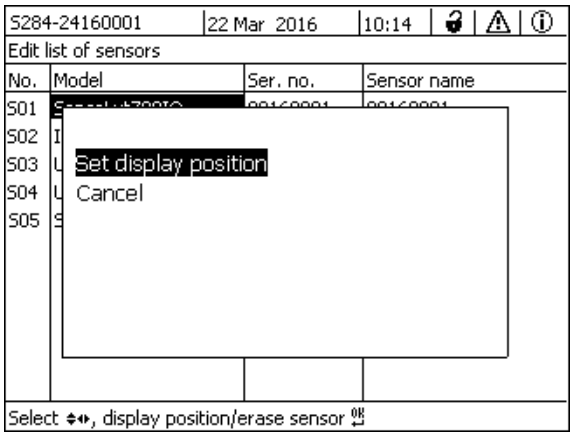


Fig. 5-5 Edit list of sensors -> Set display position

5 Using **<▲ ▼ ◀ ▶ >**, select the menu item, *Set display position* and confirm with **<OK>**. A dialog window opens.

6 Press **<▲ ▼ ◀ ▶ >** to select the required number for the display position and confirm with **<OK>**.
The sensor is displayed at the new position in the list of sensors. The other sensors are moved accordingly.

5.4.3 Erasing inactive sensor datasets

An inactive dataset for an IQ sensor arises if the Universal Transmitter receives no signals from an already registered IQ sensor. The *Error* display appears on the measured value display instead of a measured value. Inactive datasets can be recognized by a question mark, e.g. "?01" in the *Edit list of sensors* overview.

An inactive dataset can be reactivated by assigning it, e.g. to an IQ sensor of the same type (see section 9.3.2). All settings are retained. If these data are no longer required, they can be erased. All the data and settings and the link with an output belonging to this IQ sensor are erased by this action.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Edit list of sensors*.
The *Edit list of sensors* display opens.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the *Model* column. Confirm with **<OK>**.

4 Press **<▲ ▼ ◀ ▶ >** to highlight a *Model* and confirm with **<OK>**.

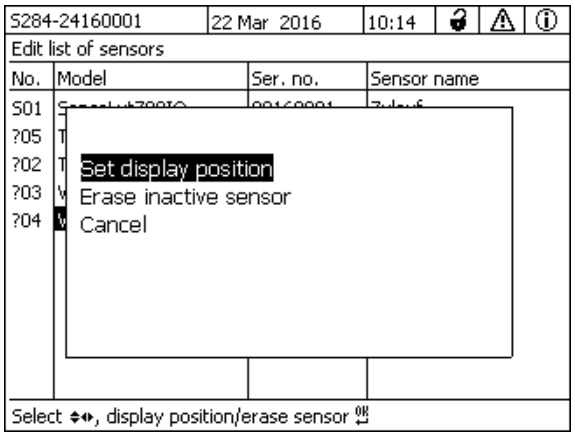


Fig. 5-6 Edit list of sensors -> Erase inactive sensor

5 Using **<▲ ▼ ◀ ▶ >**, select *Erase inactive sensor* and confirm with **<OK>**.
The dialog window for the security prompt appears.

6 Using **<▲ ▼ ◀ ▶ >**, select *Erase inactive sensor* and confirm with **<OK>**.
The inactive sensor is erased.

5.5 Settings for sensors

Sensor settings include the measured parameter, measuring range and, if necessary, compensations.

Enhanced sensor functions

For certain sensors, special representation types and settings are available in the menu, *Extended sensor functions*. An example for an enhanced sensor function is the editing of measured values as a graphic representation with cursor and zoom function (e.g. echo profile for the sludge level sensor IFL 700 IQ).

Sensor settings The following diagram shows the operating steps to call up the sensor setting menu and enhanced sensor functions:

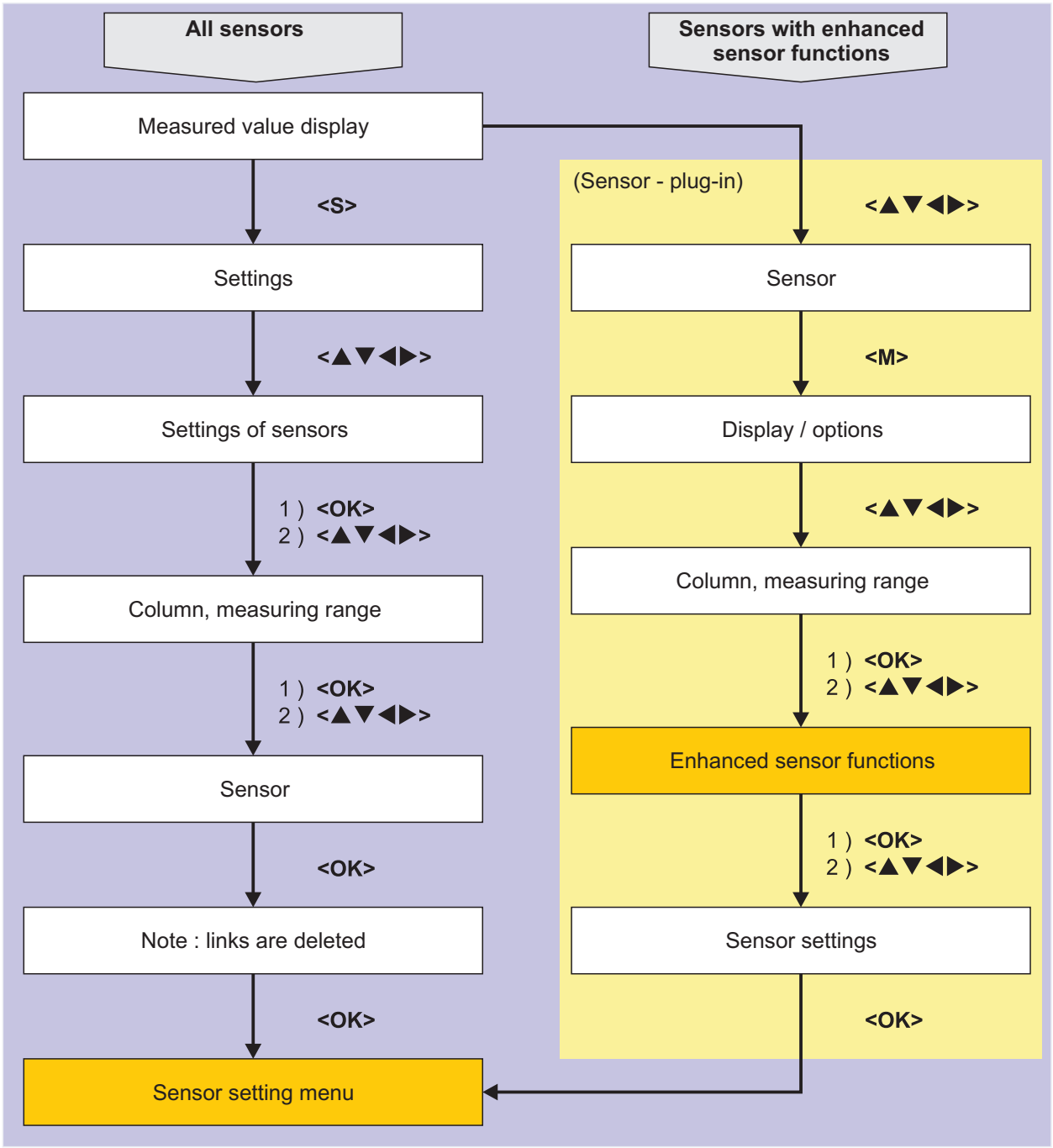


Fig. 5-7 Calling up the sensor settings

If the measuring mode or measured parameter are changed, a link of the sensor with a relay is erased!

Details on sensor settings are given in the operating manual for the IQ sensor.

5.6 *Sensor-sensor link* (automatic offset of an influencing quantity)

The *Sensor-sensor link* function automatically makes available the measured value of a sensor to another sensor in the IQ SENSOR NET system.

Example: Measuring the D.O. concentration

D.O. sensors measure the D.O. partial pressure and use the solubility function of oxygen in the test sample to calculate the D.O. concentration (mg/l).
The solubility of oxygen in water is influenced by the salt content (the salinity) of the solution and other factors such as the temperature or air pressure.

Static salinity correction

To take into account the influence of the salinity on the D.O. concentration, many D.O. measuring systems provide a function where you can manually enter the salinity value. The sensor includes the salinity and provides a corrected measured value.

This type of static salinity correction is especially suitable for test samples with almost unchanging salinity.
To obtain optimum measurement results even with changing salinity values, the actual salinity has to be newly determined and entered for each measurement of the D.O. concentration.

Dynamic salinity correction

A dynamic salinity correction is provided by the *Sensor-sensor link* function. This function supplies the D.O. sensor continuously with the current salinity value and is thus especially suitable for the continuous measurement of the D.O. concentration with changing salinity values.

5.6.1 Establishing the sensor-sensor link

Requirements for a sensor-sensor link

The following requirements have to be met for a sensor-sensor link:

- Hardware
  - A sensor for which an influence quantity can be corrected (e. g. FDO® 700 IQ, TriOxmatic® 700 IQ) is in the IQ SENSOR NET system.
  - A sensor that measures the influence quantity (e.g. TetraCon® 700 IQ) is in the IQ SENSOR NET system.
- Software
  - The software of the sensor with correction function (e.g. FDO® 700 IQ) supports the *Sensor-sensor link* function.
  - The software of the sensor measuring the influence quantity (e.g.TetraCon® 700 IQ) supports the *Sensor-sensor link* function.
- Sensor settings
  - The correction function is enabled in the setting menu for the sensor with

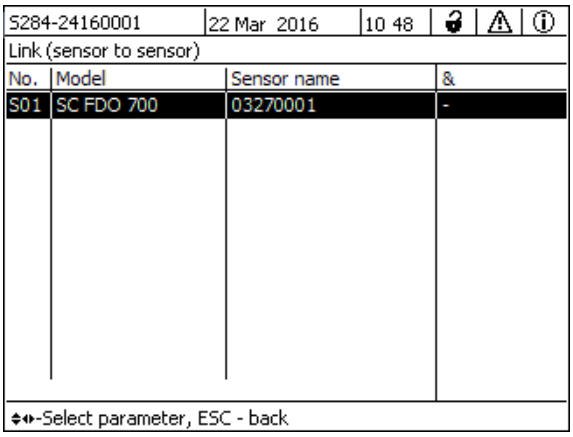
correction function (e.g. FDO® 700 IQ).

– The automatic (dynamic) correction is enabled in the setting menu for the sensor with correction function (e.g. FDO® 700 IQ).
– A sensor measures the influence quantity and displays it with the unit which is used for manual input in the menu of the sensor with correction function (e.g. TetraCon® 700 IQ measures the salinity - salinity is quoted dimensionless).
– The manually entered value for the static correction is set to the mean value of the influence quantity (e.g. salinity value) of the test sample.
If no measured value for the influence quantity is available, the correction is made with the value that was manually entered (static correction).

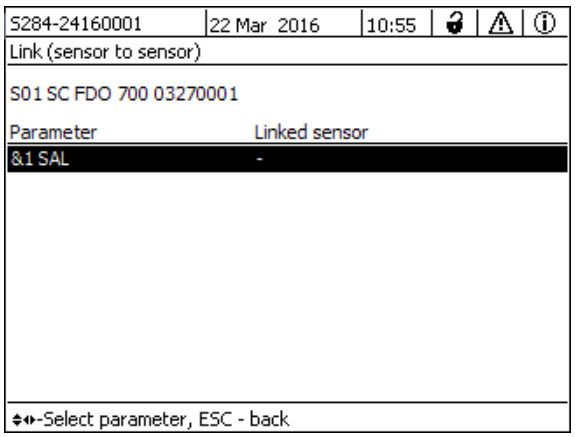
Establishing the link

1 Using **<S>**, open the *Settings* menu.

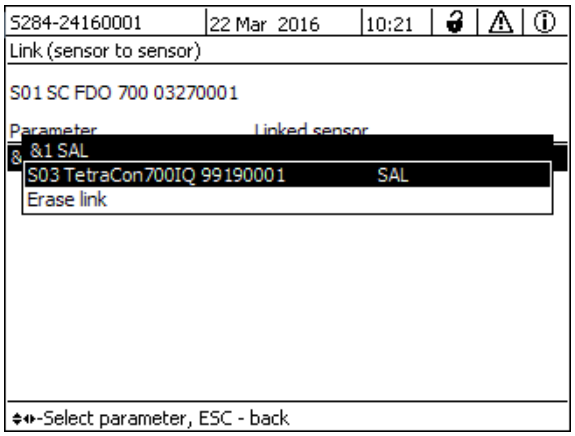
2 Using **<▲ ><▼ >** and **<OK>**, select and confirm the menu item, *System settings -> Sensor-sensor link*.
The *Sensor-sensor link* overview opens.
The displayed list includes all sensors with which the correction of an influence quantity is possible (e.g. FDO® 700 IQ).



3 Using **<▲ ><▼ >**, highlight a sensor and confirm with **<OK>**.
The influence quantity to be linked and the current state of the link are displayed.



4 Using **<▲ ><▼ >**, highlight a parameter to be linked, and confirm with **<OK>**.
The displayed list includes all sensors that measure an influence quantity with the correct unit (e.g. TetraCon® 700 IQ, which measures the salinity in mg/l).



5 Using **<▲ ><▼ >**, highlight a sensor that can be linked, and confirm with **<OK>**.
The sensors are linked.
The influence quantity to be linked and the linked sensor are displayed.

6 Leave the system settings with **<M>**.
In the measured value display, the corrected measured value is marked by an asterisk (*).

Behavior if there is no measured value for the influence quantity

Cause	Behavior
– Sensor failure	– The manually entered value for the influence quantity is automatically used for correction. An exclamation mark (!) indicates the interrupted link. – The sensor-sensor link is reactivated as soon as the measured value for the influence quantity is available again.
– Maintenance condition active	– The value last measured for the influence quantity is automatically used for correction. – The current measured value is used for correction as soon as the measured value for the influence quantity is available again.

5.6.2 Erasing a *Sensor-sensor link*

1 Open the *Settings* menu with **<S>**.

2 Using **<▲ ><▼ >** and **<OK>**, select and confirm the menu item, *System settings -> Sensor-sensor link*.
The *Sensor-sensor link* overview opens.
The displayed list includes all sensors with which the correction of an influence quantity is possible (e.g. FDO® 700 IQ).

3 Using **<▲ ><▼ >**, highlight a sensor and confirm with **<OK>**.
The displayed list includes all linked sensors.

4 Using **<▲ ><▼ >**, highlight a sensor and confirm with **<OK>**.
The displayed list includes all sensors that measure an influence quantity with the correct unit (e.g. TetraCon® 700 IQ, which measures the salinity in mg/l) and the menu item *Erase link*.

5 Using **<▲ ><▼ >**, highlight the menu item, *Erase link*, and confirm with **<OK>**.
The sensor-sensor link is erased.

6 Leave the system settings with **<M>**.
In the measured value display, the measured value is corrected by the manually entered value.

The *Sensor-sensor link* function is automatically deactivated if the measured parameter of the linked sensor is changed (e.g. by switching the display of the TetraCon® 700 IQ conductivity sensor from salinity to conductivity).

5.7 Editing the list of outputs

The *Edit list of outputs* display provides an overview of all outputs, links and inactive datasets (see section 9.3.3).

In the *Edit list of outputs* display, you can:

- assign output names (see section 5.4.1) and
- erase inactive datasets (see section 5.4.2).

5.7.1 Entering / editing the name of an output

For the easier identification of the outputs, you can assign an individual name to each output in the *Edit list of outputs* display.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Edit list of outputs*.
The *Edit list of outputs* overview opens.

3 Press **<▲ ▼ ◀ ▶ >** to highlight a name in the *Name* column and confirm with **<OK>**.

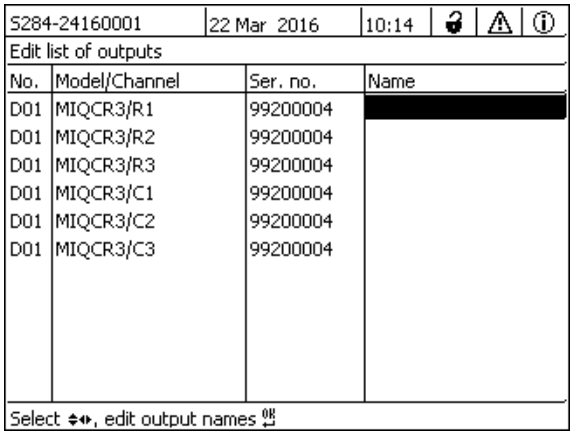


Fig. 5-8 Edit list of outputs -> enter a name

4 Enter the name with **<▲ ▼ ◀ ▶ >** and **<OK>** and confirm with **<OK>** (see also section 4.2.2).

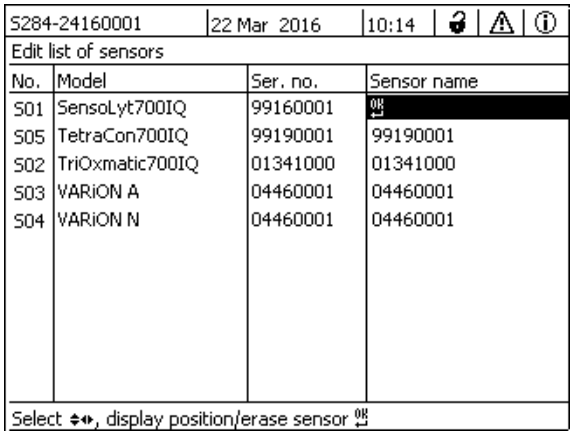


Fig. 5-9 Edit list of sensors

5.7.2 Erasing an inactive dataset for an MIQ output module

An inactive dataset for an MIQ output module arises if the system receives no signals from a registered MIQ output module. Inactive datasets can be recognized by a question mark, e.g. "?01" in the *Edit list of outputs* overview.

An inactive dataset can be reactivated by assigning it, e.g. to an MIQ output module of the same type (see section 9.3.3). All settings are retained. If you no longer require the stored data, you can erase them.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Edit list of outputs*.
The *Edit list of outputs* display opens.

3 Using **<▲ ▼ ◀ ▶ >**and **<OK>**, highlight and confirm the *Model/Channel* column. This column can only be highlighted if an inactive dataset (?xx) is present.

4 Press **<▲ ▼ ◀ ▶ >** to highlight a *Model/Channel* and confirm with **<OK>**.

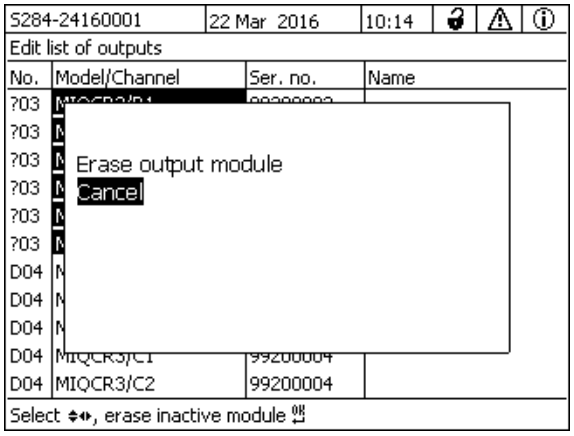


Fig. 5-10 Edit list of outputs -> Erase output module

5 Using **<▲ ▼ ◀ ▶ >**, select *Erase output module* and confirm with **<OK>**. The dialog window for the security prompt appears.

6 Using **<▲ ▼ ◀ ▶ >**, select *Erase output module* and confirm with **<OK>**. The output is erased.

5.7.3 Output links/settings

The procedure and possible settings for linking outputs with sensors are given in the operating manual of the respective output module.

5.8 Alarm settings

5.8.1 General information

Under this menu item you can specify reactions on certain alarm events.

An alarm event is when a certain measured value (limiting value) of a sensor is exceeded or undercut.

Alarm events can be relayed as follows:

- As a message on the display
- As a relay action
- As an Email (see section 5.9.5)

An alarm message via display or relay cannot be acknowledged or switched off. An alarm only disappears if the cause for the alarm was eliminated or the *Alarm settings* were changed or erased.

5.8.2 Setting up / editing alarms

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *Alarm settings*.
The *Alarm link overview* dialog window opens.
Alarms that have already been set up have entries in the *Sensor* column.

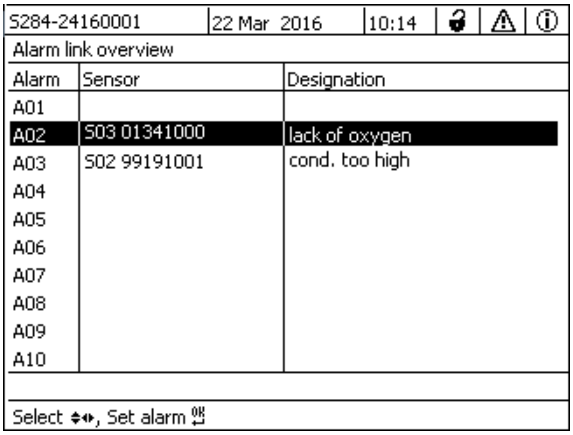


Fig. 5-11 Alarm settings -> Alarm link overview

In the *Sensor* column, the sensor number (corresponding to the list of sensors) and series number is named.

3 Select an alarm *A01* to *AXX* to be edited with **<▲ ▼ ◀ ▶ >**. To set up a new alarm without entry select in the *Sensor* column. Then confirm with **<OK>**. When a new alarm is set up a list with all sensors appears first. Alarm links that are already available can be erased or edited (for editing continue with step 5).

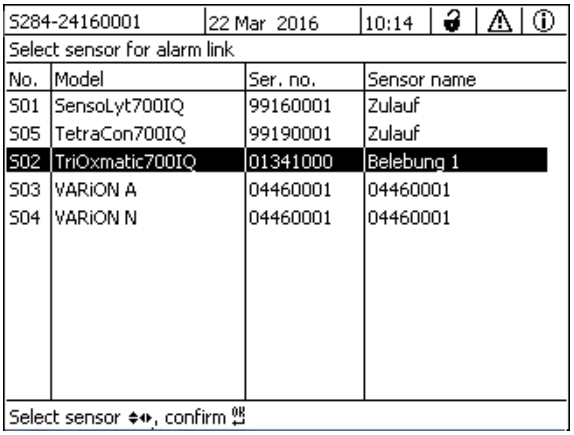


Fig. 5-12 Select sensor for alarm link

4 To set up a new alarm, select a sensor from the list with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**. The *Set alarm link* display opens.

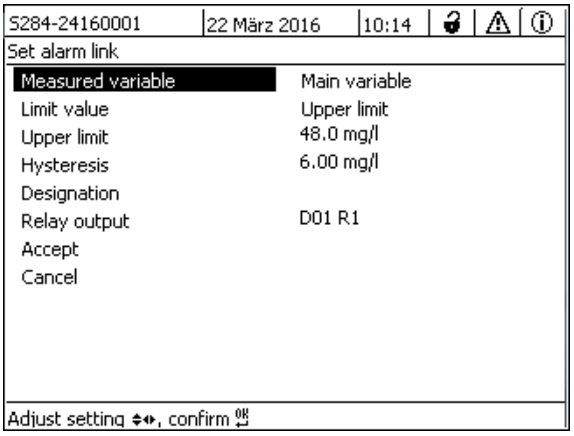


Fig. 5-13 Set alarm link

5 Edit the setting table. The required operating steps are described in detail in section 4.2 GENERAL OPERATING PRINCIPLES.

Alarm links setting table

Menu item	Selection/Values	Explanations
Measured variable	● *Main variable* ● *Adjoining variable*	*Main variable* designates the actual measured parameter of the sensor (e.g. pH, oxygen, etc.). *Adjoining variable* designates an additional measured parameter (e.g. temperature).

Menu item	Selection/Values	Explanations
Limit value	● *Lower limit* ● *Upper limit*	Type of the alarm event. *Lower limit*: An alarm is triggered if the defined limit value is undercut. *Upper limit*: An alarm is triggered if the defined limit value is exceeded.
Lower limit / *Upper limit*	within the measuring range (sensor-dependent)	Limit value for the alarm event
Hysteresis	0 - 10 % of the measuring range	Hysteresis for the limit value
Designation	(max. 20 characters)	User-defined designation for easier identification in the alarm message.
Relay output	Dxx / .../Ry ... ... *No relay output*	Opens a list with all relay outputs where the *Alarm contact* is set. Dxx: number of the output module .../Ry: relay output channel Here you can select a relay output. When the alarm event occurs, it carries out the specified action (Open or Close). For details, see section 5.8.3 ALARM OUTPUT TO DISPLAY.
Accept		The settings are taken over in the setting table by pressing **<OK>**. The display switches to the next higher level.
Cancel		The display switches to the next higher level without storing the new settings.

5.8.3 Alarm output to display

When an alarm event occurs, a window with a text message appears.

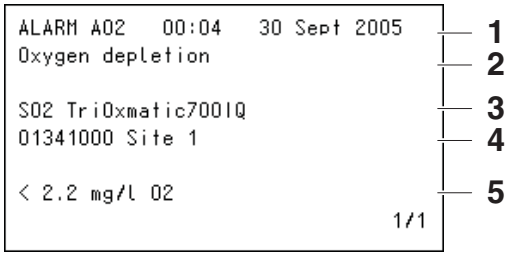


Fig. 5-14 Example of an alarm message on the display

1 Alarm no. Axx and date and time of the alarm event
2 User-defined designation
3 Sensor number and model name of the sensor that triggered the alarm event
4 Series number and name of the sensor that triggered the alarm event
5 Description of the event with specification of the limiting value:
"<" = Undercut
">" = Exceeded

Operating instructions

If there are several alarm messages indicated on the display, you can scroll through the messages with **<▲ ▼ ◀ ▶ >**. This can be recognized from the page number in the right lower corner. The latest message is always on the first position.

Pressing **<M>** hides the alarm messages and switches to the measured value display. After one minute the alarm messages appear again if what caused them is still present.

5.8.4 Alarm output as relay action

The relay outputs of the IQ SENSOR NET can be configured so a relay action is triggered when an alarm event occurs (Open or Close). For this the *Alarm contact* function must be set for the relay output in the *Settings of outputs and links*.

The *Alarm contact* function is only available for relays that are not linked with a sensor. If necessary, an existing link must be erased. For details please refer to the operating manual of the output module.

5.8.5 Alarm message as Email (variant -E, EF)

All alarm messages can be sent to an Email address. In this case, the same information that is output on the display is transmitted. For details, see section 5.9.5.

For critical alarm events take into account that Email messages may possibly be received delayed.

5.9 System settings

System settings include:

- *Change password* (see section 5.9.1).
- *Language* (see section 5.1)
- *Date/Time* (see section 5.9.2)
- *Location altitude/Air pressure* (see section 5.9.3)
- *TCP/IP settings* (variant -E, EF)
- *email* (variant -E, EF)
- *Settings bus interfaces* (variant -MOD, -PR, -EF)
- *Function code*

5.9.1 Changing the password

A password protects the system settings against inadvertent changes. The password must always be entered in order to change the release of the settings.

The password is set to 1000 in the delivery state.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Change password*.
The *Change password* dialog window opens.

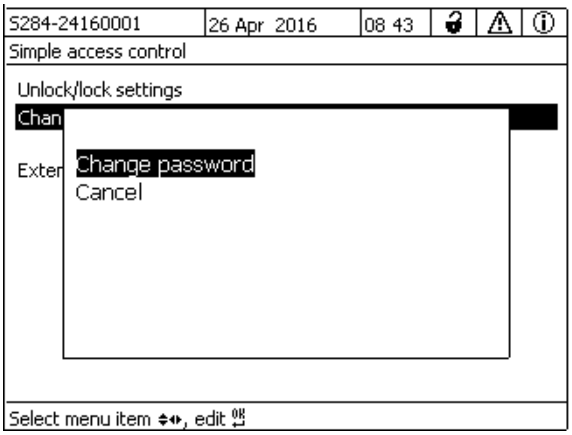


Fig. 5-15 System settings -> Change password

3 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *Change password*. The dialog window for entering the password opens.

4 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to enter the new password and press **<OK>** to confirm. The setting is changed.

5.9.2 Setting the date and time

The real time clock is used for the display of date and time in the measured value display and in log book entries.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Date/Time*.
The *Date/Time* display opens.

3 Press **<▲ ▼ ◀ ▶ >** to select *Set date* or *Set time*.

4 Confirm the selection with **<OK>**.
A field is highlighted, e.g. *Year*.

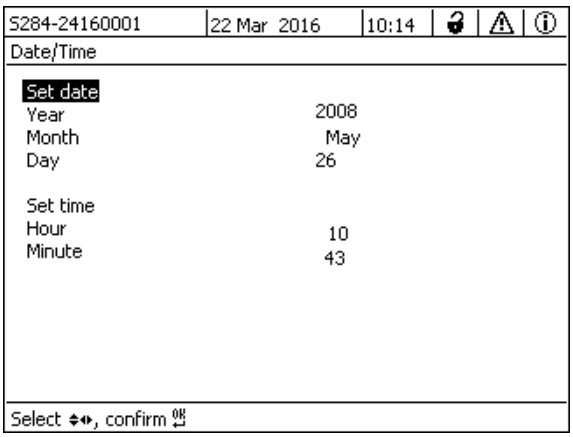


Fig. 5-16 Date/Time

5 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm a number. The next field is highlighted, e.g. *Month*.

6 Complete the entries on the display *Date/Time*.

The clock in the DIQ/S 28X bridges periods of power failure of up to several hours. After a longer power failure, the clock starts precisely at the time of the failure. A message and an entry in the log book provide information on the power failure and the necessity for resetting the clock.

5.9.3 Location altitude / average air pressure

Air pressure values can be set within a range of 500 to 1100 mbar.

1 Open the *Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Location altitude/Air pressure*.
The *Location altitude/Air pressure* display opens.

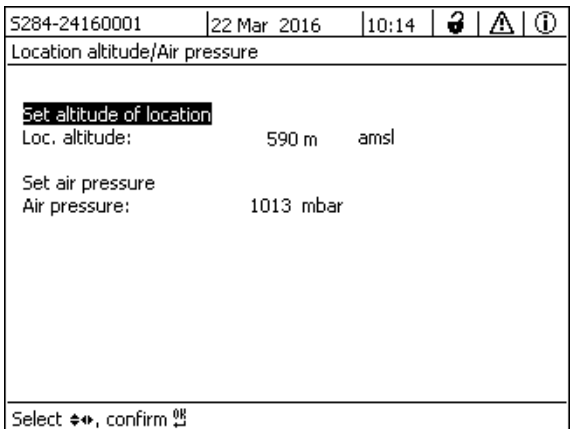


Fig. 5-17 Location altitude/Air pressure

3 Press **<▲ ▼ ◀ ▶ >** to select *Set altitude of location* or *Set air pressure* and confirm with **<OK>**.

4 Press **<▲ ▼ ◀ ▶ >** to change the values for *Loc. altitude* or *Air pressure* and confirm with **<OK>**.

5.9.4 *TCP/IP settings* (variant -E, EF)

The *TCP/IP settings* menu includes functions and settings for the operation of the DIQ/S 28X in an Ethernet network.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> TCP/IP settings*.
The *TCP/IP settings* display opens.

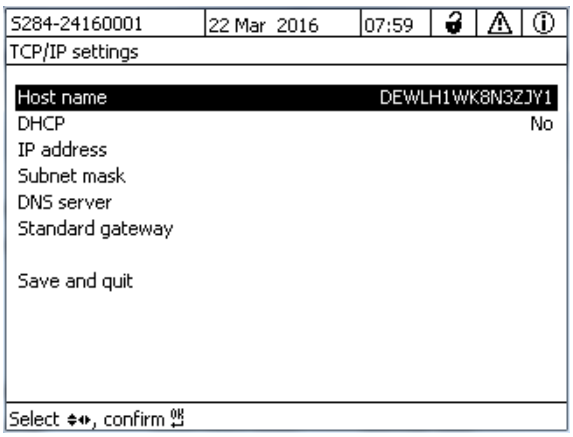


Fig. 5-18 TCP/IP settings

3 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm a menu item. An entry field or selection list opens up.

Setting	Selection/Values	Explanation
DHCP	Yes	The IQ SENSOR NET is configured as a DHCP client. If a DHCP server is in the network, the IQ SENSOR NET receives all further network settings from the DHCP server.
	No	The IQ SENSOR NET is not configured as a DHCP client. All other settings have to be made as necessary.
IP address	Address	Permanent IP address for the IQ SENSOR NET in the LAN (if *DHCP No*).
Subnet mask	Address	Subnet mask (if *DHCP No*). The subnet mask depends on the network size (for small networks: e.g. 255.255.255.0).
DNS server	Address	Entry for fieldbuses not required. For a connection with the Internet (if *DHCP No*), e.g.: ● IP address of the DNS server in the network ● Entry of *IP address* or e.g. 127.0.0.1
Standard gateway	Address	Entry for fieldbuses not required. For a connection with the Internet (if *DHCP No*), e.g.: ● IP address of the instrument providing access to the Internet ● Entry of *IP address* or e.g. 127.0.0.1

4 Enter texts with **<▲ ▼ ◀ ▶ >** and **<OK>**, or select and confirm an option from the list.

5 Complete the entries on the display *TCP/IP settings*.

5.9.5 *email* (variant -E, EF)

The *email* menu contains functions and settings for the sending of alarm messages via Email.

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> email*.
The *email* display opens.

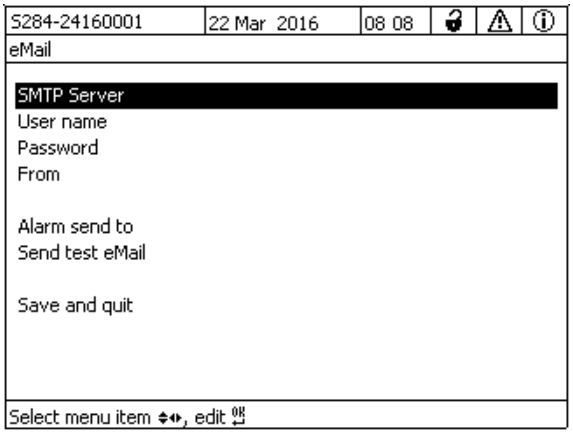


Fig. 5-19 email settings

3 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm a menu item.
An entry field or selection list opens up.

Setting	Selection/Values	Explanation
SMTP Server	Address	Address of the SMTP server of the Email provider through which the Email will be sent.
User name	Name	User name of the Email account
Password	Character string	Password to log on to the Email account
From	Name	Email sender address
Alarm send to	Name	Email target address
Send test email		A test Email with the specified settings is sent.

4 Enter texts with **<▲ ▼ ◀ ▶ >** and **<OK>**, or select and confirm an option from the list.

5 Complete the entries on the display *email*.

6 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *Save and quit*.
The settings are stored. The menu ist closed.

5.9.6 *Settings bus interfaces* (variant -E, EF)

The *Settings bus interfaces* menu contains functions and settings for the communication of the IQ SENSOR NET with a fieldbus. Prerequisite: An interface to a fieldbus is available (hardware, optional).

For details, see operating manual ba77010 "IQ SENSOR NET Fieldbus linking", for download at www.WTW.com.

5.9.7 *Function code*

Function for the service staff.

5.10 *Measured value logging*

With the *Measured value logging* setting you can record and store measured values of IQ sensors.

You can display the stored measured values

- as a list or
- display the temporal course of the stored measured values graphically (see section 4.4.4).
- display the stored measured values to a PC.

The system allocates memory blocks to an IQ sensor for the *Measured value logging*. With a recording interval of 1 measurement dataset per minute, a recording duration of 1 day per memory block is possible. 360 memory blocks are available and can be distributed to the sensors.

The recording duration directly depends on the recording interval. If a recording duration of 0 d is set for a sensor, there is no memory block allocated to the IQ sensor. The *Dur.* setting also contains the number of the allocated memory blocks (see table).

Recording interval	**Possible recording durations with the given recording interval**					
1 min	0 d	1 d	2 d	3 d	...	360 d
5 min	0 d	5 d	10 d	15 d	...	1800 d
10 min	0 d	10 d	20 d	30 d	...	3600 d

Recording interval	Possible recording durations with the given recording interval					
15 min	0 d	15 d	30 d	45 d	...	5400 d
30 min	0 d	30 d	60 d	90 d	...	10800 d
60 min	0 d	60 d	120 d	180 d	...	21600 d

5.10.1 Setting the recording interval (*dt*) and recording duration (*Dur.*)

1 Open the *Einstellungen/Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *Measured value logging*.
The *Measured value logging* display opens.
It contains a list of all sensors and inactive sensors.

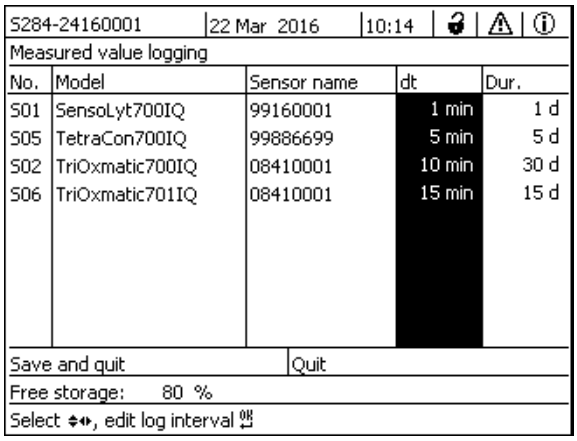


Fig. 5-20 Measured value logging

3 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm the *dt* column.

4 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm a sensor.

5 Determine the recording interval with **<▲ ▼ ◀ ▶ >** and **<OK>**.
When the recording interval is changed, the recording duration changes at the same time (*Dur.*), because the recording duration results from the recording interval due to a fixed number of memory blocks.

6 Switch to the selection of columns with **<ESC>**.

7 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm the *Dur.* column.

8 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm a sensor.

9 Select the recording duration with **<▲ ▼ ◀ ▶ >** and **<OK>**.
The recording duration is always increased or decreased in the same steps.

The percentage of the memory blocks not yet allocated is shown on the display. If all memory block are occupied (*Free storage:* 0%), the number of memory blocks allocated to another IQ sensor may have to be reduced.

When the number of memory blocks for a sensor is reduced, the memory block with the oldest data is erased. All other data is retained.

For inactive IQ sensors, the *Dur.* setting can only be reduced.

10 Switch to the selection of columns with **<ESC>**.

11 Press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm the *Save and quit* column.
The changes are stored.
The *Einstellungen/Settings* display opens.

If the changes made for recording duration or recording interval should not be stored, press **<▲ ▼ ◀ ▶ >** and **<OK>** to select and confirm the *Quit* field.

6 Ethernet connection (variant -E, -EF)

If the Universal Transmitter DIQ/S 28X-E is connected to an Ethernet network, communication with the IQ SENSOR NET System 28X is enhanced and facilitated.

- The Ethernet interface allows the DIQ/S 28XE[F] to be integrated into a local network and to be connected to other networks (e.g. Internet) using commercially available network technology.
- The web server des DIQ/S 28X-E[F] makes available the measurement data of the IQ SENSOR NET as a web page.
- Communication with the DIQ/S 28X-E[F] is possible via a large number of network-capable terminals.
  - Internet-capable devices with web browser (e.g. PC, smartphone, tablet PC) can display the measurement data of the IQ SENSOR NET.
  - The programs of the IQ WEB CONNECT can be used to operate and manage the IQ SENSOR NET on a PC.
- Extraction of the data provided by the web server is possible using commercially available or self-created programs (DataLogger).
- With the Ethernet interface of the variant DIQ/S 28X-EF, the instrument can additionally be integrated into an EtherNet/IP™, Profinet and Modbus TCP environment. Details on this subject are given in the operating manual ("IQ SENSOR NET fieldbus linking"). The current version can be found on the Internet at www.WTW.com.

6.1 Configuring the Ethernet network

The following overview helps in the general planning, project planning and installation of a network connection of the DIQ/S 28X-E[F].

A basic understanding of network technology is useful for setting up a local network and especially the connection to the Internet.

Various settings are to be made on the individual network subscribers according to the configuration of the network.

Insofar as the settings affect network subscribers of third-party vendors (e.g. the router), only a general reference is made here to the setting. For details, of the menus in which the settings are made, please refer to the respective operating manual for your device.
If you have no knowledge of networks, please contact your network administrator.

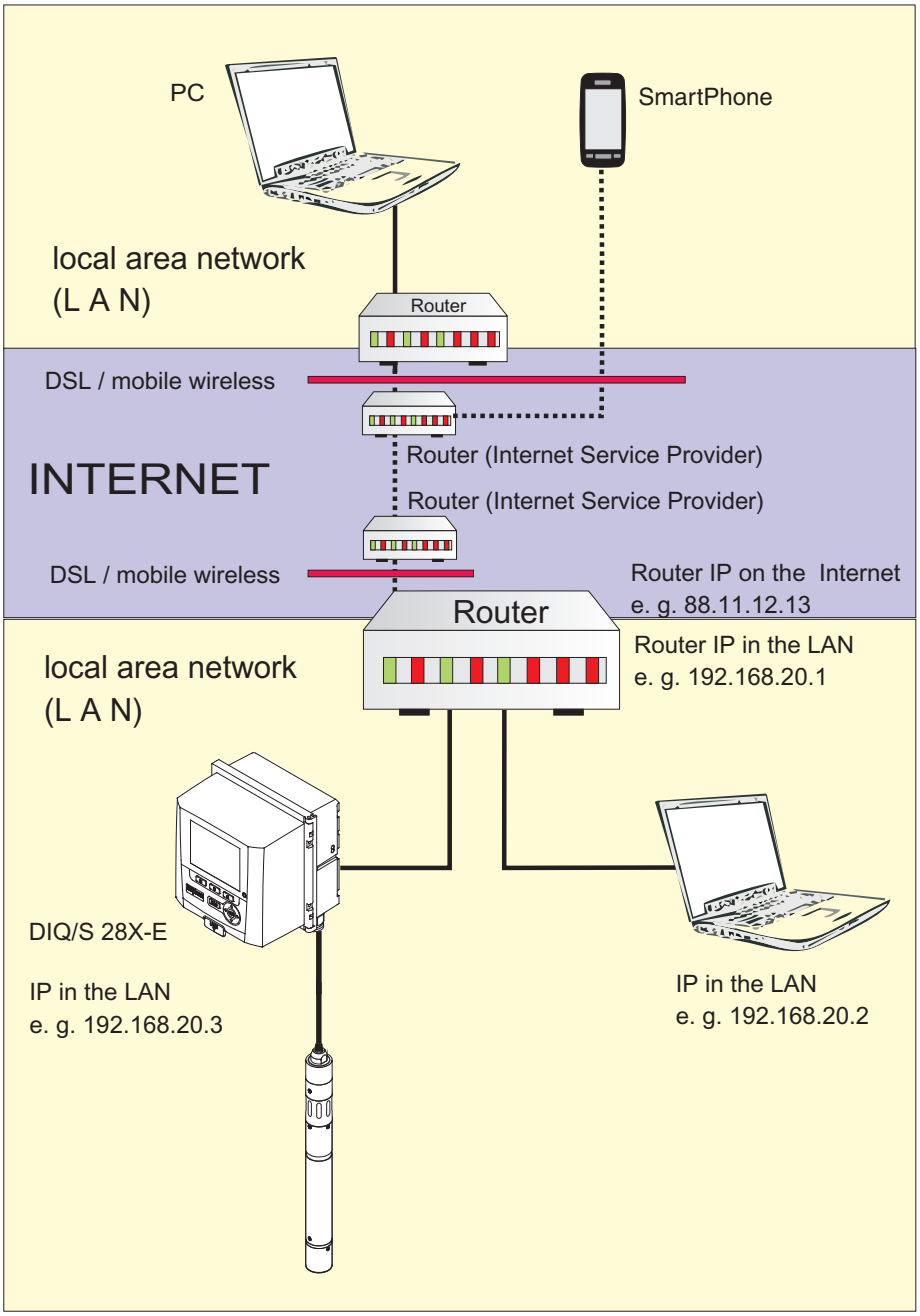


Fig. 6-1 DIQ/S 28X-E[F] in a local network and on the Internet (example)

6.1.1 Communication in a local network (LAN)

	Prerequisites	Details / Examples / Designations
Hardware	IQ SENSOR NET System 28X	Universal Transmitter DIQ/S 28X-E[F]
	Ethernet cable	RJ45 cable (shielded, Cat.5 or better) to connect the IQ SENSOR NET and router. Note: If the DIQ/S 28X-E[F] is located at an open air test site, please note section 6.2.
	Terminal equipment (a network subscriber that sets up the communication), e.g.:	● PC ● Tablet PC ● Smartphone
Software	Communication software on the terminal equipment, e.g.:	● web browser ● programs of the IQ WEB CONNECT (for PC only)
	Network services (e.g. on the terminal device or router)	● WINS server ● with DHCP and DNS servers (for network access in the LAN via the name of the DIQ/S 28X-E[F])

Network address of the Universal Transmitter in the LAN

- Instrument name (is specified in the terminal settings of the Universal Transmitters (siehe section 5.2).
  When delivered, the combination of instrument name + serial number is entered as the name (e.g. S284-16160001).

or

- Fixed local IP address of the Universal Transmitter (defined in the settings of the Universal Transmitter (see section 6.1.2).

6.1.2 Communication on the Internet

	Prerequisite	Details / Examples / Designations
Hardware	IQ SENSOR NET System 28X	Universal Transmitter DIQ/S 28X-E[F]
	Router, e.g.	● DSL router ● Mobile wireless router
	Ethernet cable	RJ45 cable to connect the DIQ/S 28X-E[F] and router. Note: If the DIQ/S 28X is located at an open air test site, please note section 6.2.
	Terminal equipment (network subscriber that sets up the communication), e.g.:	● PC ● Tablet PC ● Smartphone
Software	Communication software on the terminal equipment, e.g.:	● web browser
Network address of the DIQ/S 28X-E[F] on the Internet	The network address of the router on the Internet is configured via an Internet service (see below).	
Internet services	Internet access with data flat rate, e.g.:	● DSL connection ● Mobile wireless connection (SIM card)
	Internet service which makes the router publicly addressable on the Internet, e.g.:	● A public IP address (e.g. available at an Internet service provider) ● A service (e.g. DynDNS), which assigns a fixed name to a changing IP address of an Internet subscriber so that the subscriber is always accessible under the same name

	Prerequisite	Details / Examples / Designations
Special settings of the network subscriber	IQ SENSOR NET Universal Transmitter DIQ/S 28X-E[F]	Menu: *System settings* / *TCP/IP settings*: ● *DHCP*: *No* ● *IP address*: Enter a fixed IP address (the IP address must lie outside the address range of the DHCP server (the DHCP server is often a network service of the router) ● *Subnet mask*: The IP address depends on the local network (in home networks, e.g. 255.255.255.0) ● *DNS server*: Local IP address of the router (e.g. 192.168.179.1) ● *Standard gateway*: Local IP address of the router (e.g. 192.168.179.1)
	Router (see operating manual for your router)	● Data for Internet access (from Internet service provider) ● Port forwarding of port 8080 to port 80 of the fixed IP address of the DIQ/S 28X

6.2 Ethernet connection if mounted at an open air test site (DIQ/S 28X-E[F])

The RJ45 socket does not protect sufficiently against moisture. At an open test site, the moisture protection device (ADA/E) available as an accessory has to be mounted for safe Ethernet communication (see section 11.

6.3 Establishing the connection with the DIQ/S 28X via a network

6.3.1 Opening the IQ WEB CONNECT

The web server of the DIQ/S 28X provides functions for the (remote) operation of the DIQ/S 28X and for the data exchange (e.g. with a PC) via a network address.

Prerequisites

- All network components (Universal Transmitter, router, network-capable devices with browser) are connected
- The network services are active
- Web browser (HTML 5)

The IP address and the other network settings for the Universal Transmitter DIQ/S 28X are configured in the *System settings -> TCP/IP settings* menu.

Procedure

Enter the network address of the DIQ/S 28X in the address line in the web browser

1 Enter the network address of the *Web browser* DIQ/S 28X-E[F] in the address line of the web browser.
   - in the LAN
     e.g. name or IP address of the DIQ/S 28X-E[F]
   - on the Internet,
     e.g. fixed IP address of the router or DynDNS name

   The network connection to the DIQ/S 28X-E[F] is established.
   The start page of the IQ SENSOR NET is displayed.

Fig. 6-2 IQ WEB CONNECT start page

The IQ WEB CONNECT start page of the DIQ/S 28X-E[F] provides links to the following functions:

- "IQ WEB CONNECT Terminal"
  (operating the DIQ/S 28X-E[F])
- "IQ WEB CONNECT DatalogTransfer"
  (transmitting measurement data)
- "IQ WEB CONNECT ConfigSaveLoad"
  (saving and loading the system configuration of the DIQ/S 28X-E[F])

2 Open a link on the IQ WEB CONNECT start page.

3 Enter the user name and password
(user name and password are defined in the settings of the access control of the DIQ/S 28X-E[F].
Default setting: User name "ADMIN", password "1111")
The selected website is displayed.

6.3.2 IQ WEB CONNECT Terminal

With the "IQ WEB CONNECT Terminal", you can operate your DIQ/S 28X-E[F] just like you are used to on the instrument.

You can save data to a USB memory device connected to the instrument (similar to operation of the instrument). To save data to a PC, select the function "IQ WEB CONNECT DatalogTransfer" (see section 6.3.3).

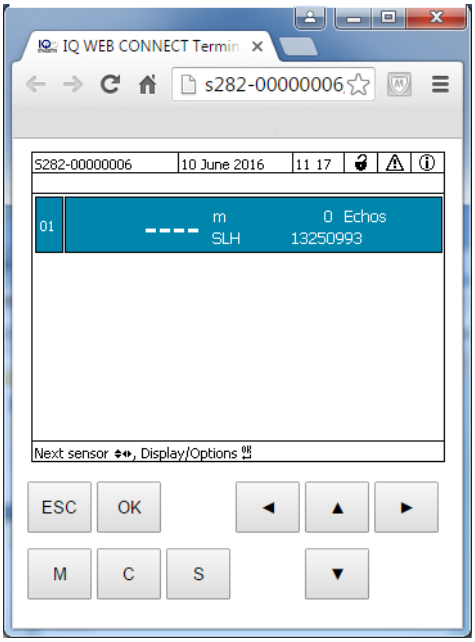


Fig. 6-3 IQ WEB CONNECT Terminal

6.3.3 IQ WEB CONNECT DatalogTransfer

"IQ WEB CONNECT DatalogTransfer" exchanges data with the terminal device with which you are carrying out IQ WEB CONNECT functions. The data exchange is optimized for the following operating systems:

- Microsoft® Windows®
- Linux

Via the website "IQ WEB CONNECT DatalogTransfer", you can save measurement data of the DIQ/S 28X-E[F] directly to a PC.

The transmitted measurement data are stored in a separate file in CSV data format for each sensor. The file name (e. g. S03_*TriOxmatic700IQ_1.csv)* is automatically assigned and includes:

- sensor number (e. g. S03)
- sensor model (e. g. TriOxmatic700IQ)
- consecutive number.

For processing you can open the csv file, e.g. with Microsoft Excel.

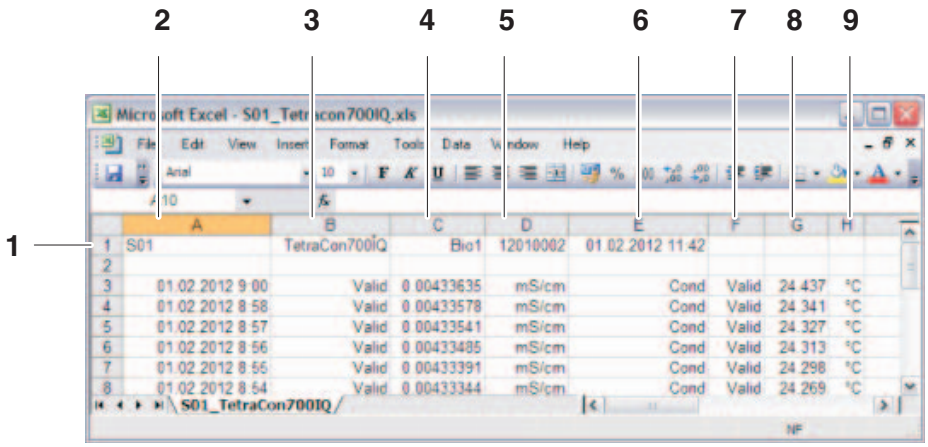


Fig. 6-4 Example of a CSV file after being imported into Microsoft Excel

1 Identification of the measurement data (from left to right, line 1)
- Sensor number (Sxx)
- Sensor model
- Sensor name
- Serial number (sensor)
- Date and time of the file save

2 Date and time of the measured value save
3 Measured value status
4 Measured value
5 Unit of the measured value
6 Measured parameter
7 Measured value status of the secondary measured value
8 Secondary measured value
9 Unit of the secondary measured value

The measured values are transmitted unprocessed. Therefore, the measured values may have a number of decimal places that exceeds the display accuracy of the respective sensor.

When you want to display and process the transmitted measured values, it may be required to limit the number of digits (e. g. by rounding).

6.3.4 IQ WEB CONNECT ConfigSaveLoad

"IQ WEB CONNECT DatalogTransfer" exchanges data with the terminal device with which you are carrying out IQ WEB CONNECT functions. The data exchange is optimized for the following operating systems:

- Microsoft® Windows®
- Linux

Via the website IQ WEB CONNECT ConfigSaveLoad, you can display or save the system configuration of the DIQ/S 28X-E[F] or load it to a DIQ/S 28X-E[F].

The system configuration comprises the following data:

- *Settings of sensors and diff. sensors*
- *Settings of outputs and links*
- *Edit list of sensors*
- *Edit list of outputs*
- *Measured value recording* (data logger settings)
- *Language*
- *Access control*
- *Alarm settings*
- *System settings*

6.4 Communication with fieldbuses (DIQ/S 28X[-XX]-EF)

Details on communication with fieldbuses are given in the operating manual ba77010e ("IQ SENSOR NET fieldbus linking"). The current version can be found on the Internet at www.WTW.com.

6.5 Troubleshooting

The Universal Transmitter DIQ/S 28X provides an Ethernet interface for the connection of the IQ SENSOR NET to private networks, company networks and public networks.

To establish accessibilty of the IQ SENSOR NET in a public network (e.g. Internet), external services (e.g. Internet access, fixed public IP address etc.) are required.

A detailed error analysis for connection errors is not possible within the scope of this operating manual because of the multitude of service providers, network architectures and connection options involved.

Here is a selection of possible causes for network/connection problems. If there are other connection problems, contact your network administrator or a network specialist.

No network connection

Cause	Remedy
– Ethernet hardware defective, e.g. – Ethernet cable defective – Ethernet connection on the DIQ/S 28X or router defective	– Exchange the Ethernet hardware
– Incorrect network address entered in the LAN (name)	– Enter the correct name: "Instrument name-serial number", replace special characters (/, spaces, etc.) with "-", e.g. DIQ-S284-16160001 – Ascertain or define the correct IP address of the DIQ/S 28X in the local network (e.g. IQ SENSOR NET setting + router setting) and enter it.
– Incorrect network address on the Internet (IP address of the router)	– Ascertain or define the correct Internet IP address of the router (e.g. FixedPublicIP) and enter
– A network connection from a terminal device to the DIQ/S 28X (IQ WEB CONNECT) already exists	– 2nd IQ WEB CONNECT
– Incorrect setting in the router (e.g. Internet access data, port forwarding)	– Correct the settings
– Incorrect setting in the DIQ/S 28X (System menu/*TCP/IP settings*)	– Correct the settings
– Ports which are used by the DIQ/S 28X are already assigned to other devices in the network (e.g. another IQ SENSOR NET system)	– Have your network administrator assign you free ports – Specify the port (1-65535) manually in the address line of the browser/ IQ WEB CONNECT (example: http://10.11.12.13:65535) – Forward this port (65535) in the router to the IP address of the DIQ/S 28X.
– Blocking by firewall	– Contact your network administrator or a network specialist

6.6 Technical network terms

DHCP (Dynamic Host Configuration Protocol)

DHCP is a network service which automatically assigns an IP address to a network subscriber.
In local networks, this function is mostly carried out by the router.

DNS (Domain Name System)

DNS is a network service which manages the name of a subscriber on the Internet (e.g. www.google.com) and the associated IP address e.g. "http://74.125.224.72/".
In local networks, this function is mostly carried out by the router.

DynDNS (Dynamic DNS)

DynDNS is an Internet service which makes a subscriber with changing (dynamically issued) IP address accessible under a fixed name on the Internet.
Prerequisite: The router in the local network must support DynDNS and must always send its current dynamic public IP address to the Internet service.

Firewall

A firewall protects a device or a local network against attacks from the Internet.
A firewall blocks the communication interfaces (ports) that are not used for standard communication (web browser, E-mail etc.).

IP address

A network address identifies a subscriber in a network.

Private IP addresses are IP addresses specially reserved for home networks (range 192.168.0.0 to 192.168.255.255). In most cases, they are automatically assigned by the router which manages the local network. They are used to uniquely identify the individual subscribers within a local network.
Routers provide the possibility to manually assign a fixed local IP address for individual devices.

Public IP addresses are automatically assigned to the router in the local network (LAN) by the Internet Service Provider (ISP). They are used to uniquely identify an Internet subscriber (a home network or even an individual device) to the Internet. They are mostly only valid for the duration of an Internet session (dynamic IP address) and are released again upon ending the Internet connection.
An Internet user can also be assigned a fixed public IP address via (chargeable) Internet services.

ISP (Internet Service Provider)

An ISP is an Internet service provider which provides Internet access.

Port

A port is the communication interface of an application (possible port numbers: 0-65535).
Some ports (port numbers) are reserved for special applications, e.g.:

- 21: FTP (File Transfer Protocol)
- 25: SMTP (Simple Mail Transfer Protocol)
- 80: HTTP (Hypertext Transfer Protocol)
  (used by the web browser for communication with web servers)

Port forwarding

If a router receives a communication request on a port for which forwarding is configured, communication is forwarded to the port of a network subscriber which is defined in the forwarding rule.
In local networks, this function is mostly carried out by the router.

Router

A router fulfills the following tasks as an interface between two networks:

- It connects the local network to the Internet.
- It controls the communication of network devices within a local network and manages the local IP addresses of the subscriber. In the local network, it is also possible to manage names for individual IP addresses (DHCP) in most cases.

Routers often assume other services in a network, e. g.:

- DNS (assigning of names to IP addresses)
- Firewall (protects the network subscriber against attacks from the Internet)
- Port forwarding

TCP/IP (Transmission Control Protocol / Internet Protocol)

The Internet Protocol is the common language (protocol) of the network subscriber.

7 Outputs

7.1 Outputs of the System 28X

Functioning of the outputs

- Relay outputs work as openers or closers.
- Current outputs provide a current depending on the measured value. Current outputs are available in the variants DIQ/S 28X-CRX and when an extension module with current outputs is used).

On the DIQ/S 28X you can do the following:

- Assign names for the outputs (see section 7.3).
- Link outputs with sensors (see section 7.4)
- Erase links between outputs and sensors (seesection 7.5)
- Set up outputs (see section 7.6 and section 7.7)
- Check the conditions of the outputs (see section 7.8)

Basis information on the use of relay outputs is given in section 7.2.

Functions for current and relay outputs

Relay output (see section 7.6)

- *System monitoring*
- *Sensor monitoring*
- *Limit indicator*
- *Frequency controller*
- *Pulse-width output*
- *Cleaning*
- *Sensor-controlled*
- *Manual control*
- *Alarm contact*

Current output (see section 7.7)

- *Recorder*
- *PID controller*
- *Fixed current value*

7.2 Basic information on relay functions

This chapter describes general basic information concerning the following relay functions:

- Monitoring (see section 7.2.1)
- Limit indicator (see section 7.2.2)
- Proportional output (see section 7.2.3)

7.2.1 Monitoring

When using a relay for monitoring, a relay action (*Open*, *Close*) occurs when certain states occur. This function is suitable, for example, for the monitoring of errors in the system.

For monitoring functions, use the relay preferably as normally closed (see section 7.6.1). In the case of an error, the relay opens. As a result, the monitoring function operates even if, for instance, the supply voltage fails.

7.2.2 Limit indicator

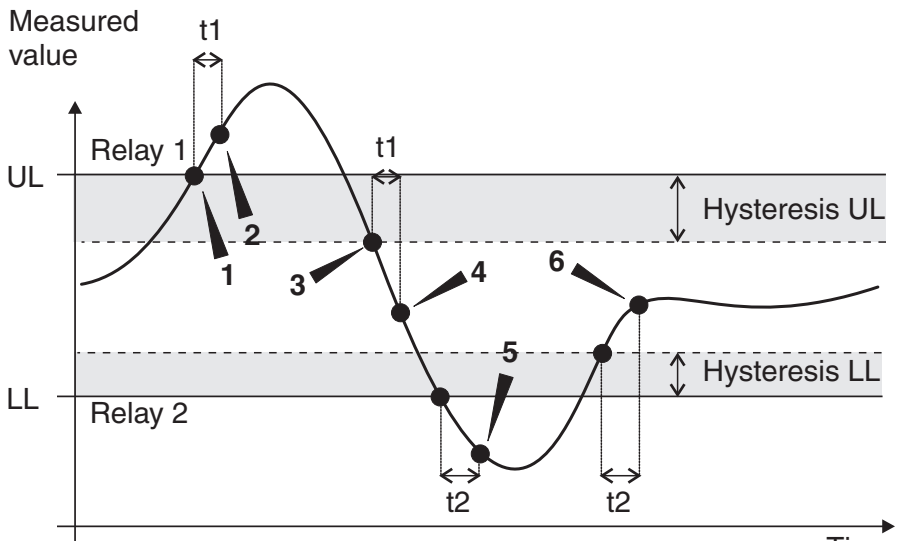
With a limit indicator, a relay switches when a specified limiting value is exceeded or undercut.

Limit indicators can be used in the following way:

- Monitoring a limiting value using a relay:
  when a limiting value (upper or lower limiting value) is exceeded or undercut, a relay switches. The *Open* or *Close* relay actions are possible in each case (see page 126).
- Monitoring two limiting values using two relays:
  If the upper limiting value is exceeded or undercut, a relay switches, and if the lower limiting value is exceeded or undercut, another relay switches. The *Open* or *Close* relay actions are possible in each case (see page 126).

If the simple monitoring function (*Open*, *Close*) with one or two relays is not sufficient, use proportional output (see section 7.2.3).

Monitoring limiting values using one or two relays



1 Upper limit value (relay 1) exceeded

2 Selected switching delay t1 for relay 1 1 expired
Relay 1 switches

3 Hysteresis for upper limiting value (relay 1) undercut

4 Selected switching delay t1 for relay 1 1 expired
Relay 1 switches back

5 Lower limit value (relay 2) undercut
Selected switching delay t2 for relay 1 1 expired
Relay 2 switches

Fig. 7-1 Switching points for relays with the function of a limit indicator

A switching delay (t) can be set up for each relay for switching processes. This is the time period for which a limiting value must be exceeded before the relay switches. This prevents frequent switching if the measured values are close to the limiting value.

7.2.3 Proportional output

In the case of proportional output, a relay switches cyclically on and off in a defined measured value range (proportional range). At the same time, the relay switches with a:

- duration of operation that corresponds to the measured value (pulse-width output, see page 128) or
- switching frequency (frequency output, see page 128).

Proportional outputs can be used in the following way:

- Output with one relay:
  An output range is defined with a *Start value* and an *End value*. No output takes place above and below the output range (see page 127).
- Output with two relays:
  An output range is defined for each relay with a *Start value* and an *End value*. One relay outputs in the upper output range and a further relay in the lower output range (see page 127).

Output with one relay

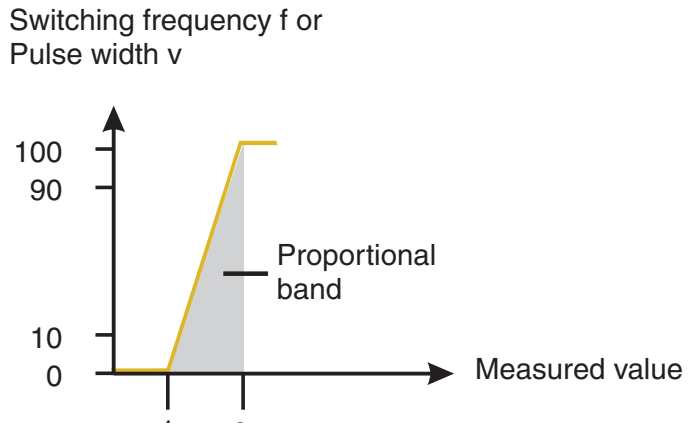
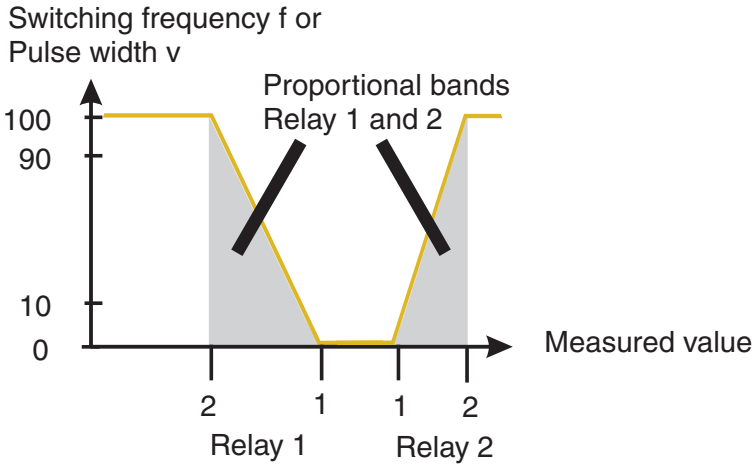


Fig. 7-2 Output with one relay

Output with two relays



1 *Start value*
Measured value with a minimum pulse width or switching frequency

2 *End value*
Measured value with a maximum pulse width or switching frequency

Fig. 7-3 Output with two relays

Pulse width output

The output of the pulse width is used, e.g. for controlling valves.

Pulse-width regulation changes the duration of operation (t_{on}) of the output signal. Depending on the position of the measured value in the proportional range, the relay is operated for a longer or shorter period.

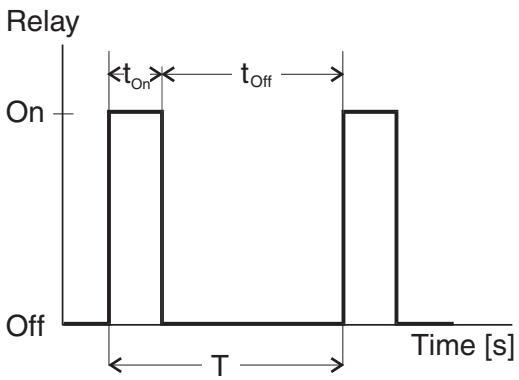


Fig. 7-4 Relay output of the pulse-width output

The cycle duration (T) is made up of the turn-on and turn-off switching duration (t_{on}, t_{off}) of the relay together. While the selected cycle duration (T) remains constant, the turn-on duration (t_{on}) changes depending on the measured value and, with it, the pulse width (v). The pulse width can be set from 0 % to 100 %.

$v = (t_{on} / T) * 100\ \%$

v = pulse width, T = cycle duration, t_{on} = turn-on duration

- If the measured value is at the end of the proportional range (*End value*), the turn-on duration (t_{on}) is long, the turn-off duration is short. This means the relay operates for a longer period.
- If the measured value is at the beginning of the proportional range (*Start value*), the turn-on duration (t_{on}) is short, and the relay operates for a correspondingly shorter period.

If the duration of the closing or opening pulse is shorter than 0.1 s, the relay remains open or closed for the complete cycle duration.

Frequency output

Switching frequency output is used, e.g. for controlling dosing pumps.

In contrast to the pulse-width output, the pulse width is not modulated with the frequency output but the switching frequency of the output signal. Depending on the position of the measured value in the proportional range, the relay is switched more often or less often.

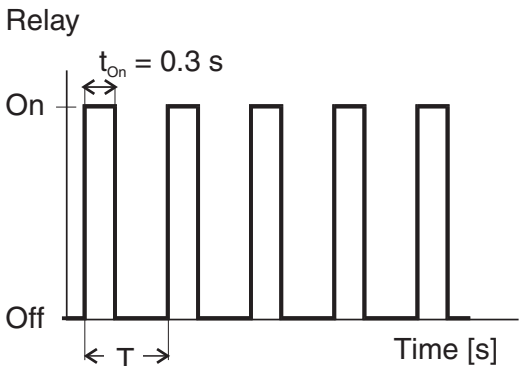


Fig. 7-5 Relay output of frequency output

While the selected switching duration (t_{on} = 0.3 s) always remains constant, the switching frequency at which the relay switches changes depending on the measured value.

- If the measured value is at the end of the proportional range (*End value*), the switching frequency is higher.
- If the measured value is at the beginning of the proportional range (*Start value*), the switching frequency is low.

Characteristic curves

Through the selection of the *Start value* and *End value*, the proportional output can be operated with a positive or negative characteristic curve.

- Positive characteristic curve:
  Select the *End value* to be greater than the *Start value*.
  The turn-on duration or frequency increases with an increasing measured value (see page 131).
- Negative characteristic curve:
  Select the *End value* to be smaller than the *Start value*.
  The turn-on duration or frequency decreases with an increasing measured value (see page 132).

The maximum values for the pulse width or switching frequency are assigned to the *End value* value and the minimum values for turn-on duration or frequency are assigned to the *Start value* value.

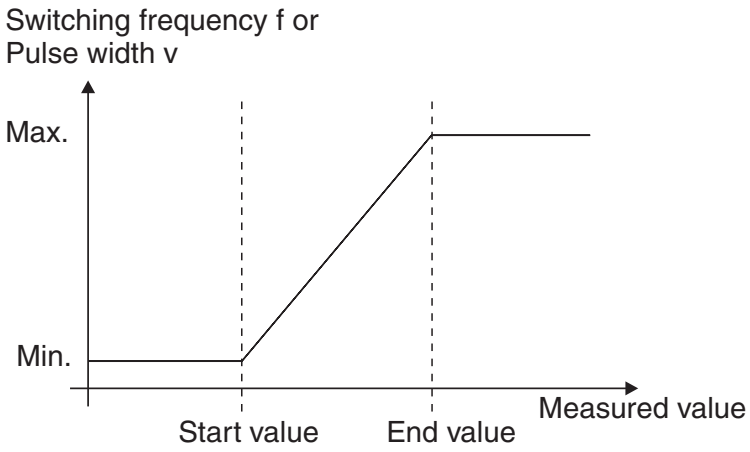


Fig. 7-6 Positive characteristic curve

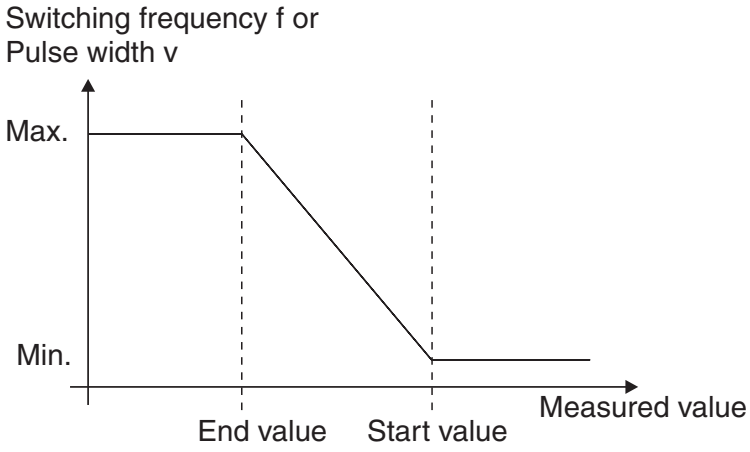


Fig. 7-7 Negative characteristic curve

Positive characteristic curve

The proportional output range begins above the initial value. If the proportional range is undercut or exceeded, the selected behavior comes into force.

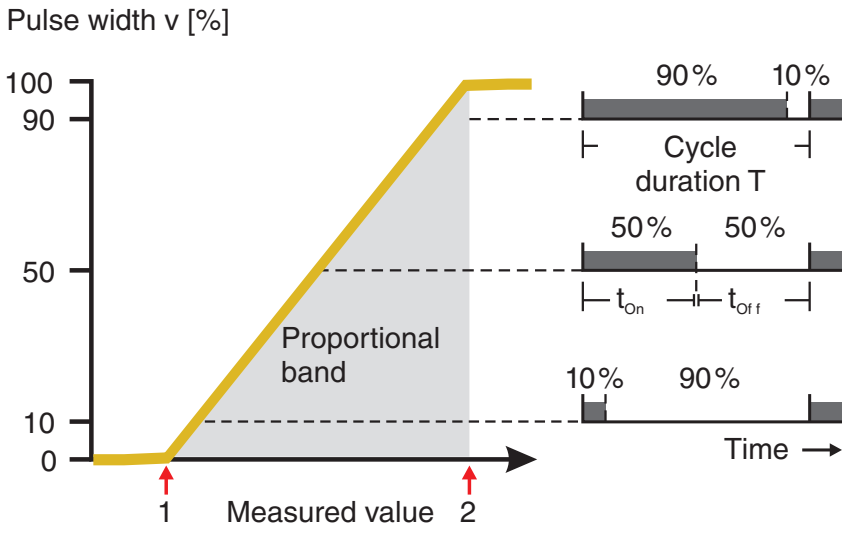


Fig. 7-8 Pulse width output

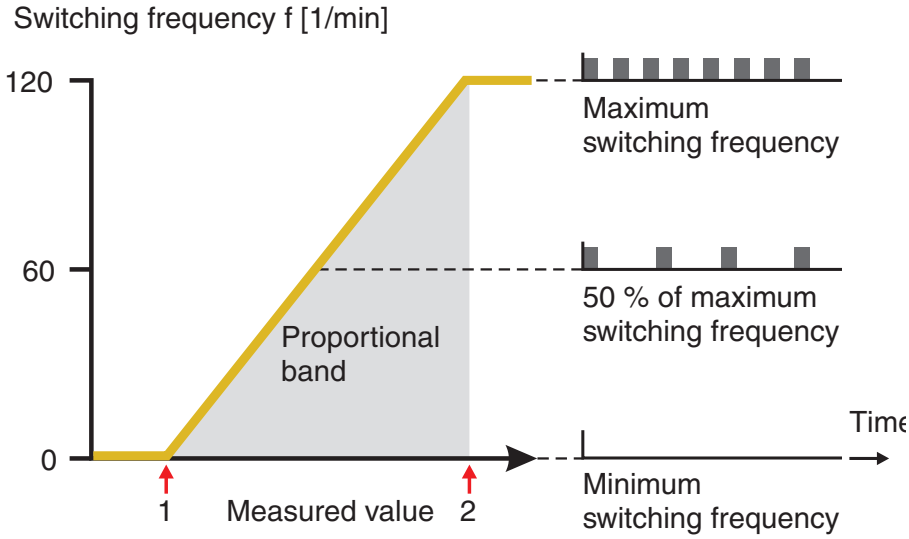


Fig. 7-9 Frequency output

1 *Start value*
Measured value with a minimum pulse width or switching frequency

2 *End value*
Measured value with a maximum pulse width or switching frequency

Negative characteristic curve

The proportional output range begins below the initial value. If the proportional range is undercut or exceeded, the selected behavior comes into force.

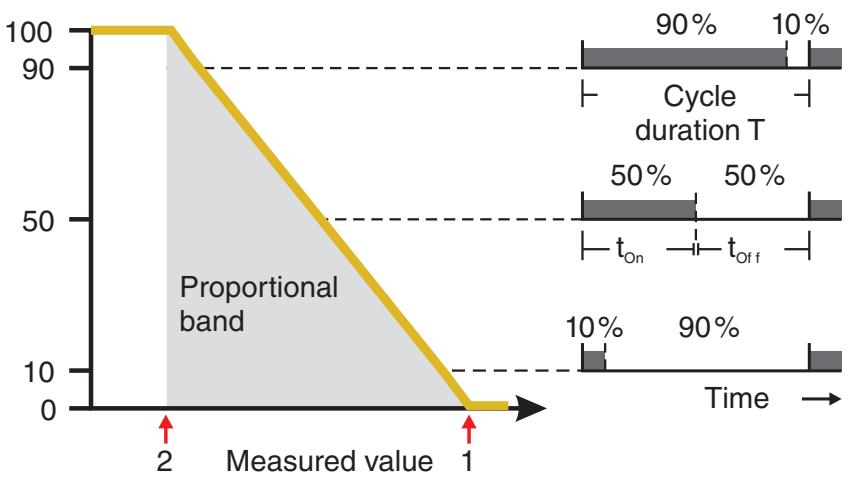


Fig. 7-10 Pulse width output

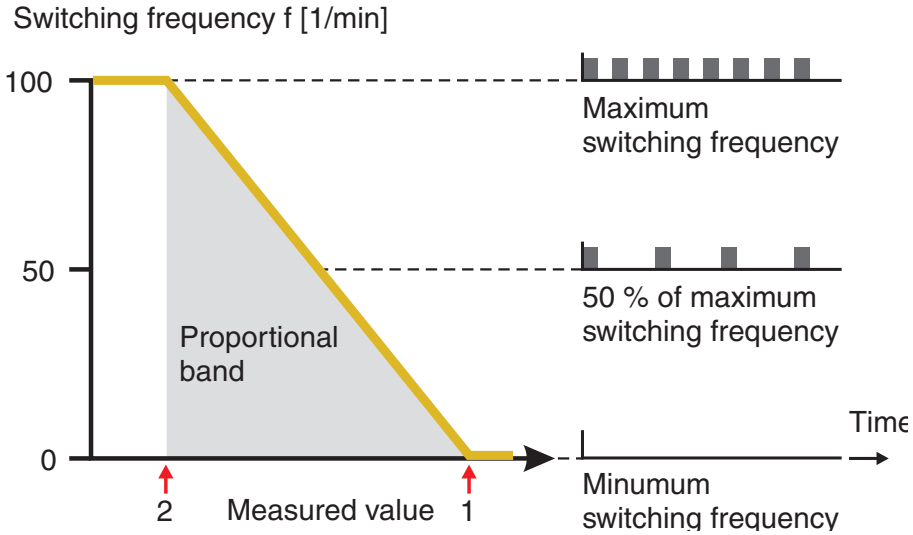


Fig. 7-11 Frequency output

1 *Start value*
Measured value with a minimum pulse width or switching frequency

2 *End value*
Measured value with a maximum pulse width or switching frequency

7.3 Entering / editing the name of an output

For easier identification of the outputs, an individual name can be given to each output in the *Edit list of outputs* overview.

1 Open the *Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Edit list of outputs*.
The *Edit list of outputs* display opens.

3 Press **<▲ ▼ ◀ ▶ >** to highlight a name in the *Name* column and confirm with **<OK>**.

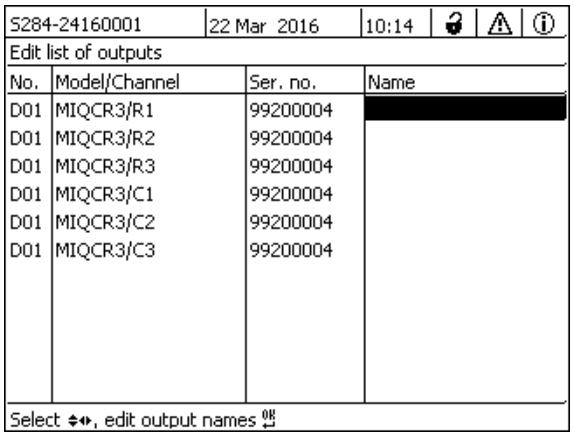


Fig. 7-12 Edit list of outputs

4 Select a letter, number or special character with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.

5 Complete the name of the output and confirm with **<OK>**.

7.4 Linking the output with a sensor

1 Open the *Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Settings of outputs and links*.
The *Settings of outputs and links* display opens.

3 Press **<▲ ▼ ◀ ▶ >** to highlight the *&* column and confirm with **<OK>**.

4 Select an output with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**. The *Link with...* display opens.
The display shows a list of sensors that can be linked.

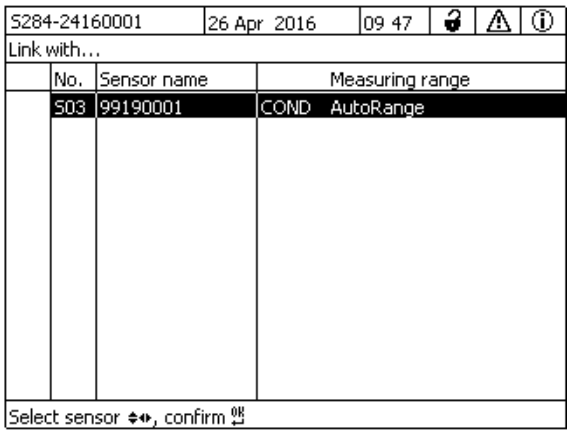


Fig. 7-13 Settings of outputs and links: Link with...

5 Using **<▲ ▼ ◀ ▶ >**, select a sensor and confirm with **<OK>**.
The output is linked with the sensor.

In the overview *Settings of outputs and links*, field *Ser. no.*, outputs that are linked with sensors have the name of the linked sensor.

7.5 Deleting a link with an output

If a link between a current or relay output and a sensor is no longer required, you can erase the link.

1 Open the *Settings* menu with **<S>**.

2 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, select and confirm the menu item, *System settings -> Settings of outputs and links*.
The *Settings of outputs and links* display opens.

3 Press **<▲ ▼ ◀ ▶ >** to highlight the *&* column and confirm with **<OK>**.

4 Select a linked output with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.

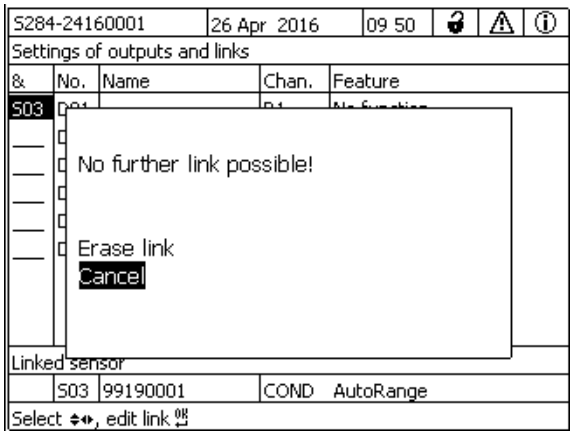


Fig. 7-14 Settings of outputs and links: Erase link

5 Select and confirm *Erase link* with **<▲ ▼ ◀ ▶ >** and **<OK>**.
A safety query appears.

6 Select and confirm *Erase link* with **<▲ ▼ ◀ ▶ >** and **<OK>**.
The link is deleted.

7.6 Setting the relay outputs

1 Call up the measured value display with **<M>**.

2 Open the *Settings* menu with **<S>**.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Settings of outputs and links*, and confirm with **<OK>**. The *Settings of outputs and links* display appears.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the *Feature* column. Confirm with **<OK>**.

5 Using **<▲ ▼ ◀ ▶ >**, highlight a line for a relay output (Rx) in the column *Feature*. Confirm with **<OK>**.
The *Settings of outputs and links* display opens.

6 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Relay function*, and confirm with **<OK>**.

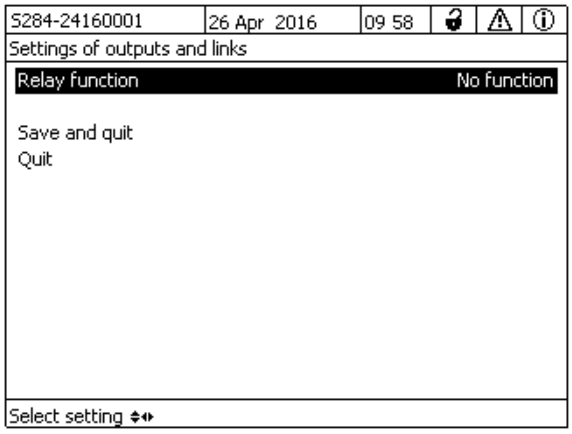


Fig. 7-15 Settings of outputs and links

7 Using **<▲ ▼ ◀ ▶ >**, select one of the functions listed below. Confirm with **<OK>**.

Function	Description
No function	The relay output is not used.
System monitoring	see section 7.6.2
Sensor monitoring	see section 7.6.3
Limit indicator	see section 7.6.4
Frequency controller	see section 7.6.5
Pulse-width output	see section 7.6.6
Cleaning	see section 7.6.7
Sensor-controlled	see section 7.6.8
Manual control	see section 7.6.9
Alarm contact	see section 7.6.10

8 Make the settings for the relay outputs with **<▲ ▼ ◀ ▶ >** and **<OK>**. The settings comprise the relay action (see section 7.6.1) and sensor dependent settings.

9 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, highlight and confirm *Save and quit*. The new settings are stored.

As soon as a function was selected for a relay output, you can select a relay action (see section 7.6.1).

7.6.1 Relay action

The following actions of the relay can be defined in the *Action* setting:

Settings	Explanations
Open	The relay should open on every event.
Close	The relay should close on every event.

Preferably set up the relay output as normally closed for monitoring functions (*ActionOpen*).

7.6.2 *System monitoring*

Function

The *System monitoring* function enables the monitoring of system errors.

In order to set up the *System monitoring* function for a relay output, the relay output must not be linked with a sensor (see section 7.4).

It can be used to monitor the following system errors.

Settings

Settings	Selection	Explanations
Power failure	*On* *Off*	The *Power failure On* function monitors the supply voltage in the IQ SENSOR NET at the DIQ/S 28X or the combination output module. If the voltage falls below the critical value, the relay switches.
Communication	*On* *Off*	The *Communication On* function monitors the functioning of the DIQ/S 28X and the communication with the combination output module.
Collective error message	*On* *Off*	*Collective error message On* function simultaneously monitors the proper functioning of all sensors and the functioning of the combination output module to be monitored. (for details, see below this table)
Action	*Open*	For all functions of the *System monitoring*, the relay action is set to *Open*.

Collective error message

In the case of a *Collective error* message, the relay opens if one of the following malfunctions occurs:

- One of the sensors properly registered to the DIQ/S 28X does not provide a valid main measured value
- One of the sensors properly registered to the DIQ/S 28X does not provide a valid secondary measured value
- The monitoring output module has not received any new data DIQ/S 28X for 2 minutes.

In any case, the relay remains open for 10 seconds and only closes when the malfunction is no longer present.

In the following cases, the relay does not open despite an invalid measured value:

- The sensor is being calibrated
- The sensor is in the maintenance condition
- The sensor is being cleaned with the aid of a valve module in the system (compressed air operated cleaning system).

7.6.3 *Sensor monitoring*

Function

The *Sensor monitoring* function enables the monitoring of sensor errors and the maintenance condition.

In order to set up the *Sensor monitoring* function for a relay output, the relay output must be linked with a sensor (see section 7.4).

Settings

Setting	Selection	Explanation
Errors	*Special*	Special sensor errors are monitored and can prompt a relay action.
	All	All sensor errors (special ones and general ones) are monitored and can prompt a relay action.
	Off	Sensor errors are not monitored.
Mainten. Condition	*On* *Off*	Switching on and off the maintenance condition (see section 7.10) is monitored and can prompt a relay action.
Action	*Open* *Close*	Relay action (see section 7.6.1)

Preferably set up the relay output for monitoring functions as an opener (*Action Open*, see section 7.6.1).

Sensor messages include errors and information that are registered by the sensor.

Special sensor errors

The special sensor errors are sensor-dependent. Details of this are given in the component operating manual of the respective sensor.

General Sensor errors

Init	This can prompt a relay action for a short time, depending on the starting behavior of the system
----	Invalid measured value, or defective sensor
Error	Communication with sensor interrupted
OFL	Measuring range undercut or exceeded (overflow)

7.6.4 *Limit indicator*

Function

The characteristic of the limit indicator is laid down in the *Limit value UL*, *Limit value LL*, *Hysteresis UL* and *Hysteresis LL* settings. The fundamentals of the function are described in the introductory chapter (see section 7.2.2).

In order to set up the *Limit indicator* function for a relay output, the relay output must be linked with a sensor (see section 7.4).

Settings

Setting	Selection/Values	Explanation
Limit values	*UL main variable* *LL main variable* *UL adjoining var.* *LL adjoining var.*	*Main variable* designates the actual measured parameter of the sensor (e.g. pH, oxygen, etc.). *Adjoining variable* designates an additional measured parameter (e.g. temperature).
Limit value UL	Upper or lower limiting value Any value within the measuring range (sensor-dependent)	Minimum difference between the upper and lower limit value: 5 % of the measuring range
Limit value LL		
Hysteresis UL	0 - 5% of the measuring range	Hysteresis for *Limit value UL* and *Limit value LL*.
Hysteresis LL		
Behavior at error	*Open* *Close* *Unchanged*	The relay opens, closes or remains unchanged in the case of system errors or sensor errors (see page 156).
Action	*Open* *Close*	Relay action (see section 7.6.1)
Switching delay	0 ... 3600 s	The time period for which a limiting value must be exceeded before the relay operates. Prevents frequent switching for measured values that are close to the limiting value.

7.6.5 *Frequency controller*

Function

The characteristic of the frequency output is laid down in the *Start value*, *End value*, *Frequency (f) min.* and *Frequency (f) max.* settings. The fundamentals of the function are described in the introductory chapter (see section 7.2.3).

In order to set up the *Frequency controller* function for a relay output, the relay output must be linked with a sensor (see section 7.4).

Settings

Setting	Selection/Values	Explanation
Measured variable	*Main variable* *Adjoining variable*	*Main variable* designates the actual measured parameter of the sensor (e.g. pH, oxygen, etc.). *Adjoining variable* designates an additional measured parameter (e.g. temperature).
Start value	within the measuring range (sensor-dependent)	Minimum spacing: 5 % of the measuring range
End value		
Frequency (f) min.	0 to 120 1/min	Minimum spacing: 10 1/min
Frequency (f) max.		
Frequency with error	0 to 120 1/min	In case of system errors or sensor errors (see page 156), the relay switches with the frequency specified.
Action	*Open* *Close*	Relay action (see section 7.6.1)

Characteristic curve

If a value for *End value* that is greater than the *Start value* is entered, the output has a positive characteristic curve.

In order to obtain a negative characteristic curve, a value for *End value* must be entered that is smaller than the value for *Start value*.

7.6.6 *Pulse-width output*

Function

The characteristic of the pulse width output is laid down in the *Start value*, *End value*, *Pulse width (v) min.* and *Pulse width (v) max.* settings. The fundamentals of the function are described in the introductory chapter (see section 7.2.3).

In order to set up the *Pulse-width output* function for a relay output, the relay output must be linked with a sensor (see section 7.4).

Settings

Setting	Selection/Values	Explanation
Measured variable	*Main variable* *Adjoining variable*	*Main variable* designates the actual measured parameter of the sensor (e.g. pH, oxygen, etc.). *Adjoining variable* designates an additional measured parameter (e.g. temperature).
Start value	within the measuring range (sensor-dependent)	Minimum spacing: 5 % of the measuring range
End value		
Pulse width (v) min.	0 ... 100 %	Minimum spacing: 10 % of the *Cycle duration (T)*
Pulse width (v) max.		
Cycle duration (T)	5 ... 100 s	Length of the switching period T $T = (t_{on} + t_{off})$
Error pulse width	0 ... 100 %	In case of system errors or sensor errors (see page 156), the relay switches with the pulse-width specified.
Action	*Open* *Close*	Relay action (see section 7.6.1)

Characteristic curve

You can specify the minimum and maximum pulse width (v). This determines the steepness of the characteristic curve of the output.

7.6.7 *Cleaning*

If the valve module MIQ/CHV PLUS is used, it is best to set the *Cleaning* function directly at the valve output (V) of the MIQ/CHV PLUS (see operating manual MIQ/CHV PLUS). The relay can be used for other purposes.

Function

The *Cleaning* function enables the time controlled automatic start of the sensor cleaning function with the aid of a relay of the combination output module. The relay controls the MIQ/CHV valve module and switches the compressed air for the CH sensor cleaning head on or off.

In order to set up the *Cleaning* function for a relay output, the relay output must be linked with a sensor (see section 7.4).

The relay of the combination output module assigned always works as a closer.

The cleaning cycle consists of *Cleaning duration* and *Adjustment time*.

During the cleaning cycle the *Clean* display flashes. The outputs linked with this sensor are frozen. The maintenance condition (see section 7.10) is active.

After the *Cleaning duration*, the relay is opened. During the following *Adjustment time* the outputs remain blocked.
The outputs linked with this sensor are only released when the cleaning cycle is complete. The *Clean* display disappears. The maintenance condition is finished.

Testing the operativeness

You can test the operativeness of the cleaning system as follows: Manually open or close the relay with the *Manual control* function (see section 7.6.9) and, while doing so, check the behavior of the cleaning system.

Alternatively, you can test the operativeness of the cleaning system by checking the performance of the function at the start time set up (reference time ± interval). To perform a test immediately, the reference time can be set so that the next cleaning cycle will start in a few minutes (settings: see following table).

Settings

Setting	Selection/Values	Explanation
Reference time (h)	0 ... 23 h	Time at which a cleaning cycle is started. Further cleaning cycles will be performed at the times specified by the cleaning interval.
Reference time (min)	0 ... 60 min	
Interval unit	1 .. 7 d 1 .. 24 h 5 .. 60 min	Selection of range and unit for the *Reinigungsintervall*.

Setting	Selection/Values	Explanation
Cleaning interval	1/2/3/4/5/6/7 d or: 1/2/3/4/6/8/12/24 h or: 5/10/15/20/30/60 min	Repeat interval for the cleaning function: Time between the start time of a cleaning cycle and the start time of the next cleaning cycle*.
Cleaning duration	0 ... 300 s	Duration of the cleaning
Adjustment time	0 ... 900 s	Time extension to allow the sensor to adjust to the test sample after cleaning.

* With short *cleaning intervals*, the adjustable values for the *Cleaning duration* and *Adjustment time* are limited. The following values apply:

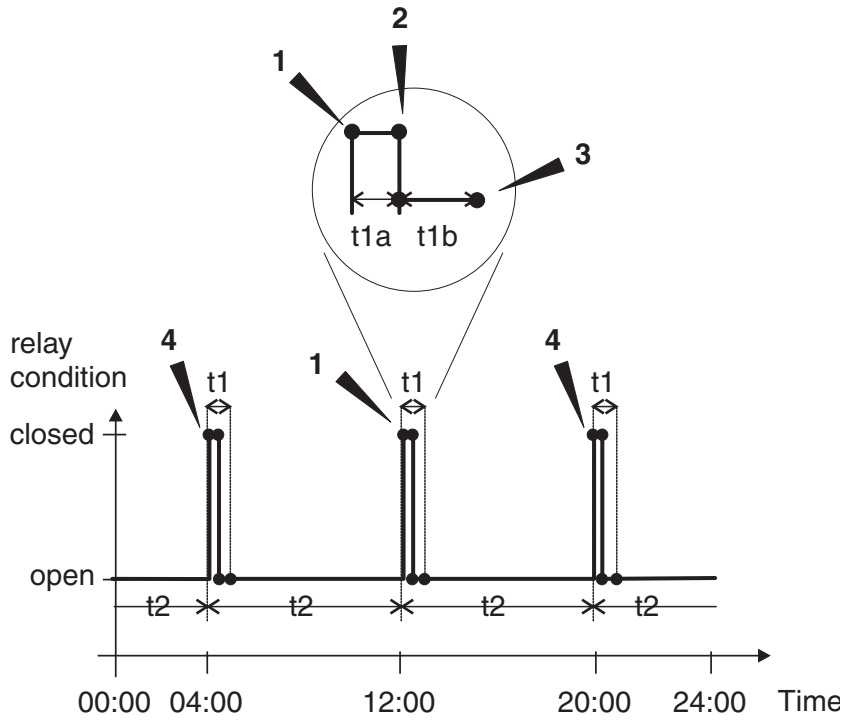
Cleaning interval	***Cleaning duration***	***Adjustment time***
≤ 10 min	max. 60 s	max. 120 s
≤ 20 min	max. 180 s	max. 300 s

With this, the cleaning times are fixed. They only change when the *reference time* is changed.

The reference time and all further cleaning times relate to the date and time of the system clock. How to set the system clock is described in the system operating manual.

Example

Setting		Result
Reference time (h): *Reference time (min)*: *Interval unit*: *Cleaning interval*:	12 0 *Hours (h)* 8 h	Reference time: 12:00 hours This specifies the following start times: 04:00, 12:00 and 20:00 hours



1 Reference time
Begin of a cleaning cycle (**t1**)
Begin of the specified *Cleaning duration* (**t1a**)

2 End of the specified *Cleaning duration* (**t1a**)
Begin of the specified *Adjustment time* (**t1b**)

3 End of the specified *Adjustment time* (**t1b**)
End of the cleaning cycle (**t1**)

4 Reference time ± *Cleaning interval* (**t2**)
Begin of a cleaning cycle

Canceling the cleaning

A running cleaning cycle is canceled:

- Automatic
  - if the sensor switches to the inactive condition during the cleaning cycle
- Manual
  - By pressing the **<C>** key
  - By switching on the maintenance condition

Each time the cleaning cycle is canceled, the relay opens immediately.

If the cleaning cycle is canceled automatically, the outputs linked to the sensor are released immediately.
If the cleaning cycle is canceled manually, the sensor is in the maintenance

condition. The linked outputs are only released after the maintenance condition was terminated manually.

The next cleaning cycle will be performed at the time set up.

In case of a power failure, all relays open. The cleaning cycle is canceled. The outputs linked with the sensor change to the non-active condition (see section 7.9.2). As soon as the power is available, the outputs are released again. The next cleaning cycle will be performed at the time set up.

7.6.8 *Sensor-controlled*

With the *Sensor-controlled* function, the relay is controlled by a linked sensor.

Prerequisites

- Sensor that sends signals to trigger a cleaning cycle, e.g. UV/VIS sensor

Settings

Setting	Selection/Values	Explanation
Pulse length	*Automatic*	The duration of the cleaning procedure with air is programmed in the sensor. The relay automatically takes over from the sensor the cleaning duration.
	0,5 s 1 s 2 s 3 s	The relay finishes the cleaning procedure after the interval selected here.

Set up the cleaning process in the menu *Settings of sensors and diff. sensors* of the relevant sensor.

7.6.9 *Manual control*

Function The *Manual control* function can be used to test the operativeness of an instrument that is connected to the relay. To do so, close or open the relay manually and, while doing so, check the behavior of the connected instrument.

Setting	Selection/Values	Explanation
Relay function	*Manual control*	The selected relay action is carried out with *Save and quit*.
Action	*Open* *Close*	Relay action (see section 7.6.1)

The settings for other functions in the *Relay function* menu as, for example, *Frequency controller* and *Pulse-width output* are retained while the *Manual control* is carried out.

7.6.10 *Alarm contact*

Function The *Alarm contact* function triggers a relay action (opening or closing) if a defined alarm event takes place. The *Alarm contact* function is only available for relays that are not linked with a sensor. If necessary, an existing link must be erased.

Setting	Selection/Values	Explanation
Relay function	*Alarm contact*	The selected relay action is carried out with *Save and quit*.
Action	*Open* *Close*	Relay action (see section 7.6.1)

7.7 Setting the current outputs (variant -CR3, CR6)

1 Call up the measured value display with **<M>**.

2 Open the *Settings* menu with **<S>**.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Settings of outputs and links*, and confirm with **<OK>**. The *Settings of outputs and links* display appears.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the *Feature* column. Confirm with **<OK>**.

5 Using **<▲ ▼ ◀ ▶ >**, highlight a line for a current output (Cx) in the column *Feature*. Confirm with **<OK>**.
The *Settings of outputs and links* display opens.

6 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Current output*, and confirm with **<OK>**.

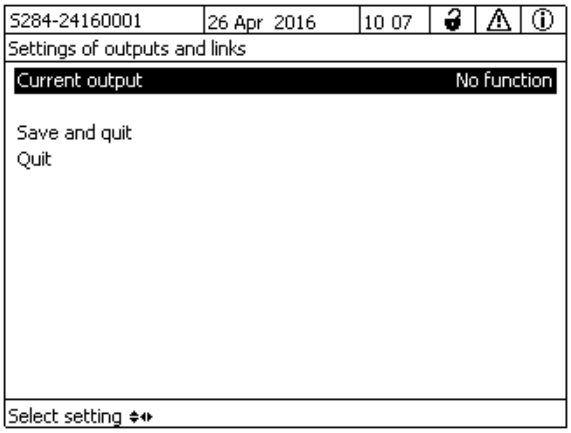


Fig. 7-16 Settings of outputs and links

7 Select and confirm a function with **<▲ ▼ ◀ ▶ >** and **<OK>**.

Function	Settings
No function	The current output is not used.
Recorder	see section 7.7.1
PID controller	see section 7.7.2
Fixed current value	see section 7.7.3

8 Make the settings for the current output with **<▲ ▼ ◀ ▶ >** and **<OK>**.

9 Using **<▲ ▼ ◀ ▶ >** and **<OK>**, highlight and confirm *Save and quit*.
The new settings are stored.

7.7.1 *Recorder*

Function The measured values of the linked sensor at the current output are set up as current intensity in the *Recorder* application. The output of measured values is laid down in the *Recorder type*, *Start value* and *End value* settings.

Settings

Setting	Selection/Values	Explanation
Recorder type	0 to 20 mA or 4 to 20 mA	
Start value	(sensor dependent)	Minimum spacing: ≤ 5 % of the measuring range (sensor-dependent)
End value		
Measured variable	*Main variable* *Adjoining variable*	*Main variable* designates the actual measured parameter of the sensor (e.g. pH, oxygen, etc.). *Adjoining variable* designates an additional measured parameter (e.g. temperature).
Attenuation	0 ... 40 mA/s	Speed of change of the output current (mA/s) in the case of erratic changes of the input signal.
I -> UFL/OFL	*Error*	Current values outside the range between *Start value* and *End value* are regarded as an error. The current output reacts as specified under *Behavior at error* (see below).
	Limitation	The current at the output is limited to the *Start value* or *End value*.
Behavior at error	*Fixed current value*	In the case of system errors and sensor errors, the current output delivers the fixed current value that was specified. Possible values: 0 ... 21 mA.
	Unchanged	The current at the output remains unchanged.

7.7.2 *PID controller*

Function

The *PID controller* function can use an output as a controller output. The regulator can be configured as a **P**roportional regulator with switchable **I**ntegral and **D**ifferential regulator parts (**PID** Controller).

The control response of the PID controller is described by the following formula:

$$I_{Controller} = I_0 + K\left(x_e + \frac{1}{T_i}\int x_e dt + T_d \frac{dx_e}{dt}\right)$$

with:

$$K = \frac{I_{max} - I_{min}}{X_p}$$

$$x_e = x_{nom} - x_{actual}$$

$$I_{min} \le I_{Controller} \le I_{max}$$

$I_{Controller}$	Current on the controller output at time t
I_0	*Current on the output if* $x_{actual} = x_{set}$
K	Amplification
X_p	Proportional range
x_e	Control difference
x_{actual}	Actual value (current measured value)
x_{set}	Set value
ti	Integral algorithm
td	Differential control part
t	Time
I_{min}	Lower current limitation
I_{max}	Upper current limitation

The adjustable control parameters are x_{set}, I_0, X_p, I_{min}, I_{max}, *ti* and *td* (see setting table on page 153).
By activating or deactivating the **I**ntegral (*ti*) and **D**ifferential (*td)* controller part, the following controller types can be configured:

Regulator type	***td* [s]**	***ti* [s]**
P controller	0	0
PI controller	0	1 to 9999

Regulator type	*td* [s]	*ti* [s]
PD controller	1 to 9999	0
PID controller	1 to 9999	1 to 9999

Characteristic curve of the proportional controller

For a pure P controller the correlation between the measured value and current I on the controller output results in the following characteristic curve:

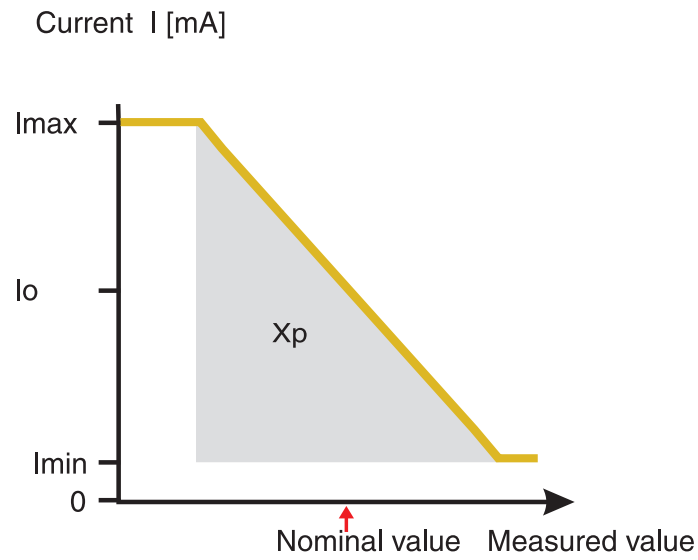


Fig. 7-17 Proportional controller (negative characteristic curve)

The proportional range *Xp* is limited by the measurement range of the linked sensor. If a value is entered for the parameter *Xp* that is greater than zero, the controller has a positive characteristic curve (example Fig. 7-17). To obtain a positive characteristic curve, a negative value must be entered for *Xp*.

Application example

- Regulation of the oxygen concentration
- Sensor: TriOxmatic 700 IQ (measuring range: 0 to 60 mg/l)

Control parameter	Value
Nominal value	4 mg/l
Xp	10 % of the measuring range or 6 mg/l
Imin	8 mA
Imax	14 mA
Io	12 mA
ti	0 s (no I algorithm)
td	0 s (no D algorithm)

The control parameters result in the following (negative) characteristic curve:

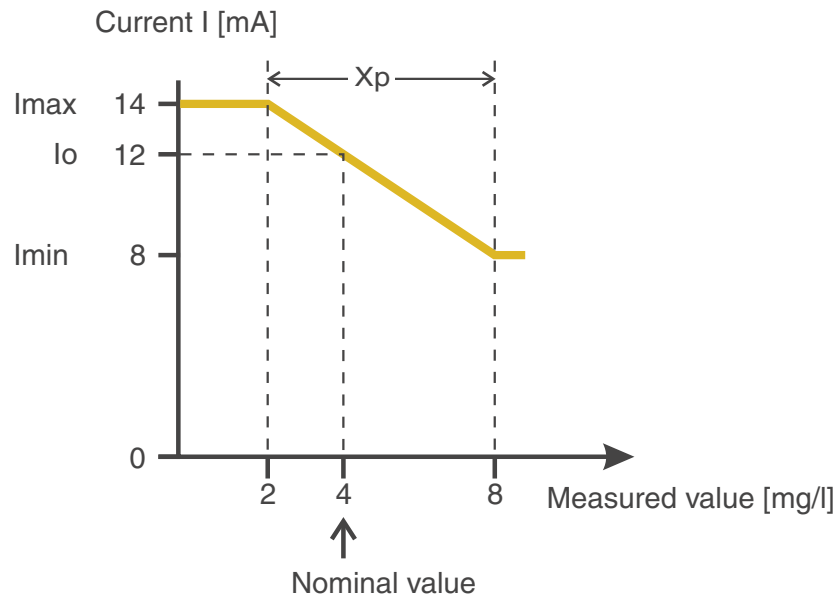


Fig. 7-18 Characteristic curve for application example

The controller works with the following amplification:

$$K = \frac{6\ mA}{6\ mg/l} = 1\frac{mA}{mg/l}$$

Within the proportional range an increase of the concentration by 1 mg/l causes a reduction of the output current by 1 mA. If the measured concentration is 5 mg/l, for example, 11 mA is output:

$$I_{Controller} = 12\ mA + 1\frac{mA}{mg/l} \cdot (4\ mg/l - 5\ mg/l)$$

$$I_{Regler} = 12\ mA + 1\frac{mA}{mg/l} \cdot (-1\ mg/l) = 11\ mA$$

The highest concentration at which the controller still works in the proportional range is 8 mg/l (corresponding to *Imin* = 8 mA) and the lowest is 2 mg/l (corresponding to *Imax* = 14 mA).

Settings

Setting	Selection/Values	Explanation
Measured variable	*Main variable* *Adjoining variable*	*Main variable* designates the actual measured parameter of the sensor (e.g. pH, oxygen, etc.). *Adjoining variable* designates an additional measured parameter (e.g. temperature).
Nominal value	within the measuring range (sensor-dependent)	Nominal value the measured value is regulated to
Xp	5 ... 100 % -5 ... -100 % % of the measuring range	Proportional range of the controller. Negative values result in a positive characteristic curve.
Imin	0 ... 20 mA	Lower current limitation *
Imax	0 ... 20 mA	Upper current limitation * * Note: Spacing between *Imin* and *Imax*: at least 5 mA

Setting	Selection/Values	Explanation
Io	0 ... 20 mA	Current value on the output if the measured value equals the *Nominal value*
ti	0 ... 9999 s	Hold-back time: Integral part of the controller (*0* = not effective)
td	0 ... 9999 s	Reset time: Differential part of the controller (*0* = not effective)
Behavior at error	*Fixed current value*	In the case of an error, the current output supplies the current value defined in the *Current with error* field (any in the range *0 ... 21 mA).*
	Unchanged	In the case of an error, the current on the output remains unchanged.

7.7.3 *Fixed current value*

Function The *Fixed current value* function can be used to test the operativeness of the instruments connected to the outputs: output different current values to the output and, while doing so, check the behavior of the connected instrument.

Setting	Selection/Values	Explanation
Current output	*Fixed current value*	Using *Save and quit*, the nominal amperage that was input as *Inom* is output.
Inom	0 ... 20 mA	The nominal amperage that is output.

The settings for other functions in the *Current output* menu as, for example, *PID controller* and *Recorder* are retained while the *Fixed current value* is carried out.

7.8 Checking the condition of the outputs

This function provides a simple overview of the conditions of all outputs of the combination output module.

For the relays, the displayed condition is *open* or *closed*.

For the current outputs, the current value present at the outputs is displayed.

1 Call up the measured value display with **<M>**.

2 Open the *Settings* menu with **<S>**.

3 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *Service*, and confirm with **<OK>**. The *Service* dialog window opens.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item, *List of all components*, and confirm with **<OK>**.
The *List of all components* dialog window opens.

5 Highlight the required component with **<▲ ▼ ◀ ▶ >** (column *Model*, entry *MIQCR3*) and confirm with **<OK>**.
The *Status of output channels* window opens.

S284-24160001	26 Apr 2016	10 43			
Status of output channels					
No.	Name	Chan.	Status		
D01	GW Lft 1	R1	open		
D01	GW Lft 2	R2	open		
D01	GW Lft 3	R3	open		
D01	O2 Bel 1	C1	6.78 mA		
D01	O2 Bel 2	C2	0.00 mA		
D01	O2 Bel 3	C3	10.13 mA		
Return ESC					

Fig. 7-19 Status of output channels

6 Using **<M>** or (ESC), exit the window *Status of output channels*.

7.9 Behavior of linked outputs

7.9.1 Behavior in case of error

For linked relay outputs or current outputs, you can determine the behavior of the outputs in case of errors.

Depending on the use of the output, the behavior in case of errors is set in the following menus:

Output	Menu
Frequency controller	*Frequency with error* (see section 7.6.5)
Pulse-width output	*Error pulse width* (see section 7.6.6)
Recorder	*Current with error* (see section 7.7.1)

Error events

The specified behavior occurs with the following events or conditions:

- The linked sensor does not provide any valid measured value (display of *Init*, *Error*, *"-----"*, or *OFL)*
- Communication with the DIQ/S 28X is interrupted for more than 2 minutes.
- The supply voltage for the DIQ/S 28X is too low.
- In the function *Recorder*, the measured value of the linked sensor is outside the range between *Start value* and *End value*.

Freezing the conditions of the outputs

Irrespective of the behavior in case of error that was defined, the following situations cause the conditions of the outputs to be frozen:

- The linked sensor is in the maintenance condition (display of *Cal*, *Clean*, or flashing measured value).
- Communication with the DIQ/S 28X is temporarily interrupted. After an interruption of 2 minutes the output changes to the behavior defined for error.

Restoring the normal functioning

The relay or current output automatically returns to its normal condition as soon as all errors have been eliminated and all conditions that caused the freezing of the outputs were eliminated.

7.9.2 Behavior in non-operative condition

An output is non-operative when no function is activated for the output.

An output becomes non-operative in case of

- Power failure
  (As soon as the supply voltage is sufficient again, the non-operative condition of the outputs ends. The outputs function as specified by the user again.)
- Erasing a link to a sensor
- Changing the *Measuring mode* sensor setting for a linked sensor
- Changing the *Measuring range* sensor setting for a linked sensor

Before editing sensor settings a note appears on the display to inform you that links will be erased when you change the *Measuring mode* or *Measuring range* sensor setting.

Settings in the non-active condition

Current output	Relay output
Current: 0 A	Relay: Open

7.10 Maintenance condition of the sensors

The maintenance condition of the sensors is used for calibrating, cleaning, servicing and repairing (removing and exchanging) the sensors.

In the maintenance condition

- the system does not react to the current measured value or the condition of the selected sensor
- linked outputs are frozen
- sensor errors do not prompt changes in the conditions of linked outputs.

The maintenance condition is automatically activated

- during calibration. After calibration the sensor remains in the maintenance condition until the maintenance condition is switched off manually (see section 7.10.2)
- during the cleaning cycle (see section 7.6.7)

If you want to clean, service or repair (remove and exchange) a sensor, switch on the maintenance condition manually (see section 7.10.1).

When you have finished cleaning, servicing or repairing the sensor, switch off the maintenance condition manually (see section 7.10.2).

If the maintenance condition is activated for a sensor, the measured values or status indicators of this sensor flash in the measured value display.

7.10.1 Switching on the maintenance condition

1 Call up the measured value display with **<M>**.

2 Select the sensor you want to switch on the maintenance condition for with **<▲ ▼ ◀ ▶ >**. The measured values of the sensor do not flash.

3 Open the *Display/Options* menu with **<OK>**.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item *Switch maintenance condition on/off* or *Maintenance Sensor S0x* and confirm with **<OK>**. A window that informs you about the maintenance condition opens up.

5 Confirm *Continue* with **<OK>**.
The selected sensor is in the maintenance condition. Linked outputs are frozen.

6 Call up the measured value display with **<M>**.
The measured values of the sensor flash.

7.10.2 Switching off the maintenance condition

1 Call up the measured value display with **<M>**.

2 Select the sensor you want to switch off the maintenance condition for with **<▲ ▼ ◀ ▶ >**. The measured values of the sensor flash.

3 Open the *Display/Options* menu with **<OK>**.

4 Using **<▲ ▼ ◀ ▶ >**, highlight the menu item *Switch maintenance condition on/off* or *Maintenance Sensor S0x* and confirm with **<OK>**. A window that informs you about the maintenance condition opens up.

5 Confirm *Continue* with **<OK>**.
The maintenance condition of the selected sensor is switched off. Linked outputs are released.

6 Call up the measured value display with **<M>**.
The measured values of the sensor do not flash.

8 Maintenance and cleaning

8.1 Maintenance

Maintenance activities

Component	Maintenance
IQ sensors	Depending on the type of sensor (see the component operating manual of the sensor)
IQ SENSOR NET, DIQ modules, MIQ modules	No maintenance required

8.2 Cleaning

IQ SENSOR NET, DIQ modules, MIQ modules

Clean components mounted in the open of gross contamination as necessary. We recommend cleaning the worst of the dirt on the enclosure and the area directly around it each time before opening in order to prevent contamination from entering the open enclosure.

To clean the module, wipe the enclosure surfaces with a damp, lint-free cloth. If compressed air is available on site, blow off the worst of the dirt beforehand. Keep the enclosure closed while doing so.

NOTE
Do not use high-pressure water blasters for cleaning (danger of water penetration!). Also do not use aggressive cleaning agents such as alcohol, organic solvents or chemical detergents. These types of cleaning agent can attack the surface of the enclosure.

The enclosure and the window of the display are made of plastic. Thus, avoid contact with acetone and similar detergents. Remove any splashes immediately.

IQ sensors

The cleaning of the IQ sensors depends greatly on the respective application. Instructions for this are given in the respective component operating manual.

A valve module for the compressed air-operated cleaning of sensors is available as an accessory.

9 What to do if ...

9.1 Information on errors

Log book

The IQ SENSOR NET system performs a comprehensive cyclical self test during operation. While doing so, the system identifies all states that deviate from normal operation and enters corresponding messages in the log book (information or error message).

With the aid of the log book, you can call up instructions on how to clear the error directly on the Universal Transmitter. The log book is described in detail in section 4.5 MESSAGES AND LOG BOOK.

Information on possible errors in IQ sensors and MIQ output modules is given in the chapter WHAT TO DO IF ... of the respective component operating manual.

9.2 Errors: causes and elimination

The system no longer reacts to entries

Cause	Remedy
– System error	Reset the system: – Switch off the power supply and switch it on again after 10 s

"Error" in the measured value display

Cause	Remedy
– Communication with the IQ Sensor interrupted	– Check the cable connection
– Error in the IQ sensor	– Disconnect the IQ sensor and reconnect it after 10 s

The selected system language was not activated for all components

Cause	Remedy
– A system language was selected that is not available in at least one component (sensor, Universal Transmitter, output module). The standard language, *English*, was activated instead of the selected system language.	– Contact the service department, as a software update is required for the relevant components.

9.3 Replacing system components

It is always possible to replace components and assign a substitute if the software state of the substitute component is as high as or higher than the software version of the original component.

9.3.1 Replacing passive components

Passive components include all components that the Universal Transmitter cannot recognize.
These include:

- MIQ/PS (power supply module)
- DIQ/JB (branching module)
- DIQ/CHV (module for automatic compressed air cleaning)
- Cables (SNCIQ, SACIQ).

WARNING
If the MIQ/PS power supply module is opened during operation, there is a danger to life due to possible hazard of electric shock. The MIQ/PS may only be opened when the line voltage is switched off. Secure the line voltage against being switched on again.
Only ever replace components when the IQ SENSOR NET system is switched off. Defective components are removed in the reverse order to the installation (see chapter 3 INSTALLATION).

9.3.2 Adding and replacing IQ sensors

Inactive datasets of IQ sensors

If an IQ sensor is removed from the system, its settings remain stored in the Universal Transmitter. A "?" appears in the left column of the *Edit list of sensors* menu. This indicates an "inactive dataset". A dataset contains the following information:

- Serial number of the IQ sensor (and, with it, the type of sensor)
- Display position
- All sensor settings
- All characteristics of the link with an output.

If no suitable inactive dataset is available, a newly connected IQ sensor is automatically recognized as a new module and added to the list of sensors.

The maximum number of datasets (active and inactive datasets) for IQ sensors is limited to 2 in the IQ SENSOR NET system DIQ/S 284, to 4 in the IQ SENSOR NET system DIQ/S 282.

When this number is reached, no further IQ sensor can be installed. If necessary, an inactive dataset has to be erased to make an extension possible.

The current calibration data of the IQ sensor is always stored in the sensor. If an IQ sensor is connected that is ready for operation and calibrated, this can be used immediately without the need for recalibration.

To erase inactive datasets, see section 5.4.3.

If an IQ sensor is connected to the system when an inactive dataset is present, the following cases are possible:

Case 1:

The serial number of the IQ sensor is identical with the serial number of an inactive dataset.	The connected IQ sensor is automatically assigned to the inactive dataset and starts to operate again. Example: Maintenance or repair. This mechanism ensures that all IQ sensors retain their settings and links if an IQ sensor was removed for maintenance, or if the system was temporarily switched off.

Case 2:

The type of sensor is identical with the type of sensor in an inactive dataset (or several inactive datasets), but the serial numbers differ.	Operator intervention is required here. The connected IQ sensor can: – be assigned to the inactive dataset (or one of the inactive datasets). Example: Replacing an IQ sensor. Make sure that the substitute sensor has at least the software status of the active IQ sensor. – be included as a new module in the list of the sensors. The operating sequence to do this is described below.

Operating sequence in case 2

1 Connect a new IQ sensor.

2 Switch to the measured value display with **<M>**. The component database is updated. The following display appears (example):

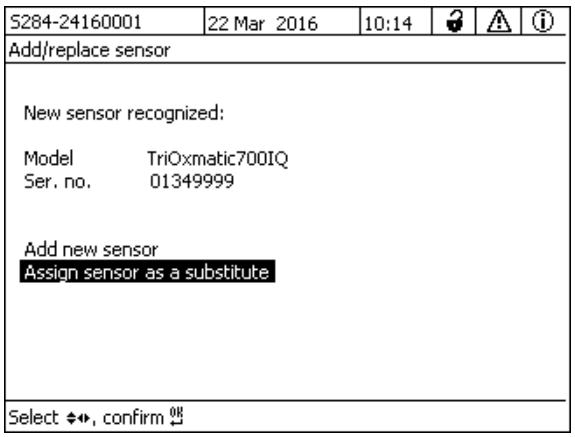


Fig. 9-1 510 - Add/replace sensor

3 Select the required option with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.
- If *Add new sensor* was selected, the system changes directly to the measured value display. As soon as the IQ sensor is ready for operation, it delivers a measured value.
- If *Assign sensor as a substitute* was selected, a list of matching inactive datasets appears:

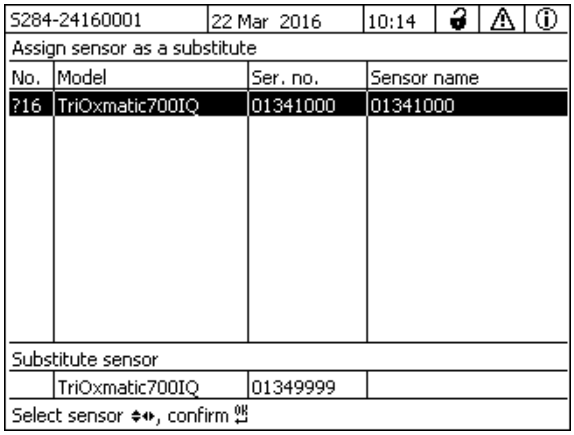


Fig. 9-2 520 - Assign sensor as a substitute

4 Select the required inactive dataset with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**. The system changes to the measured value display. The IQ sensor takes over all settings of the inactive dataset. As soon as the IQ sensor is ready for operation, it delivers a measured value.

9.3.3 Adding and replacing DIQ or MIQ output modules

WARNING
There is also a danger to life from voltages that may present a hazard of electric shock on the relay contacts of open DIQ or MIQ output modules (e.g. DIQ/CR3 or MIQ/CR3). Output modules with relays may only be opened if all external voltages have previously been switched off. Secure all external voltages against being switched on again for the duration of the work.

When replacing DIQ or MIQ modules make sure that the substitute module has at least the software status of the active module.

Only replace any DIQ or MIQ output modules (all DIQ or MIQ modules with relay contacts and/or electrical signal outputs) while the DIQ/S 28X system is switched off. Defective DIQ or MIQ output modules are removed in the reverse order to that of the installation. The installation is described in the INSTALLATION chapter of the respective component operating manual.

Inactive datasets in MIQ output modules

If an DIQ or MIQ output module is removed from the system, its settings remain stored in the Universal Transmitter. A "?" appears in the left column (= inactive dataset) of the *Edit list of outputs* menu. The dataset contains the following information:

- All settings of the relays
- All settings of the current outputs.

If no inactive dataset is available, a newly connected MIQ output module is automatically recognized as a new module and added to the list of outputs.

The maximum number of data sets (active and inactive datasets) for DIQ or MIQ output modules is limited to 2 in the IQ SENSOR NET system DIQ/S 28X. When this number is reached, no further DIQ or MIQ output module can be installed. If necessary, an inactive dataset has to be erased to make an extension possible.

To erase inactive datasets, see section 5.7.2.

If a DIQ or MIQ output module is connected to the system when an inactive dataset is present, the following cases are possible:

Case 1:

The serial number of the DIQ or MIQ output module is identical with the serial number in an inactive dataset.	The connected DIQ or MIQ output module is automatically assigned to the inactive dataset and start operating again. Example: In the case of repair.

Case 2:

The type of the DIQ or MIQ output module is identical with the type of an inactive dataset (or several inactive datasets), but the serial numbers differ.	Operator intervention is required here. The connected DIQ or MIQ output module can: – be assigned to the inactive dataset (or one of the inactive datasets). Example: Replacing a DIQ or MIQ output module. – be included as a new module in the list of outputs. The operating sequence to do this is described below.

Operating sequence in case 2

1 Remove the (defective) DIQ or MIQ output module. The output module is removed in the reverse order to the installation. The installation is described in the INSTALLATION chapter of the respective component operating manual.

2 Install the new DIQ or MIQ output module (INSTALLATION chapter of the respective component operating manual).

3 Switch to the measured value display with **<M>**. The component database is updated. The following display appears (example):

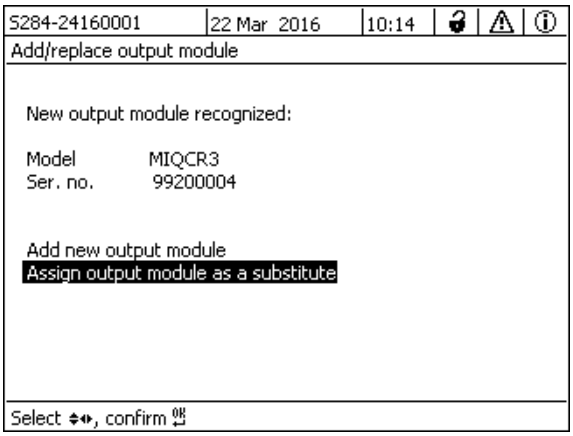


Fig. 9-3 410 - Add/replace output module

4 Select the required option with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**.
- If *Add new output module* was selected, the system changes directly to the measured value display.
- If *Assign output module as a substitute* was selected, a list of the matching inactive datasets appears:

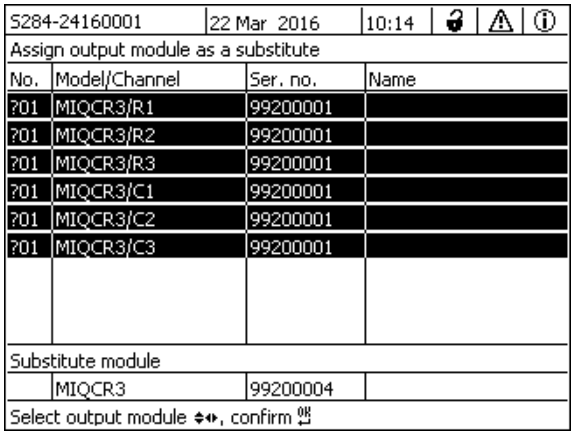


Fig. 9-4 420 - Assign output module as a substitute

5 Select the required inactive dataset with **<▲ ▼ ◀ ▶ >** and confirm with **<OK>**. The system changes to the measured value display. The MIQ output module takes over all settings of the inactive dataset.

10 Technical data

10.1 DIQ/S 282, DIQ/S 284

Dimensions DIQ/S 28X-CRx

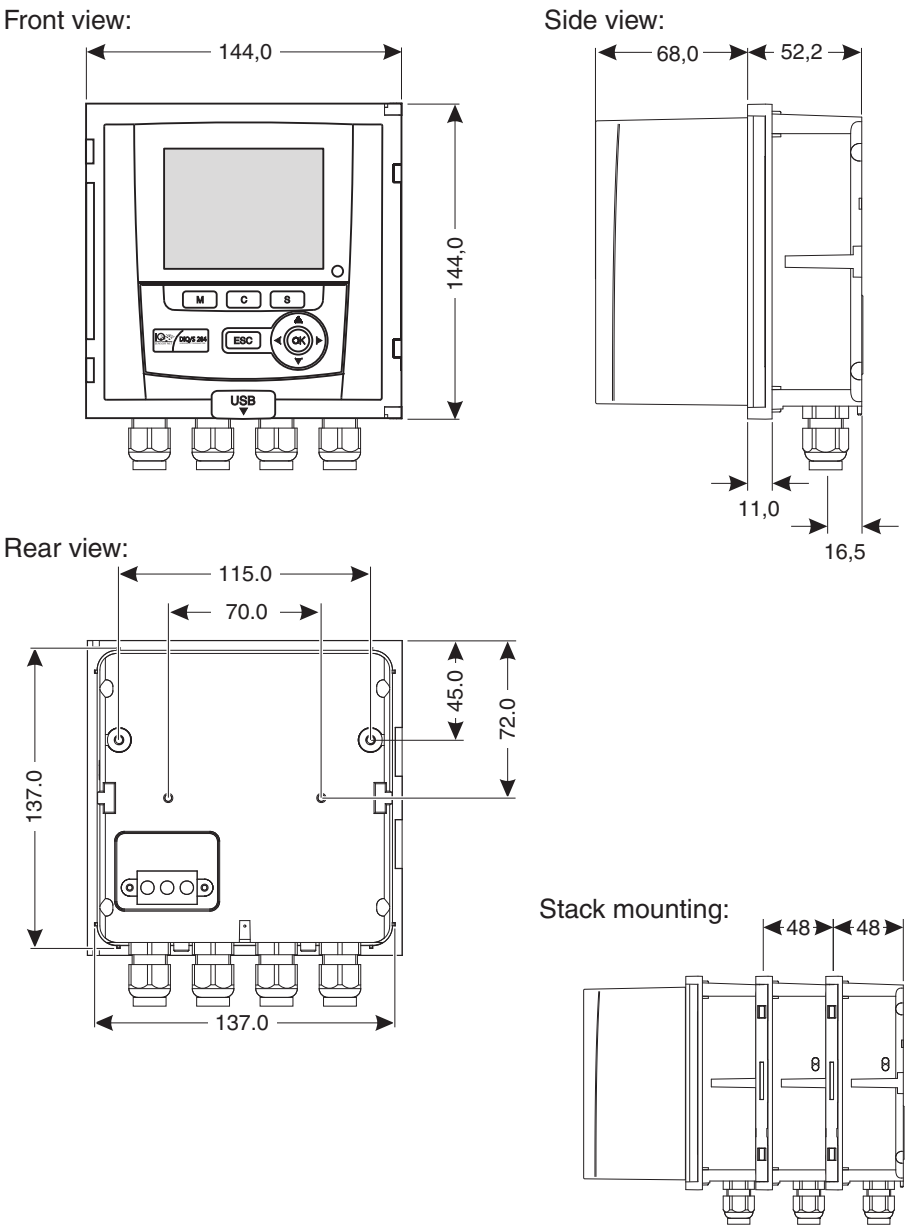


Fig. 10-1 Dimension drawing of the DIQ/S 28X (dimensions in mm)

Dimensions
DIQ/S 28X-MOD
DIQ/S 28X-PR

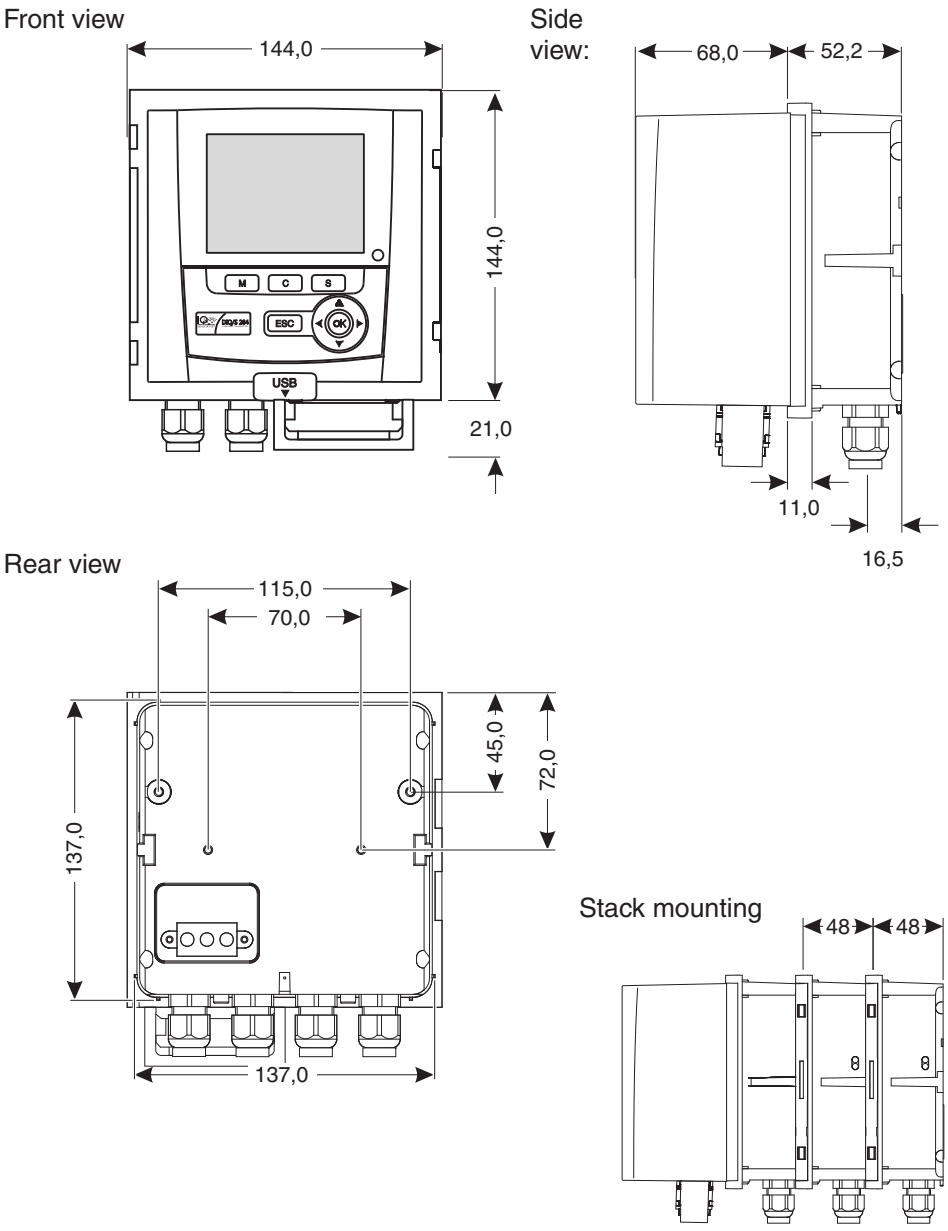


Fig. 10-2 Dimension drawing DIQ/S 28X-MOD, DIQ/S 28X-PR (dimensions in mm)

Dimensions DIQ/S 28X [-CRx]-E[F]

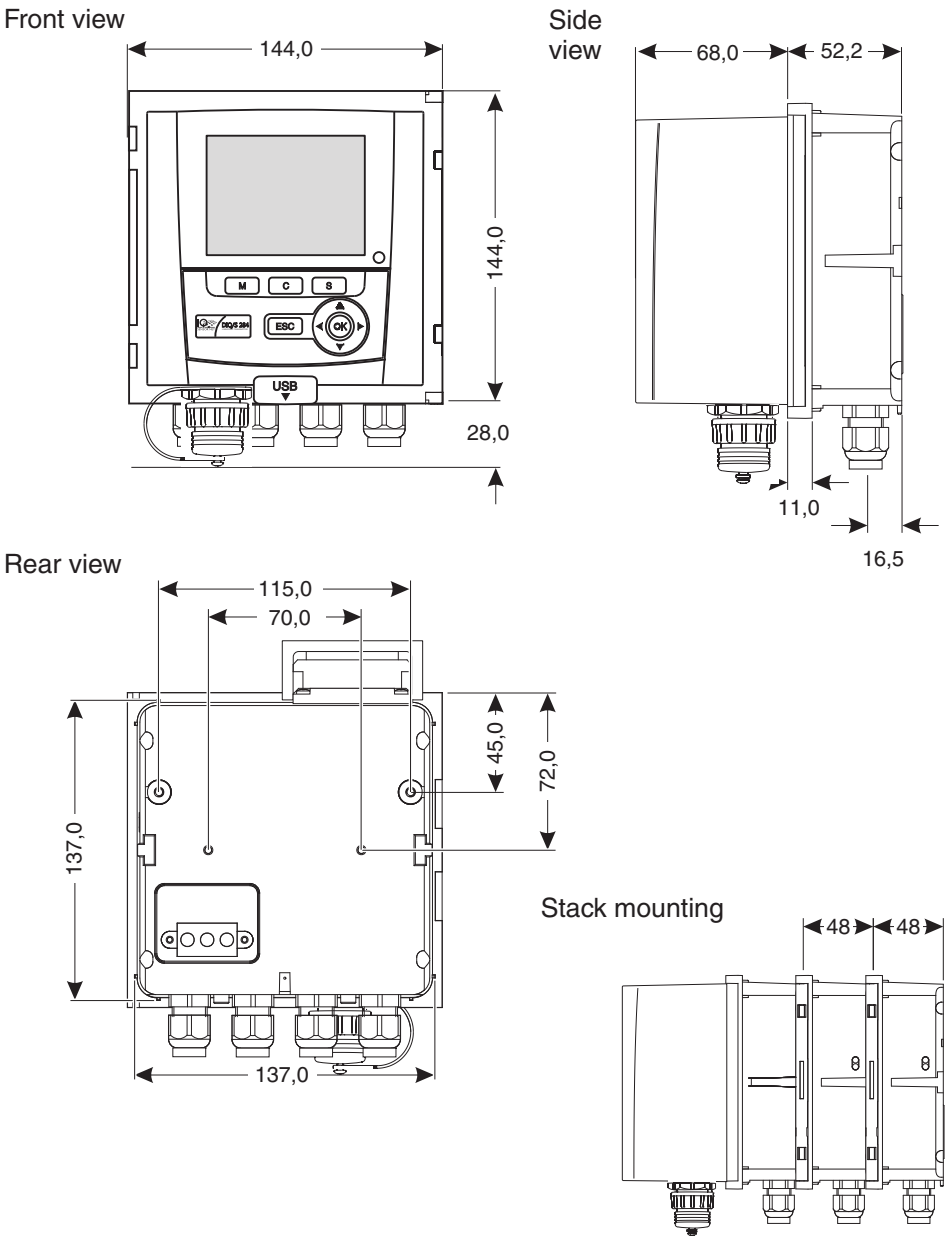


Fig. 10-3 Dimension drawing of the DIQ/S 284E[F] (dimensions in mm)

Mechanical structure

Maximum number of MIQ modules in a module stack	3
Enclosure material	Polycarbonate with 20 % glass fiber
Weight	Approx. 1.2 kg Approx. 1.7 kg (Variant DIQ/S 284-CR6[-E])
Type of protection	IP 67 (not suitable for conduit connection).

Test certificates

CE

Ambient conditions

Temperature

Mounting/installation/ maintenance	+ 5 °C ... + 40 °C (+ 41 ... +104 °F)
Operation	- 20 °C ... + 55 °C (- 4 ... + 131 °F)
Storage	- 25 °C ... + 65 °C (- 13 ... + 149 °F)

Relative humidity

Mounting/installation/ maintenance	≤ 80 %
Yearly average	≤ 90 %
Dew formation	Possible

Site altitude	Max. 2000 m above sea level

Electrical data DIQ/S 28X (240 V AC/DC line power version)

Power supply	Nominal voltage: 100 ... 240 VAC ± 10 % Frequency: 50/60 Hz according to DIN IEC 60038 Line power connection: 2 pin, N and L Line cross-section of mains connection: Europe: 1.5 ... 4.0 mm^2 USA: AWG 14 ... 12 Fuse rating on the operator side: max. 16 A
Protective class	II
Overvoltage category	II
Power consumption	max. approx. 20 W

Electrical data DIQ/S 28X[-XX]/ 24V (24 V AC/DC version)

Supply	Nominal voltage: 24 V AC/DC ± 10 % protective low voltage SELV (Safety Extra Low Voltage) AC frequency:50/60 Hz according to DIN IEC 60038 Connection:2 pin Line cross-section of connections: Europe: 1.5 ... 4.0 mm^2 USA: AWG 14 ... 12 Fuse rating on the operator side: max. 16 A Switch-on current: 1.5 A AC/DC (100 ms)
Power consumption	max. approx. 20 W

Electrical connections DIQ/S 28X[-...]

The electrical connections are inside the housing.

Assignment of the terminal strips: See section 3.13.

Relay (3 x)

Output	Galvanically separated
Max. switching voltage	240 VAC or 24 VDC
Max. switching current	2 A (AC and DC)
Installation require-ments	Fuse rating on the operator side: max. 2 A
Relay functions	Programmable as: – Opener or closer – Limit monitor – Monitoring of the warning and error signals of the IQ SENSOR NET – Proportional frequency output – Proportional pulse width output

Current outputs (DIQ/S 28X-CRx)

Output	Galvanically separated from the sensors
Output current	Can be switched between 0 - 20 mA and 4 - 20 mA In the case of errors, can be set to: 0 ... 21 mA

	Max. initial output voltage	13 V, in the case of missing or incorrect burden
	Accuracy	0.3 % of current value ± 50 µA, load max. 500 Ω
	Functions	Programmable: – Recorder attenuation, adjustable 0 - 40 mA/s – Error behavior can be set as required 0 ... 21 mA – Error behavior according to Namur NE43 can be selected – Positive and negative characteristic curve – PID controller
Connecting terminals	Terminal type	Screw-type terminal strip, accessible by raising the lid
	Terminal ranges	Solid wires: 0.2 ... 4.0 mm^2 AWG 24 ... 12 Flexible wires: 0.2 ... 2.5 mm^2
Cable glands	Suitable for cable diameter	4.5 ... 10 mm or 7 ... 13 mm
EMC product and system characteristics	EN 61326	EMC requirements for electrical resources for control technology and laboratory use – Resources for industrial areas, intended for indispensable operation – Interference emission limits for resources of class A
	System lightning protection	Extended protective characteristics as opposed to EN 61326
	FCC, class A	

Any combination of the IQ SENSOR NET with IQ SENSOR NET products in a user-specific system achieves the listed EMC characteristics.

Meter safety

Applicable norms	– EN 61010-1 – UL 61010-1 – CAN/CSA C22.2#61010-1

USB-A interface

Version	USB 2.0
Usage	Download of measurement data, software updates, electronic key

Immediately close the USB connection with the protective cover when you have removed the USB device.
When the USB connection is open, there is a danger of corrosion.

Ethernet connection (DIQ/S 28X-E[F])

RJ45 socket (can be retrofitted as a climate resistant RJ45 socket for operation at an open-air test site section 11).

Fieldbus connection

DIQ/S 28X variant	Fieldbus connection
DIQ/S 28X[-CRx][-E]	no connection to fieldbus
DIQ/S 28XPR	PROFIBUS DP (RS 485)*
DIQ/S 28X-MOD	Modbus RTU (RS 485)*
DIQ/S 28X[-CRx]-EF	Ethernet fieldbuses (EtherNet/IP™, Profinet, Modbus TCP)

* Connection via 9-pin D-SUB socket on the underside of the housing, compatible with Phoenix connector (IP67).

10.2 General data of MIQ modules

Technical data on special MIQ modules are given in the respective operating manuals.

Dimensions

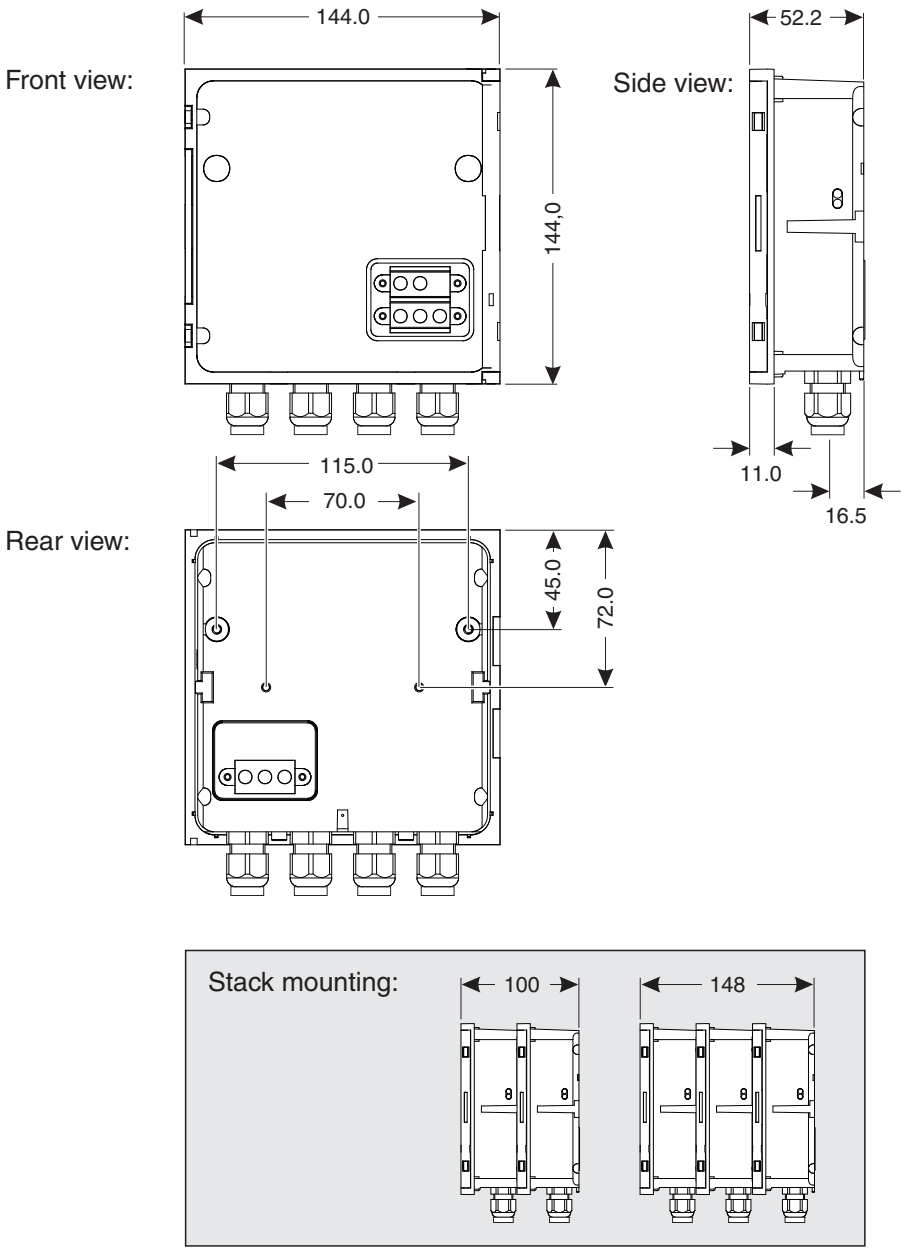


Fig. 10-4 Dimension drawing of MIQ module (dimensions in mm)

Mechanical structure	Maximum number of MIQ modules in a module stack	3
	Enclosure material	Polycarbonate with 20 % glass fiber
	Weight	Approx. 0.5 kg
	Type of protection	IP 66 (not suitable for conduit connection).
Terminal connections	SENSORNET connections	At least two in each DIQ or MIQ module. Additional connectable SENSORNET terminator (terminating resistor)
	Further connections	Module-dependent
	Terminal type	Screw-type terminal strip, accessible by raising the lid
	Terminal ranges	Solid wires: 0.2 ... 4.0 mm^2 AWG 24 ... 12 Flexible wires: 0.2 ... 2.5 mm^2
	Cable feeds	4 cable glands M16 x 1.5 on the underside of the module
Cable glands	Suitable for cable sheath diameter	4.5 - 10 mm or 9.0 - 13 mm

10.3 DIQ/JB

Dimensions

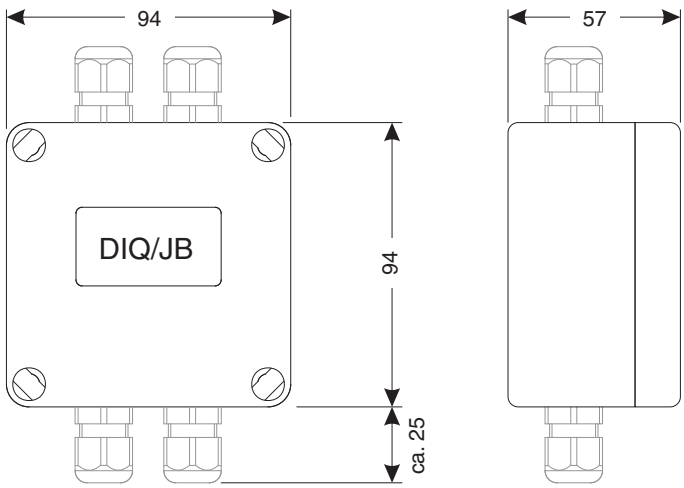
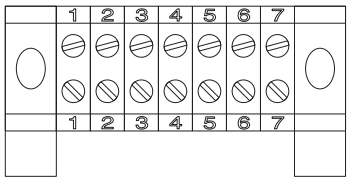


Fig. 10-5 Dimension drawing of DIQ/JB (dimensions in mm)

Mechanical structure

Enclosure material	Polystyrene
Weight	Approx. 0.2 kg
Type of protection	IP 66 (not suitable for conduit connection).

Electrical connections



(7 passive, potential free terminals for line extension or branching)

Connecting terminals

Terminal type	Screw-type terminal strip	
Terminal ranges	Solid wires:	0.2 ... 4.0 mm^2 AWG 24 ... 12
	Flexible wires:	0.2 ... 2.5 mm^2
Cable feeds	Prepared openings for installing two screwed cable glands M16 x 1.5 both on the upper and underside	

10.4 DIQ/CHV

Dimensions

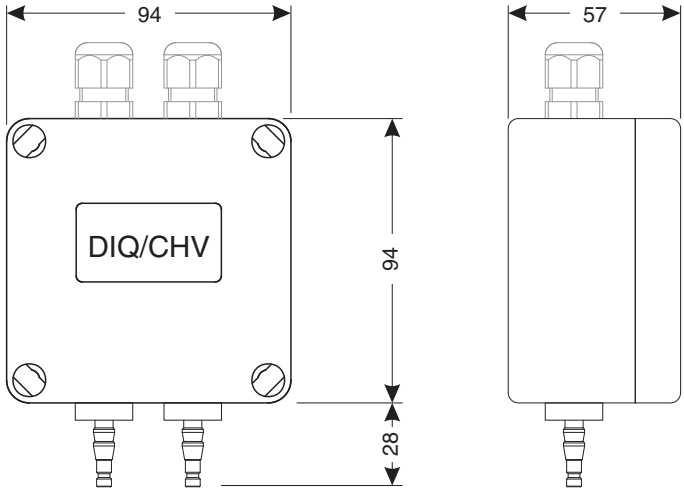


Fig. 10-6 Dimension drawing of DIQ/CHV (dimensions in mm)

Mechanical structure

Enclosure material	Polystyrene
Weight	Approx. 0.3 kg
Type of protection	IP 66 (not suitable for conduit connection).

Electrical connections

- 1 x valve switching contact
- 4 x potential-free terminals to connect interface lines

Terminal strip inside the enclosure:

Connecting terminals

Terminal type	Screw-type terminal strip	
Terminal ranges	Solid wires:	0.2 ... 4.0 mm^2 AWG 24 ... 12
	Flexible wires:	0.2 ... 2.5 mm^2
Cable feeds	Prepared openings for installing two screwed cable glands M16 x 1.5 on the upper side	

Valve circuits

Switching voltage	Approx. 22 V
Max. switching current	Approx. 40 mA

NOTE
The valve may only be operated with the auxiliary voltage of the DIQ/S 28X Universal Transmitter.

Compressed air

Required air quality	Dry, free of dust and oil
Operating pressure	Max. $5x10^5$ Pa (5 bar) absolute
Connections on the DIQ/CHV	6 mm hose nozzles

10.5 Space required by mounted components

Wall mounting and top hat rail mounting

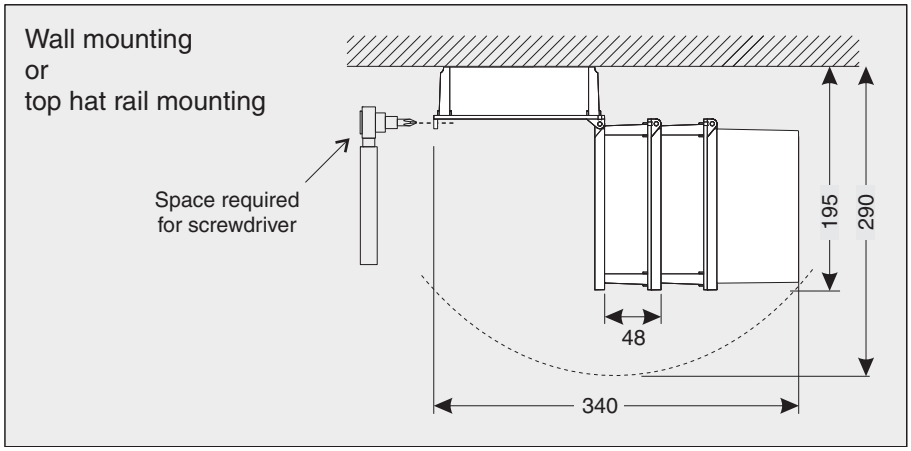


Fig. 10-7 Space required for wall and top hat rail mounting: (dimensions in mm)

Panel mounting (PMS/IQ)

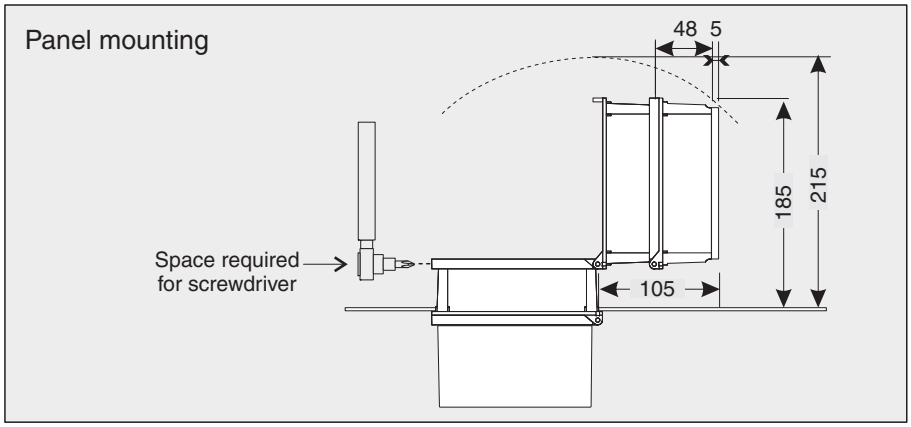


Fig. 10-8 Space required for panel mounting (PMS/IQ) (dimensions in mm)

Information on the space required with the PMS/IQ-X mounting set: see PMS/IQ-X operating manual.

11 Accessories and options

Description	Model	Order no.
IQ SENSOR NET cable - please specify required length in m when ordering	SNCIQ SNCIQ/UG	480046 480047
IQ sensor connection cable 1.5 m 7.0 m 15.0 m Special length up to max. 100 m 20 m (seawater version) 25 m (seawater version) 50 m (seawater version) Special length (seawater version)	 SACIQ-1.5 SACIQ-7.0 SACIQ-15.0 SACIQ-SO SACIQ-20.0 SW SACIQ-25.0 SW SACIQ-50.0 SW SACIQ-SO SW	 480040 480042 480044 480041V 480045 480066 480060 480064V
Set of 4 cable glands M20 for cable sheaths with an outer diameter greater than 10 mm	EW/1	480051
Branching module	DIQ/JB	472005
Valve module	DIQ/CHV	472007
Sun shield for a unit of up to two stacked MIQ modules plus docked Universal Transmitter	SSH/IQ	109295
Sun shield for a single MIQ module plus docked Universal Transmitter	SD/K 170	109284
Mounting kit for fixing the SD/K 170 sun shield on horizontal or vertical pipes	MR/SD 170	109286
Kit for wall mounting of a MIQ module	WMS/IQ	480052
Set for panel mounting of MIQ modules	PMS/IQ	480048
Set for panel mounting of the DIQ/S 28X [-MOD], [-PR], [-E(F)]. The interface (MOD, PR, E, EF) is mounted behind the panel.	PMS/IQ-X	480049
Kit for mounting of MIQ modules on a 35 mm top hat rail in accordance with EN 50022	THS/IQ	480050
Adapter to protect the RJ45 interface against moisture	ADA/E	902890

12 Messages

12.1 Explanation of the message codes

The log book contains a list with all the messages from all modules. Each message consists of message code, date and time. You can obtain more detailed information by opening the full message text (see section 4.5).

The full message text comes from the component that has triggered the message. Therefore, these texts are only available from components which are connected to the system and ready for operation.

If a message text is not available, because the component is not connected to the system, you can look up the texts of the messages in the operating manual of the respective component.

The following lists contain the message codes and the related message texts that are shown on the display. Error messages and info messages are listed separately.

General explanations on the subjects of messages, message codes and log book are given in section 4.5 of this system operating manual.

Module code	Component
171	DIQ/S 282
172	DIQ/S 284
612	DIQ/CRx

12.1.1 Error messages

Message code	Message text
EA4612	*Current output range undercut* ** Check process* ** Check settings and, if necessary, change them*
EA5612	*Current output range exceeded* ** Check process* ** Check settings and, if necessary, change them*
EI3612	*Burden resistor too large (> 500 Ohm) or current loop interrupted* ** Check burden, terminal connections and connection lines*
EI4171 EI4172	*Max. components of this component type exceeded* *Danger of system overload* ** Check and adapt the components for this type*

Message code	Message text
EI5171 EI5172	*Component cannot be reached or not present* ** Component has been removed from the system, insert component again* ** Connex. to component cut.,* *Check sys. installation acc. to op. manual*
EI6171 EI6172	*Incompatible terminal software* ** Contact service*
EI7171 EI7172	*Incompatible controller software* ** Contact service*
EI8171 EI8172	*Connection to the component instable* ** Check installation and cable lengths,* *Follow installation instructions* ** Set SN terminator switch acc. to operating manual* ** Check environmental effects* ** Component defective, contact service*
EI9171 EI9172	*Power failure occurred* ** Check date and time and, if necessary, adjust them*
EA8171 EA8172	*Error at automatic air pressure measurement* *An air pressure value of 1013 mbar is used for air pressure compensation* ** Contact service*

12.1.2 Informative messages

Message code	Message text
II1171 II1172	*Language not available,* *Default language German* ** Contact service*
II2171 II2172	*New IQ Sensor Net component identified*
II3171 II3172	*New IQ Sensor Net component recorded* ** See component lists*
II4171 II4172	*IQ Sensor Net component recorded as replacement component* ** See component lists*
II5171 II5172	*Link sensor - output has been erased* ** if necessary, link sensor again*
II9171 II9172	*Date and time have been set*

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1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

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