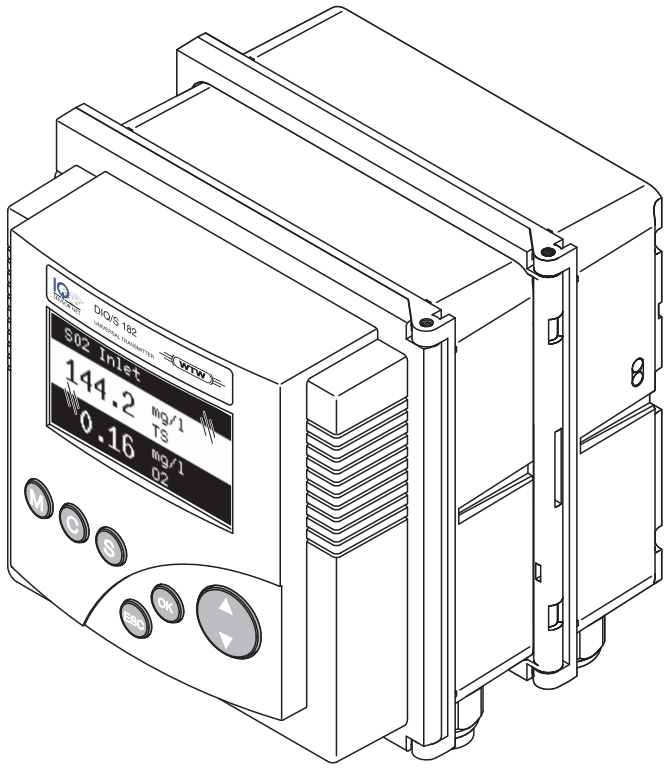
OPERATING MANUAL

ba75753e06 12/2014



DIQ/S 182-XT-4
System 182-XT-4

MODULAR MEASURING SYSTEM FOR 4 DIGITAL SENSORS

WTW

a xylem brand

Copyright © Weilheim 2014, WTW GmbH
Reprinting - even as excerpts - is only allowed with the explicit written authorization of WTW GmbH, Weilheim..
Printed in Germany.

System 182-XT-4 - Contents

1 Overview 1-1
1.1 Structure and function 1-1
1.2 Behaviour of the system to a power failure 1-4

2 Safety 2-1
2.1 Safety information 2-1
2.1.1 Safety information in the operating manual 2-1
2.1.2 Safety signs on the product 2-1
2.1.3 Further documents providing safety information 2-1
2.2 Safe operation 2-2
2.2.1 Authorized use 2-2
2.2.2 Requirements for safe operation 2-2
2.2.3 Unauthorized use 2-2
2.3 User qualification 2-2

3 Installation 3-1
3.1 Scope of delivery 3-1
3.2 Basics of the installation 3-2
3.2.1 System planning 3-2
3.2.2 Requirements of the measurement location 3-3
3.2.3 Drawing up the power rating 3-3
3.2.4 Optimum installation of the additional MIQ power supply module 3-5
3.3 Safety requirements on the electrical installation 3-6
3.4 Installation guidelines for lightning protection 3-6
3.5 Connecting system components 3-9
3.5.1 Connecting MIQ modules: General information 3-9
3.5.2 Variant 1: Stack expansion forwards 3-11
3.5.3 Variant 2: stack expansion backwards 3-14
3.5.4 Distributed mounting 3-17
3.5.5 Connecting IQ sensors 3-21
3.6 Onsite installation of DIQ/S 182-XT-4 and MIQ modules 3-23
3.6.1 General information 3-23
3.6.2 Mounting on a mounting stand with the SSH/IQ sun shield 3-24
3.6.3 Mounting under the SD/K 170 sun shield 3-27
3.6.4 Panel mounting 3-28
3.6.5 Top hat rail mounting 3-30
3.7 Using DIQ modules (accessories) 3-31
3.7.1 DIQ/JB 3-31
3.7.2 DIQ/CHV 3-31
3.7.3 Installation of the DIQ modules 3-32
3.8 Electrical connections: General instructions 3-33
3.9 Connecting the voltage supply 3-35

3.9.1 DIQ/S 182-XT-4 (line power version) 3-35
3.9.2 DIQ/S 182-XT-4/24V (24 V version) 3-39
3.10 Connections to the relay and current outputs 3-42
3.10.1 General installation instructions 3-42
3.10.2 Usage of the auxiliary voltage 3-44
3.11 Commissioning 3-46
3.12 Installation examples 3-47
3.12.1 Connection of four sensors (without compressed air cleaning) 3-47
3.12.2 Compressed air cleaning of two sensors 3-49
3.12.3 Connection of a sensor that is located at a distance (without compressed air cleaning) 3-52
3.13 Figures of the terminal strips 3-53

4 Operation 4-1
4.1 Operating elements 4-1
4.2 Measured value and status display 4-2
4.3 Working with the *SETTINGS* menu 4-4
4.3.1 Selection menus 4-4
4.3.2 Setting tables 4-5
4.3.3 Entry mode 4-6
4.4 *PROPERTIES* menu 4-8
4.4.1 Overview 4-8
4.4.2 Maintenance condition 4-9
4.4.3 *Sensor status* Sxx 4-11
4.5 Calibration of sensors 4-15
4.6 Passwords 4-17

5 The *SETTINGS* menu 5-1
5.1 Overview of the *SETTINGS* menu 5-1
5.2 *Language* 5-1
5.3 Sensor S01 to S04 5-2
5.4 Outputs D00 to Dxx 5-4
5.5 System 5-4

6 Outputs 6-1
6.1 Outputs of the system 182 XT-4 6-1
6.2 Linking and adjusting: general procedures 6-2
6.2.1 linking outputs 6-2
6.2.2 Deleting a link with an output 6-3
6.2.3 Setting outputs 6-4
6.3 Basic information on relay functions 6-5
6.3.1 Monitoring 6-5
6.3.2 Limit indicator 6-5
6.3.3 Proportional output 6-7

6.4 Setting table for relays 6-14
6.4.1 Functions and settings 6-14
6.4.2 *System monitoring* 6-15
6.4.3 *Sensor monitoring* 6-16
6.4.4 *Limit indicator* 6-17
6.4.5 *Frequency output* 6-18
6.4.6 *Pulse-width output* 6-19
6.4.7 *Sensor controlled* 6-20
6.4.8 *Cleaning* 6-21
6.4.9 *Manual control* 6-24
6.5 Setting tables for current outputs 6-25
6.5.1 Functions and settings 6-25
6.5.2 *Recorder* 6-26
6.5.3 *PID controller* 6-28
6.5.4 *Fixed current value* 6-33
6.6 Behavior of linked outputs 6-34
6.6.1 Behavior in case of error 6-34
6.6.2 Behavior in non-operative condition 6-34

7 Maintenance and cleaning 7-1
7.1 Maintenance 7-1
7.2 Cleaning 7-1

8 What to do if 8-1
8.1 Information on errors 8-1
8.2 Error causes and remedies 8-1
8.3 Replacing system components 8-2
8.3.1 Replacing passive components 8-2
8.3.2 Adding and replacing IQ sensors 8-2

9 Technical data 9-1
9.1 DIQ/S 182-XT-4 9-1
9.2 MIQ modules 9-6
9.3 DIQ/JB 9-8
9.4 DIQ/CHV 9-9
9.5 Space required by mounted components 9-11

10 Accessories and options 10-1

11 Index 11-1

12 Appendix (store separately if required) 12-1
12.1 Forgotten the password? 12-1
12.2 Default passwords 12-1

1 Overview

1.1 Structure and function

Main components of DIQ/S 182-XT-4

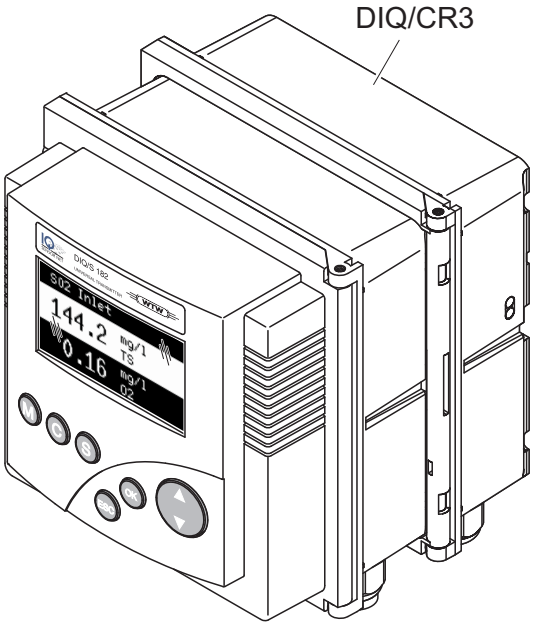


Fig. 1-1 Main components

Sensors

Up to four main measured variables (e.g. pH, oxygen content, turbidity value...) together with their associated auxiliary measured variable (e.g. temperature) can be displayed and administrated with this measuring system. According to the number of available main measured variables, individual sensors (one physical sensor for each main measured variable) and multiple sensors (one physical sensor for several main measured variables) from the selection of digital IQ SENSOR NET sensors can be combined and connected.

Each sensor is automatically recognized after being connected and immediately starts measuring.

Up to three physical sensors can be connected directly to the DIQ/S 182-XT-4. A further sensor can be connected via the DIQ/JB passive branching module (accessories) (see Fig. 1-2).

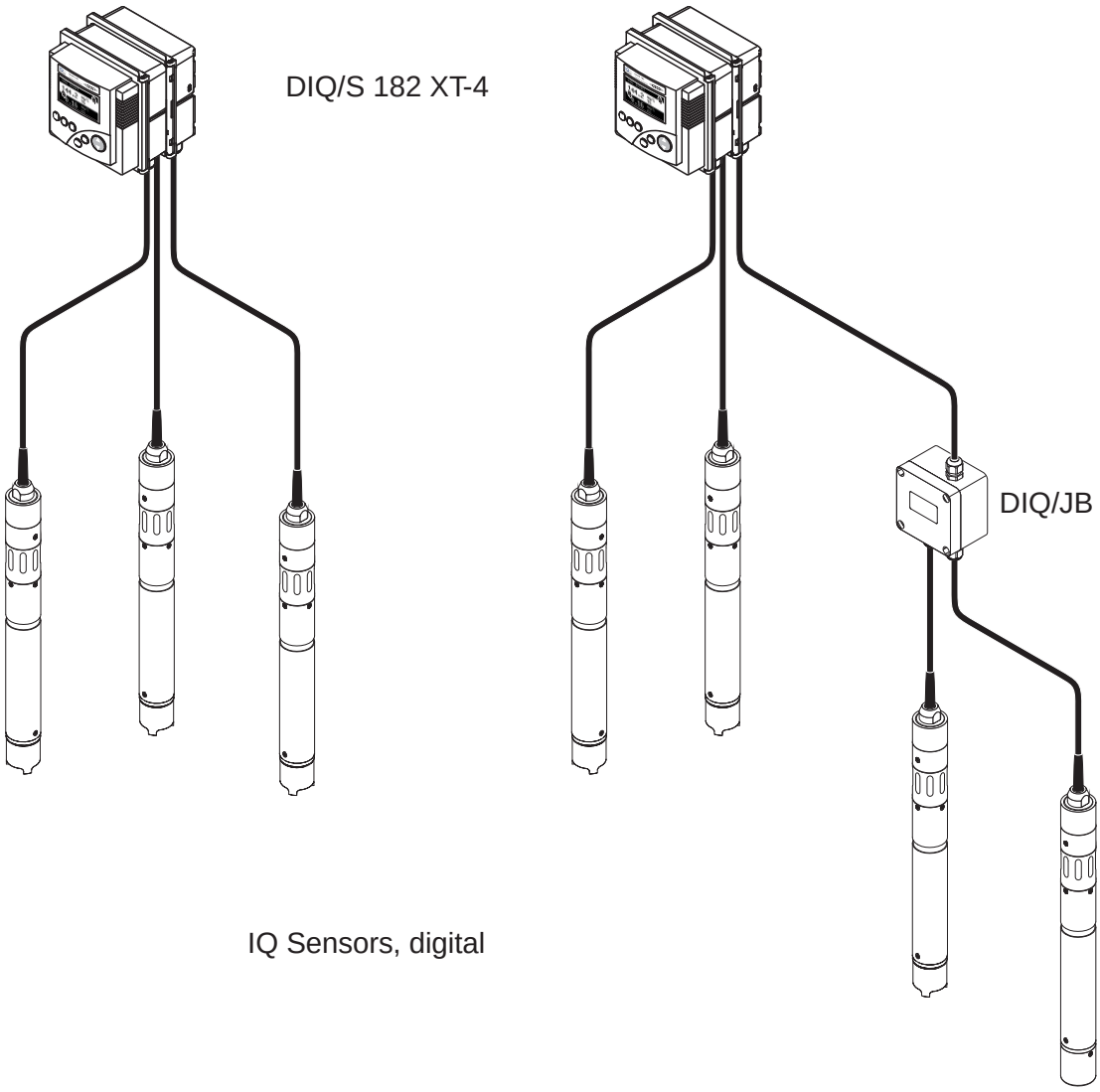


Fig. 1-2 Systems with 3 and 4 physical sensors

Other installation examples are given in section 3.12 INSTALLATION EXAMPLES.

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:

- a monitoring relay
- a limit monitor
- a proportional output of measured values (pulse width or frequency output)
- the control unit of a sensor cleaning system driven by compressed air.

A current output can be programmed as:

- an analog output
- a PID controller

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

Cleaning system driven by compressed air

The DIQ/S 182 XT-4 is prepared for the time-controlled sensor cleaning function driven by compressed air. The cleaning process is controlled from the operating unit. The operating unit provides the supply voltage and control relay for the compressed air valve in the DIQ/CHV valve module. This enables 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 there is a greater distance between the DIQ/S 182 XT-4 and sensor.

Further system options

In case of increased energy demand, an additional power supply unit can be installed for the power supply if necessary.

1.2 Behaviour of the system to a power failure

- The system configuration is non volatile and 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 system continues to work with the settings at the time of the power failure (except for the time).

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 meter 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 danger level:



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 possibly dangerous 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 DIQ/S 182-XT-4 system (power packs, controller, 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 System 182-XT-4 consists of its use in online analysis. Only the operation and running of the product according to the instructions and technical specifications given in this operating manual is authorized (see chapter 9 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 supplied with power by the energy sources mentioned in this operating manual.
- The product may only be operated under the environmental conditions mentioned in this operating manual.
- The product may not be opened.

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 9 TECHNICAL DATA).

2.3 User qualification

Target group

The DIQ/S 182-XT-4 system 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 MIQ/PS power supply module to the power line (see MIQ/PS module manual).
- Connection of external, line voltage-carrying circuits to relay contacts (see module manual of the relay output module).



WARNING

A circuit (except for the power supply connections), that is connected to an DIQ/S 182-XT-4 component, must not feed any voltages or currents that are not allowed. It has to be made sure that the circuit at any time meets all requirements of a *Limited circuit* or *Limited Power* as well as of *SELV* (Safety Extra Low Voltage). These include the following limiting value specifications:

- **AC voltage: max. 30 V effective / 42.4 V peak**
- **DC voltage: max. 60 V**
- **Current limit: max. 8 A**
- **Power output limitation: max. 150 VA**

3 Installation

3.1 Scope of delivery

The following parts are included in the scope of delivery of the DIQ/S 182-XT-4:

- DIQ/S 182 XT-4 with attached DIQ/CR3 combi output module
- Accessory kit with:
  - Contact carrier with screws
  - ISO cap nuts with screws and ring washers
  - Cable glands with sealing gaskets
- Operating manual.

3.2 Basics of the installation

3.2.1 System planning

Overview of planning steps

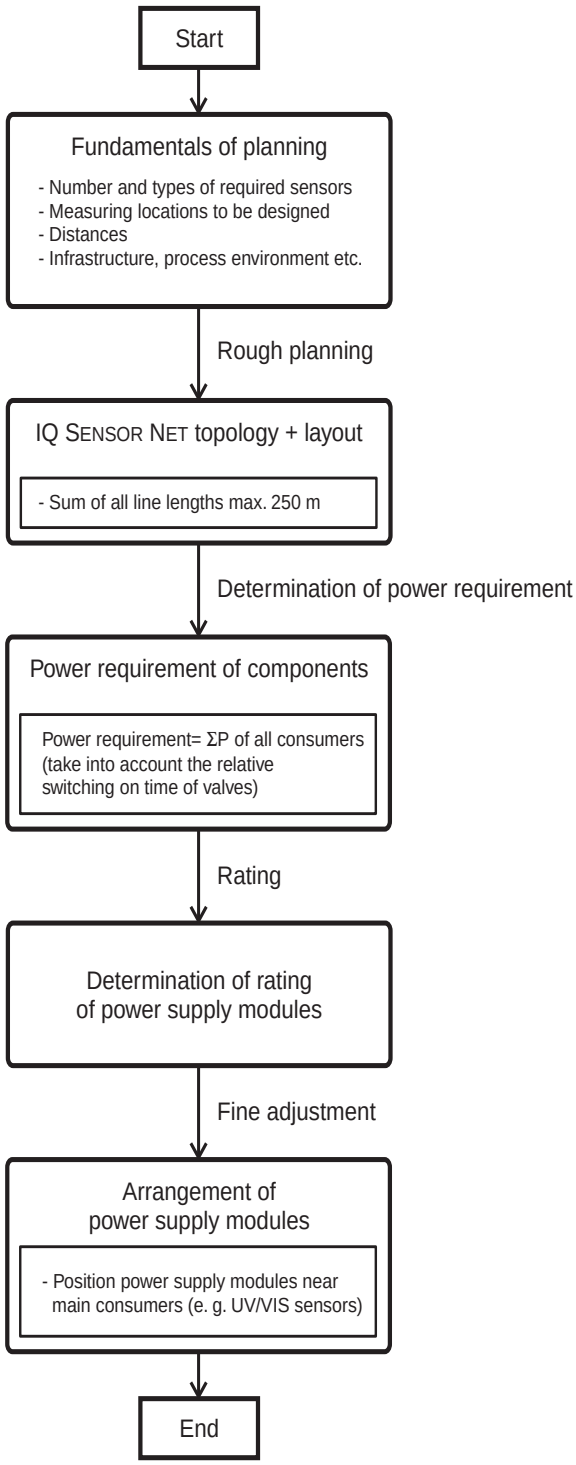


Fig. 3-1 System planning

3.2.2 Requirements of the measurement location

The measurement location must meet the environmental conditions specified in section 9.1.

3.2.3 Drawing up the power rating

General information

The System 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.

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 a determination is made of whether the entire power requirement of all components (consumers) is covered by the existing power supply in the DIQ/S 182-XT-4. If this is not the case, the power available in the system must be increased by an additional MIQ power supply module.

Power requirement of IQ SENSOR NET components

Component	Power requirement [W]
IQ sensors	
SensoLyt® 700 IQ (SW)	0.2
TriOxmatic® 700 IQ (SW)	0.2
TriOxmatic® 701 IQ	0.2
TriOxmatic® 702 IQ	0.2
FDO® 70x IQ (SW)	0.7
TetraCon® 700 IQ (SW)	0.2
VisoTurb® 700 IQ	1.5
ViSolid® 700 IQ	1.5
AmmoLyt® *Plus* 700 IQ	0.2
NitraLyt® *Plus* 700 IQ	0.2
VARiON® *Plus* 700 IQ	0.2
NitraVis® 70x IQ (TS)	8.0
CarboVis® 70x IQ (TS)	8.0
NiCaVis® 70x IQ	8.0

MIQ modules

MIQ/JB	0
MIQ/JBR	0
MIQ/CR3	3.0
MIQ/C6	3.0
MIQ/R6	1.5
MIQ/IC2	0.2 + 2.2 W per connected WG 20 A2 power supply/isolator
MIQ/CHV PLUS	1.0 x rel. turn-on duration *
DIQ/CHV	0.8 x rel. turn-on duration *
MIQ/Blue PS	0.6

* In order to take the relative on-time into account, see following text

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 182-XT-4 is the time averaged (effective) power requirement that depends on the relative on-time, ED:

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

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

$P = P_{nominal} * ED$

Since ED 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 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 additional MIQ power supply modules
$P \leq 4.5$ W	0
$P > 4.5$ W	1

Calculation example:

Example configuration 1	Power requirement [W] (component)	Total power requirement P [W] (sum of the components)
+ 1 VisoTurb® 700 IQ	1.5	1.5
+ 1 ViSolid® 700 IQ	+ 1.5	3.0
+ 1 FDO® 700 IQ	+ 0.7	3.7
+ VARiON® *Plus* 700 IQ	+ 0.2	3.9
+ 1 DIQ/CHV (ED = 0.1)	(0.8 x 0.1 =) 0.08	3.98
+ 1 DIQ/CHV (ED = 0.05)	(0.8 x 0.05 =) 0.04	4.02

Result: Total power requirement P < 4.5 W, hence no additional power supply module is required.

Example configuration 2	Power requirement [W] (component)	Total power requirement P [W] (sum of the components)
+ 1 FDO® 700 IQ	0.7	0.7
NitraVis® 705 IQ	8.0	8.7
MIQ/CHV PLUS (ED = 0.1)	(1.0 x 0.1 =) 0.1	8.8

Result: Total power requirement P > 4.5 W, hence an additional power supply module is required.

Power supply with the aid of the MIQ/Blue PS radio module

The MIQ/Blue PS radio module can also supply power to components with a total of up to 7 W power consumption on an IQ SENSOR NET island. Details of this are given in the operating manual of the MIQ/Blue PS.

3.2.4 Optimum installation of the additional MIQ power supply module

Basic rule

It is preferable to install the MIQ power supply module in the vicinity of the IQ SENSOR NET component with the highest power consumption (example UV/VIS sensor).

3.3 Safety requirements on the electrical installation

Electrical equipment (e.g. motors, contactors, cables, lines, relays) must meet the following requirements:

- Conformity with national regulations (e.g. NEC, VDE and IEC)
- Suitability for the electrical conditions at the installation site
  - Maximum operating voltage
  - Maximum operating current
- Suitability for the environmental conditions at the installation site
  - Temperature resistance (minimum and maximum temperature)
  - Stability against UV light when used outdoors
  - Protection against water and dust (Nema or IP protection class).
- Suitable fusing of the electrical circuit
  - Overcurrent fuses (in accordance with the technical data of the device input or output)
  - Overvoltage class II surge limiters
- Suitable disconnecting device (e. g. switch or circuit breaker) for the mains supply of permanently mounted equipment with separate mains connection
  - in compliance with the following regulations
    - IEC 60947-1
    - IEC 60947-3
  - in the vicinity of the equipment (recommendation)
- Flame-resistant (cables and lines), in compliance with the following regulations
  - UL 2556 VW-1 (for USA, Canada)
  - IEC 60332-1-2 (outside of USA, Canada)

3.4 Installation guidelines for lightning protection

When using the IQ SENSOR NET instrumentation, 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 measuring technology as so-called 'lightning protection' (see chapter 9 TECHNICAL DATA).

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

1 All lines of IQ SENSOR NET 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 the SNCIQ or SNCIQ-UG cable material must be used. This cable material, particularly the high line cross section of the cable shielding (1.5 mm²), 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 IQ SENSOR NET components. It is not recommended to use cables from other manufacturers with usually appreciably lower shielding conductor cross sections.

3 All metallic mounting constructions, handrails, pipes, posts etc. on which MIQ 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 IQ SENSOR NET cable and via the valuable sensors in the measuring medium.

4 The contacts of the MIQ modules must always be protected by the associated contact covers if they are not in use. The contact cover provides improved insulation against the electric fields of a thunderstorm event through the extension of the air and creepage paths.

5 It is recommended to attach a metallic or nonmetallic sun shield to each outside location of the MIQ modules. Sun shields protect the electric field lines in the area of the MIQ module through 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.

6 The mains voltage for supplying the measuring system 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.

7 One part of the IQ SENSOR NET safety and lightning protection concept is based on high-grade protective insulation of the network components and of the entire system. It does not have or require any protective ground (PG) conductor or earth terminal. Avoid any direct connection of the IQ SENSOR NET connections or the metallic sensor enclosures with the local grounding or potential equalization system and with metallic construction elements (see point 9).

8 Additional external lightning protection measures directly on the IQ SENSOR NET system or its components, 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.

9 For the realization of the internal lightning protection of the system (e.g. wastewater treatment plant control stands) and for the protection of IQ SENSOR NET external resources, cable entry points into buildings or distributions coming from the IQ SENSOR NET 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 surge 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.

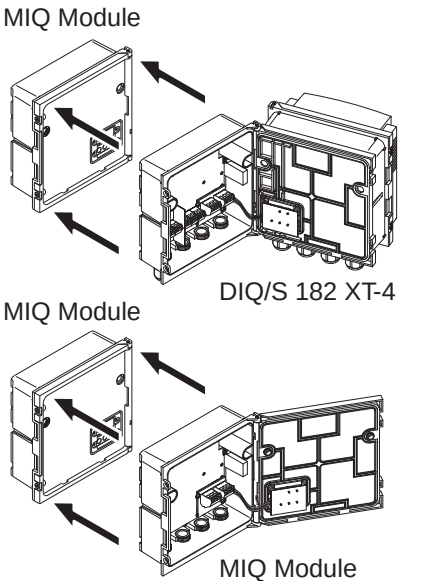
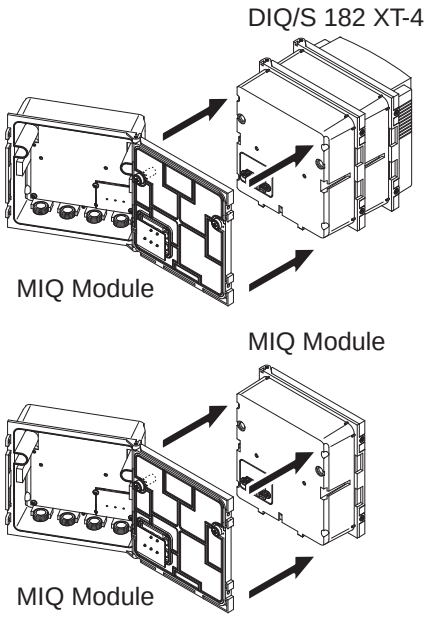
   – Relay lines should be connected to the local potential equalization in order to provide general and consistent protection via gas overvoltage surge arresters.

3.5 Connecting system components

3.5.1 Connecting MIQ modules: General information

You can connect the DIQ/S 182 XT-4 with MIQ modules without connecting cable (stacking). According to the same principle MIQ modules can also be connected with one another.

Mounting direction

Variant 1 - stack expansion forwards. The DIQ/S 182-XT-4 or an MIQ module is attached by its back to the lid of an MIQ module (from page 3-11). Select this variant if an MIQ module is already permanently installed, e.g. to a wall.	
Variant 2: - stack expansion backwards. An MIQ module is attached with its lid to the back of the DIQ/S 182-XT-4 or another MIQ module (page 3-14). Select this variant if the DIQ/S 182-XT-4 or the front MIQ module is already permanently installed, e.g. in a panel.	

NOTE

For optimum stability only one MIQ module may be attached to the

DIQ/S 182 XT-4.



In all MIQ modules in the System 182 XT-4, the terminator switch on the terminal strip must be set to "Off".

Materials required

- 2 x ISO blind nuts (M4)
- 2 x cheese-head screws (M4x16) with plastic washer
- 1 x contact base with two plastic tapping screws (scope of delivery of the MIQ module).

Tools

- Phillips screwdriver.

Both installation variants of the attachment of an MIQ module on the DIQ/S 182 XT-4 is described in the following. The assembly of further MIQ modules is carried out analogously. To dismantle a stack, proceed in the reverse order to mounting.

3.5.2 Variant 1: Stack expansion forwards

Preparing the stack mounting

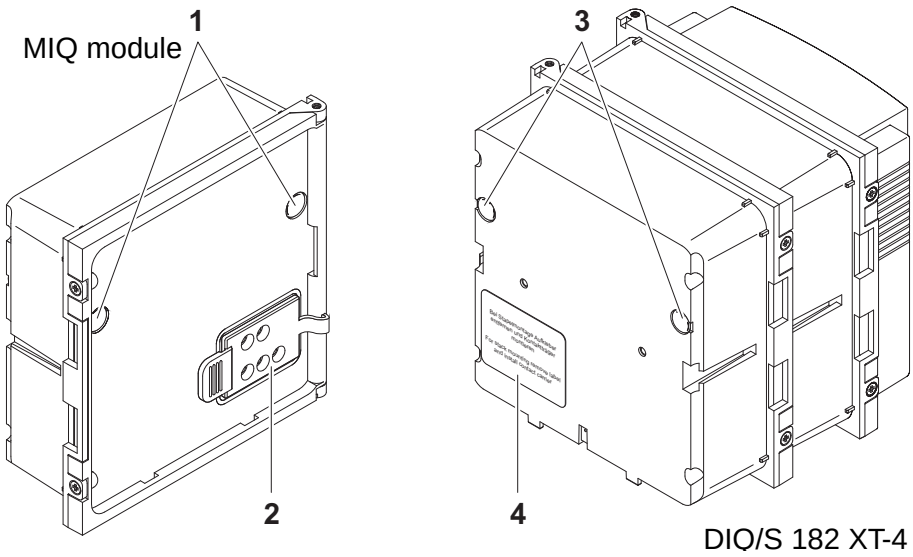


Fig. 3-2 Preparing components for stack mounting (variant 1)

1	Remove the covers from the drilled mounting holes (pos. 1 and 3 in Fig. 3-2).
2	Remove the contact cover (pos. 2).
3	Pull off the adhesive label (pos. 4).

Mounting the contact base

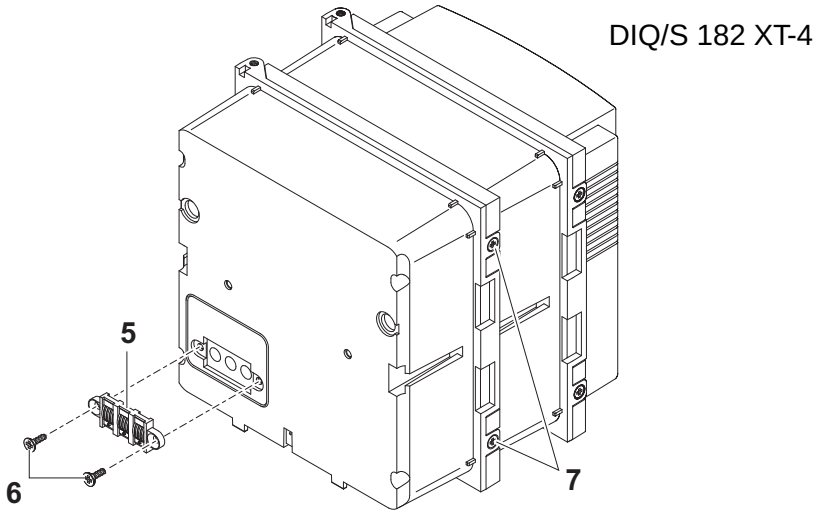


Fig. 3-3 Mounting the contact base (variant 1)

Only use the plastic tapping screws supplied for attaching the contact base. They ensure the correct fit.

4	Fix the contact base (pos. 5 in Fig. 3-3) onto the DIQ/S 182-XT-4 with the two plastic self-tapping screws (pos. 6).
5	Remove the two countersunk screws (pos. 7 in Fig. 3-3) of the DIQ/S 182-XT-4 and swing open the lid.

Premounting the ISO blind nuts

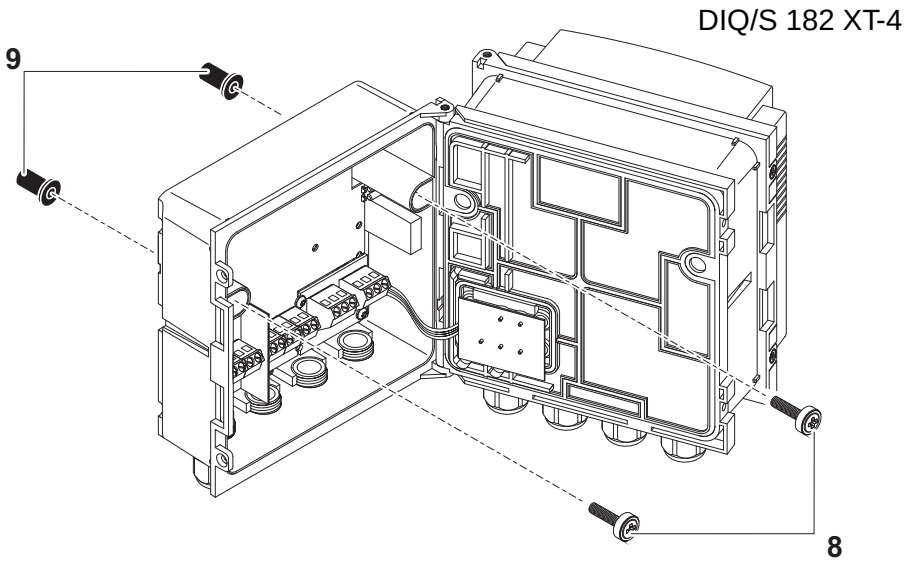


Fig. 3-4 Premounting the ISO blind nuts (variant 1)

6	Insert the cheese-head screws (pos. 8 in Fig. 3-4) with the plastic washers in the drilled mounting holes in the enclosure and loosely screw in the ISO blind nuts (pos. 9).

Stacking the MIQ modules

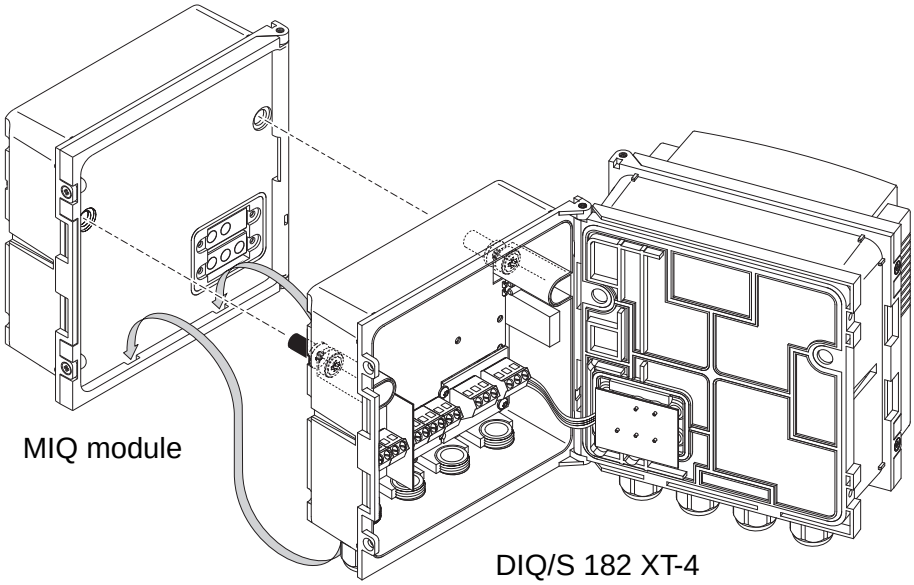


Fig. 3-5 Stacking the *MIQ modules (variant 1)*

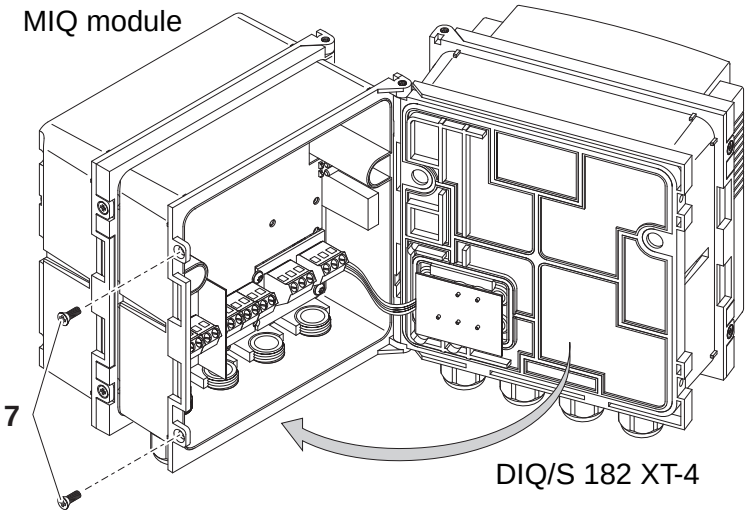


Fig. 3-6 Closing the enclosure (variant 1)

7	Attach the prepared DIQ/S 182-XT-4 to the cover of the MIQ module. At the same time, ensure that the two clips on the DIQ/S 182-XT-4 click into place in the lid of the MIQ module. Subsequently, tighten the two screws (pos. 8 in Fig. 3-4).
8	Close the cover of the DIQ/S 182-XT-4 and fix it in place with the two countersunk bolts (pos. 7 in Fig. 3-6).

3.5.3 Variant 2: stack expansion backwards

Preparing the stack mounting

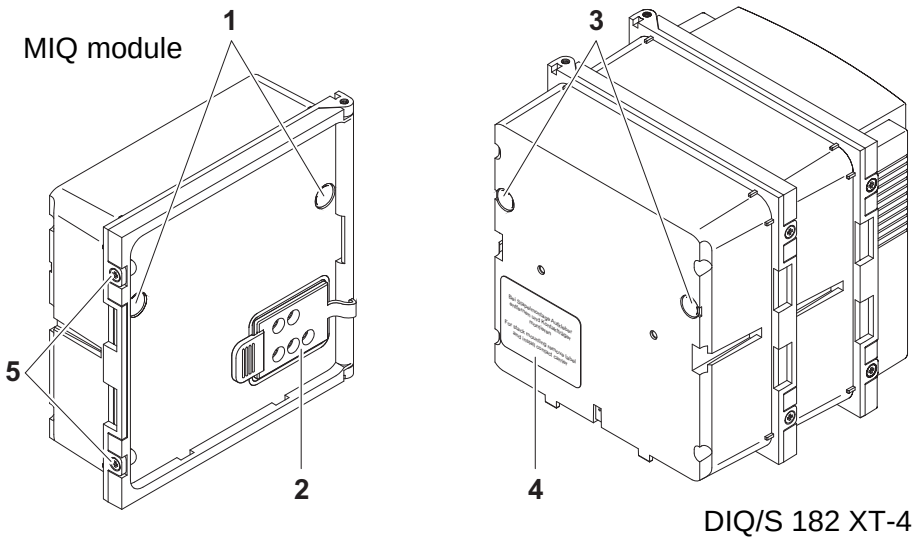


Fig. 3-7 Preparing the MIQ modules for stack mounting (variant 2)

1	Remove the covers from the drilled mounting holes (pos. 1 and 3 in Fig. 3-7).
2	Remove the contact cover (pos. 2).
3	Pull off the adhesive label (pos. 4).
4	On the MIQ module, remove the two countersunk screws (pos. 5) and swing open the module lid.

Mounting the contact base

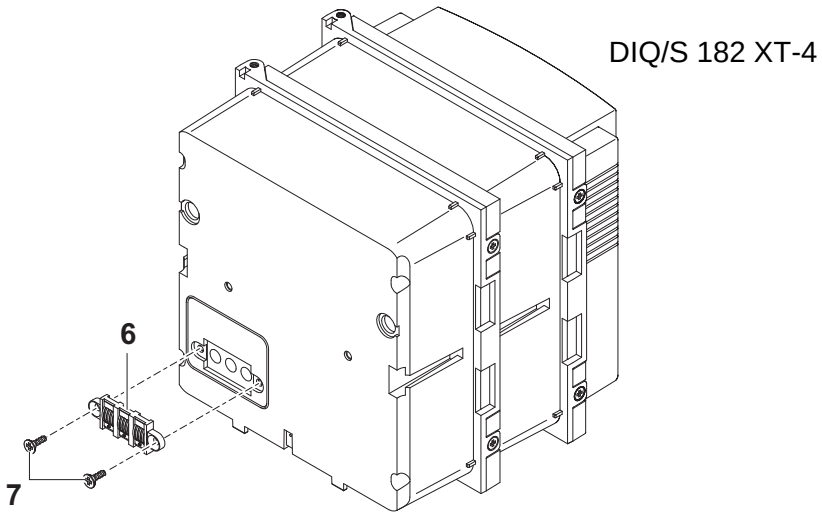


Fig. 3-8 Mounting the contact base (variant 2)

Only use the plastic tapping screws supplied for attaching the contact base. They ensure the correct fit.

5	Fix the contact base (pos. 6 in Fig. 3-8) onto the DIQ/S 182-XT-4 with the two plastic self-tapping screws (pos. 7).

Premounting the ISO blind nuts

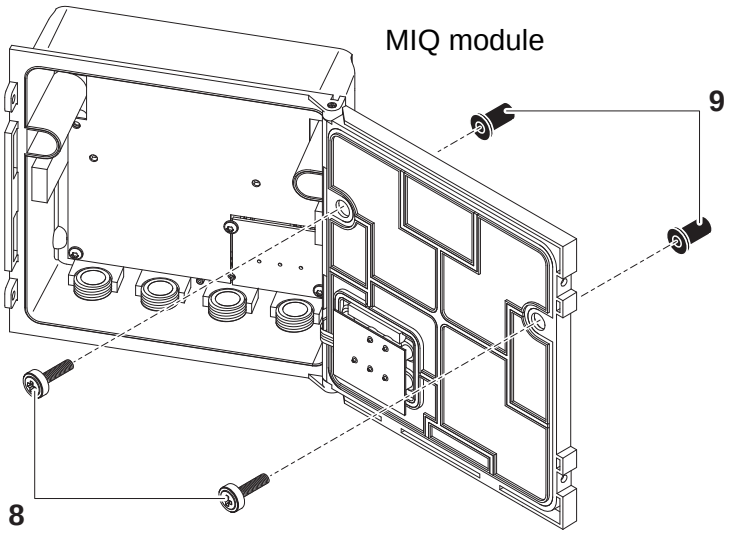


Fig. 3-9 Premounting the ISO blind nuts (variant 2)

6	Insert the cheese-head screws (pos. 8 in Fig. 3-9) with the plastic washers in the drilled mounting holes in the module lid and loosely screw in the ISO blind nuts (pos. 9).

Stacking the MIQ modules

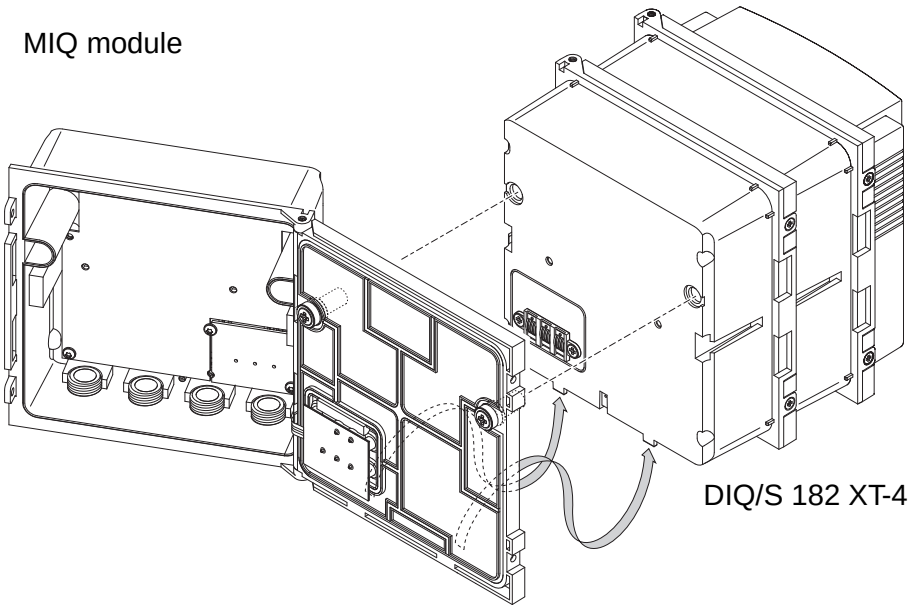


Fig. 3-10 Stacking the *MIQ modules (variant 2)*

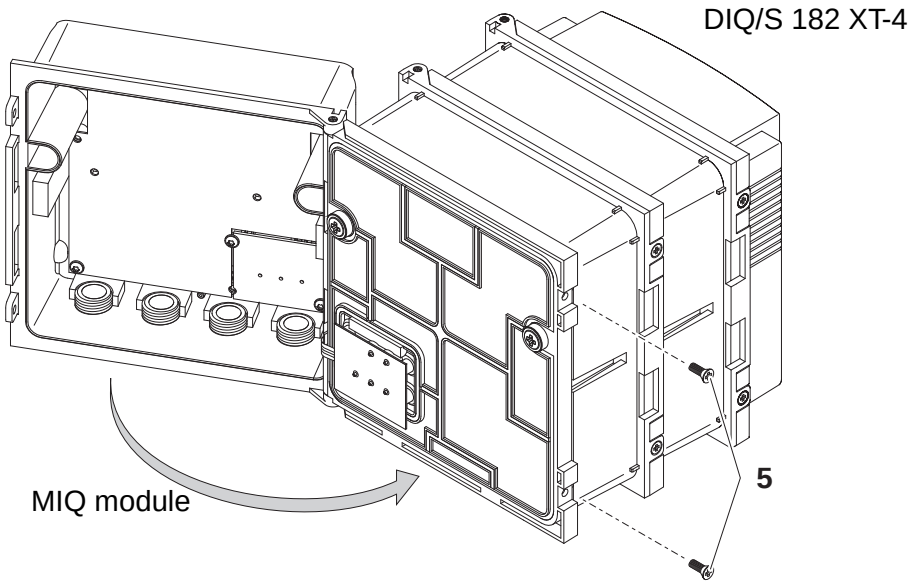


Fig. 3-11 Closing the enclosure (variant 2)

7	Attach the prepared MIQ module to the back of the DIQ/S 182-XT-4. At the same time, ensure that the two clips on the DIQ/S 182-XT-4 click into place in the lid of the MIQ module. Subsequently, tighten the two screws (pos. 8 in Fig. 3-9).
8	Close the MIQ module and fix it with the two countersunk screws (pos. 5 in Fig. 3-11).

3.5.4 Distributed mounting

General information

For the locally separated connection between DIQ/S 182-XT-4 and MIQ modules and between MIQ modules, the following cables can be used:

- SNCIQ cable
- SNCIQ/UG earth cable - suitable for underground laying in accordance with VDE 01816, Part 2 and DIN/VDE 0891, Part 6.

The cables are delivered as piece goods (please specify length when ordering!).

SENSORNET connections

The DIQ/S 182-XT-4 has a SENSORNET connection on the front terminal strip and two others on the rear terminal strip. The terminal strips are shown in section 3.13. In addition, free SENSORNET connections can all be used in the system, e.g. the two SENSORNET connections of an additional power supply module. All SENSORNET connections are of equal value in the system.

NOTE

The IQ SENSOR NET cable may only be connected to the SENSORNET connections. No wires of the cable may be connected with an external electrical potential. Otherwise, malfunctions could occur.

General installation instructions

Pay attention to the following points when connecting components via IQ SENSOR NET lines:

- The sum of all IQ SENSOR NET line lengths (SNCIQ, SNCIQ/UG and SACIQ) in the system may be up to a maximum of 250.
- IQ SENSOR NET lines must always be installed separately at a minimum distance of 20 cm from any other lines carrying a voltage greater than 60 V.
- The terminator switch on the terminal strip of all MIQ modules in the System 182 must be set to "Off".

Materials required

- 1 x SNCIQ or SNCIQ/UG connection cable (see chapter 10 ACCESSORIES AND OPTIONS)
- Wire end sleeves for 0.75 mm2 wire cross-section with matching crimping tool
- 1 x cable gland, matched to the cable diameter (see section 3.8 on page 3-33).

Tools

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

Preparing the cable ends

1	Cut off the cable to the required length.
2	Remove approx. 45 mm of cable insulation (in the case of the SNCIQ/UG earth cable, remove both the inner and outer insulation).
3	Only for the SNCIQ/UG earth cable: strip the outer insulation for a further 35 mm.
4	Shorten the exposed shielding braid up to the cable sheath.
5	Shorten the two fillers (plastic inlays) up to the cable sheath.
6	Bare the red and green wires and fit them with wire end sleeves.
7	Fit the filler stranded wire with a wire end sleeve.

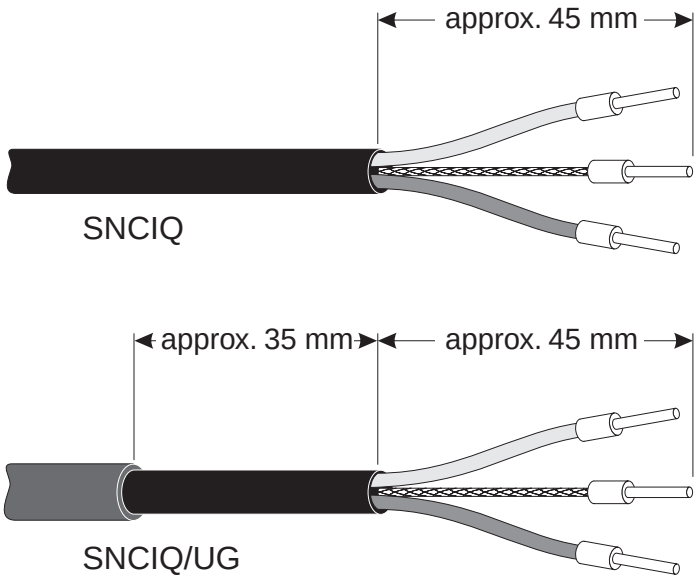


Fig. 3-12 Prepared cable end

Connecting the cables

The SNCIQ and SNCIQ/UG cables are connected to the terminal strip in the same way as the SACIQ sensor connection cable (see section 3.5.5):

1	Open the enclosure of the DIQ/S 182-XT-4 or the MIQ module.
2	Select a free SENSORNET connection. At the same time, look out for the SENSORNET designation on the label on the bottom of the enclosure.

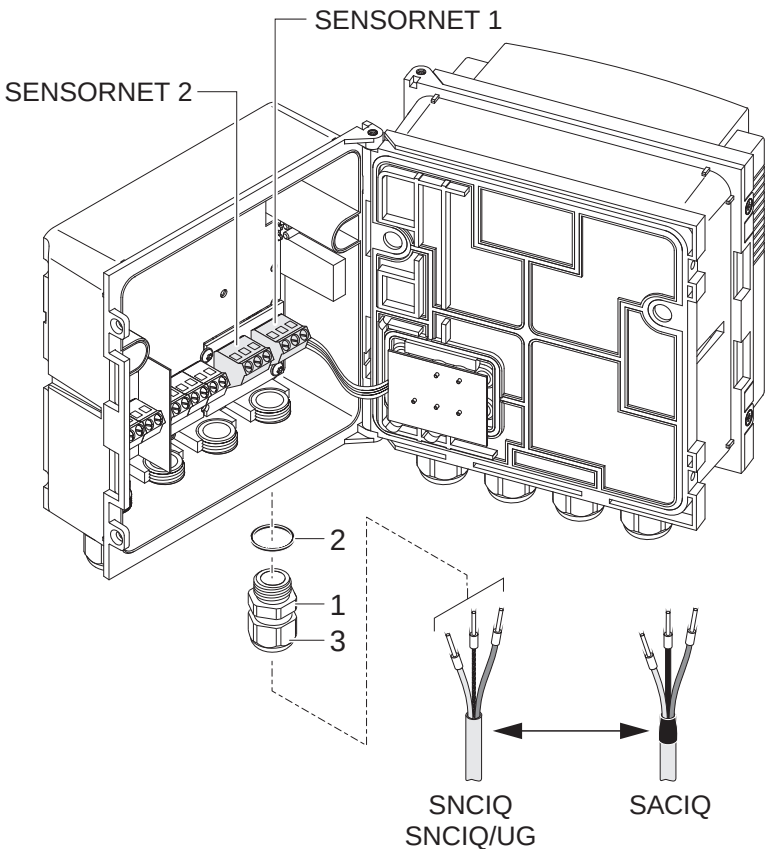


Fig. 3-13 Connect cable (example: rear terminal strip)

3	Screw a cable gland (pos. 1 in Fig. 3-13) with the sealing ring (pos. 2) into the enclosure.
4	Loosen the coupling ring (pos. 3 in Fig. 3-13).
5	Feed the cable through the cable gland into the enclosure.
6	Connect the cable ends to the terminal strip. At the same time, look out for the designations of the terminals (red / shield / green).
7	Tighten the coupling ring (pos. 3 in Fig. 3-13).
8	Close the enclosure.

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

3.5.5 Connecting IQ sensors

Sensors can be connected to all free SENSORNET connectors in the System 182 XT-4. The DIQ/S 182-XT-4 has three SENSORNET connections. If no more free SENSORNET connections are available, other sensors with the DIQ/JB branching module can be connected (see section 3.7 and installation examples in section 3.12).

General installation instructions

Observe the following points when attaching sensors to the system:

- The sum of all IQ SENSOR NET line lengths (SNCIQ, SNCIQ/UG and SACIQ) in the system may be up to a maximum of 250
- IQ SENSOR NET lines must always be installed separately at a minimum distance of 20 cm from other lines that carry a voltage greater than 60 V.

Materials required

- 1 x SACIQ connection cable (see chapter 10 ACCESSORIES AND OPTIONS)
- 1 x cable gland, matched to the cable diameter (see section 3.8 on page 3-33).

The free end of the connection cable already has the sheath removed in the factory and all the wires are fitted with wire end sleeves.

Tools

- Phillips screwdriver
- Small screwdriver.

Connecting the SACIQ cable to the DIQ/S 182-XT-4 or MIQ module

The connection of the SACIQ cable to the terminal strip is described in section 3.5.4 (see CONNECTING THE CABLES, page 19).

NOTE

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

Connecting the sensor to the connection cable

1	Remove the protective caps from the plug connections of the IQ sensor and SACIQ sensor connection cable and keep them safe.
2	Plug the socket of the SACIQ sensor connection cable onto the plug head connector of the IQ sensor. At the same time, rotate the socket so that the pin in the plug head connector (1) clicks into one of the two holes in the socket.
3	Then, screw the coupling ring (2) of the IQ sensor connection cable on the IQ sensor up to the stop.

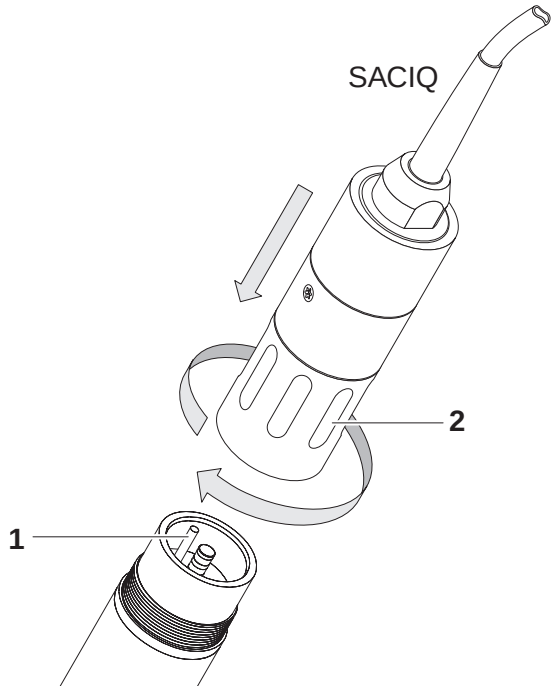


Fig. 3-14 Connecting the SACIQ cable with the IQ sensor

For further instructions on the mounting of IQ sensors at the application location, please see the respective manuals (immersion depths, etc.).

3.6 Onsite installation of DIQ/S 182-XT-4 and MIQ modules

3.6.1 General information

The DIQ/S 182-XT-4 and the DIQ and MIQ modules have a comprehensive program of mounting accessories, which can be used to adapt the installation to the most varied 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 DIQ/S 182-XT-4 vertically. Do not under any circumstances install MIQ modules without rain protection with the lid facing upwards (danger of retained humidity and penetration of moisture).



CAUTION

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 theDIQ/S 182-XT-4 are described in the following chapters:

- **Mounting on a mounting stand with the SSH/IQ sun shield:**
  The SSH/IQ sun shield provides enough space for the DIQ/S 182-XT-4 and two MIQ modules (section 3.6.2).
- **Mounting on the SD/K 170 sun shield**
  The SD/K 170 sun shield provides room for the DIQ/S 182-XT-4. The sun shield can be mounted on round or square section pipes (e.g. rails) with the aid of the MR/SD 170 mounting kit (section 3.6.3).
- **Wall mounting:**
  The DIQ/S 182-XT-4 or MIQ module is permanently screwed to a wall. For wall mounting, use the WMS/IQ mounting set (see chapter 10 ACCESSORIES AND OPTIONS).
- **Panel mounting:**
  The DIQ/S 182-XT-4 or the MIQ module is installed in the aperture of a panel. The dimensions of the aperture are 138 x 138 mm + 1 mm. The panel may not be thicker than 15 mm (section 3.6.4).
- **Top hat rail mounting:**
  The DIQ/S 182-XT-4 or the MIQ module 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 3.6.5).

How to mount the DIQ/S 182-XT-4 is described in the following chapters. MIQ modules are mounted in the same way.

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

Materials required

- SSH/IQ sun shield (see chapter 10 ACCESSORIES AND OPTIONS).

Tools

- 4 mm set screw wrench
- Phillips screwdriver.

Mounting the sun shield on a mounting stand

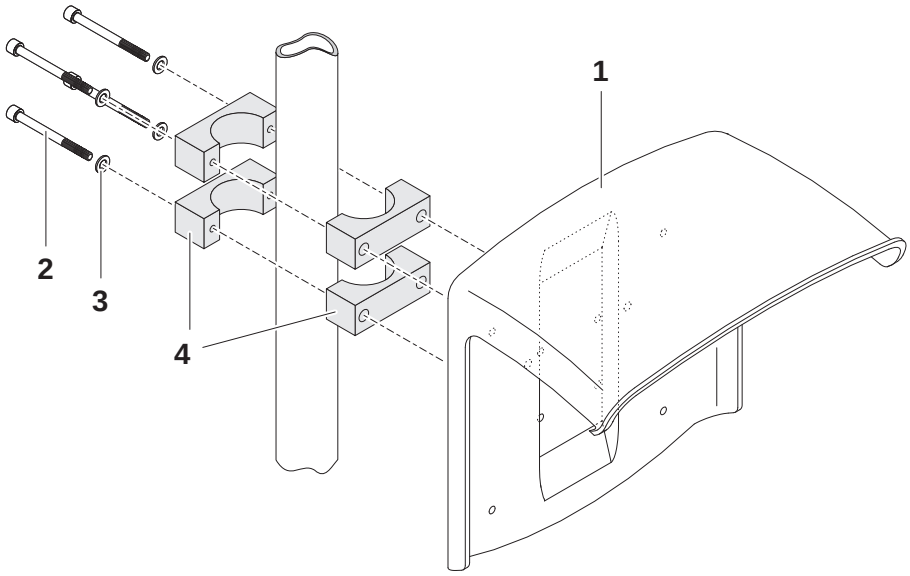


Fig. 3-15 Mounting the SSH/IQ sun shield on a mounting stand

1	Screw the sun shield (pos. 1 in Fig. 3-15) 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

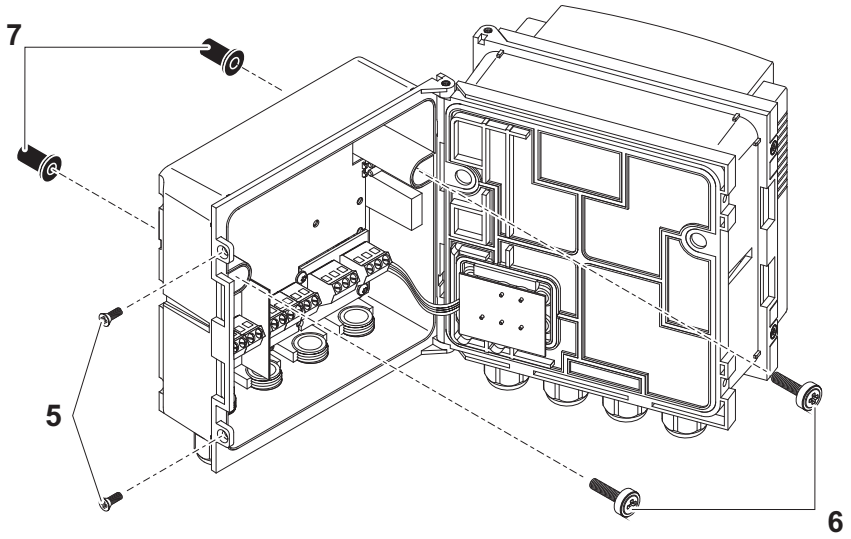


Fig. 3-16 Mounting the sun shield: Premounting the ISO blind nuts

2	Remove the two countersunk screws (pos. 5 in Fig. 3-16) and swing open the lid.
3	Insert the cheese-head screws (pos. 6 in Fig. 3-16) with the plastic washers in the drilled mounting holes and loosely screw in the ISO blind nuts (pos. 7).

Mounting the DIQ/S 182-XT-4 on the sun shield

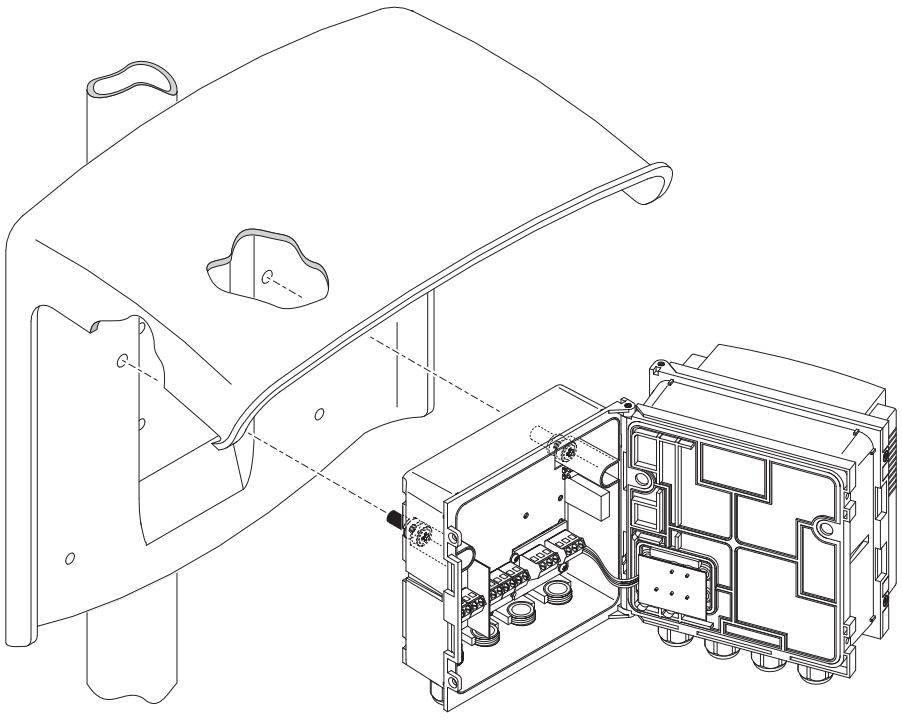


Fig. 3-17 Mounting DIQ/S 182-XT-4 on the protective cover of the SSH/IQ

4	Position the DIQ/S 182-XT-4 on the sun shield and fix it into place with the two screws (pos. 6 in Fig. 3-16).
5	Close the lid and fix it with the two countersunk screws (pos. 5 in Fig. 3-16).

3.6.3 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 10 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 10 ACCESSORIES AND OPTIONS).

Tools

- Phillips screwdriver.

Mounting the DIQ/S 182-XT-4 with sun shield

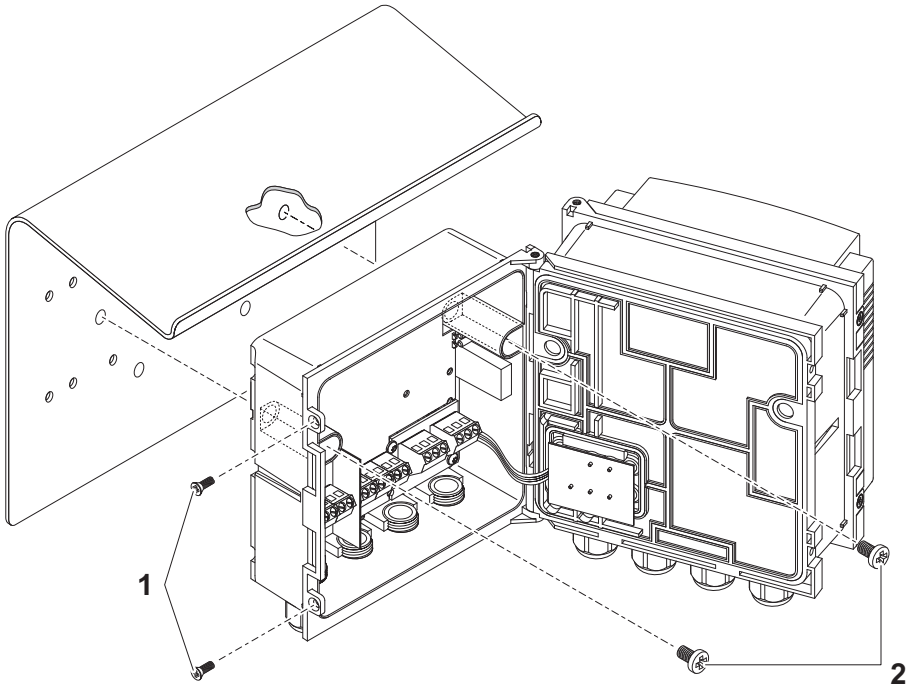


Fig. 3-18 Mounting the DIQ/S 182-XT-4 with sun shield SD/K 170

1	Remove the two countersunk screws (pos. 1 in Fig. 3-18) and swing open the module lid.
2	Position the DIQ/S 182-XT-4 on the sun shield and fix it into place with the two screws (pos. 2 in Fig. 3-18).
3	Close the lid and fix it with the two countersunk screws (pos. 1 in Fig. 3-18).

3.6.4 Panel mounting

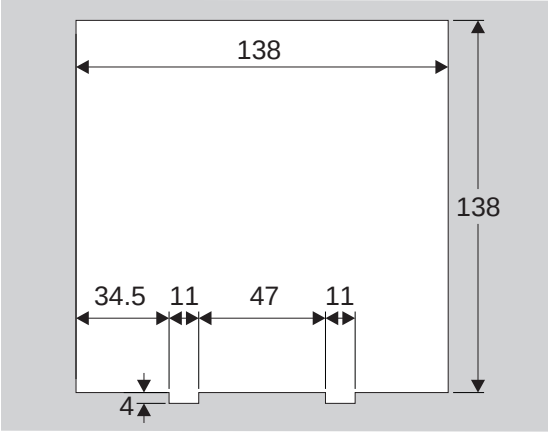
Materials required

- PMS/IQ kit for panel mounting (see chapter 10 ACCESSORIES AND OPTIONS).

Tools

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

Switch panel aperture



Maximum thickness 3 mm

Fig. 3-19 Mounting aperture in the switch panel (dimensions in mm)

The space required on the panel for DIQ/S 182-XT-4 is given in the dimension drawings in section 9.5.

Mounting the DIQ/S 182-XT-4 in a switch panel

1	Unscrew the DIQ/CR3 combi output module from the DIQ/S 182 Universal Transmitter.
2	Insert the DIQ/S 182 Universal Transmitter in the panel aperture from the front.

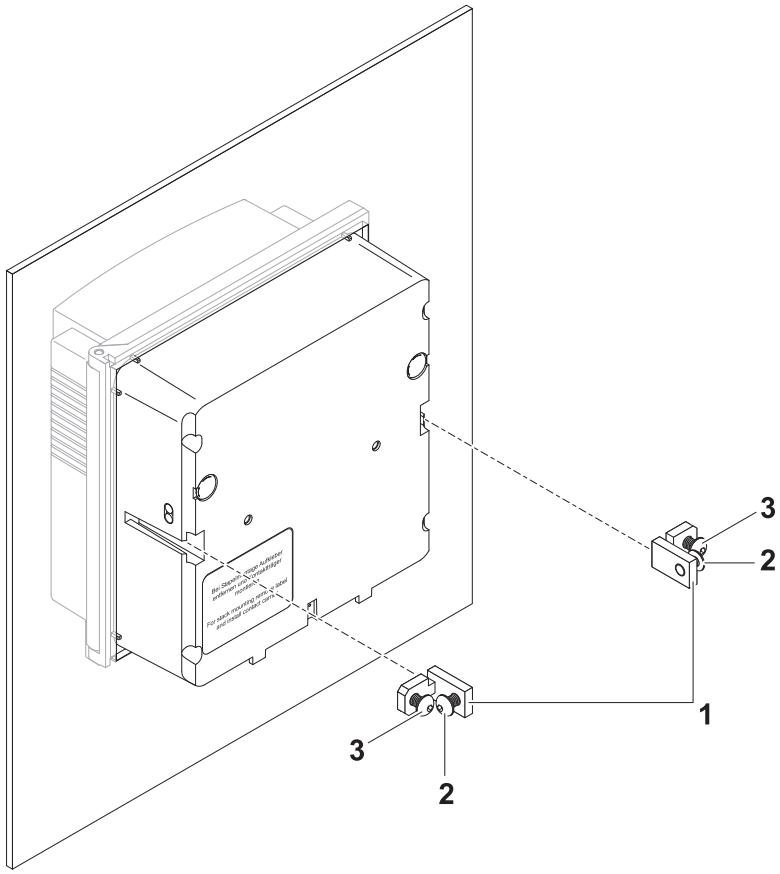


Fig. 3-20 Mounting DIQ/S 182 Universal Transmitter in switch panel

3	Slightly unscrew the screws (pos. 2 and 3) of the two angle brackets (pos. 1 in Fig. 3-20), but do not remove them.
4	Push in the two angle brackets - as shown in Fig. 3-20 - into the lateral guides of the Universal Transmitter up to the stop.
5	Tighten the screws (pos. 2).
6	Screw in the screws (pos. 3) until the screws rest snugly against the panel.
7	Screw the DIQ/CR3 combi output module onto the DIQ/S 182 Universal Transmitter.

3.6.5 Top hat rail mounting

Materials required

- THS/IQ kit for top hat rail mounting (see chapter 10 ACCESSORIES AND OPTIONS).

Tools

- Phillips screwdriver.

Mount DIQ/S 182 XT-4 on top hat rail mounting

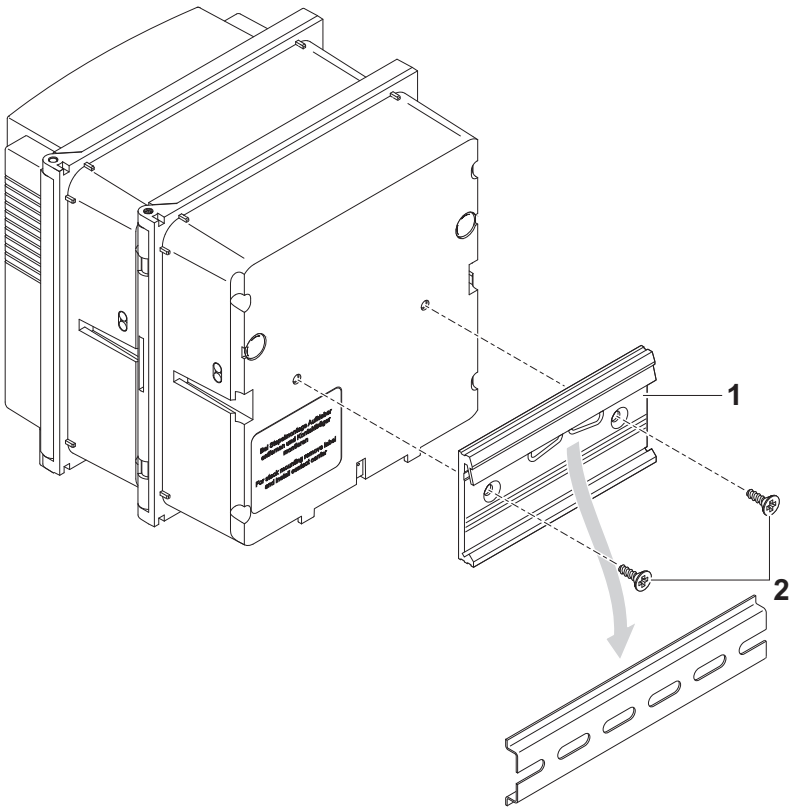


Fig. 3-21 Mount DIQ/S 182-XT-4 on top hat rail mounting

1	Screw the clamping assembly (item 1 in Fig. 3-21) with the two plastic self-tapping screws (item 2) onto the back of the DIQ/S 182 XT-4.
2	Attach the DIQ/S 182-XT-4 to the top hat rail from above using the clamping assembly and press against the rail until the clamping assembly clicks into place. The DIQ/S 182-XT-4 can subsequently be pushed sideways.
3	To unhook the DIQ/S 182-XT-4, press it downwards and pull it forwards at the bottom.

3.7 Using DIQ modules (accessories)

The various application possibilities of the DIQ modules are shown by means of examples in section 3.12.

3.7.1 DIQ/JB

The DIQ/JB module is a passive branching module and can be used for the following purposes:

- To extend the IQ SENSOR NET SNCIQ(/UG) cable and the SACIQ sensor connection cable, e.g. to connect a sensor that is located farther away to the DIQ/S 182-XT-4.
- Connection of another sensor to the DIQ/S 182-XT-4 if all SENSORNET connections are already in use. Example of the connection of four sensors to the DIQ/S 182-XT-4.

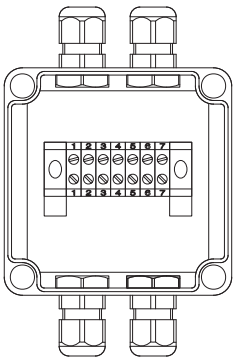


Fig. 3-22 DIQ/JB open.

The DIQ/JB module has seven potential free terminals. To extend or branch lines, connect the three IQ SENSOR NET wires to each other one-to-one at any terminal.

- green <-> green
- red <-> red
- black/filler stranded wire <-> black/filler stranded wire.

3.7.2 DIQ/CHV

The DIQ/CHV module is a valve module for the automatic relay-controlled compressed air-driven cleaning function in the System 182 XT-4. It provides four additional potential free terminals to branch (extend) interface lines. For each sensor that is to have compressed air

cleaning a DIQ/CHV is required.

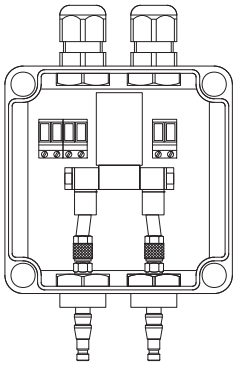


Fig. 3-23 DIQ/CHV open.

3.7.3 Installation of the DIQ modules

The DIQ module enclosure is designed like a commercial connection socket and can be mounted directly on a wall. For mounting on a WTW mounting stand, WTW provides the MS/DIQ mounting set. It contains a pipe clip for the mounting stand and provides enough space for two DIQ modules. For assembly use the screws and blind nuts provided with the MS/DIQ as demonstrated in the following figure

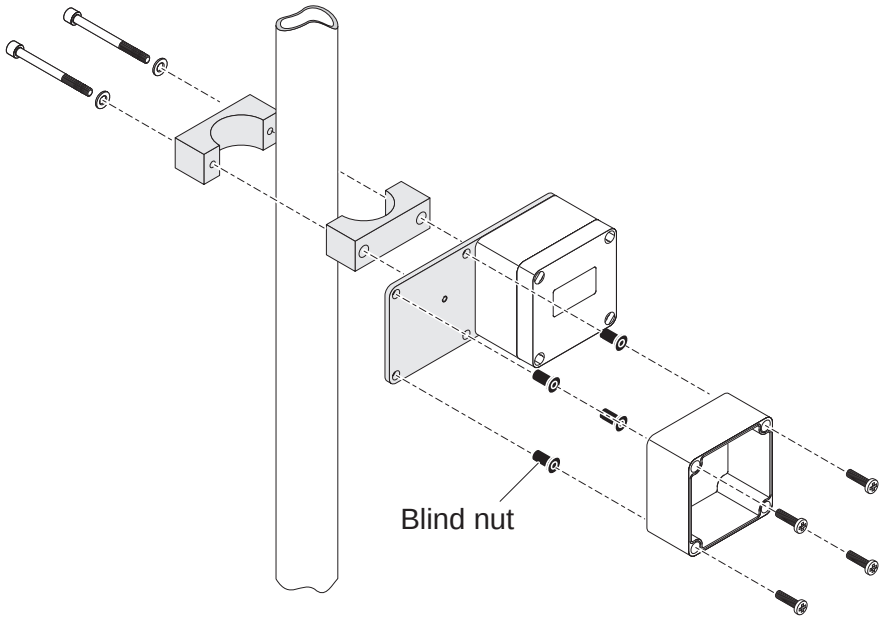


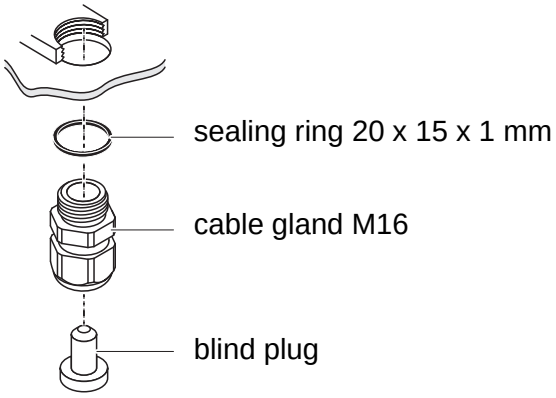
Fig. 3-24 Mounting DIQ modules with the MS/DIQ mounting set.

3.8 Electrical connections: General instructions

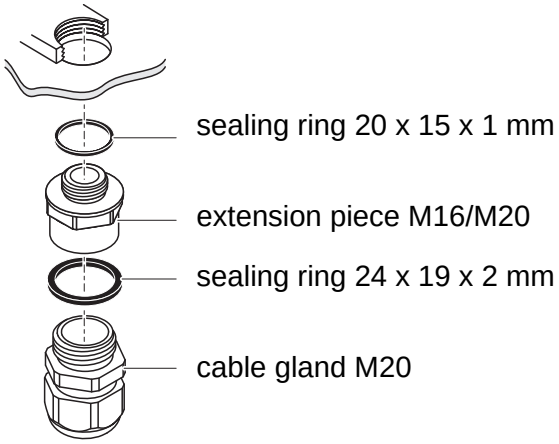
Cable glands

All electric cables are fed from below via prepared openings in the enclosure of the DIQ/S 182-XT-4 and the MIQ modules. Cable glands with different clamping ranges are included with the DIQ/S 182-XT-4 to provide sealing between the cable and enclosure as well as for strain relief. Select the matching cable gland for the respective cable diameter:

- **Small**, clamping range 4.5 to 10 mm. This cable gland is suitable for all IQ SENSOR NET cables (including earth cable after stripping the outer insulation, see section 3.5.4) and IQ SENSOR NET sensor connection cable.



- **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 other sizes of cable gland (see chapter 10 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 must be allowed to project into the enclosure. Otherwise, there is a danger that areas safe to contact could come into contact with dangerous voltages. which could result in life threatening electric shock when working with the DIQ/S 182-XT-4. 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 following two paragraphs describe how to connect both models of the DIQ/S 182-XT-4 to the voltage supply. How to connect additional power supply modules is described in the operating manual of the respective power supply module.

3.9.1 DIQ/S 182-XT-4 (line power version)



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

- **The DIQ/S 182-XT-4 must only be connected by a qualified electrician.**
- **The DIQ/S 182-XT-4 must only be connected in a voltage-free condition.**
- **The power supply must fulfill the specifications given on the nameplate and in chapter 9 TECHNICAL DATA.**
- **A switch or circuit breaker must be provided in the building installation as an interrupt facility for the DIQ/S 182-XT-4. The interrupt facility must be**
  - **installed in the vicinity of the DIQ/S 182-XT-4, easily accessible by the user and**
  - **marked as an interrupt facility for the DIQ/S 182-XT-4.**
- **After it has been installed, the DIQ/S 182-XT-4 may only be opened if the mains voltage has been switched off beforehand.**

Materials required

- Wire end sleeves, suitable for the power line, with suitable crimping tool
- 1 x cable gland, matched to the cable diameter (see section 3.8 on page 3-33).

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.

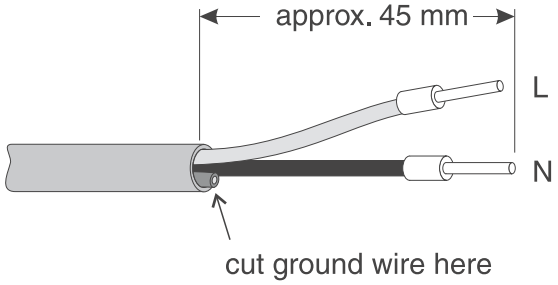


Fig. 3-25 Prepared power cable.

NOTE

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

Connecting the power line

5	Open the enclosure of the DIQ/S 182 XT-4 (front terminal strip).

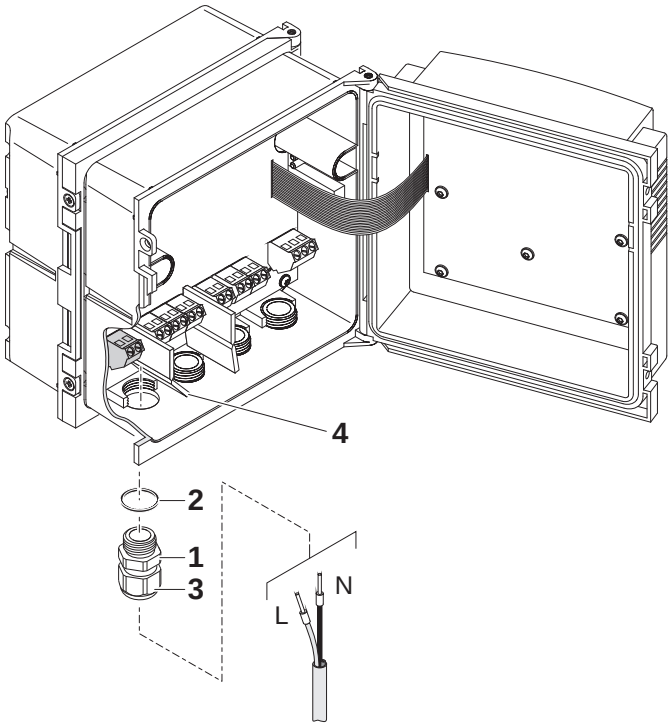


Fig. 3-26 Inserting the supply line.

6	Screw a cable gland (pos. 1 in Fig. 3-26) 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.

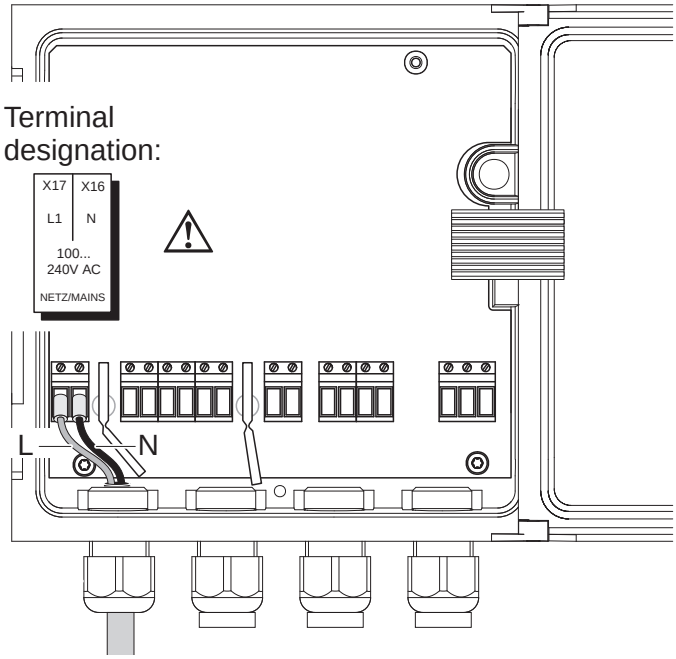


Fig. 3-27 Line power connection.

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 coupling ring (pos. 3 in Fig. 3-26).

WARNING
No free wires must be allowed to project into the enclosure. 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 182 XT-4.

3.9.2 DIQ/S 182-XT-4/24V (24 V version)



WARNING

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

- **The DIQ/S 182-XT-4 must only be connected by a qualified electrician.**
- **The 24 V AC/DC supply must meet the specifications quoted on the name plate and in chapter 9 TECHNICAL DATA (protective low voltage SELV).**
- **The DIQ/S 182-XT-4 must only be connected in a voltage-free condition.**
- **A switch or circuit breaker must be provided in the building installation as an interrupt facility for the DIQ/S 182-XT-4. The interrupt facility must be**
  - **installed in the vicinity of the DIQ/S 182-XT-4, easily accessible by the user and**
  - **marked as an interrupt facility for the DIQ/S 182-XT-4.**



Rechargeable battery systems should have a deep discharge protection. The DIQ/S 182-XT-4/24V 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, matched to the cable diameter (see section 3.8 on page 3-33).

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.

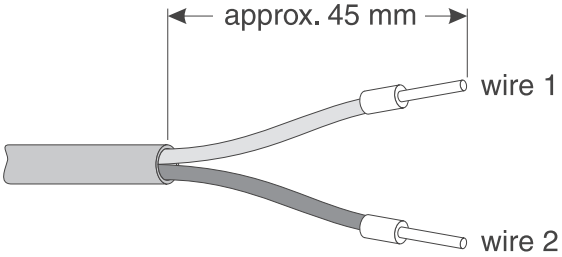


Fig. 3-28 Prepared 24 V AC/DC line.

Connecting the 24 V AC/ DC line

4	Open the enclosure of the DIQ/S 182 XT-4 (front terminal strip).

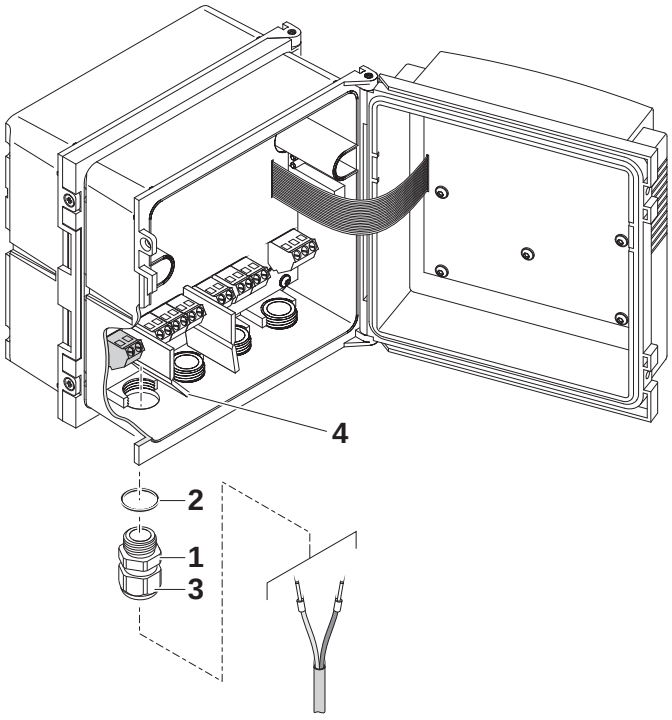


Fig. 3-29 Inserting the 24V AC/DC line

5	Screw a cable gland (pos. 1 in Fig. 3-29) 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.

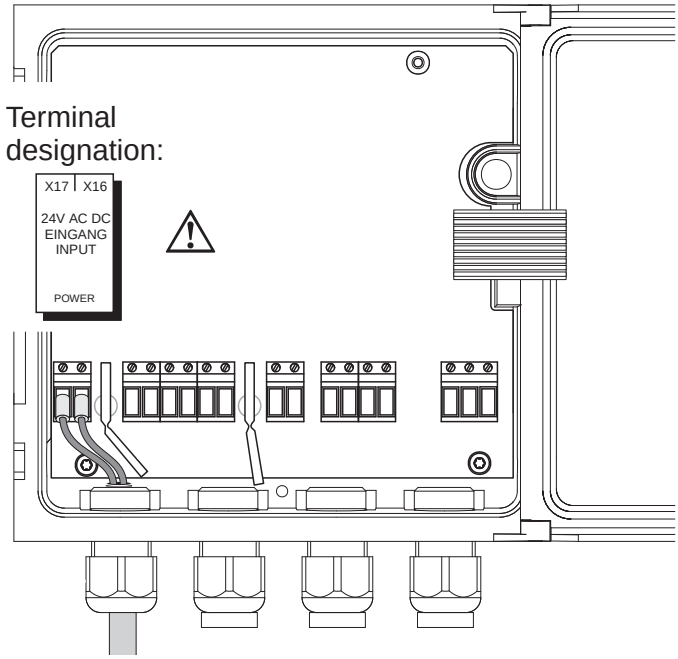


Fig. 3-30 24 V AC/DC connection.

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 coupling ring (pos. 3 in Fig. 3-29).

WARNING
No free wires must be allowed to project into the enclosure. 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 182 XT-4.

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 must only be connected by a qualified electrician.**
- **Electrical circuits subject to the danger of physical contact must 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 9 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 must multiphase consumers be switched with the aid of several relays (example three-phase current driven pumps). Always switch multiphase consumers via a protective relay.**
- **The DIQ/S 182-XT-4 may only be opened after the installation if all external voltages have been previously switched off.**

Connections

The DIQ/S 182-XT-4 has a total of five current outputs and six relay outputs which are spread across the two terminal strips in the DIQ/S 182 XT-4. The terminal strips are shown in section 3.13.

Materials required

- Wire end sleeves, suitable for the connecting wires, with suitable crimping tool
- 1 x cable gland, matched to the cable diameter (see section 3.8 on page 3-33).

Tools

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

Connecting lines to the terminal strip

11	Open the enclosure of the DIQ/S 182 XT-4.

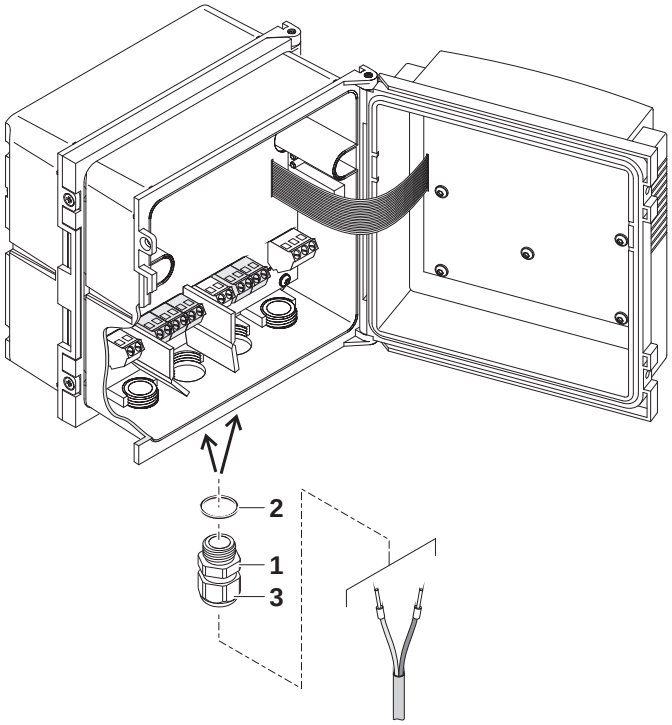


Fig. 3-31 Feeding in the lines (example: front terminal strip)

12	Screw a cable gland (pos. 1 in Fig. 3-31) with the sealing ring (pos. 2) into the enclosure below the respective connections.
13	Loosen the coupling ring (pos. 3).
14	Feed the line through the cable gland in the enclosure.
15	Connect the wires to the terminal strip. While doing so, pay attention to the specifications on the label located under the terminal strip.
16	Tighten the coupling ring (pos. 3).



WARNING

No free wires must be allowed to project into the enclosure. 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 System 182-XT-4. Always cut off any wires that are not in use as closely as possible to the cable gland.

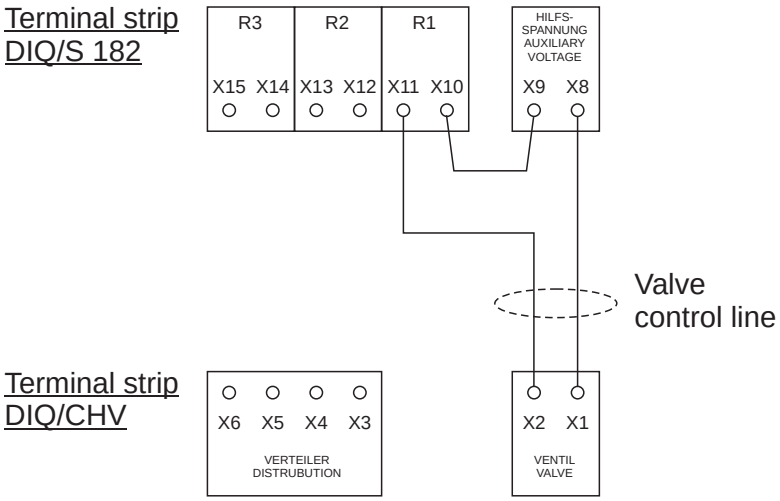
17	Close the enclosure of the DIQ/S 182 XT-4.

3.10.2 Usage of the auxiliary voltage

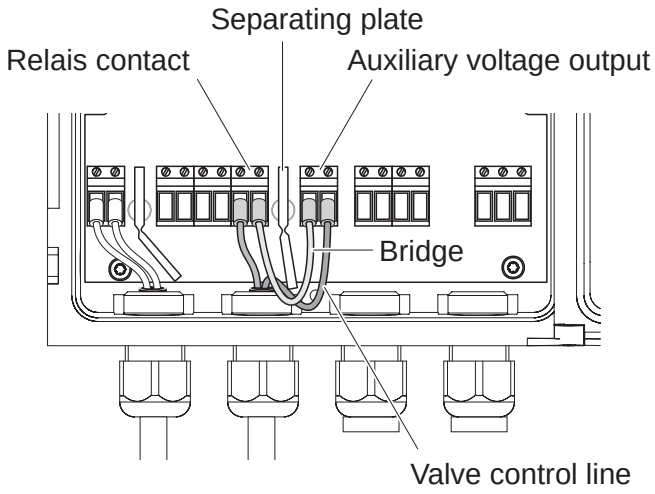
The DIQ/S 182 XT-4 has a 24 V output (designation, HILFSSPANNUNG or AUXILIARY VOLTAGE on the terminal strip). You can use this auxiliary voltage for the relay-controlled opening of the valve in a DIQ/CHV valve module for the compressed air-driven sensor cleaning function. To do so, you have to connect 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.



Installation examples with one and two sensors with compressed air cleaning can be found in section 3.12.

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 system components correctly connected with one another (see section 3.5)?

2 Are the DIQ/S 182 XT-4 and all additional power supply modules correctly connected to the voltage supply (see section 3.9)?

3 Do the line voltage and line frequency agree with the data on the name plate of theDIQ/S 182 XT-4 and all additional power supply modules?

4 Are all IQ sensors ready for measuring, e.g. a D.O. sensor filled with electrolyte solution?

Starting the system

Switch on the voltage supply of the DIQ/S 182 XT-4 and all additional power supply modules. As soon as the system is successfully initialized, the measured value display appears. In the case of IQ sensors that are not yet providing measured values, "Init" appears temporarily

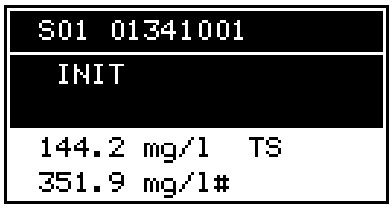


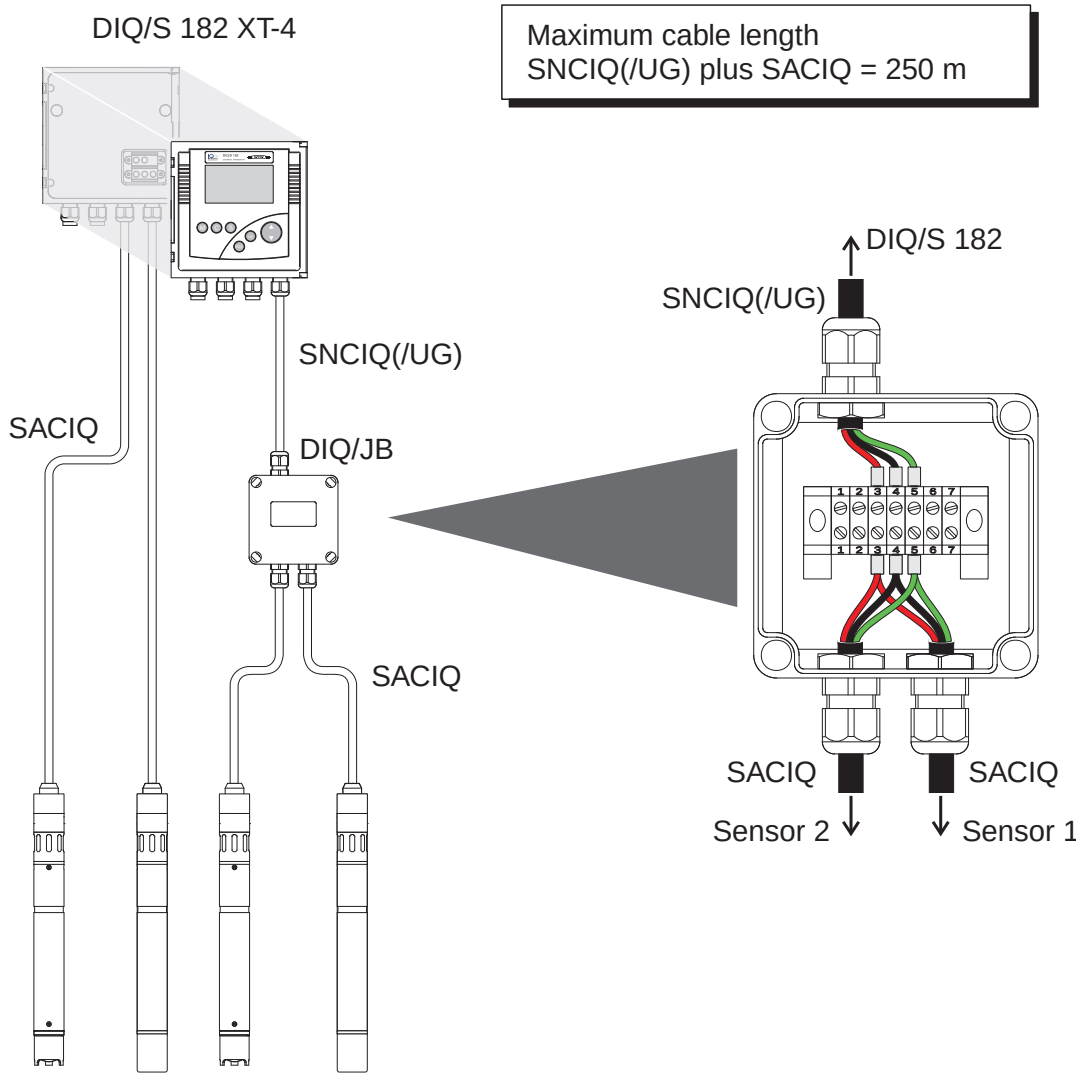
Fig. 3-32 Display during the start phase

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 5.3 on page 5-2.

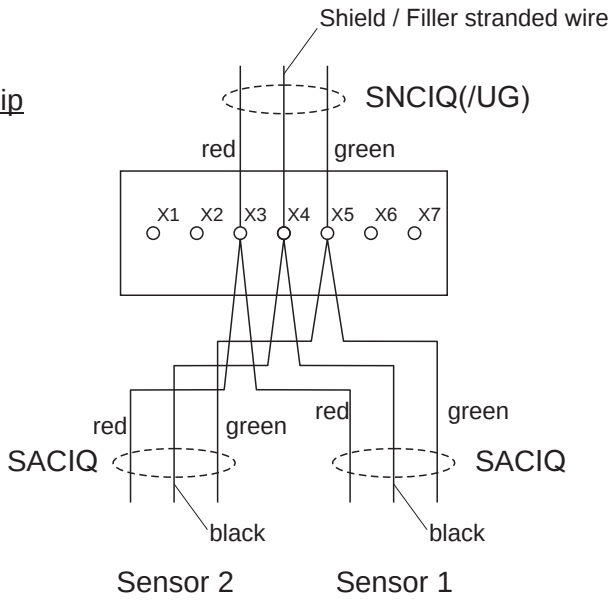
If the system start failed, see chapter 8 WHAT TO DO IF ....

3.12 Installation examples

3.12.1 Connection of four sensors (without compressed air cleaning)

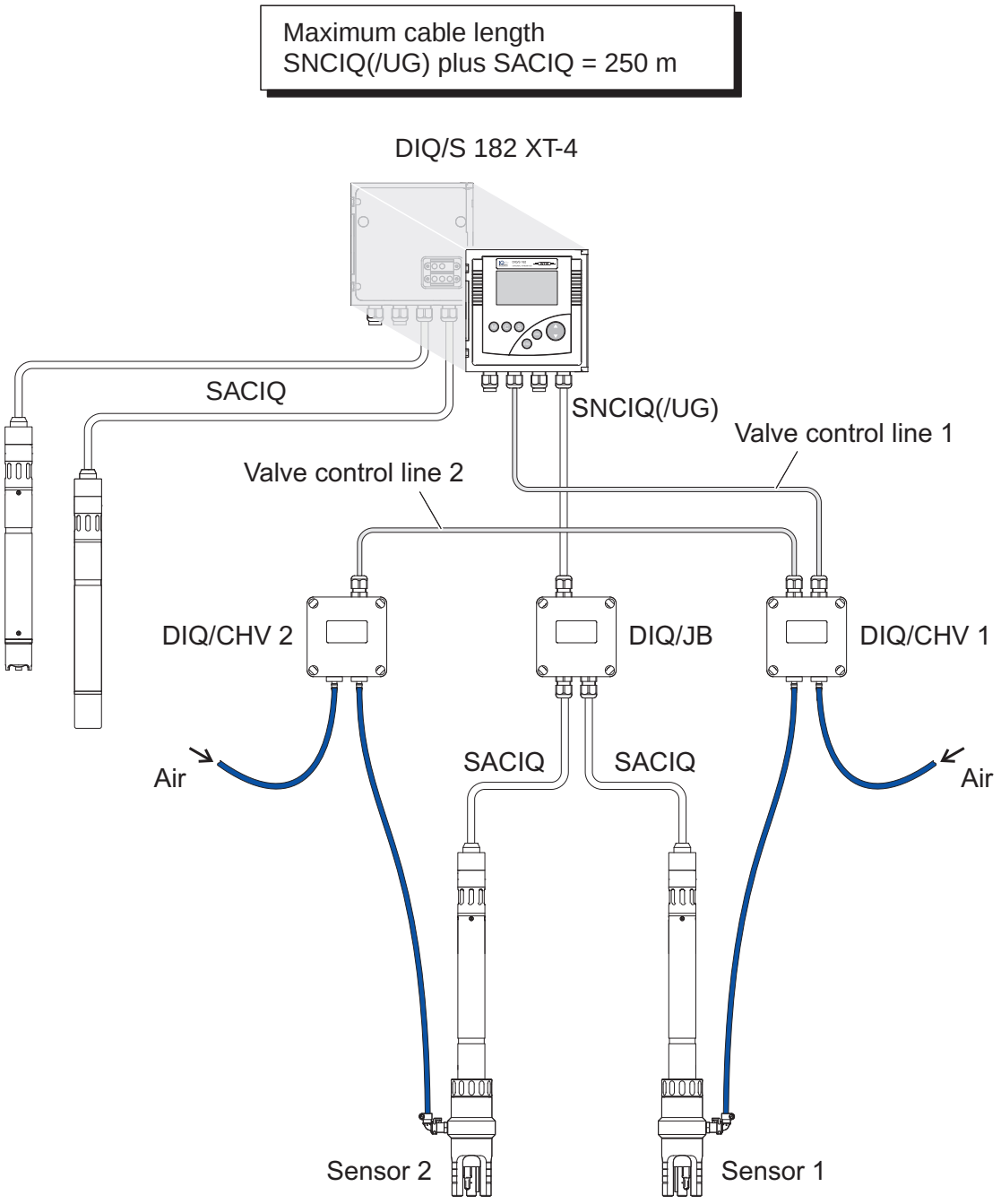


Connection scheme of the DIQ/JB



Terminal strip DIQ/JB

3.12.2 Compressed air cleaning of two sensors



Connection scheme of valve control

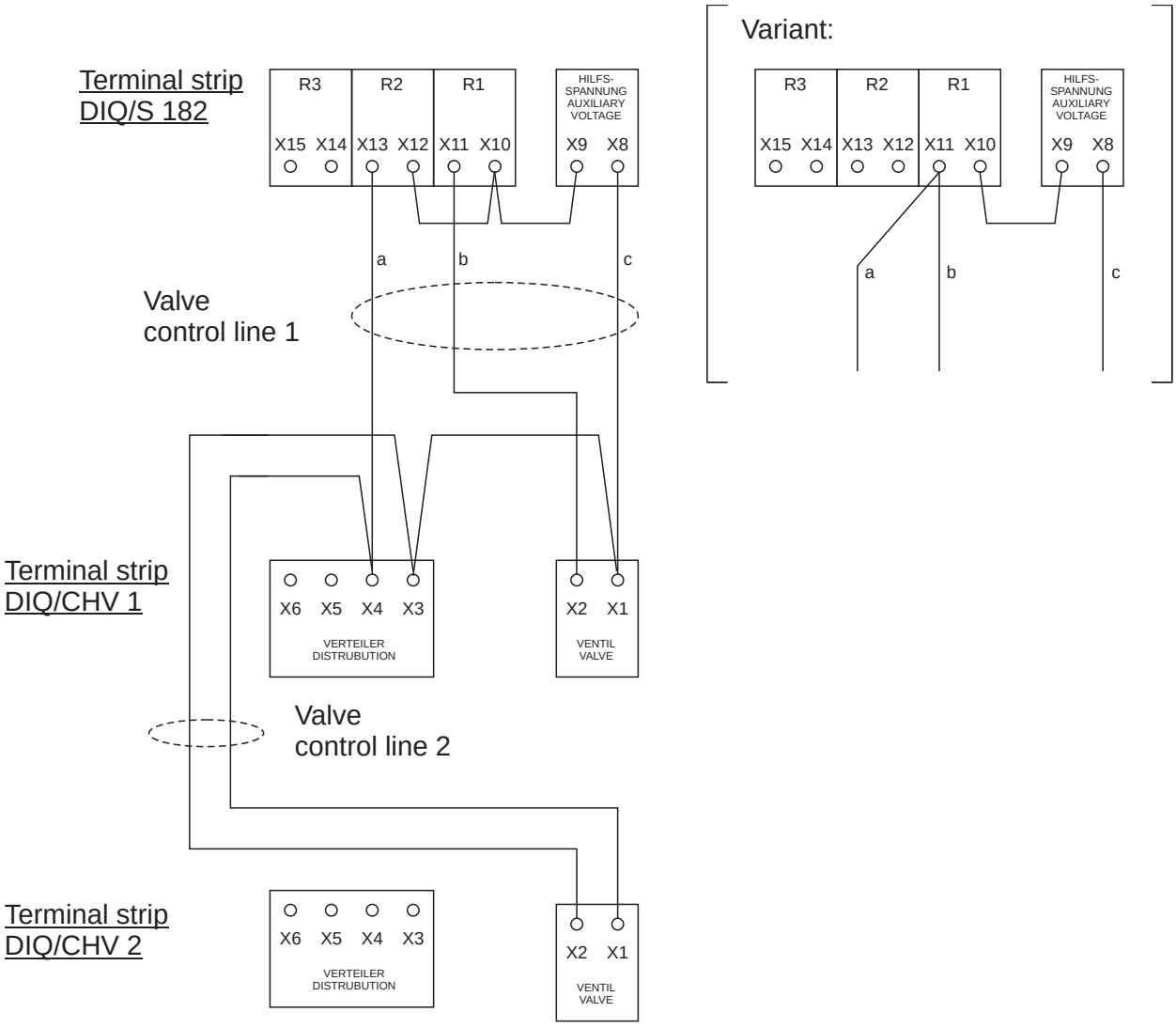
Example:
Relay 1 controls the cleaning of sensor 1.
Relay 2 controls the cleaning of sensor 2.

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

WARNING
In this configuration, the free switching contact (here: R3) may be

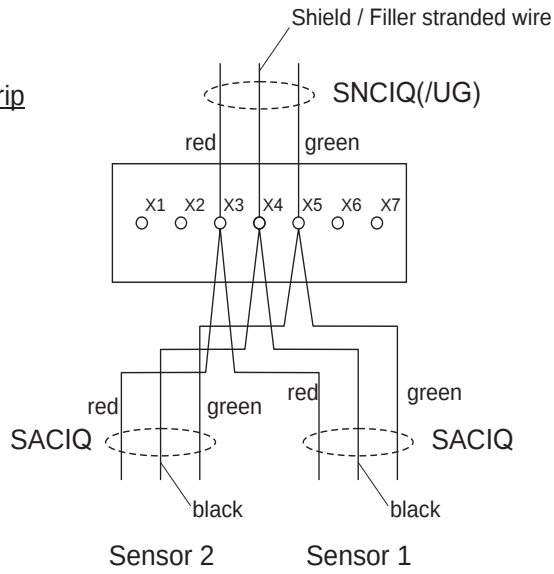
used to switch SELV voltages only.

WARNING
No free wires must be allowed to project into the enclosure. 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.

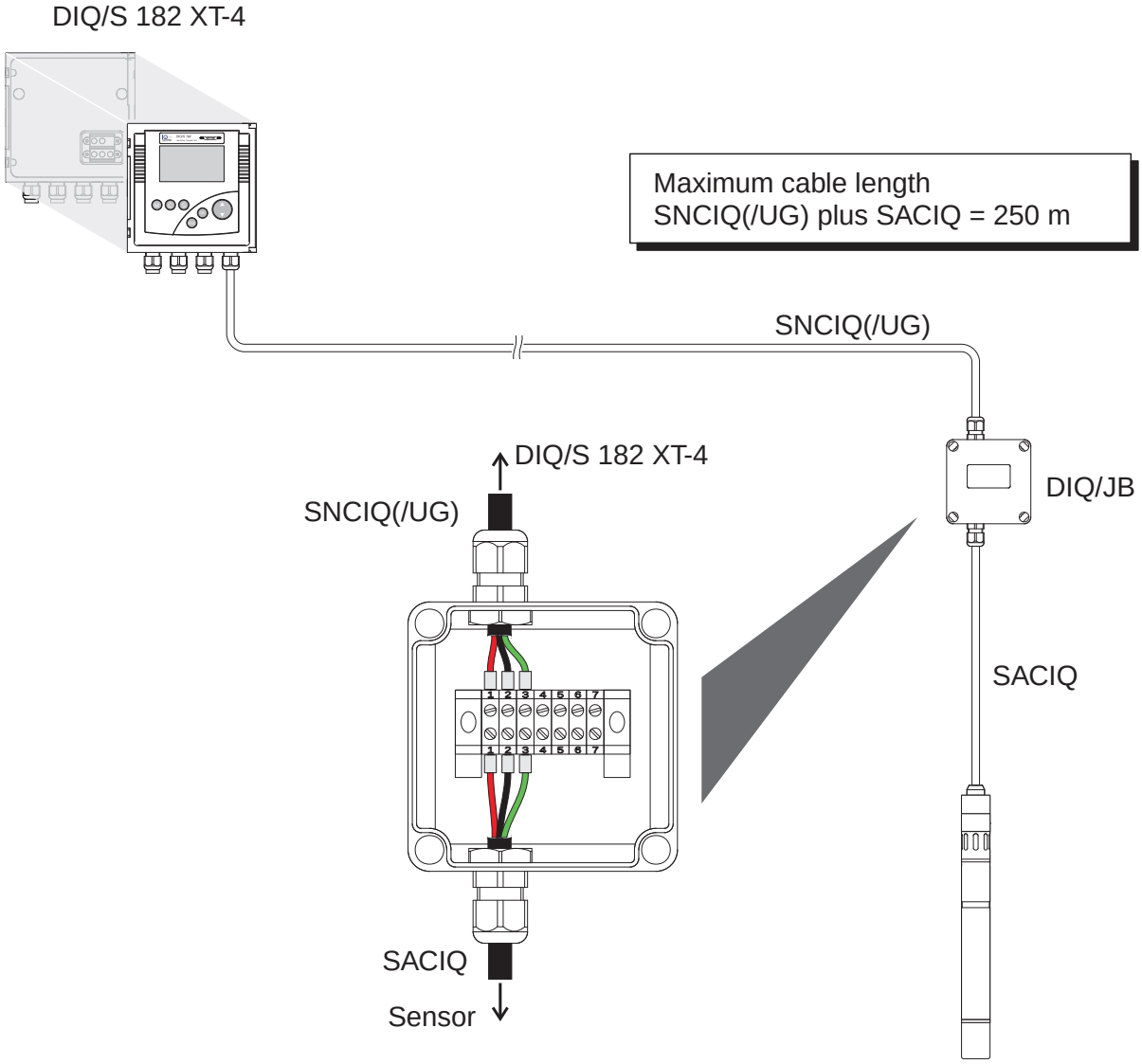


Connection scheme of the DIQ/JB

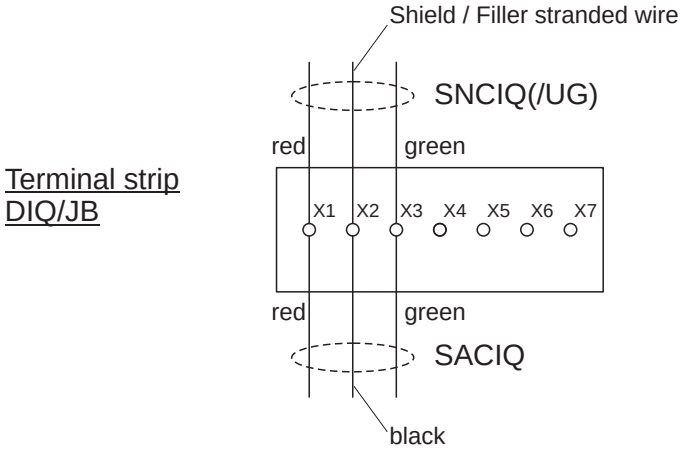
Terminal strip
DIQ/JB



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

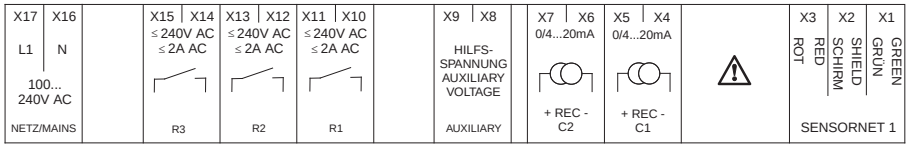


Connection scheme of the DIQ/JB

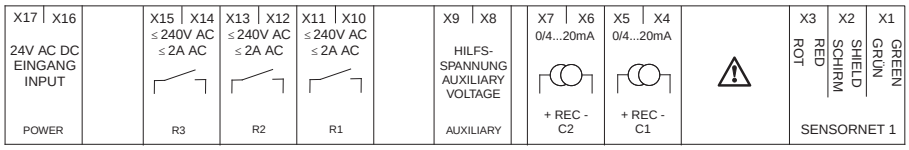


3.13 Figures of the terminal strips

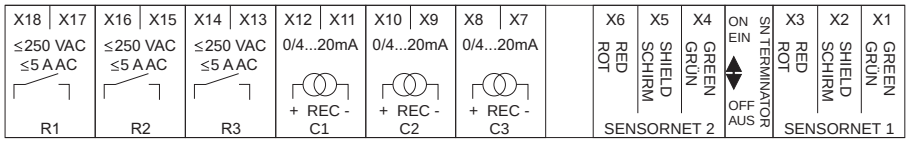
DIQ/S 182-XT-4, front terminal strip



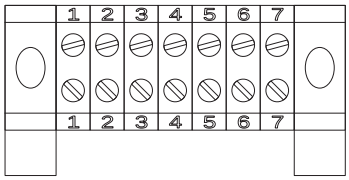
DIQ/S 182-XT-4/24V, front terminal strip



DIQ/S 182-XT-4(/24V), rear terminal strip



DIQ/JB



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

DIQ/CHV



4 Operation

4.1 Operating elements

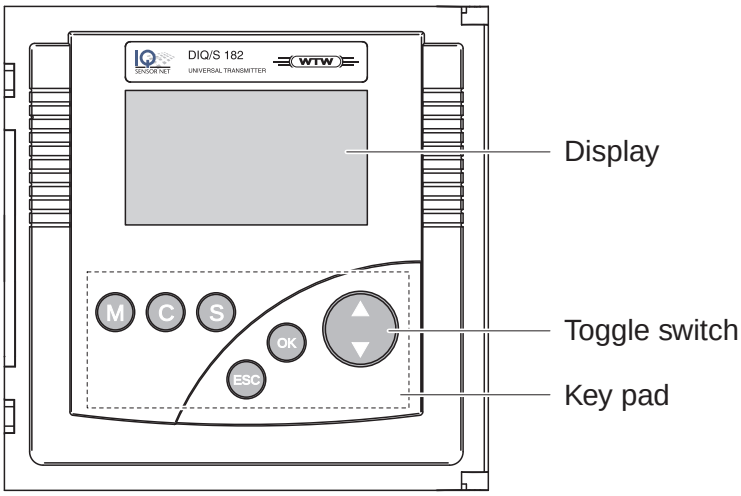


Fig. 4-1 Operating elements of the DIQ/S 182 XT-4

Functions

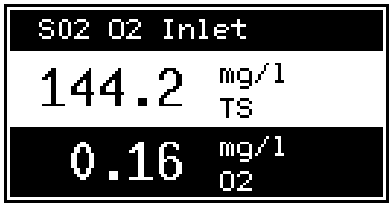
Key	Function
(M)	Switches directly to the measured value display from all operating situations
(C)	Starts calibration of the sensor selected in the measured value display
(S)	Opens the *SETTINGS* menu in the measured value and status display
(ESC)	● Switches to the higher menu level ● Cancels entries without storing them
(OK)	● Opens the *PROPERTIES* menu in the measured value and status display ● Confirms an entry
(▲▼) (toggle switch)	● Selects: – The active sensor (measured value display) – Menu items – List entries – Letters or numerals ● Scrolls through longer menus or texts

4.2 Measured value and status display

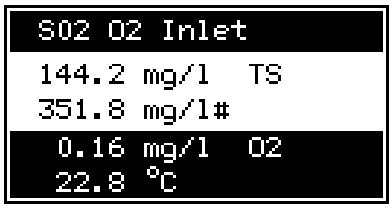
The Ⓜ key switches to the last selected measured value and status display from any operating situation. Entries that are not completed are ignored while doing so.

Pressing Ⓜ once again cyclically switches between further display options.

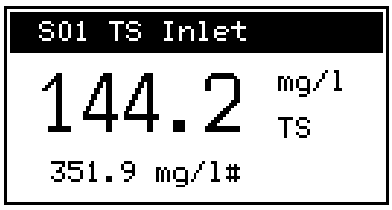
Example: Display options with four connected sensors



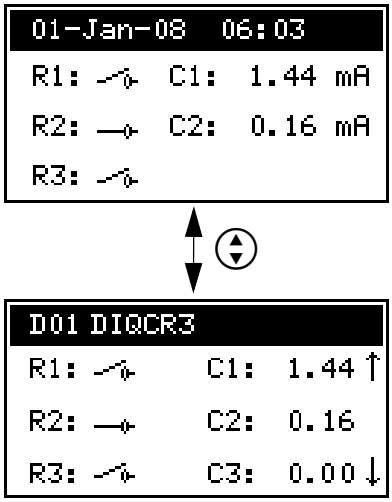
Double display of measured values, large:
Main measured parameter only.



Double display of measured values, detail:
Main and secondary measured parameter.



Single display, measured value.



Display of the outputs.
The current states of the relays and current outputs and the date and time are displayed.

The information is spread over two pages. Press ⇕ to swap between the outputs of the front and rear terminal strip (DIQ/CR3).

Operating notes

- If more sensors are connected than can be shown in the respective display option, the display changes its contents accordingly in 3-second intervals.
- Select a sensor in the double display with ⇕. The selected sensor is displayed in reverse video. The number and name of the selected sensor are displayed in the header. In the single display, the sensor

that is shown is always also the selected sensor.

- Start a calibration procedure for the selected sensor with Ⓒ. Starting a calibration procedure from the display of interfaces is not possible.
- Select the *PROPERTIES* menu with Ⓞ. This menu can be used to put sensors in the maintenance condition and prompt for important data (calibration data, error messages, operating states, software versions etc.).
- Open the *SETTINGS* menu with Ⓢ.

Special sensor conditions

The following displays inform you of special states of the sensors

Init	Sensor is being initialized ● during commissioning or ● if a new IQ sensor is recognized that is not yet giving measured values
----	Sensor inactive or inadmissible operating conditions
Cal	Sensor is being calibrated
Clean	Cleaning procedure active
Error	No communication with the sensor due to defective connection
OFL	Measuring range undercut or exceeded (overflow)
Display flashes	Sensor in maintenance condition

Error and info symbol

If the info symbol ⓘ or error symbol ⚠ appears in the header, error messages from the sensors or error conditions of the system have occurred. Error messages from the sensors are entered in the log book. The log book is described in detail in section 4.4.3. Error conditions of the system can, for example, be an insufficient operational voltage or malfunctions of the communication and are displayed in the *PROPERTIES / SYSTEM STATUS* menu (see section 4.4.1).

4.3 Working with the *SETTINGS* menu

All settings in the *SETTINGS* menu can be protected by a password against unauthorized changing. For more detailed information on password protection, see section 4.6.

4.3.1 Selection menus

Pressing (S) switches from the measured value display to the *SETTINGS* menu (main menu).

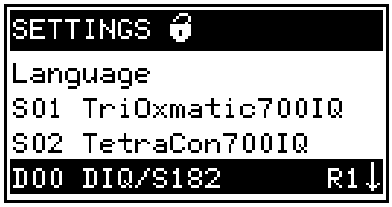


Fig. 4-2 SETTINGS menu (main menu)

Operating notes

- In the main menu, the lock symbol shows the current safety level for the settings
  - Settings not protected by password
  - Settings protected by password (reading possible only)

  For more detailed information on password protection, see section 4.6.
- The arrows ↑/↓ appear automatically if further display contents are above or below the visible display range.
- The toggle switch (▲▼) is used to highlight a menu item (displayed in reverse video) and move the visible display range up or down.
- To open a menu item, highlight it and press (OK). The display switches to a further submenu or to a setting table.
- To return to the measured value display, press (M) or (ESC).

4.3.2 Setting tables

The actual settings are made in the setting tables. Each setting is represented by two lines together. The name of the setting appears in the upper line on the left side of the display. The corresponding value is in the line below on the right side.

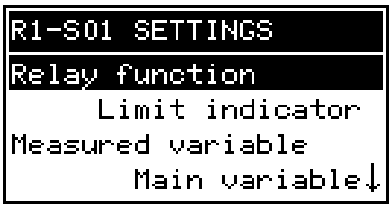


Fig. 4-3 Example of a setting table

Operating notes

- The arrows ↑/↓ appear if further display settings are above or below the visible display range.
- The toggle switch ⇕ is used to highlight a setting (displayed in reverse video) and move the visible display range up or down.
- To edit a setting highlight it and press OK. The line below is highlighted and switches to the entry mode. Depending on the operating situation, a new submenu or a table with further relevant settings can open up.
- Break off an action and change to the next higher level with the ESC key.
- Move directly to the measured value display with M.

To accept all settings, highlight the *Save and quit* menu item at the lower end of the setting table and press OK. If you exit the setting table via M, ESC/*Quit* or the *Quit* menu item, all changes are ignored.

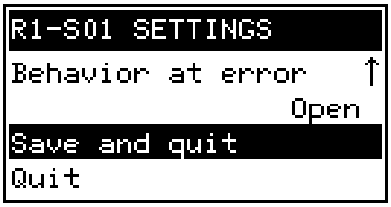


Fig. 4-4 Save and quit

4.3.3 Entry mode

In the entry mode you can change individual values or enter a character string. Depending on the value type, change a value as follows

- **Fixed values of a selection list** (e.g. sensor measuring ranges): This is the most frequent form of an entry. Select the required option with the toggle switch ⇕ and confirm the selection with OK. The display switches back to the setting table.

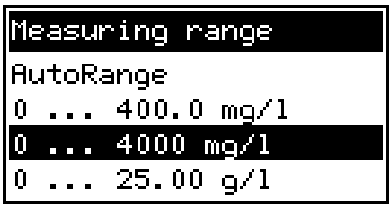


Fig. 4-5 Example of a selection list

- **Character strings** (text and numerals):

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

  Entries are made character after character. Select the first character with the toggle switch ⇕ and press OK. The entry mark moves to the next position and indicates ↵. Select the next character with the toggle switch ⇕. When you have selected the required sequence of characters select ↵ as the following character and press OK. This completes the entry and the display switches back to the setting table.

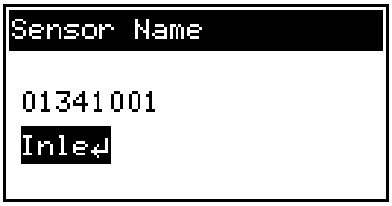


Fig. 4-6 Example of text entry

  If you want to correct a previously selected character while entering, select the thin arrow to the left ← and press OK. This moves the entry mark by one digit to the left. Thus you can go back to the required character. All characters on its right side, however, have to be entered once again.

  If you want to restart entering the characters, select the thick arrow to the left ← and press OK.

- **Numerals**:
  Entering numerals is made in the same way as entering characters.

  The following numerals can be entered: **`0..9-`**.

  Entering" **`-`**" or "." is only allowed where it makes sense, e.g. "**`-`**" at the first position only.

Save and quit

On principle, all settings made in the entry mode are only taken over after selecting the *Save and quit* item in the relevant setting table and pressed (OK). If you exit the setting table via (M), (ESC) or the *Quit* menu item, all changes are ignored.
Exceptions: Date/time, air pressure and password.

4.4 *PROPERTIES* menu

4.4.1 Overview

Pressing (OK) switches from the measured value display to the *PROPERTIES* menu.

In the *PROPERTIES* menu, you can prompt calibration data and various information on system components. Moreover, you can switch the maintenance condition of a sensor on and off.

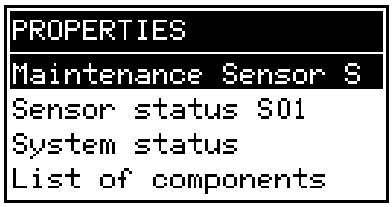


Fig. 4-7 PROPERTIES menu

Submenus/functions

- *Maintenance* **Sxx** This function switches the maintenance condition of a sensor on and off (see section 4.4.2)
- *Sensor status **Sxx***
  Here you can prompt the following data of a sensor (see section 4.4.3):
  - Type, series number and software version
  - Data of the last calibration
  - Error and info messages
- *System status*
  Here you can prompt the following data of the system:
  - Series number and software version of the DIQ/S 182-XT-4
  - Status of the operational voltage (☺ = OK / ☹ = faulty)
  - Status of communication (☺ = OK / ☹ = faulty)
  - Current states of interfaces

  If the operational voltage or communication are faulty, the flashing error symbol ⚠ appears in the header of the measured value display. The error symbol ⚠ automatically disappears when the malfunction has been eliminated.
- *List of components*
  Here is a list of all connected sensors.

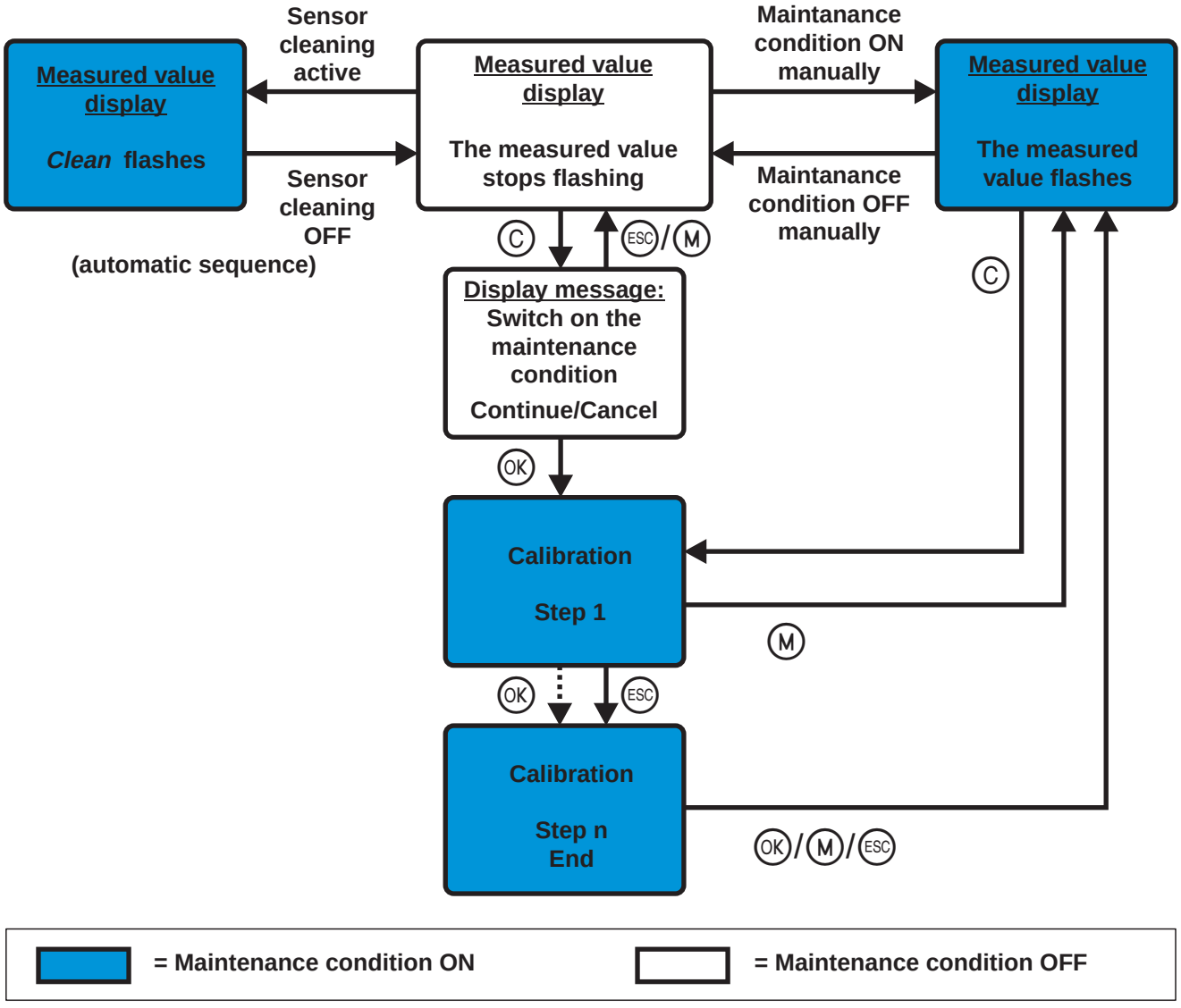
4.4.2 Maintenance condition

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

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

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



Recommended proceeding for cleaning, maintenance and repair

1	Switch on the maintenance condition for the IQ sensor. The measured value display flashes.
2	Pull the sensor out of the sample.
3	Carry out the cleaning, maintenance or repair (removal and replacement) of the 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. The display of the sensor in the measured value display no longer flashes.

Automatic switch-on of the maintenance condition

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 4.5)
- during a compressed-air cleaning cycle. After the cleaning cycle is finished the maintenance condition is automatically switched off again.

4.4.3 *Sensor status* Sxx

In the *SENSOR STATUS Sxx* menu you can prompt the following information on a sensor:

- Type and series number
- Software status
- Error and info messages ("log book")
- Data of the last calibration (only for sensors that can be calibrated)

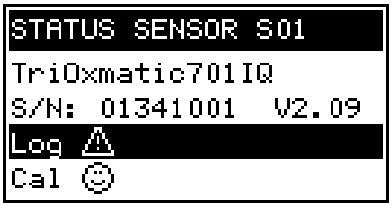


Fig. 4-8 SENSOR STATUS Sxx

Log book

The log book is a list of messages related to a sensor. If there is a new message the info or error symbol in the header of the measured value display flashes:

⚠	Flashes if a new or unacknowledged error message is present in the log book that requires immediate action.
ⓘ	Flashes if a new or unacknowledged informational message is present in the log book.

If there are info and error messages present at the same time, the error symbol ⚠ flashes (more important).

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 tick (✓). The operating sequence to do this is described on page 4-13.

The error symbol also flashes if the operational voltage or communication in the system are faulty. You can check this in the *PROPERTIES / SYSTEM STATUS* menu (see section 4.4.1).

Calibration data

You can view the data of the last calibration under the *Cal* menu item. Sensors that have not yet been calibrated do not have this menu item. The symbol in the *Cal* line quotes the validity state:

☺= valid

☹= invalid

The content and form of the calibration data depend on the sensor type.

Log book messages

Each log book message in the log book consists of one line. The latest message is on the first position. They are not yet marked with a tick, i.e. acknowledged.

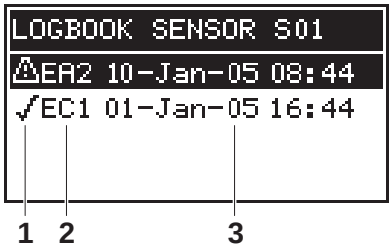


Fig. 4-9 Log book

1	Message type (error or info symbol) of an unacknowledged message, or tick (✓) with an acknowledged message
2	Message code
3	Date and time of the message

The log book shows the current status at the point of time it was opened. If new messages arrive while the log book is open, these do not appear in the log book. The new messages are only included when you switch to the measured value and status display.

Structure of the message code

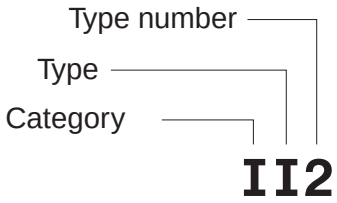


Fig. 4-10 Message code

Pos.	Information	Explanation
1	Category	● Info message (I) ● Error message (E)
2	Type	● Calibration (C) ● Installation and commissioning (I) ● Instructions for service and repair (S) ● Application instructions (A)
3	Type number	Each type contains subtypes (0..9A..Z)

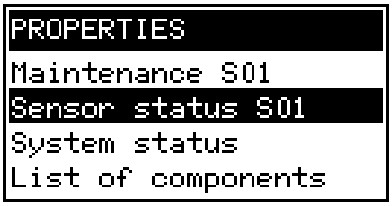
Only the last message of each message code is ever displayed. If a new message arrives with a message code that already exists in the log book, the older message is overwritten.

Detailed message text

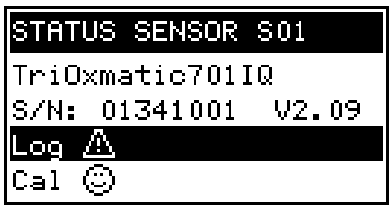
You can view the detailed message text when you acknowledge the message. It contains a precise description of the message codes and, if required, instructions for any further actions. The detailed message texts can also be found in the respective sensor operating manual.

Proceeding: Open log book, acknowledge messages and view detailed messages

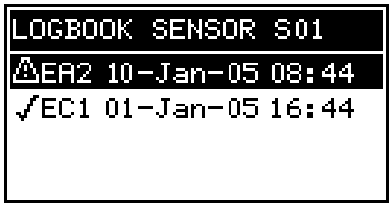
1	Open the *PROPERTIES* menu. To do so, press OK in the measured value display.



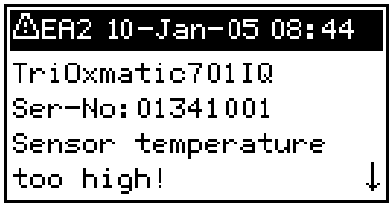
2	Select *Sensor status Sxx* (xx = required sensor) and press OK.



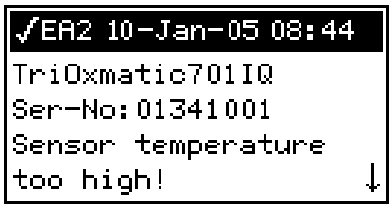
3	Select the *Log...* menu item and press (OK). The log book is displayed.



4	Highlight the message to be acknowledged and press (OK). The detailed message text is displayed. Scroll through the text with the toggle switch (▲▼).



5	Press (OK). Thus you acknowledge the message (✓).



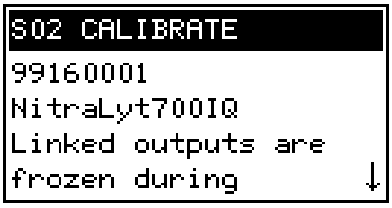
6	Press (OK) once again. This returns you to the log book where you can view and acknowledge further messages as necessary.
7	To exit the log book press (ESC). Return directly to the measured value and status display with (M).

4.5 Calibration of sensors

Sensors can be protected by a password against unauthorized calibration. For more detailed information on password protection, see section 4.6.

General proceeding

1	Switch to the measured value display with (M).
2	Select the sensor to be calibrated with (▲▼) (in the single display, the sensor being displayed is always selected at the same time).
3	Call up calibration with (C). The message, *During the calibration procedure, the linked outputs are frozen,* appears. The maintenance condition is switched on the next time the (OK) key is pressed. Return to the measured value display without switching on the maintenance condition with (M) or (ESC).



By activating the maintenance condition, linked outputs remain in their present state. The measured value or status display of the sensor flashes in the measured value display.

4	Confirm with (OK). The maintenance condition is active. The following proceeding is sensor type specific. The display guides you through all steps. Follow the instructions exactly. A message of the success of the calibration and the determined calibration data appear at the end.

Up to this point you can cancel the calibration procedure with the (ESC) key at any time. The system continues to work with the old calibration data. The maintenance condition, however, has to be switched off again in any case.

5	Confirm the calibration data with (OK). Calibration is completed with this. The following display message describes the further steps to put the sensor into operation again.



Putting the sensor into operation after calibrating

6	Confirm with (OK). The display returns to the measured value display (the measured value flashes as the sensor is still in the maintenance condition).
7	If calibration was successful, immerse the sensor in the test sample.
8	Wait for a stable measured value.
9	Switch off the maintenance condition (highlight sensor and press (OK) three times). The measured value has stopped flashing.

If calibration was not successful, this is indicated by "----" on the display and a corresponding message with remedial actions appears in the log book. Follow the instructions and repeat calibration.

4.6 Passwords

You can assign and activate two passwords for the System 182-XT-4.

- **Settings password**
  protects all settings in the *SETTINGS* menu.
  If the password is active, all settings can be viewed but not changed. The password prompt appears on leaving a setting table with the *Save and quit* command. Resetting the system configuration to default is also protected.

- **Calibration password**
  protects against unauthorized calibration.
  If this password is active, the password query appears on calling up calibration with Ⓒ. If no valid password is entered, calibration is blocked.

Configuring passwords

Activating/deactivating and changing passwords is carried out in the *SETTINGS -> System* menu.

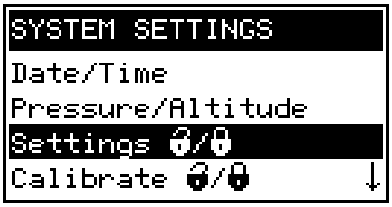


Fig. 4-11 SYSTEM SETTINGS menu

Operating notes

- The settings password is configured with the *Settings* 🔓 / 🔒 menu item.
- The calibration password is configured with the *Calibrate* 🔓 / 🔒 menu item.
- Any activating, deactivating or changing action requires the entry of the relevant current password.

5 The *SETTINGS* menu

5.1 Overview of the *SETTINGS* menu

Pressing Ⓢ switches from the measured value display to the *SETTINGS* menu (main menu).

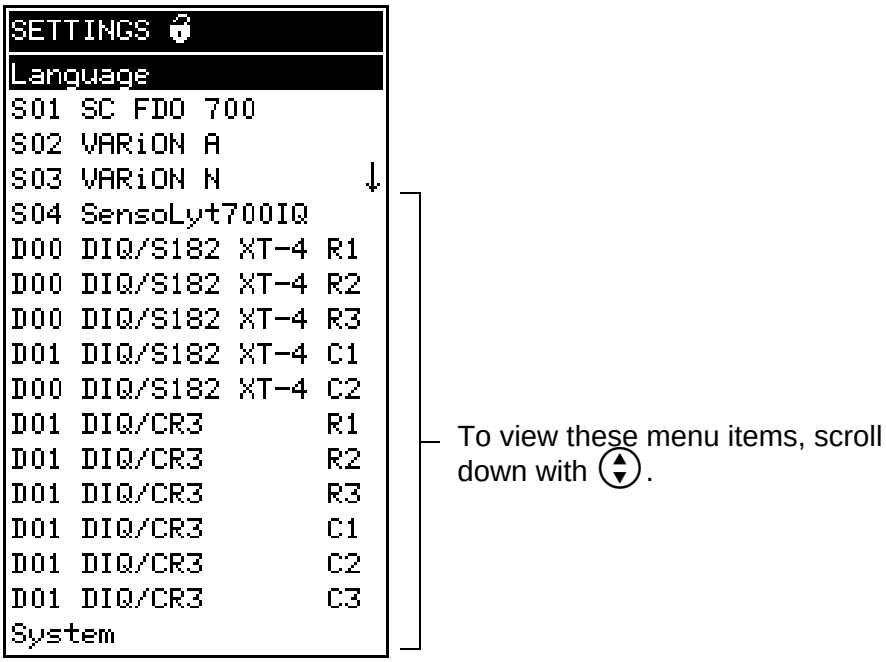


Fig. 5-1 Submenus in the SETTINGS menu

The individual submenus are described in the following paragraphs.

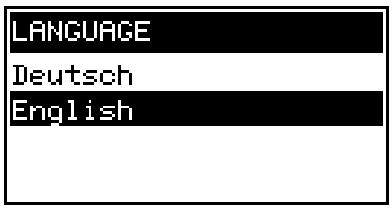
The entire system configuration can be saved on a PC and loaded back from there with the aid of the ConfigSaveLoad PC software. ConfigSaveLoad is part of the "IQ Softwarepack Connect" (see www.WTW.com).
More detailed information is given in the operating manual of the "IQ Softwarepack Connect" (see www.WTW.com).

5.2 *Language*

In this menu, you can set the system language.

Procedure: Selecting the language

1	Open the *SETTINGS* menu with Ⓢ.
2	Select and confirm the *Language* menu item with ⇕ and OK. The *LANGUAGE* display opens.



3	Select the required language from the list with ⇕ and confirm with OK. The selection is taken over immediately. The display switches to the higher menu level.
4	Switch to the measured value display with M.

If the selected system language is not available in a sensor, all displays of this sensor appear in the standard language, English. To activate the selected system language for this component, a software update of the component is required. Contact WTW.

5.3 Sensor S01 to S04

In this menu, you can assign a name of your choice to a sensor and adjust the sensor so it optimally meets the requirements of your application (measured parameter, measuring range, etc.).

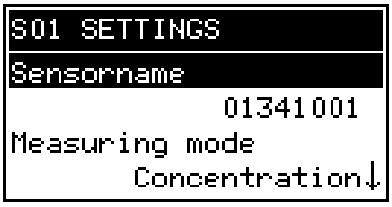
All settings are specific for the respective sensor type. They can only be modified if the sensor is connected and communicates properly with the DIQ/S 182-XT-4. Otherwise, the dataset is inactive. How to deal with inactive datasets is described below.

General steps for editing sensor settings are given below. The *Sensorname* menu item is always on the first position of the setting table. Details of further sensor settings can be found in the chapter, COMMISSIONING of the sensor operating manual.

Procedure: Carrying out settings

5	Open the *SETTINGS* menu with S.

6	Use ▲▼ and OK to select and confirm the *S0x Sensor* menu item (corresponding to sensor number). The following note appears: *If the measuring mode or measuring range is changed, the links of the sensor are erased. .*
7	If you want to continue, press OK. The setting table of the sensor is displayed.



8	Edit the setting table as described in section 4.3.2.

To accept all settings, highlight the *Save and quit* menu item at the lower end of the setting table and press OK. If you exit the setting table via M, ESC/*Quit* or the *Quit* menu item, all changes are ignored.

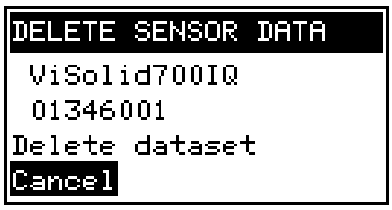
Inactive sensor datasets

An inactive dataset for an IQ sensor arises if the DIQ/S 182-XT-4 receives no signals from an IQ sensor that is already registered.The *Error* display appears on the measured value display instead of a measured value.

An inactive dataset can be reactivated by assigning it to, for example, an IQ sensor of the same type (see section 8.3.2). All settings are retained. If these data are no longer required, they can be erased. All the settings belonging to this IQ sensor as well as any links with outputs are deleted by this action.

Procedure: Deleting inactive datasets

1	Open the *SETTINGS* menu with S.
2	Using ▲▼ and OK select and confirm the *S0x Sensor* menu item (corresponding to sensor number). If the dataset is inactive, the following display appears:



3	Select *Delete dataset* with ⟲ and confirm with OK. The dialog window for the security prompt appears.
4	Select *Delete dataset* with ⟲ and confirm with OK. The inactive sensor is erased.

5.4 Outputs D00 to Dxx

These two menus can be used to link the sensors with the relay and current outputs of the DIQ/S 182-XT-4 and setting the outputs. The various setting options are described in detail in the chapter 6 OUTPUTS menu.

5.5 System

The settings in the *SYSTEM* menu comprise:

- *Date/Time*
- *Pressure/Altitude*
  This setting is important if you want to carry out D. O. measurements with the System 182.
  (adjustable range: 500 ... 1100 mbar or 0 ... 5955 m altitude).
- *Settings* 🔓 / 🔒
  Here you can configure the password for the settings.
  For details on the passwords, refer to section 4.6.
- *Calibrate* 🔓 / 🔒
  Here you can configure the password for calibration.
  For details on the passwords, refer to section 4.6.
- *Display contrast*
  Here you can set the display contrast for optimum readability.
- *Delivery state*
  Here you can reset all settings to the default values. Only the date, time and contrast setting for the display will remain stored. If the settings password is active, a password prompt appears before the reset. In any case a security prompt appears to prevent an inadvertent reset.

Delivery condition

Settings	Default values
Language	English
Pressure/Altitude	1013 mbar / 0 m
Settings password	1000 / inactive
Calibration password	1000 / inactive
Sensor settings	Sensor dependent (see settings tables in the respective sensor operating manual). Note: Calibration of the sensor is stored in the sensor and is retained when the system configuration is reset.
Relay outputs	No function, all links are erased
Current outputs	No function, all links are erased

6 Outputs

6.1 Outputs of the system 182 XT-4

The DIQ/S 182-XT-4 has six relay outputs and five current outputs. The outputs are spread over the two terminal strips as follows (Rx = relay output, Cy = current output):

Allocation of the outputs

Name in the menu *SETTINGS*	Front terminal strip	Rear terminal strip
DIQ/S182 XT-4 R1	R1	
DIQ/S182 XT-4 R2	R2	
DIQ/S182 XT-4 R3	R3	
DIQ/S182 XT-4 C1	REC C1	
DIQ/S182 XT-4 C2	REC C2	
DIQ/CR3 R1		R1
DIQ/CR3 R2		R2
DIQ/CR3 R3		R3
DIQ/CR3 C1		REC C1
DIQ/CR3 C2		REC C2
DIQ/CR3 C3		REC C3



The terminal strips are shown in section 3.13.

Functions for relay outputs

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

Relay outputs can be configured as openers or closers.

Functions for current outputs

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

You can view the current states of the relay and current outputs in the measured value and status display (see section 4.2).

Valve outputs (MIQ/CHV PLUS)

The MIQ/CHV PLUS valve module is administrated by the system as a valve output (designation, MIQ/CHV PLUS V1). The relevant setting tables are available via the *SETTINGS* menu.

The installation and settings of the valve module are described in the operating manual of the MIQ/CHV PLUS.

6.2 Linking and adjusting: general procedures

6.2.1 linking outputs

Linking options

The following options of linking outputs are available:

- *Sensor Sxx*
  The output is linked with sensor 0x
- *Sensor S01&S02*
  The output is linked to both sensors S01 and S02.
  This option is available for relay outputs only.
- *System*
  Select this option if you want to use the output for system monitoring (details, see section 6.4.2).

Procedure: linking outputs

Proceed as follows if the output was not yet linked. If you want to change a link, you have to erase the existing link first.

1	Open the *SETTINGS* menu with Ⓢ.
2	Select the menu item *Relay output Rx* or *mA output Cy* with ▲▼ and OK and confirm. A list with all linking options is displayed.



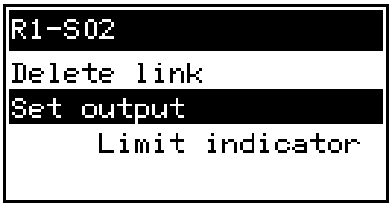
3	Select the required option with ▲▼ and confirm with OK. The output is linked. The link is displayed in the header when the setting of the output is edited.

6.2.2 Deleting a link with an output

If a link is no longer required, it can be erased.

Procedure: Erasing a link

1	Open the *SETTINGS* menu with S.
2	Select the menu item *Relay output Rx* or *mA output Cy* with ▲▼ and OK and confirm.

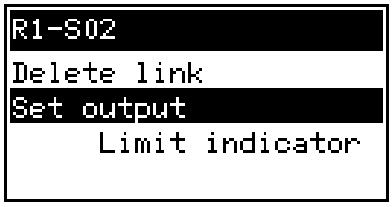


3	Using ▲▼, select *Delete link* and confirm with OK. A security prompt appears.
4	Using ▲▼, select *Delete link* and confirm with OK. The link is deleted.

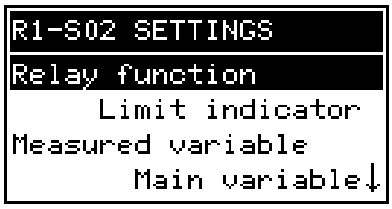
6.2.3 Setting outputs

Proceeding: Setting an output

1	Open the *SETTINGS* menu with Ⓢ.
2	Select the menu item *Relay output Rx* or *mA output Cy* with ▲▼ and Ⓞ and confirm.



3	Confirm the selection *Set output* with Ⓞ. The setting table of the output is displayed.



4	Edit the setting table as described in section 4.3.2.

To accept all settings, highlight the *Save and quit* menu item at the lower end of the setting table and press Ⓞ. If you exit the setting table via Ⓜ, ESC/*Quit* or the *Quit* menu item, all changes are ignored.

6.3 Basic information on relay functions

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

- Monitoring (see section 6.3.1)
- Limit indicator (see section 6.3.2)
- Proportional output (see section 6.3.3)

6.3.1 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 an opener. In the case of an error, the relay opens. As a result, the monitoring function operates even if, for instance, the supply voltage fails.

6.3.2 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 6-6).
- 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 6-6).



If the simple monitoring function (*Open*, *Close*) with one or two relays is not sufficient, use proportional output (see section 6.3.3).

Monitoring limiting values using one or two relays

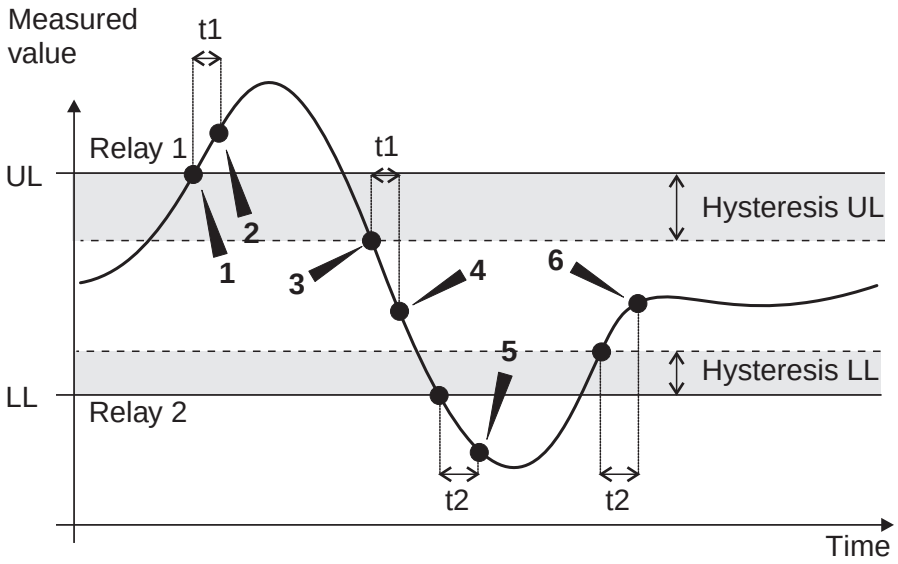


Fig. 6-1 Switching points for relays with the function of a limit indicator

1	Upper limit value (relay 1) exceeded
2	Selected switching delay t1 for relay 1 expired Relay 1 switches
3	Hysteresis for upper limiting value (relay 1) undercut
4	Selected switching delay t1 for relay 1 expired Relay 1 switches back
5	Lower limit value (relay 2) undercut Selected switching delay t2 for relay 2 expired Relay 2 switches
6	Hysteresis for lower limiting value (relay 2) exceeded Selected switching delay t2 for relay 2 expired Relay 2 switches back

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.

6.3.3 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 6-9) or
- switching frequency (frequency output, see page 6-10).

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 6-8).
- 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 6-8).

Output with one relay

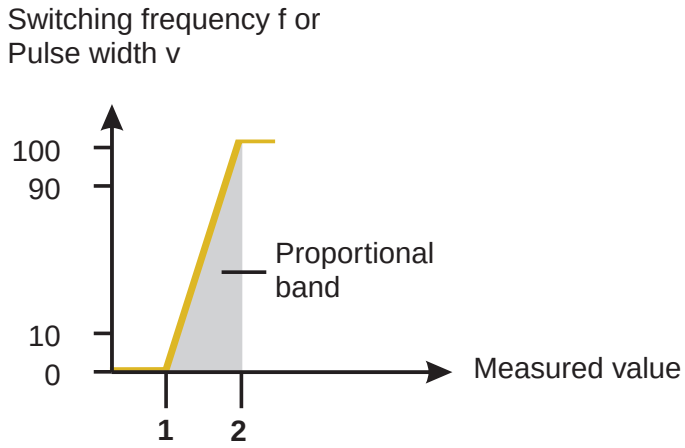


Fig. 6-2 Output with one relay

Output with two relays

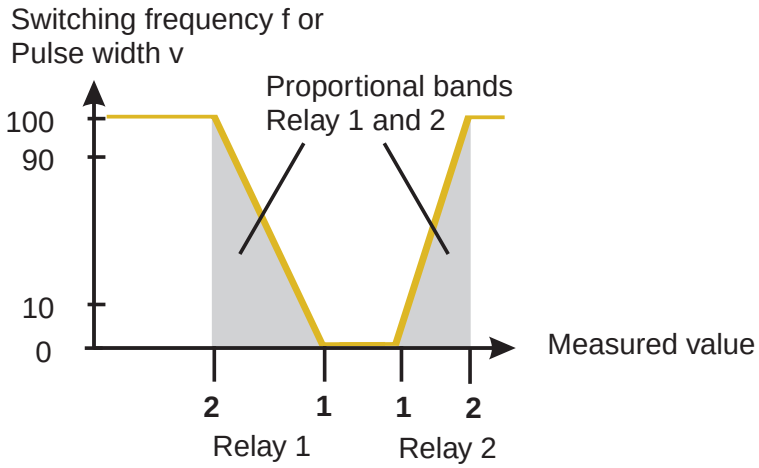


Fig. 6-3 Output with two relays

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

Pulse width output

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

Pulse-width regulation changes the duration of operation (ton) 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.

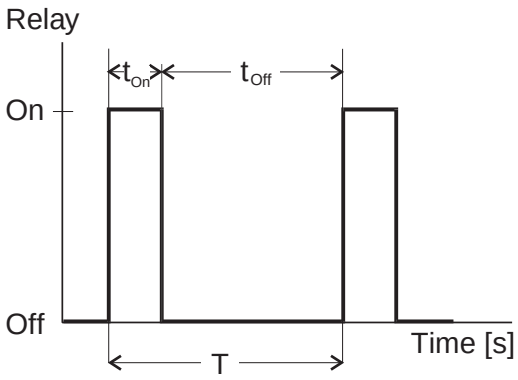


Fig. 6-4 Relay output of the pulse-width output

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.

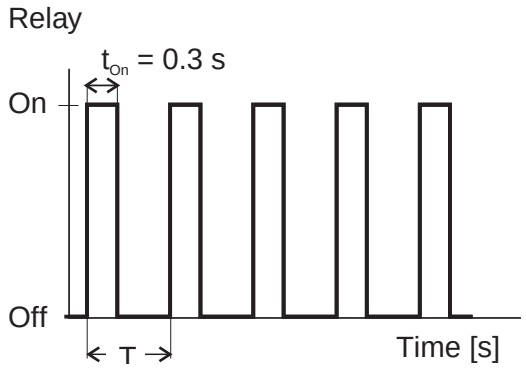


Fig. 6-5 Relay output of frequency output

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 6-12).
- 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 6-13).

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.

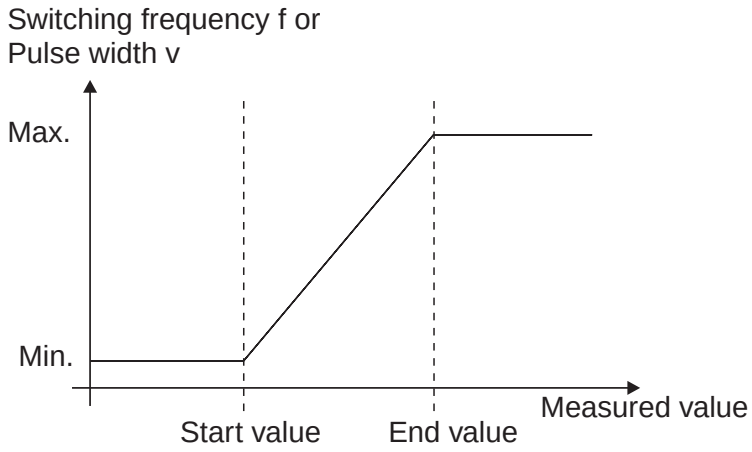


Fig. 6-6 Positive characteristic curve

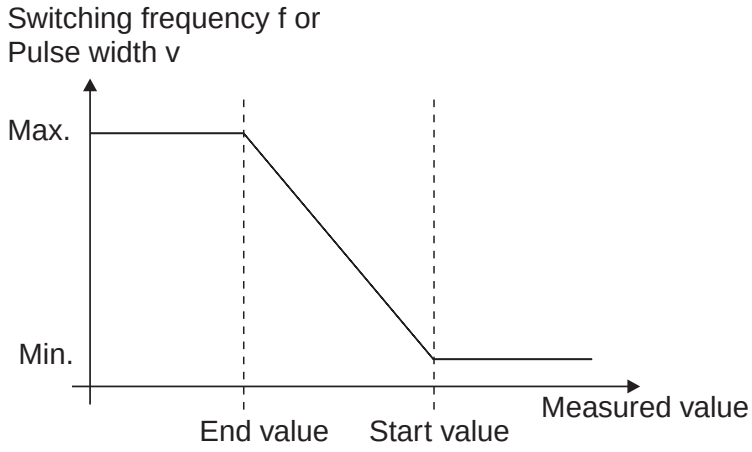


Fig. 6-7 Negative characteristic curve

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.

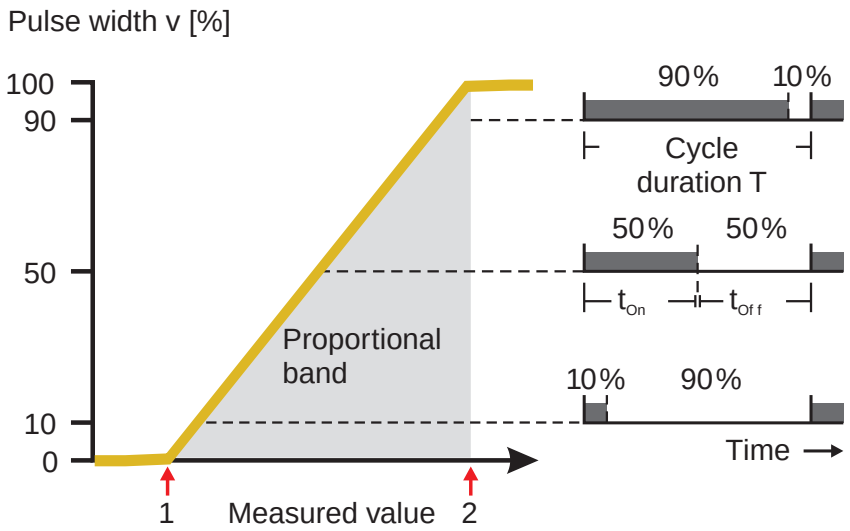


Fig. 6-8 Pulse width output

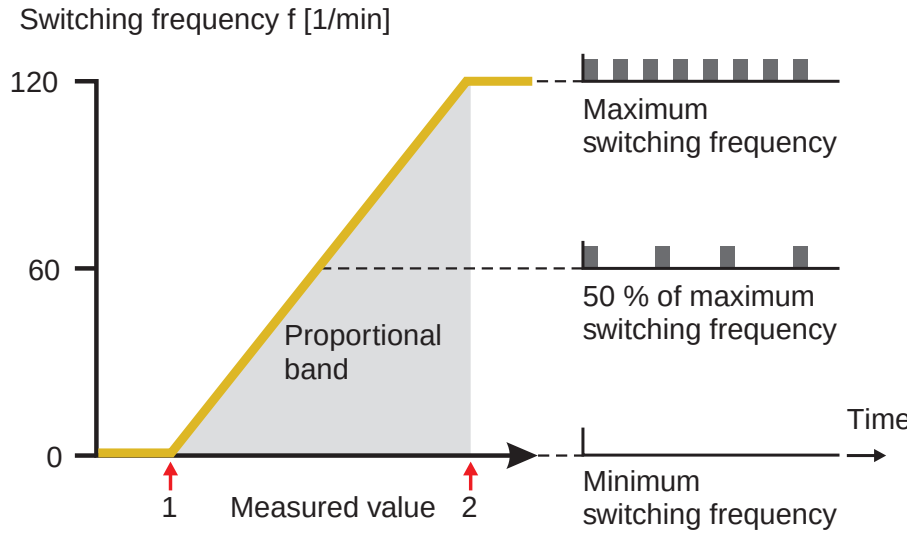


Fig. 6-9 Frequency output

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.

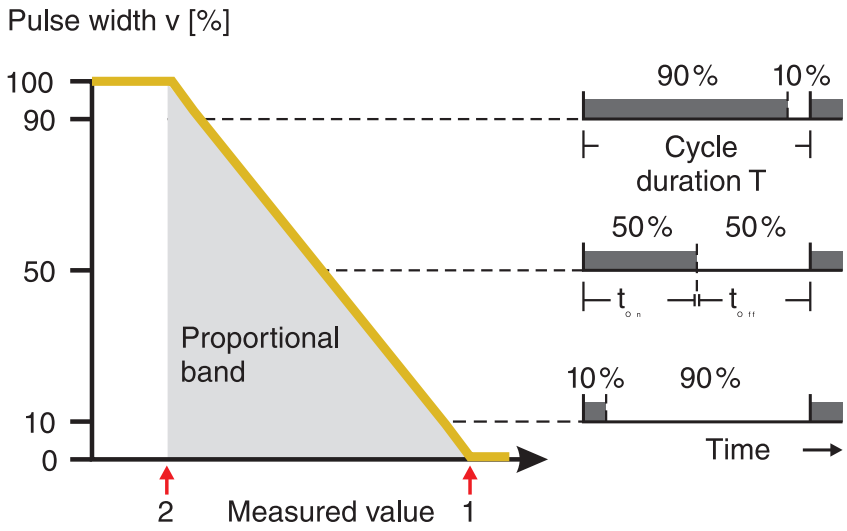


Fig. 6-10 Pulse width output

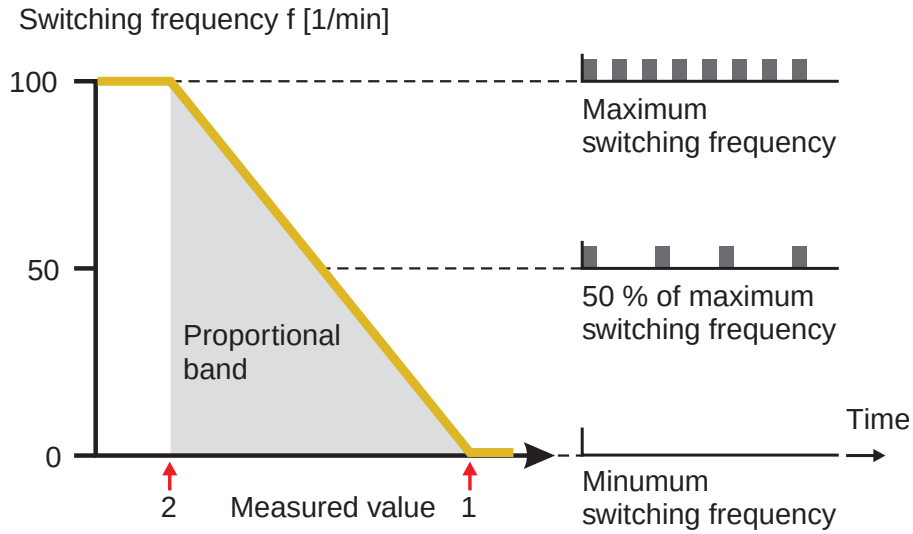


Fig. 6-11 Frequency output

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

6.4 Setting table for relays

6.4.1 Functions and settings

To set a relay, its function has to be selected first. Then the relevant setting table is displayed:

Relay function and relevant setting tables

Function	Setting table
No function	The relay output is not used.
System monitoring	See section 6.4.2
Sensor monitoring	See section 6.4.3
Limit indicator	See section 6.4.4
Frequency output	See section 6.4.5
Pulse-width output	See section 6.4.6
Sensor controlled	See section 6.4.7
Cleaning	See section 6.4.8
Manual control	See section 6.4.9

6.4.2 *System monitoring*

Function

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

To set up the *System monitoring* function for a relay output, you have to select the *System* option when linking the relay output (see section 6.2.1).

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 DIQ/S 182-XT-4. If the voltage falls below a critical value, the relay switches.
Collective error	*On* *Off*	The *Collective errorOn*function simultaneously monitors the proper function of all sensors. (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 at the controller does not supply a valid main measured value
- One of the sensors properly registered at the controller does not supply a valid secondary measured value

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).

6.4.3 *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 6.2.1).

Settings

Setting	Selection	Explanation
Errors	*All*	All sensor errors (special ones and general ones) are monitored and can prompt a relay action.
	Special	Special sensor errors 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 is monitored and can prompt a relay action.
Action	*Open*	For all functions of the *Sensor monitoring*, the relay action is set to *Open*.



Preferably set up the relay output as an opener for monitoring functions.

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)

6.4.4 *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 6.3.2).

In order to set up the *Limit indicator* function for a relay output, the relay output must be linked with a sensor (see section 6.2.1).

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	*Within the measuring range (sensor-dependent)*	Any upper or lower limiting value
Limit value LL		
Hysteresis UL	*0 - 10 % of the measuring range*	Hysteresis for upper or lower limiting value
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 6-34).
Action	*Open* *Close*	Relay action
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.

6.4.5 *Frequency output*

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 6.3.3).

In order to set up the *Frequency output* function for a relay output, the relay output must be linked with a sensor (see section 6.2.1).

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 6-34), the relay switches with the frequency specified.
Action	*Open* *Close*	Relay action

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*.

6.4.6 *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 6.3.3).

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 6.2.1).

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 6-34), the relay switches with the pulse-width specified.
Action	*Open* *Close*	Relay action

Characteristic curve

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

6.4.7 *Sensor controlled*

With the *Sensor controlled* function, the relay is controlled by a linked sensor.

Requirements

- Controller version from 2.80
- Sensor that transmits signals to trigger a cleaning cycle, e.g. UV/VIS sensor

Settings

Setting	Selection/Values	Explanation
Pulse length	*Automatic*	The duration of the air cleaning process is programmed in the sensor. The relay automatically takes over the cleaning duration from the sensor.
	0,5 s *1 s* *2 s* *3 s*	The relay finishes the cleaning after the selected interval.



Settings of the cleaning process can be done in the *SETTINGS* menu of the respective sensor.

6.4.8 *Cleaning*

Function

The *Cleaning* function enables the time controlled automatic start of the sensor cleaning function with the aid of a relay of the DIQ/S 182-XT-4. The relay controls the DIQ/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 6.2.1).

The assigned relay 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 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

The operativeness of the cleaning system can be tested as follows: manually open or close the relay with the *Manual control* function (see section 6.4.9) and, while doing so, check the behavior of the cleaning system.

Alternatively, the operativeness of the cleaning system can be tested by checking the performance of the function at the programmed start time (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 *Cleaning interval*.
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. The setting of the system clock can be found in section 5.5.

Example

Setting		Result
Reference time (h):	12	Reference time: 12:00 hours
Reference time (min):	0	This specifies the following start times:
Interval unit:	*Hours (h)*	04:00, 12:00 and 20:00 hours
Cleaning interval:	8 h	

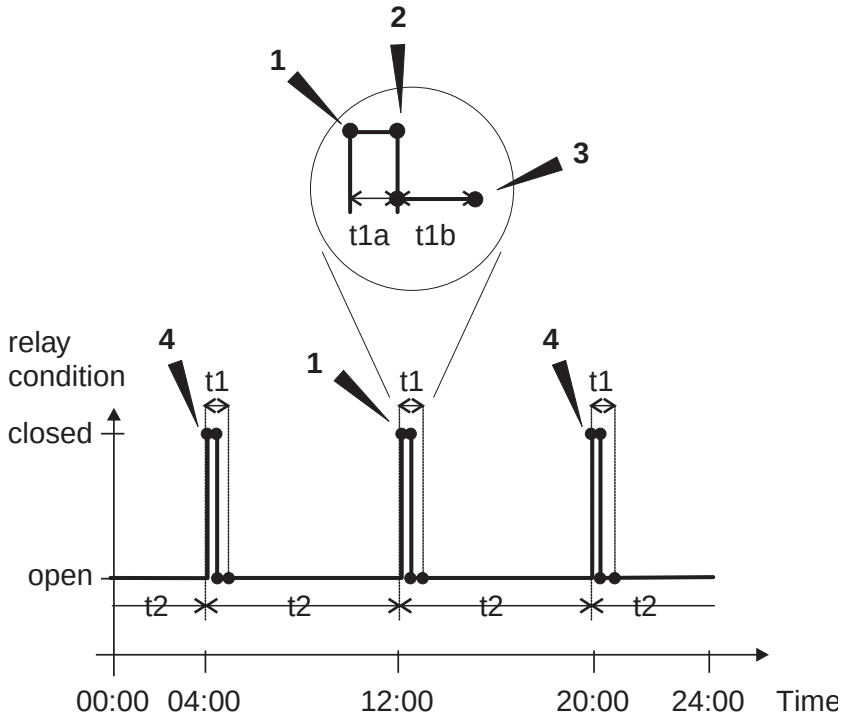


Fig. 6-12 Cleaning cycle

1	Reference time Start of a cleaning cycle (**t1**) Start of the specified *Cleaning duration* (**t1a**)
2	End of the specified *Cleaning duration* (**t1a**) Start 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**) Start of a cleaning cycle
t1	Cleaning cycle = *Cleaning duration* (**t1a**) *Adjustment time* **(t1b**) Linked outputs are frozen.
t2	*Cleaning interval*

Canceling the cleaning

A running cleaning cycle is canceled:

- Automatically
  - if the sensor switches to the inactive condition during the cleaning cycle
- Manually
  - By pressing Ⓒ
  - 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 6.6.2). As soon as the power is available, the outputs are released again. The next cleaning cycle will be performed at the time set up.

6.4.9 *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



The settings for other functions in the *Relay function* menu as, for example, *Frequency output* and *Pulse-width output* are retained while the *Manual control* is carried out.

6.5 Setting tables for current outputs

6.5.1 Functions and settings

To set a current output, its function has to be selected first. Then the relevant setting table is displayed:

Function of current outputs and relevant setting tables

Function	Setting table
No function	The current output is not used.
Recorder	See section 6.5.2
PID controller	See section 6.5.3
Fixed current value	See section 6.5.4

6.5.2 *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	*Within the measuring range (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 -> OFL/UFL	*Error*	Current values outside the range between *Start value* and *End value* are considerd as errors. 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 case of system errors and sensor errors, and in case of measured values outside the range between *Start value* and *End value*, the current output supplies the specified fixed current value. Possible values: 0 ... 21 mA.
	Unchanged	The current at the output remains unchanged.

6.5.3 *PID controller*

Function

The *PID controller* function can use an output as a controller output. The controller can be configured as a **P**roportional controller with a switchable **I**ntegral and **D**ifferential controller 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:

$$K = \frac{I_{max} - I_{min}}{X_p}$$

$$x_e = x_{set} - x_{act}$$

$$I_{min} \le I_{Controller} \le I_{max}$$

$I_{Controller}$	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_{act}	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 6-31).

By activating or deactivating the **I**ntegral (*ti*) and **D**ifferential (*td)* controller part, the following controller types can be configured:

Controller type	***td* [s]**	***ti* [s]**
P controller	0	0
PI controller	0	1 to 9999
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:

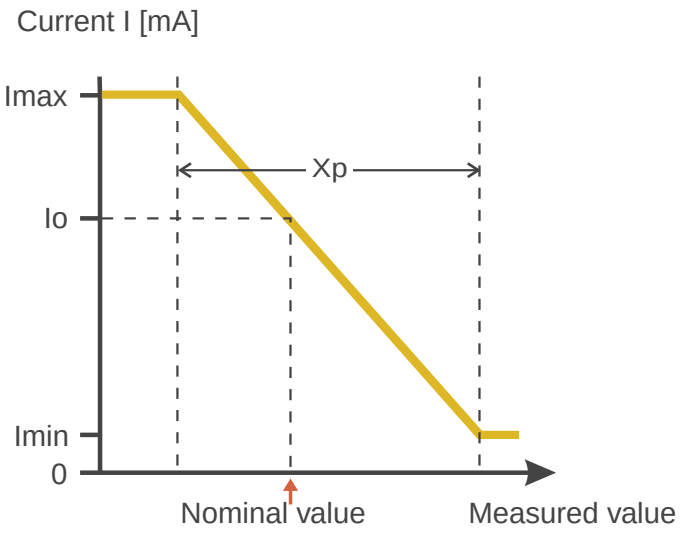


Fig. 6-13 Proportional controller (negative characteristic curve)

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 negative characteristic curve (example Fig. 6-13). 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:

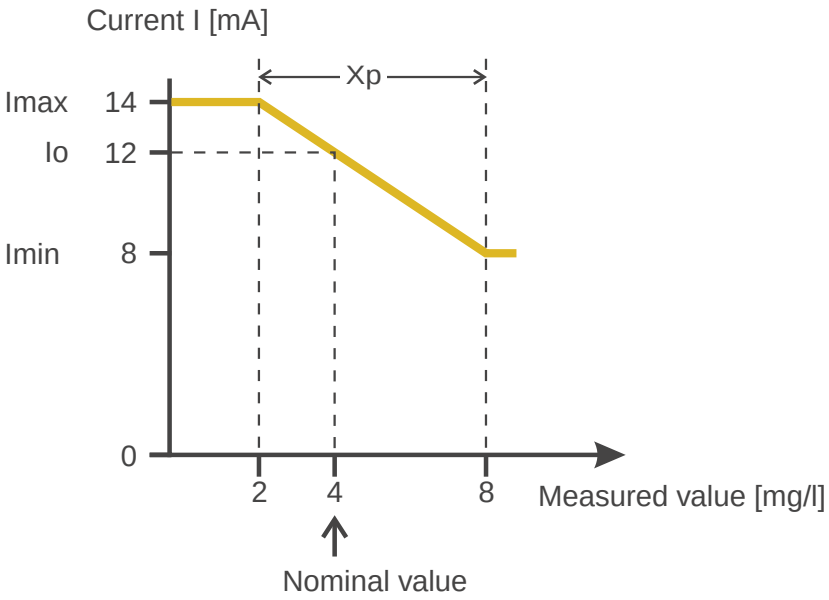


Fig. 6-14 Characteristic curve for application example

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 17 mg/l, for example, 11 mA is output:

$$I_{Controller} = 12\,mA + 1\frac{mA}{mg/l} \cdot (4\,mg/l - 5\,mg/l)$$

$$I_{Controller} = 12\,mA + 1\frac{mA}{mg/l} \cdot (-1\,mg/l) = 11\,mA$$

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.

6.5.4 *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.

6.6 Behavior of linked outputs

6.6.1 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
Limit indicator	*Behavior at error* (see section 6.4.4)
Frequency output	*Frequency with error* (see section 6.4.5)
Pulse-width output	*Error pulse width* (see section 6.4.6)
Recorder	*Current with error* (see section 6.5.2)

The specified behavior occurs with the following errors.

- The system is in the maintenance condition or displays *Init*, ----, *Cal*, *Clean*, *Error* or *OFL*.
  The meaning of these displays is given in section 4.2 of this operating manual.
- The supply voltage is too low.

6.6.2 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 *Messmodus* sensor setting for a linked sensor
- Changing the *Messbereich* 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 *Messmodus* or *Messbereich* sensor setting.

Settings in the non-active condition

Current output	Relay output
Current: 0 A	Relay: Open

7 Maintenance and cleaning

7.1 Maintenance

Maintenance activities

Component	Maintenance
IQ sensors	Depending on the type of sensor (see the component operating manual of the sensor)
DIQ/S 182-XT-4, DIQ modules, MIQ modules	No maintenance required

7.2 Cleaning

DIQ/S 182-XT-4, 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 housing.

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.

8 What to do if ...

8.1 Information on errors

Log book

The 182 XT-4 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 terminal. The log book is described in detail in section 4.4.3 Sensor status SXX.



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.

8.2 Error causes and remedies

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 a sensor

Cause	Remedy
– A system language was selected that is not available in the sensor. The English language was activated instead of the selected system language.	– Contact WTW, a software update is required for the respective components

8.3 Replacing system components

8.3.1 Replacing passive components

Passive components include all components that the controller cannot recognize.
These include:

- MIQ power supply modules
- DIQ/JB
- DIQ/CHV
- Cables (SNCIQ, SACIQ).



WARNING
If the DIQ/S 182-XT-4 and MIQ/PS power supply module is opened during operation, there is a danger to life due to possible hazard of electric shock. Before opening the Universal Transmitter, switch off the system and, if necessary, all external relay circuits that present a hazard of electric shock and secure the system against being switched on again.

Only ever replace components when the system is switched off. Defective components are removed in the reverse order to the installation (see chapter 3 INSTALLATION).

8.3.2 Adding and replacing IQ sensors

Inactive datasets of IQ sensors

If an IQ sensor is removed from the system, its settings remains stored in the DIQ/S 182-XT-4 as 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 recognized and added automatically.



The DIQ/S 182-XT-4 can display and administrate up to four main measured parameters. If necessary, an inactive dataset has to be erased to be able to add a new sensor.

To erase inactive datasets, see page 5-3.

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.

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.

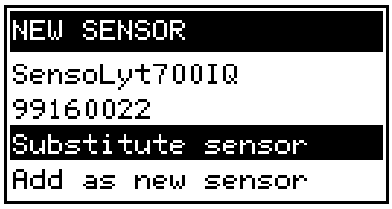
Case 2:

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 inactive IQ sensor. – be included as a new module in the list of the sensors. The operating sequence to do this is described below.

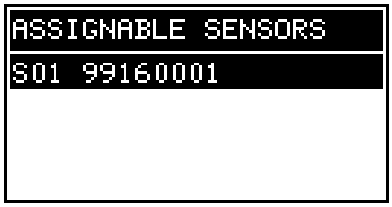
It is always possible to replace components and assign a substitute if the software state of the substitute component is as high or higher as the software version of the original component. Otherwise the component may not be accepted as a substitute component by the DIQ/S 182-XT-4.

Operating sequence in case 2

1	Connect the IQ sensor.
2	Change to the measured value display with (M). The module database is updated. The following display appears (example):



3	Select the required option with (↕) and confirm with (OK). – If *Add as 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 *Substitute sensor* was selected, a list with the assignable sensors or inactive datasets appears.



4	Select the required sensor 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 Technical data

9.1 DIQ/S 182-XT-4

Dimensions

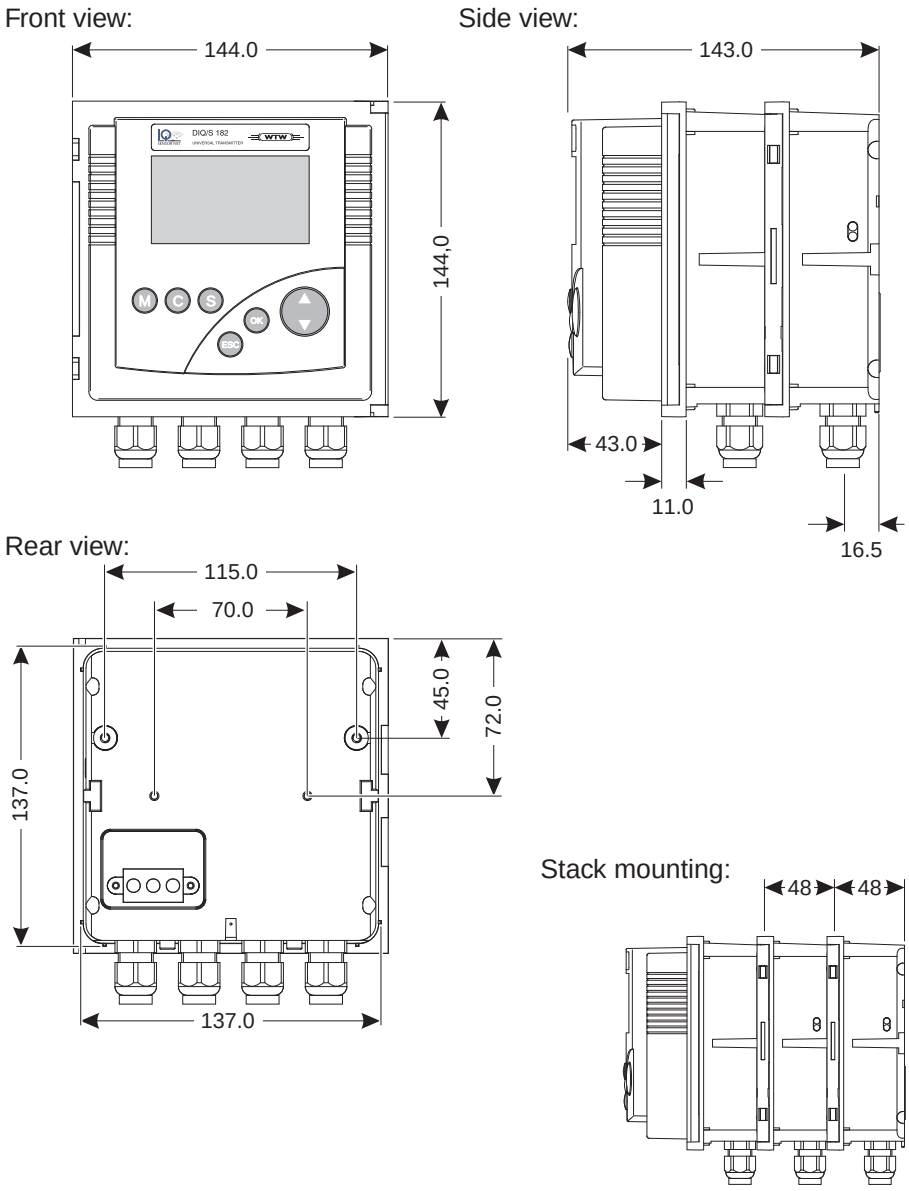


Fig. 9-1 Dimension drawing of the DIQ/S 182-XT-4 (dimensions in mm)

Test marks

CE

Mechanical construction

Enclosure material	Polycarbonate with 20 % glass fiber
Weight	Approx. 0.7 kg
Type of protection	– IP 66 – corresponds to NEMA 4X The DIQ/S 182-XT-4 is not suitable for conduit connection

Ambient conditions

Temperature	
Operation	- 20 °C ... + 55 °C (- 4 ... 131 °F)
Storage	- 25 °C ... + 65 °C (- 13 ... 149 °F)
Relative humidity	
Yearly average	≤ 90 %
Dew formation	Possible
Site altitude	Max. 2000 m above sea level

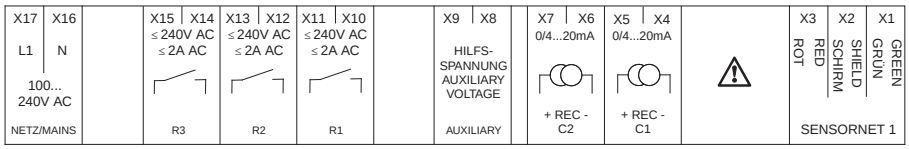
Electrical data DIQ/S 182-XT-4 (line power version)

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. 12 W

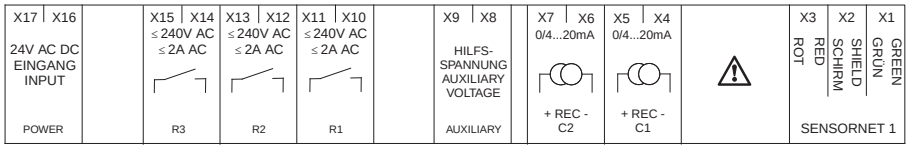
Electrical data DIQ/S 182-XT-4/24V (24 V AD/DC version)

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
Power consumption	max. approx. 12 W

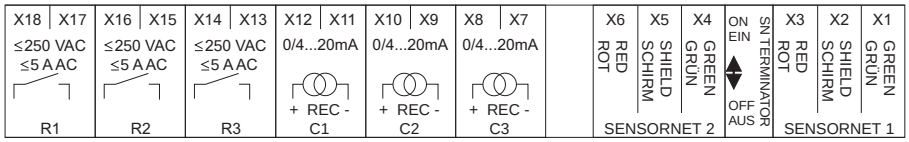
DIQ/S 182-XT-4, front terminal strip



DIQ/S 182-XT-4/24V, front terminal strip



DIQ/S 182-XT-4, rear terminal strip



Relay (6 x)

Output	Galvanically separated	
Max. switching voltage	Front terminal strip:	240 VAC or 24 VDC
	Rear terminal strip:	250 VAC or 24 VDC
Max. switching current	Front terminal strip:	2 A (AC and DC)
	Rear terminal strip:	5 A (AC and DC)
Fuse rating on the operator side	Front terminal strip:	max. 2 A
	Rear terminal strip:	Maximum 5 A
Relay functions	Programmable as: – Opener or closer – Limit monitor – Monitoring of the warning and error signals of the DIQ/S 182-XT-4 – Proportional frequency output – Proportional pulse width output	

Current outputs (5 x)

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	24 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

Terminals	Terminal type	Screw-type terminal strip, accessible by opening 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 B	
	System lightning protection	Extended protective characteristics as opposed to EN 61326	
	FCC, class A		

Any combination of the DIQ/S 182-XT-4 with IQ SENSOR NET products in a user-specific system achieves the listed EMC characteristics.

Instrument safety	Applicable norms	– EN 61010-1 – UL 61010-1 – CAN/CSA C22.2#61010-1

9.2 MIQ modules

Technical data on special MIQ modules are given in the respective operating manuals.

Dimensions

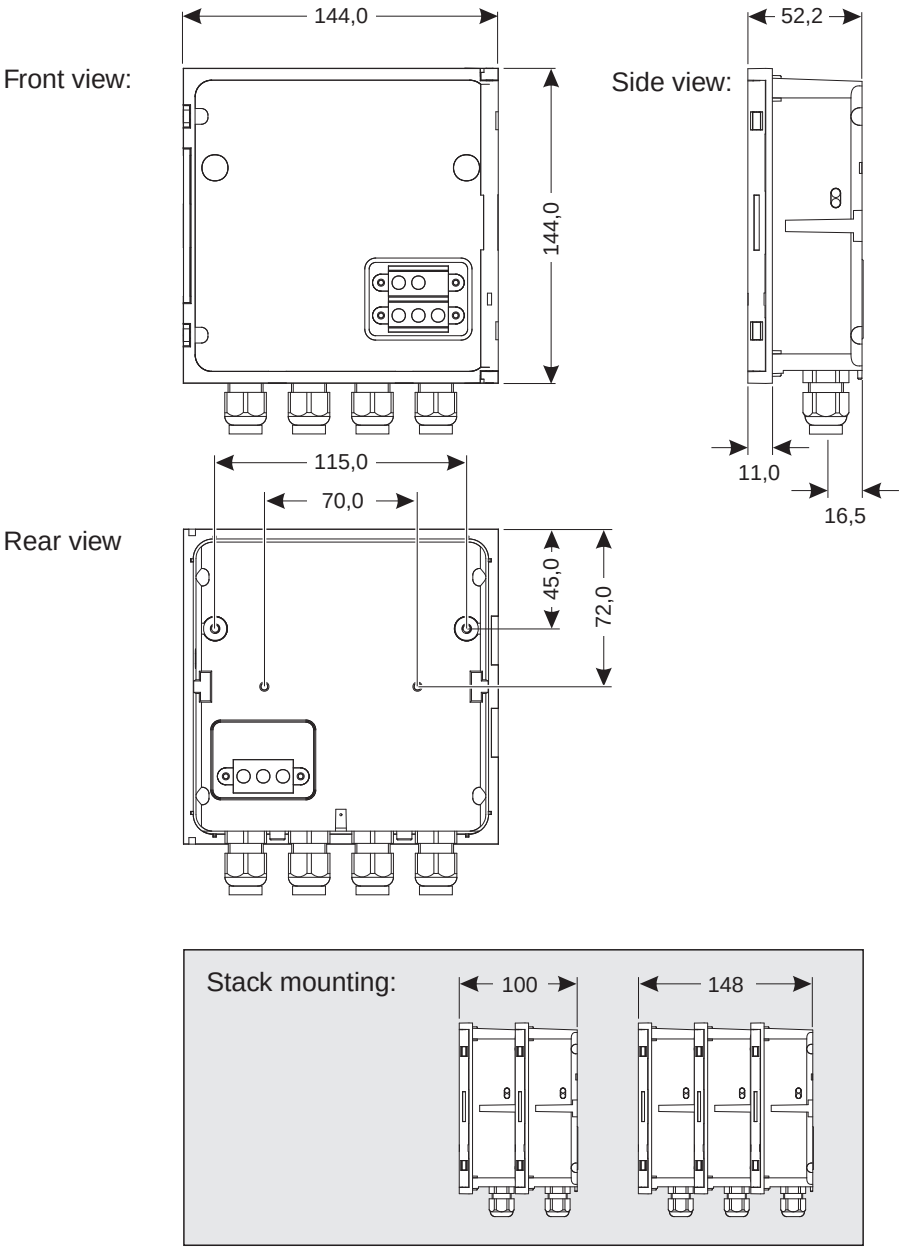


Fig. 9-2 Dimension drawing of MIQ module (dimensions in mm)

Mechanical construction	Maximum number of MIQ modules in a module stack	1 plus DIQ/S 182-XT-4
	Enclosure material	Polycarbonate with 20 % glass fiber
	Weight	Approx. 0.5 kg (type-dependent)
	Type of protection	– IP 66 – In accordance with NEMA 4X MIQ modules are not suitable for conduit connection
Terminal connections	SENSORNET connections	At least two in each MIQ module.
	Further connections	Module-dependent
	Terminal type	Screw-type terminal strip, accessible by opening 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

9.3 DIQ/JB

Dimensions

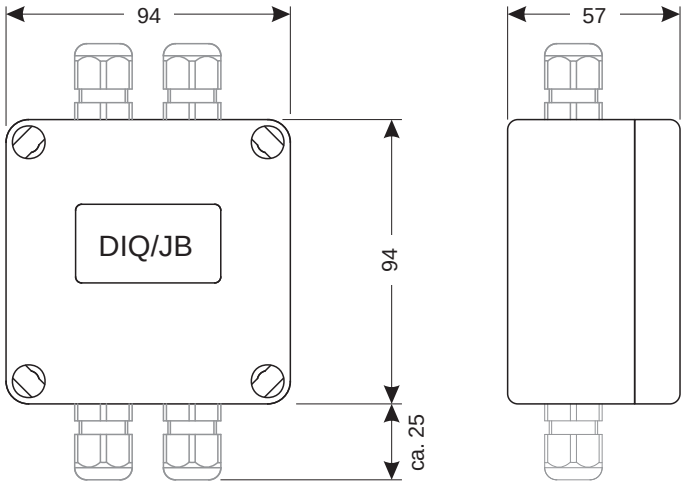
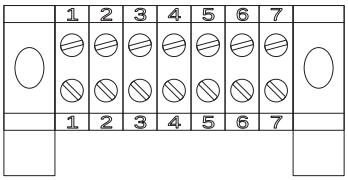


Fig. 9-3 Dimension drawing of DIQ/JB (dimensions in mm)

Mechanical construction

Enclosure material	Polystyrene
Weight	Approx. 0.2 kg
Type of protection	IP 66

Electrical connections



(7 passive, potential free terminals for line extension or branching)

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	

9.4 DIQ/CHV

Dimensions

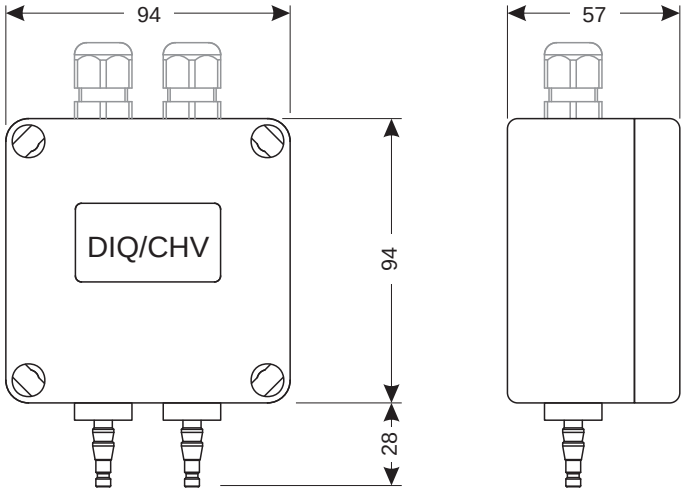


Fig. 9-4 Dimension drawing of DIQ/CHV (dimensions in mm)

Mechanical construction

Enclosure material	Polystyrene
Weight	Approx. 0.3 kg
Type of protection	IP 66

Electrical connections

- 1 x valve switching contact
- 4 x potential-free terminals to connect interface lines

Terminal strip inside the enclosure:



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 182-XT-4.

Compressed air

Required air quality	Dry, free of dust and oil
Operating pressure	Max. $7x10^5$ Pa (7 bar) absolute
Connections on the DIQ/CHV	6 mm hose nozzles

9.5 Space required by mounted components

Wall mounting and top hat rail mounting

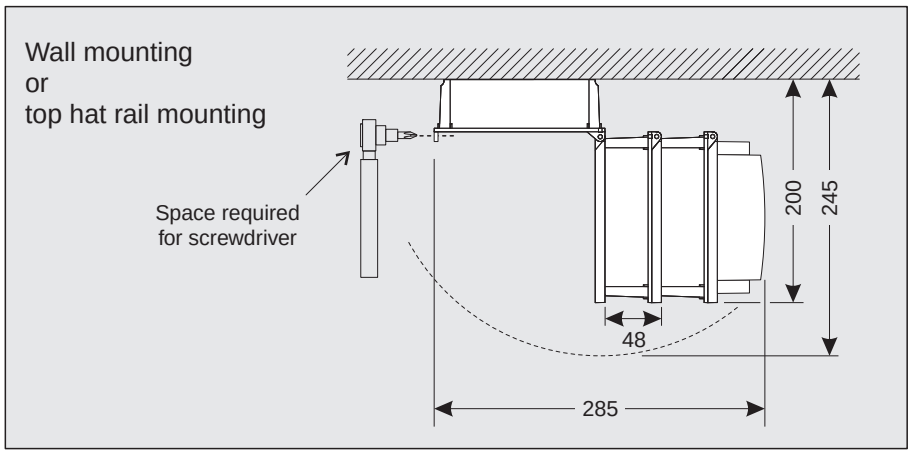


Fig. 9-5 Space required for wall and top hat rail mounting: (dimensions in mm)

Panel mounting

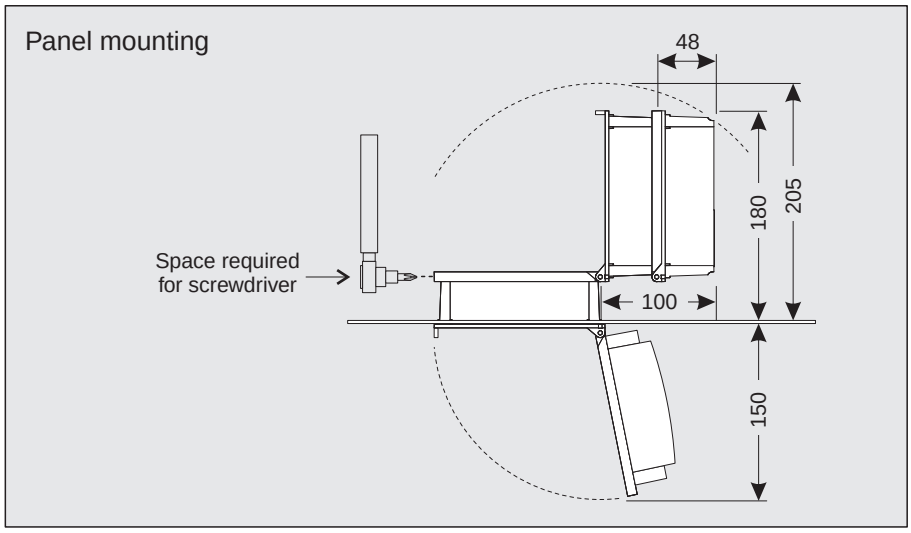


Fig. 9-6 Space required for panel mounting (dimensions in mm)

10 Accessories and options

Description	Model	Order no.
IQ SENSOR NET cable - please specify the required length in m with your order	SNCIQ SNCIQ/UG	480 046 480 047
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) – 75 m (seawater version) – 100 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-75.0 SW SACIQ-SO SW SACIQ-SO SW	 480 040 480 042 480 044 480 041V 480 045 480 066 480 060 480 067 480 062 480 064V
Set with four cable glands for cable sheath diameter of 7 to 13 mm	EW/1	480 051
Branching module	DIQ/JB	472 005
Valve module	DIQ/CHV	472 007
Set for mounting of one or two DIQ modules to a WTW mounting stand	MS/DIQ	472 009
Sun shield for the DIQ/S 182-XT-4	SSH/IQ	109 295
Set for wall mounting of the DIQ/S 182-XT-4 or an MIQ module	WMS/IQ	480 052
Set for panel mounting of the DIQ/S 182-XT-4 or an MIQ module; switch panel aperture 138 x 138 mm according to DIN 43700 or IEC 473 (max. thickness 15 mm)	PMS/IQ	480 048
Set for mounting of the DIQ/S 182-XT-4 or an MIQ module on a 35 mm top hat rail according to EN 50022	THS/IQ	480 050



Other accessories for the IQ SENSOR NET system are given in the WTW catalog or in the Internet.

11 Index

A

Air pressure 5-4
Altitude 5-4
Ambient conditions 9-2
Analog output (mA output) 6-26
Auxiliary voltage
  Terminal strip 3-53
  Usage 3-44

C

Calibration
  Calibration data 4-11
  General proceeding 4-15
Calibration data 4-11
Cleaning
  compressed air-driven 6-21
  of module enclosures 7-1
Compressed air cleaning 6-21
Configuring passwords 4-17
Contact base 3-11, 3-14
Contrast (display) 5-4
Current outputs
  Behavior in case of error 6-34
  Behavior in non-operative condition .. 6-34
  Display of states 4-2
  Functions and settings 6-25
  Terminal strip 3-53

D

Date/time 5-4
Delivery condition 5-5
Dimensions
  DIQ/S 182 9-1
  DIQCHV 9-9
  DIQJB 9-8
  MIQ modules 9-6
Display contrast 5-4

E

Effects of the weather 3-23
Electrical data
  DIQ/S (24 V version) 9-3
  DIQ/S (line power version) 9-2
EMC characteristics 9-5
erasing a link 6-3
Error symbol 4-3, 4-11

F

Frequency output (relay) 6-18

I

Inactive dataset 5-3, 8-2
Info symbol 4-3, 4-11

K

Key functions 4-1

L

Language 5-1
  Setting 5-1
  System language 5-1
Lightning protection
  External protective measures 3-7
  Installation guidelines 3-6
  Internal protective measures 3-7
Limit indicator (relay) 6-17
Line length, maximum 3-17, 3-21
Line power connection
  24 V version 3-39
  Line power version 3-35
Linking outputs 6-2
Log book 8-1
  open 4-13
  Structure 4-12

M

Maintenance activities 7-1
Maintenance condition
  automatic activation 4-10
  during calibration 4-10
  during compressed air cleaning 4-10
  during maintenance 4-10
  General information 4-9
Measured values
  Double display 4-2
  Single display 4-2
Message code 4-13
Message text 4-13
Mounting
  Connecting MIQ modules 3-9

Distributed mounting 3-17

O

Operating elements 4-1

P

Password
Calibration 4-17
Settings 4-17
PID controller (mA output) 6-28
Power failure 1-4
Power rating 3-3
Power requirement 3-3
Pulse width output (relay) 6-19

R

Relay
Behavior in case of error 6-34
Behavior in non-operative condition ..6-34
Display of states 4-2
Functions and settings 6-14
Terminal strip 3-53
Replacement
of IQ sensors 8-2
of passive components 8-2

S

Sensor conditions, special ones 4-3
Sensor connection cable SACIQ 3-21
Sensor monitoring (relay) 6-16
Sensor status 4-11
Sensor-controlled cleaning 6-20
SENSORNET connection (terminal strip) 3-53
SNCIQ cable 3-17
SNCIQ/UG earth cable 3-17
Special user qualifications 2-3
Stack expansion
backwards 3-14
forwards 3-11
Start checklist 3-46
Starting the system 3-46
Status
sensor 4-11
System 4-8
System language 5-1
System monitoring (relay) 6-15
System status 4-8

T

Target group 2-2
Terminal strips (figures) 3-53
Time 5-4
Toggle switch 4-1
Types of installation 3-23

12 Appendix (store separately if required)

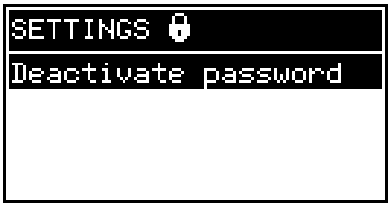
12.1 Forgotten the password?

Procedure:
Prompt for the password

1	Open the *SETTINGS* menu with Ⓢ.
2	Depending on the password to be prompted, use ▲▼ and OK to select and confirm the menu item, *Settings* 🔓 / 🔒 or *Calibrate* 🔓 / 🔒. The following display appears:



or



3	First press Ⓒ, then press Ⓢ. The current password is displayed.



4	Quit the display of the password with OK.

12.2 Default passwords

In the default condition of the DIQ/S 182-XT-4 both passwords are set to 1000.

Xylem |ˈzīləm|

1) Das Gewebe in Pflanzen, das Wasser von den Wurzeln nach oben befördert;
2) ein führendes globales Wassertechnikunternehmen.

Wir sind 12.000 Menschen, die ein gemeinsames Ziel eint: innovative Lösungen zu schaffen, um den Wasserbedarf unserer Welt zu decken. Im Mittelpunkt unserer Arbeit steht die Entwicklung neuer Technologien, die die Art und Weise der Wassernutzung und Wiedernutzung in der Zukunft verbessern. Wir bewegen, behandeln, analysieren Wasser und führen es in die Umwelt zurück, und wir helfen Menschen, Wasser effizient in ihren Haushalten, Gebäuden, Fabriken und landwirtschaftlichen Betrieben zu nutzen. In mehr als 150 Ländern verfügen wir über feste, langjährige Beziehungen zu Kunden, bei denen wir für unsere leistungsstarke Mischung aus führenden Produktmarken und Anwendungskompetenz, unterstützt durch eine Tradition der Innovation, bekannt sind.

Weitere Informationen darüber, wie Xylem Ihnen helfen kann, finden Sie auf xyleminc.com

WTW
a xylem brand

Wissenschaftlich-Technische Werkstätten GmbH

Dr.-Karl-Slevogt-Straße 1
D-82362 Weilheim
Germany

Tel: +49 881 183-0
Fax: +49 881 183-420
E-Mail: info@wtw.com
Internet: www.wtw.com