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Operating manual

IQ SENSOR NET MIQ/TC 2020 XT



Modular multiparameter measuring system,
Terminal/Controller MIQ/TC 2020 XT

**Note**

For the most recent version of the manual, please visit www.ysi.com.

Up-to-dateness of instrument software

The continuous development of the instrument software is part of the consequent improvement process of the instrument software. The current instrument software for the MIQ/TC 2020 XT is available on the Internet. It can be transferred to your instrument with the aid of USB memory device. More detailed information is given on the Internet under www.ysi.com.

Saving the password

If access control is enabled for the IQ SENSOR NET and the administrator password is lost, quick administrator access to the IQ SENSOR NET is not possible (access control: see section 5.4).

To avoid the loss of the password we recommend to create a back-up of the administrator password. This also applies to the use of the electronic key.

To be on the safe side, you can store the administrator password on an electronic key and/or note it on paper or a PC. Store the passwords in a safe place.

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1 Overview

1.1 How to use this system operating manual

Structure of the IQ SENSOR NET operating manual

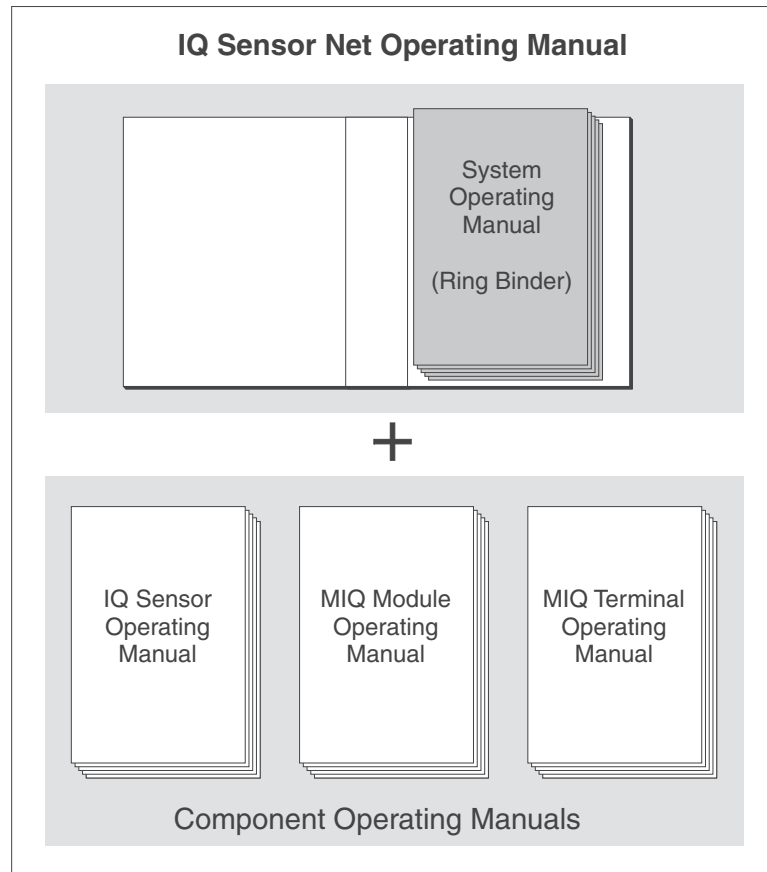


Fig. 1-1 Structure of the IQ SENSOR NET operating manual

The IQ SENSOR NET operating manual has a modular structure like the IQ SENSOR NET system itself. It consists of this system operating manual and the operating manuals of all the components used.

The space in the ring binder behind the system operating manual is intended for filing the component operating manuals. Please file all component operating manuals here so that all information is quickly available in one location.

1.2 The IQ SENSOR NET system 2020 XT USB

1.2.1 Structure of the system

The IQ SENSOR NET is a modular measuring system for online analysis. Modular means that the essential functional units of the measuring system are distributed in components that can be individually compiled for special applications.

The essential functional units of the IQ SENSOR NET system 2020 XT USB include:

- Terminal/controller
- IQ sensors
- Inputs (current inputs)
- Outputs (relay contacts, current outputs, valve outputs)
- Additional terminals (mobile terminals, software terminal)
- Help functions (e.g. power supply unit).

System communication

The functional units are connected with one another via a common line (Fig. 1-2). The line consists of two wires and a shield. It transports digital information between the controller and the other modules. At the same time, the line is used to supply all modules with electrical voltage from a power supply unit. The power supply unit is only required for the power supply and is not used in the system communication.

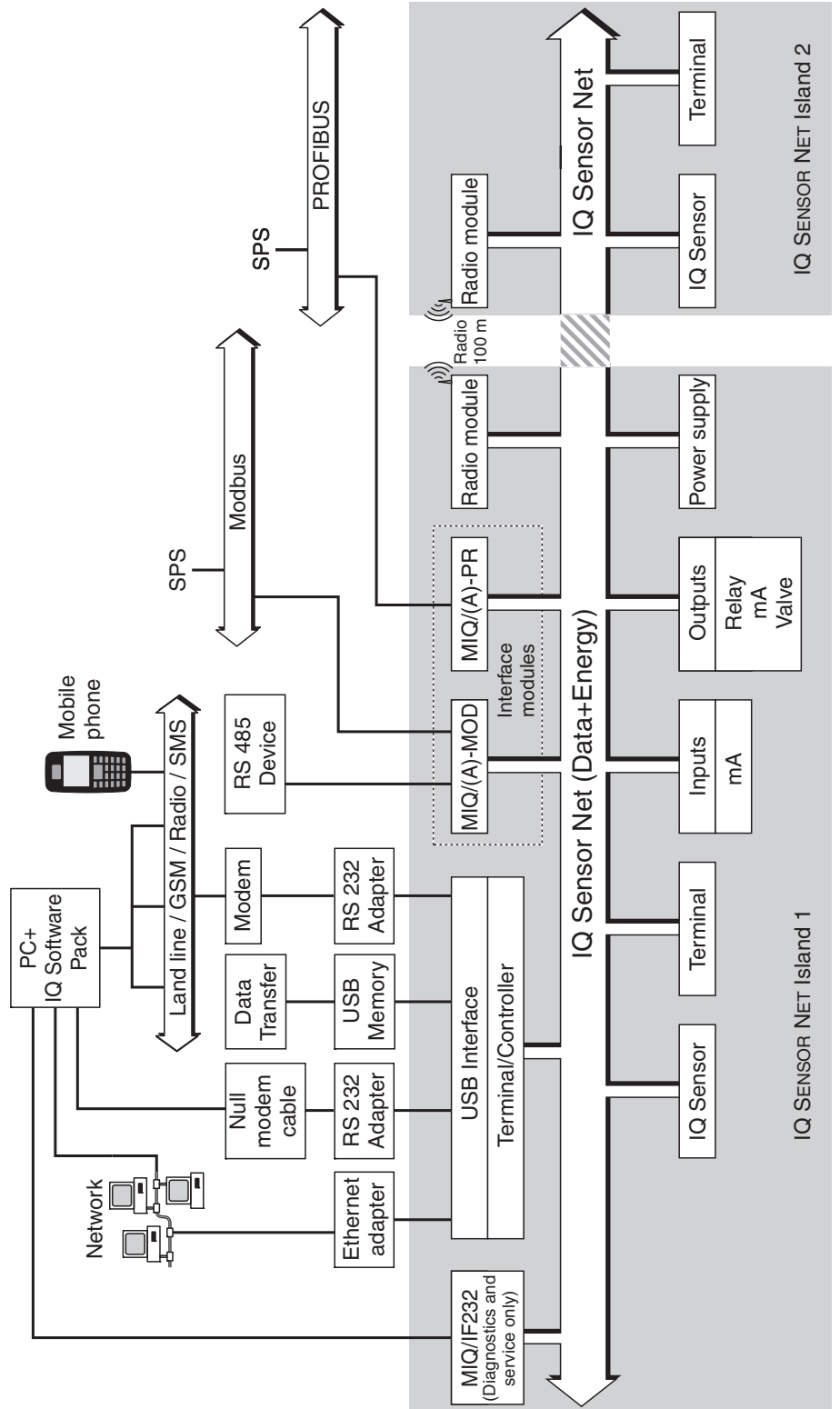


Fig. 1-2 Functional units of the IQ SENSOR NET System 2020 XT USB

1.2.2 Functions in the IQ SENSOR NET

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

Function	Component
Alarm messages	System
Analog output	Current output module
Data logging	System
Data recording (PC)	IQ software pack
Data transmission (PC)	IQ software pack
Data backup on USB memory device	MIQ/TC 2020 XT
Data communication (Profibus)	MIQ/(A)-PR
Data communication (Modbus)	MIQ/(A)-MOD
Remote data transmission (modem)	MIQ/TC 2020 XT + USB RS232 adapter
Datalogger	IQ software pack
Data server	IQ software pack
Differential sensor	System
Frequency output	Relay output module
Limit monitor	Relay output module
Calibration history	System
List of outputs, list of sensors	System
Log book	System
Log book (messages from components)	IQ sensor Output module
Measured value representation (4 types)	System
Password	System
PID controller	Current output module
Pulse-width output	Relay output module
Sensor cleaning	Relay output module Valve module
Local settings	System
Daily, weekly, monthly load diagram	System
Monitoring functions (sensors, system)	Output module
Access control	System

1.2.3 Possible ways to communicate with the IQ SENSOR NET

Digital communication

The IQ SENSOR NET can communicate with humans and machines via different interfaces.

The following page provides an overview:

- who can communicate with the IQ SENSOR NET
- what interfaces and components are required for this
- which functions are available with which interface

Current and relay interfaces

In addition to the digital communication, output modules provide relay and current outputs. These can be used for control, feedback control and monitoring functions.

Available functions Who communicates with the IQ Sensor Net via which interface/component	Direct actions via the terminal user interface	Viewing/transmitting current data: – Measured values – Status info – Alarm messages	Viewing/transmitting logged data: – Measured values – Measured value status	System configuration, – save/load – view – print	Calibration data, view/transmit
Human					
Terminal/controller MIQ/TC 2020 XT + USB memory device	X	X	X	X	X
Human + PC					
MIQ/IF232 + IQ software pack	X	X	X	X	X
MIQ/TC 2020 XT + USB RS232 adapter + null modem cable + IQ software pack	X	X	X	X	X
Human + PC + modem					
MIQ/TC 2020 XT + USB RS232 adapter + modem (analog, GSM, or radio) + IQ software pack	X	X	X	X	X
Human + PC/mobile phone + modem					
MIQ/TC 2020 XT + USB RS232 adapter + GSM modem communication via SMS		X			
PROFIBUS DP-V1					
MIQ/(A-)PR		X			
Modbus					
MIQ/(A-)MOD; Modbus RTU operation		X			
MIQ/(A-)MOD; Point-to-point communication via RS485		X			
Network (TCP/IP)					
MIQ/TC 2020 XT + USB Ethernet adapter	X	X	X	X	X
Client + Server + PC ("data logger")					
MIQ/IF232 + IQ software pack (+ network)		X			X

1.2.4 Components of the system 2020 XT USB

Minimum configuration (basic components)

The following basic components are required for a 2020 XT USB system:

- An MIQ/TC 2020 XT, configured as controller
- A power supply module (e.g. MIQ/PS)
- At least one IQ sensor.

IQ sensors, main and secondary measured values

Sensors provide main measured values (e.g. pH, D. O. concentration, turbidity value...) and additionally, depending on the type, secondary measured values (e.g. temperature). In the System 2020 XT USB, digital YSI single sensors and double sensors can be used:

- Single sensors provide a main measured value and normally a secondary measured value (example: TriOxmatic 700 IQ → D. O. + temperature).
- All active 0/4-20 mA inputs of the MIQ/IC2 input module rank among the single sensors. Via a 0/4-20 mA input, any external instruments can be connected to the IQ SENSOR NET via their current output. Each input provides a main measured value.
- Double sensors provide up to two main measured values and normally a secondary measured value (example: VARiON 700 IQ → ammonium + nitrate + temperature).

Each main measured value occupies a sensor location in the IQ SENSOR NET. A double sensor with two active main measured values thus occupies two sensor locations. The available sensor locations can be occupied by any single or double sensors.

Extension components

The system can be adapted to fulfill different specifications by adding further components, e.g. by:

- Terminals. They are the operation and communication units for the IQ SENSOR NET. Available are:
 - MIQ/TC 2020 XT for operation of the system from various locations, e.g. calibration of IQ sensors on site (compatible terminals, see section 1.4)
 - MIQ/T2020 PC software terminals. The connection to the PC can be established with the MIQ/IF232 interface module and the RS 232 interface of the PC or a remote connection with a modem (set for radio transmission, see chapter 10).
- Output modules with relay, current and valve outputs. Valve outputs enable the time controlled, compressed air operated cleaning of the sensor.

Each current output, relay output and valve output occupies an output channel in the IQ SENSOR NET. The available output channels can be assigned to outputs arbitrarily.

- Power supply modules for power supply
- MIQ/JB and MIQ/JBR branching modules to branch the system and to connect IQ sensors and terminals
- MIQ/Blue PS radio modules for wireless connection within the IQ SENSOR NET.

Maximum configuration

Maximum configuration of the IQ SENSOR NET system 2020 XT USB:

Component or resource	Maximum number
Terminal/controller MIQ/TC 2020 XT	1 (registered as a controller)
Sensor locations, can be occupied by: <ul style="list-style-type: none"> – Single sensors – Double sensors – 0/4-20 mA inputs 	20
Terminal locations, can be occupied by: <ul style="list-style-type: none"> – Mobile terminals (MIQ/TC 2020 XT) – MIQ/T2020 PC software terminal. 	3
Output channels, can be occupied by: <ul style="list-style-type: none"> – Current outputs – Relay outputs – Valve outputs 	48
Power supply modules (e.g. MIQ/PS)	6
MIQ/JB branching modules	25
MIQ/JBR branching modules with integrated signal processing	2
MIQ/Blue PS radio modules	Several transmission paths (see operating manual of the MIQ/Blue PS)
Modbus module	1
PROFIBUS module	1

Connecting MIQ modules

There are two basic mounting variants for connecting the MIQ modules:

- **Stack mounting** - permanent mechanical and electrical connection. The housings of the MIQ modules are permanently mounted on one another to form a stack. No cabling is necessary.
- **Distributed mounting** - electrical connection via cable. Locally separated MIQ modules or module stacks are connected with one another via the SNCIQ or SNCIQ/UG cable.

The following diagram shows an IQ SENSOR NET system with two mounting variants (Fig. 1-3).

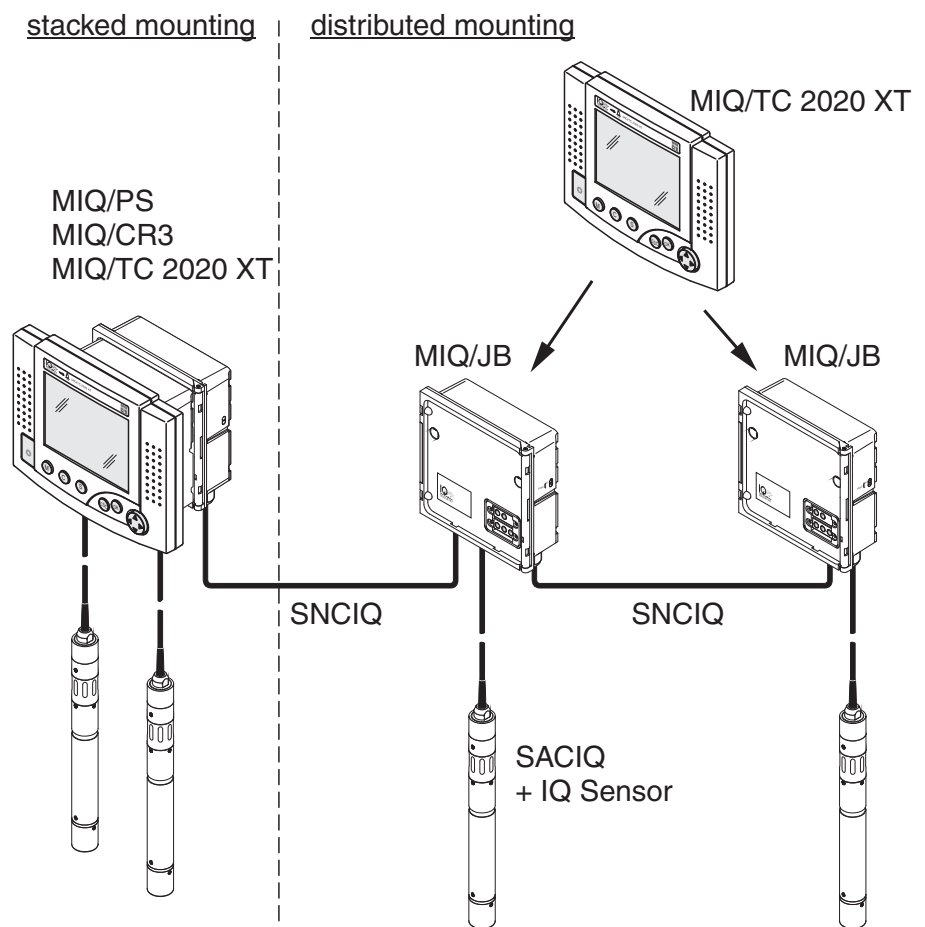


Fig. 1-3 Example of an IQ SENSOR NET system configuration

IQ sensors

Up to 20 IQ sensors of any type can be used in the system 2020 XT USB. They can be connected to any MIQ module that has a free connection for the IQ SENSOR NET. The connection between the IQ sensor and MIQ module is made via the SACIQ sensor connection cable. The IQ sensor connection cable is connected with the plug head connector of the IQ sensor via a screwable socket to form a watertight connection. As a result, the IQ sensor can be quickly removed for maintenance activities and then connected again.

1.2.5 MIQ modules

Some of the IQ SENSOR NET components are so-called MIQ modules with different functions.

All MIQ modules have a standard housing with the following features (Fig. 1-4):

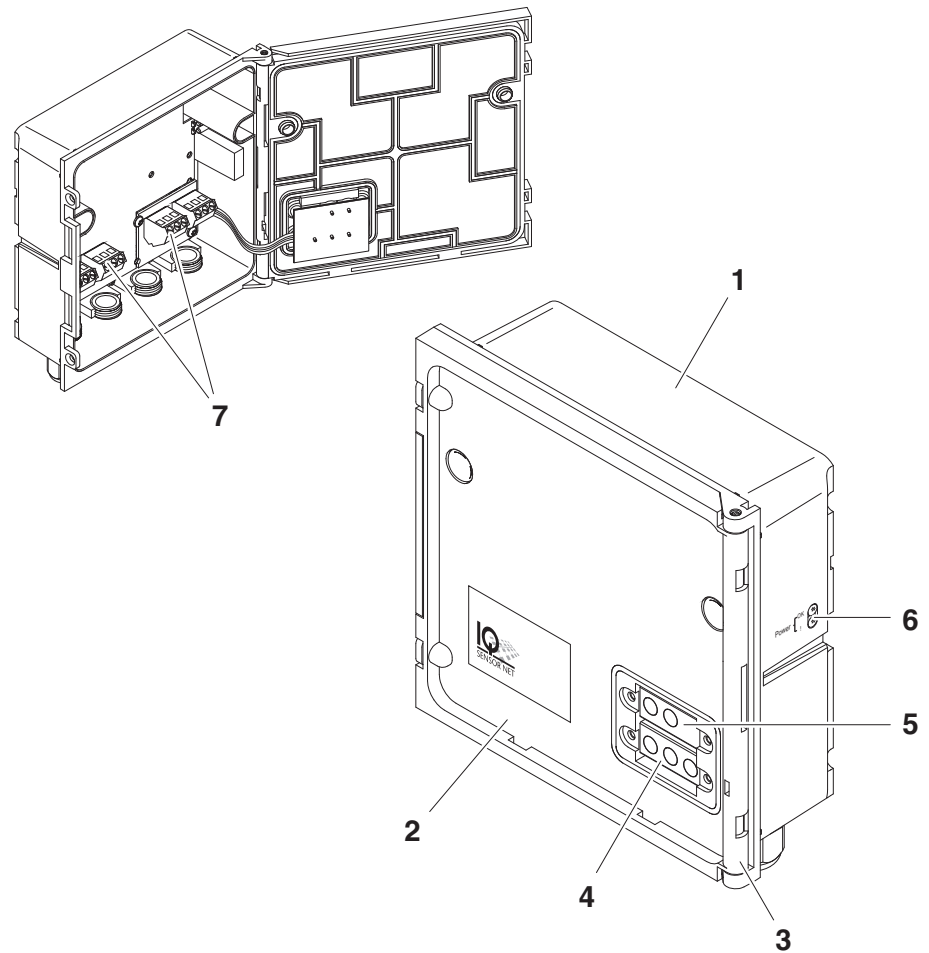


Fig. 1-4 MIQ module

1	Housing
2	Lid
3	Hinge
4	Contacts for voltage and communication
5	Contacts for the local identity function
6	Voltage LEDs
7	Terminal strip (example)

Common characteristics of the MIQ modules

- **Module lid with hinge**

Due to its wide opening angle, the lid provides a large space for working inside the module (e.g. for connecting lines to the terminal strip).
- **Docking facility**

MIQ modules can be mechanically docked onto one another. As a result, several MIQ modules can be mounted in the form of a stack to create a single unit (**stack mounting**). At the same time, docking enables the MIQ modules to be electrically connected with one another via the module contacts on the front and back so that no cabling is required. Even when it is part of a stack, each MIQ module can be opened. In addition, a terminal component can be docked onto each free lid front.
- **Terminal strip**

Further IQ SENSOR NET components can be connected by cable to the terminal strip inside the housing (**distributed mounting**). The terminal strip enables IQ sensors to be connected via the SACIQ sensor connection cable or the IQ SENSOR NET can be further branched and extended here. Certain MIQ modules have a terminal strip with further specific connections (e.g. power connection, relay contacts, current outputs).
- **Local identity function**

The local identity function is integrated in each MIQ module in the form of a memory chip. This memory chip can store information such as the designation of the measurement location and a specific selection of IQ sensors for the measured value display. This information is output when a terminal is docked and, thus, e.g. enables the rapid finding of local IQ sensors for calibration.
- **Voltage diagnosis via LEDs**

Two LEDs, yellow and red, on the side of the housing are used to monitor the operational voltage of each MIQ module.

1.3 MIQ/TC 2020 XT terminal/controller

The MIQ/TC 2020 XT can be configured in the IQ SENSOR NET as a controller (see section 1.3.1) or as a terminal (see section 1.3.2).

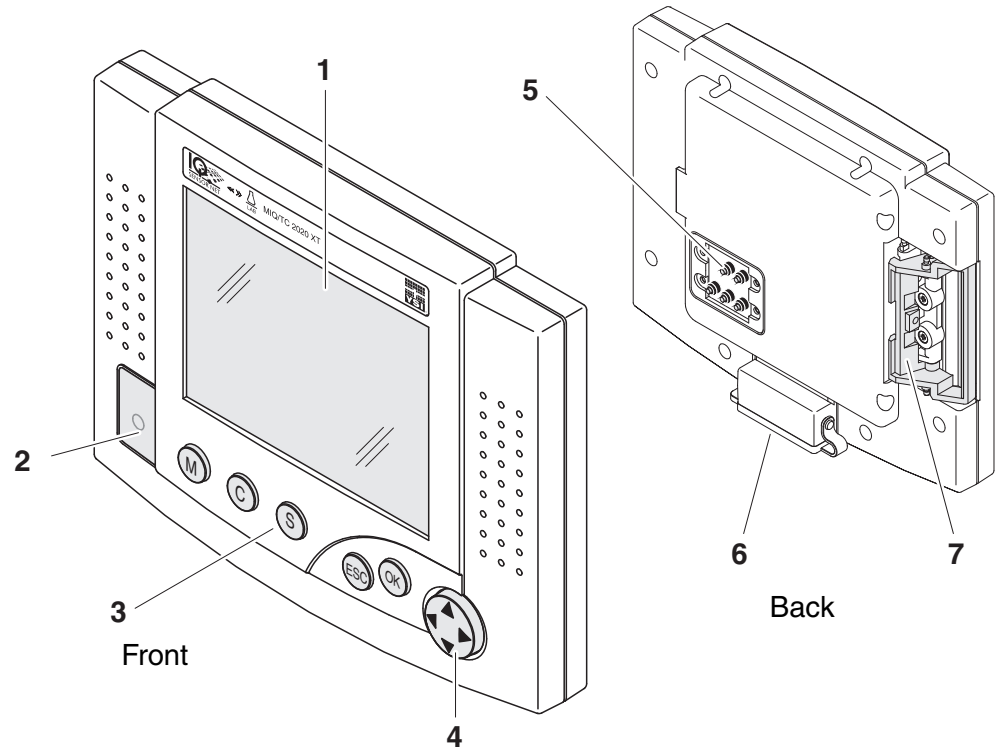








Fig. 1-5 MIQ/TC 2020 XT terminal/controller

1	Graphical display
2	Status LED
3	Keys
4	Arrow keys
5	Module contacts
6	USB-A interface with cover plate
7	Docking mechanism

Keys The keys have the following functions:

Key	Designation	Functions
	<M>	– Switches the photometer on and off
	<C>	– Starts the calibration procedure for the selected sensor
	<S>	– Opens the menu, <i>System settings</i>
	<OK>	– Opens the menu, <i>Display/Options</i>
	<ESC>	– Quits the current menu without changing any settings
 (Arrow keys)	<▲> or <▼>	– Moves the selection in menus, lists and table columns by one position upwards or downwards
	<◀> or <▶>	– Moves the selection in tables by one position to the left or to the right – Erases the character left of the insertion point when entering characters

1.3.1 Operation as terminal/controller

When configured as a controller, the MIQ/TC 2020 XT is a basic component of the 2020 XT USB system and must therefore permanently remain in the system.

The MIQ/TC 2020 XT is connected to the system by docking on the free front cover of an MIQ module.

The **controller function** takes over the following tasks:

- Control and monitoring of all IQ sensors
- Control and monitoring of all current and relay outputs
- Continuous diagnosis of the system, i.e. recording the information and error messages of all modules and entering them in the system log book (e.g.: voltage monitoring)
- Recording measured data in the fixed interval
- Communication with external digital interfaces such as
 - USB memory device
 - Modem
 - PROFIBUS, Modbus, RS485
 - PC

A terminal is required to display and set up the functions of the controller. The following terminal components are suitable:

- MIQ/TC 2020 XT configured as terminal/controller or as terminal (compatible terminals, see section 1.4)
- MIQ/T2020 PC (with MIQ/IF232 interface module, PC, modem connection or PROFIBUS environment).

The present component operating manual of the IQ SENSOR NET System 2020 XT USB includes all functions of the MIQ/TC 2020 XT. The connection to Profibus or Modbus is established with the MIQ/(A-)PR and MIQ/(A-)MOD extension modules.

1.3.2 Operation as a terminal

The MIQ/TC 2020 XT configured as a terminal is an extension component for the IQ SENSOR NET System. The MIQ/TC 2020 XT can be used as a mobile control unit and docked on and removed from all free front covers of MIQ modules. The docking is simply done by hand, without using any tools.

The **terminal function** is the graphical user interface of the system. It is used for the following purposes:

- Display of measured values
- Setting of IQ sensors, outputs, terminal characteristics, date, time, etc.
- Execution of maintenance and calibration work
- Display of calibration data
- Display of components lists (IQ sensors and outputs)
- Display of the log book entries

If the MIQ/TC 2020 XT is registered in the system as a terminal, it is mobile and can be removed at any time. If the main controller of the system fails, the MIQ/TC 2020 XT automatically assumes the job of the failed controller (see section 1.3.3).

1.3.3 Operation as backup controller

Automatic backup function

If the MIQ/TC 2020 XT is configured as a terminal, it has a backup controller that assumes the basic functions of the IQ SENSOR NET controller in the case of its failure. Thus the operating safety of the system is considerably increased. For these purposes the MIQ/TC 2020 XT regularly and automatically saves the system configuration during the normal terminal operation.

System configuration

The system configuration includes the following allocations and settings:

- *Settings of sensors and diff. sensors*
- *Settings of outputs and links*
- *Edit list of sensors*
- *Edit list of outputs*
- *Measured value recording* (datalogger settings)
- List of all components including software versions but without terminal information.
- Application-related sensor calibration (e.g. matrix adjustment)

In the IQ SENSOR NET, the system configuration is stored in the controller (MIQ/TC 2020 XT).

Functions of the MIQ/TC 2020 XT when operating as a backup controller

If the MIQ/TC 2020 XT operates as a backup controller, all basic IQ SENSOR NET functions are carried out. Relay interfaces and current interfaces, PROFIBUS, Modbus and RS485 work without restrictions.

Restrictions of the MIQ/TC 2020 XT when operating as a backup controller

The following functions are not supported:

- Continuation of the data logger operation of the main controller
- Continuation of the modem communication of the main controller if the modem is connected to the interface of the MIQ/TC 2020 XT (configured as controller).
A redundant data logging function can be set up with the aid of the MIQ/IF232 interface module.

Manual backup function

In addition to the automatic backup of the system configuration you can manually store the system configuration on a USB memory device at any time. In the case of a system failure you can then transfer the stored configuration from the USB memory device to another controller.

1.3.4 USB interface

The USB interface of the MIQ/TC 2020 XT provides the following functions:

- Connection of a USB memory device for data transmission (see section 4.9)
 - Measurement data
 - Calibration data
 - Configuration data
 - Log book
- Connection of a PC for data transmission or for control via the MIQ/T2020 PC software terminal (see operating manual ba64108 "IQ SENSOR NET Softwarepack"). The various connection options (direct connection, modem, network etc.) are described in the operating manual ba75790 "Remote connection to the IQ SENSOR NET 2020 XT USB".
- Connection of an electronic key for simple system access with enabled access control (see section 5.4.2)
- Connection of a USB hub to multiply the USB interface



Note

The USB interface is equipped with a protective cover. Only remove the protective cover if you want to connect a USB device. Close the connection immediately after disconnecting the USB device. If the USB connection remains open there is the risk of corrosion.

Operation of the MIQ/TC 2020 XT in the open

Do not leave any USB devices permanently connected to the USB interface. There is the risk of corrosion.

1.3.5 Status LED

The status LED informs you of the state of the system:

Status LED	Meaning
Permanently on	<ul style="list-style-type: none">– The IQ SENSOR NET is running fault-free
Permanently off	<ul style="list-style-type: none">– No power supply
Flashes	<ul style="list-style-type: none">– The IQ SENSOR NET discovered an alarm.– The IQ SENSOR NET discovered an error, e.g.:<ul style="list-style-type: none">– A communication error in the IQ SENSOR NET– An invalid measure value– The backup controller has assumed controller function <p>The LED flashes as long as the error is present (even if the log book message of the error has already been acknowledged). More detailed information on the error is given in the log book.</p>

1.4 Behavior of the IQ SENSOR NET in case of error

1.4.1 Behavior of the IQ SENSOR NET in case of power failure

- The system configuration (*Settings of sensors and diff. sensors* and *Settings of outputs and links*) is stored permanently
- All stored measured data remain permanently available
- Linked current outputs and relay outputs switch to the non-active condition.
 Current output: 0 mA current
 Relay output: Relays open
 For details, refer to the component operating manual of the current or relay output module.
- When the power supply is available again, the system is automatically restarted, starts working again and switches to the measured value display
- During the restart, an entry informing of the power failure is made in the log book.

1.4.2 Behavior of the IQ SENSOR NET if a components fails

- If the operating voltage is too low, the LEDs on the MIQ modules extinguish.
- The blue status LED of the MIQ/TC 2020 XT flashes
- If active components (e.g. sensors or output modules) cannot be contacted, an entry is made in the log book. The error symbol flashes on the display.
- The *Edit list of sensors* or *Edit list of outputs* display shows a question mark "?" for the component.

Component	Behavior
IQ sensor	<ul style="list-style-type: none"> ● The configuration for the IQ sensor (<i>Settings of sensors and diff. sensors</i>) remains stored. ● Current measured values are not available. ● The measured value display shows <i>ERROR</i>.
MIQ modules	<ul style="list-style-type: none"> ● If an active module fails, an entry is made in the log book. The error symbol flashes on the display. ● The configuration for these modules is retained (e.g. links with output modules).

Component	Behavior
Controller	<ul style="list-style-type: none"> ● No current measured data can be displayed, processed or stored. ● If communication with the controller is disturbed, output modules activate the error behavior after 2 minutes (see component operating manual of the output module).
Terminal	<ul style="list-style-type: none"> ● The measured value display is not updated. ● The display does not react to entries. ● The system continues working. ● Stored measured data and the system configuration remain stored in the MIQ/TC 2020 XT.
Power supply module	like power failure (see section 1.4.1)

1.4.3 Availability of the system

As a basic principle, the IQ SENSOR NET offers a very high availability. This is achieved by

- The two-wire connection technique that is not interference-prone
- The digital signal transmission resulting from this
- Tools for error diagnosis
 - LEDs on the MIQ modules to check the available voltage
 - Log book messages with instructions to eliminate problems
- The possibility to simply assign substitute components for components to be exchanged.
 Replacing components is simple and can be performed very quickly (see section 7.4). The system configuration (*Settings of sensors and diff. sensors* and *Settings of outputs and links*) and the measured data are stored in the controller and remain stored when other components are used.

Preventive actions to optimize the availability of the system

If the requirements of the availability are especially high, you can further improve the availability of the system as follows:

- Install identical components in the system.
If the requirements of the availability are high, components can be installed doubly in the system (exception: controller component).
- Back up the controller function with the aid of a second MIQ/TC 2020 XT configured as a terminal.
The MIQ/TC 2020 XT has a redundant controller function. It maintains all essential functions of the system in the case of a controller malfunction and saves all settings. The controller operation starts automatically.
- Keep substitute components ready.
The system automatically recognizes substitute components of active components (IQ sensors and the output modules). They are easily integrated in the system by assigning them as substitute components.
- Save the system configuration.
The system configuration (*Settings of sensors and diff. sensors* and *Settings of outputs and links*) can be saved on a PC. Transmission takes place via the USB interface (alternative options: see section 1.2.3). The stored system configuration can be loaded from the PC on a substitute controller if necessary.

2 Safety instructions

This operating manual contains essential instructions that must be followed during the commissioning, operation and maintenance of the IQ SENSOR NET system. Thus, it is essential for the operator to read this component operating manual before carrying out any work with the system.

Some components such as IQ sensors and special MIQ modules are delivered with their own component operating manual. It is also important to read the SAFETY chapter in this manual. Keep the system and all component operating manuals in the vicinity of the IQ SENSOR NET system if possible.

General safety instructions

Safety instructions in this operating manual are indicated by the warning symbol (triangle) in the left column. The signal word (e.g. "Caution") indicates the danger level:



Warning

indicates instructions that must be followed precisely in order to prevent serious dangers to personnel.



Caution

indicates instructions that must be followed precisely in order to avoid slight injuries to personnel or damage to the instrument or the environment.

Other labels



Note

indicates notes that draw your attention to special features.



Note

indicates cross-references to other documents, e.g. component operating manuals.

Target group

2.1 User qualification

The IQ SENSOR NET 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).

2.2 Authorized use

The authorized use of the IQ SENSOR NET system consists only of its use in online analysis.

Please observe the technical specifications according to chapter 8 TECHNICAL DATA. Only operation and running according to the instructions in this component operating manual is authorized.

Any other use is considered to be **unauthorized**. Unauthorized use invalidates any claims with regard to the guarantee.

2.3 General safety instructions

All components of the System IQ SENSOR NET are constructed and inspected in accordance with the relevant guidelines and norms for electronic instruments (see chapter 8 TECHNICAL DATA). They left the factory in a safe and secure technical condition.

Function and operational safety

The failure-free function and operational safety of the IQ SENSOR NET components are only guaranteed if the generally applicable safety measures and the special safety instructions in this operating manual are followed during their use.

The failure-free function and operational safety of the IQ SENSOR NET components are only guaranteed under the environmental conditions that are specified in chapter 8 TECHNICAL DATA.

If IQ SENSOR NET components are transported from a cold environment into a warm environment, this can cause a functional malfunction through the formation of condensation. In this case, wait for the components to adjust to room temperature before recommissioning.

Safe operation

If safe operation is no longer possible, the IQ SENSOR NET must be taken out of operation and secured against inadvertent operation. Safe operation is no longer possible if components:

- have been damaged in transport
- have been stored under adverse conditions for a lengthy period of time
- are visibly damaged
- no longer operate as described in this manual.

If you are in any doubt, contact the supplier of your IQ SENSOR NET.

Obligations of the operator

The operator of the IQ SENSOR NET system must ensure that the regulations and guidelines listed below are followed when dealing with dangerous substances:

- EEC guidelines relating to safety at work
- National laws relating to safety at work
- Safety regulations
- Safety datasheets of the chemicals manufacturers.

**Warning**

A circuit (except for the line power supply), that is connected to an IQ SENSOR NET 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 Scopes of delivery

3.1.1 MIQ modules

The following parts are contained in the scope of delivery of an MIQ module:

- MIQ module
- Accessory kit with:
 - Contact carrier with screws
 - ISO cap nuts with screws and ring washers
 - Cable glands with sealing gaskets
- Operating manual.

3.1.2 Terminal/Controller

The following parts are contained in the scope of delivery of the MIQ/TC 2020 XT terminal/controller:

- MIQ/TC 2020 XT
- Screw to fix the terminal on the MIQ module
- Operating manual.

3.2 Requirements of the measurement location

The respective measurement location of all IQ SENSOR NET components must meet the environmental conditions specified in section 8.1 GENERAL SYSTEM DATA.

3.3 System planning

Overview of the planning steps

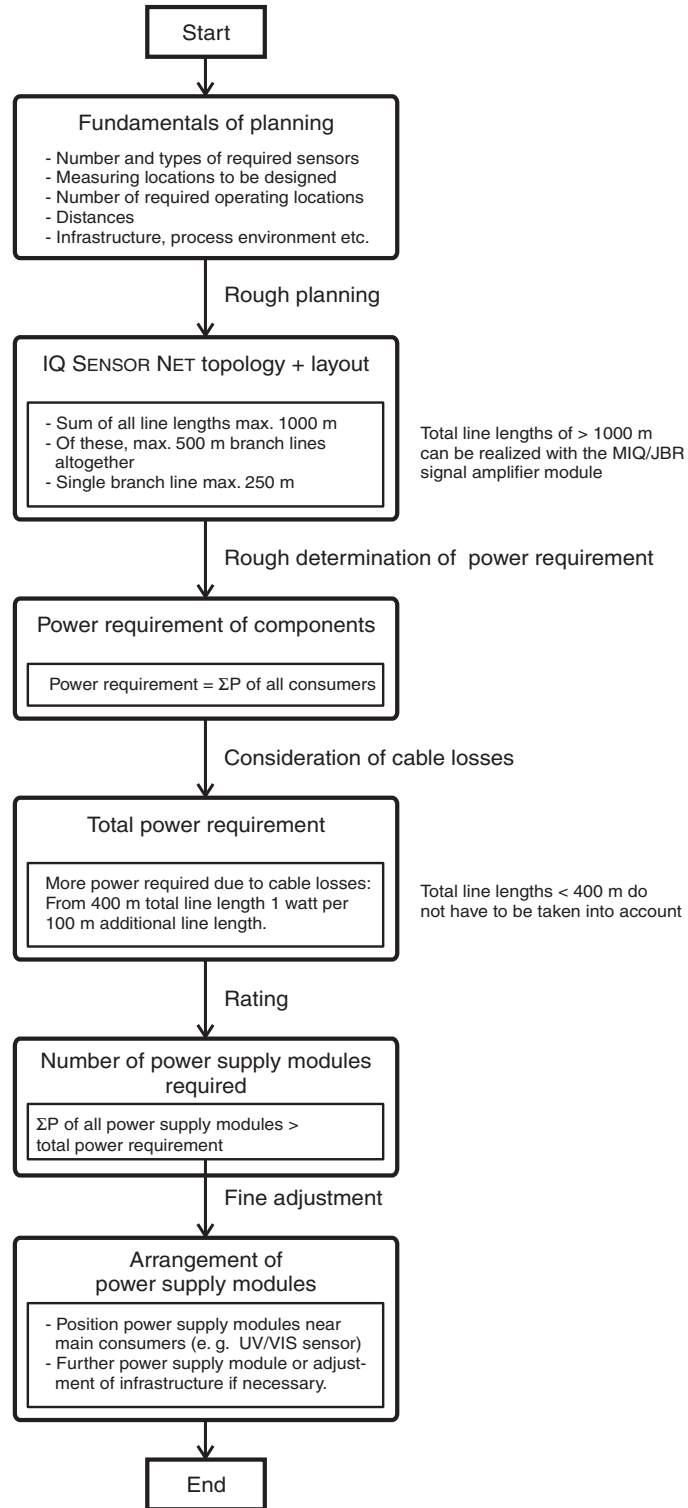


Fig. 3-1 System planning

3.4 Basic requirements for optimum installation

3.4.1 General information

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

Due to this characteristic, the following factors must be taken into account in the planning of an IQ SENSOR NET system:

- Power consumption of all components (power rating). Primarily, this determines the number of power supply modules required (section 3.4.2).
- Distance of the components from one another. Large distances may require a further MIQ/PS power supply module and/or an MIQ/JBR signal amplifier module (section 3.4.3).
- Placement of the MIQ/PS power supply modules in the IQ SENSOR NET (effect on the power supply - section 3.4.3).



Caution

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

Power rating - why?

3.4.2 Drawing up the power rating

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 all the components. At the same time, this can determine whether the entire power requirement of all components (consumers) is covered by the existing MIQ power supply modules. If this is not the case, the power available in the system must be increased by further MIQ power supply modules.



Note

The power rating provides an initial guide value. In specific limiting cases, the power supply may be insufficient despite the positive power rating. Long cable lines, for example, result in additional power losses that may have to be compensated by further MIQ power supply modules. This can be checked for the planned installation by following section 3.4.3.

The total power requirement P of all consumers can be determined from the following table:

Power requirement of IQ SENSOR NET components	Component	Power requirement [W]
	<i>IQ sensors</i>	
	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
	<i>MIQ modules</i>	
	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	2.0
	MIQ/CHV PLUS	1.0
	MIQ/Blue PS	0.6
	MIQ/A	1.5
	MIQ/(A)-PR	3.0
	MIQ/(A)-MOD	3.0
	<i>Terminal, Controller</i>	
	MIQ/TC 2020 XT	3.0
	MIQ/IF232 (+ MIQ/T2020 PC)	0.2

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 MIQ power supply modules
$P \leq 18 \text{ W}$	1
$18 \text{ W} < P \leq 36 \text{ W}$	2
$36 \text{ W} < P \leq 54 \text{ W}$	3
$54 \text{ W} < P \leq 72 \text{ W}$	4
$72 \text{ W} < P \leq 90 \text{ W}$	5
$90 \text{ W} < P \leq 108 \text{ W}$	6

Sample configuration	Power requirement [W] (component)	Total power requirement P [W] (sum of the components)	Number of power supply modules required
1 MIQ/TC 2020 XT (terminal/controller)	3.0	3.0	1
+ 1 MIQ/TC 2020 XT (terminal)	+ 3.0	6.0	1
+ 1 NiCaVis [®] 705 IQ	+ 8.0	14,0	1
+ 1 VisoTurb [®] 700 IQ	+ 1.5	15,5	1
+ 1 SensoLyt [®] 700 IQ	+ 0.2	15,7	1
+ 1 MIQ/CR3	+ 3.0	18.7	2
+ 1 MIQ/CR3	+ 3.0	21.7	2
+ 1 MIQ/TC 2020 XT (terminal)	+ 3.0	24,7	2



Note

The determined number of power supply modules required in the IQ SENSOR NET can increase if the cables are very long (see section 3.4.3).

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

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

3.4.3 Effect of the cable length

The length of the cables in the IQ SENSOR NET affects

- the operating voltage available for a component
- the quality of data transmission.



Note

All information applies to SNCIQ cable material only. As regards the copper wire diameter and dielectric, this cable is especially designed for the combined energy and data transmission via great distances and ensures the lightning protection characteristics stated in chapter 8 TECHNICAL DATA.

Voltage drop due to cable lengths

Very long cables in the IQ SENSOR NET cause voltage drops with growing distance from the power supply module. If the voltage is under the limit values, further IQ power supply modules must be used to compensate.

Guideline

If the power supply modules are positioned in the vicinity of the main consumers and the total cable length is no more than 400 m, no additional cable losses have normally to be taken into account. Main consumers are components with a power consumption of 5 W or more.



Note

When determining the number of power supply modules required, the most unfavorable design has to be taken into account for mobile components (Terminals). I. e., take into account

- the maximum number of mobile components and
- their greatest possible installation distance from the power supply module.

Determining the length of the cable section

A diagram is used to determine whether an additional MIQ power supply module is necessary for the planned installation. To do so, the length of the cable section must be determined.

A cable section is the longest continuous length of cable from an MIQ power supply module to a consumer. Sensor connection cables up to 15 m are not taken into account in this.

Example The following figure shows the length of the cable section L made up of the partial lengths L1, L2 and L3 as the cable section L4 is shorter than L3:

$$L = L1 + L2 + L3$$

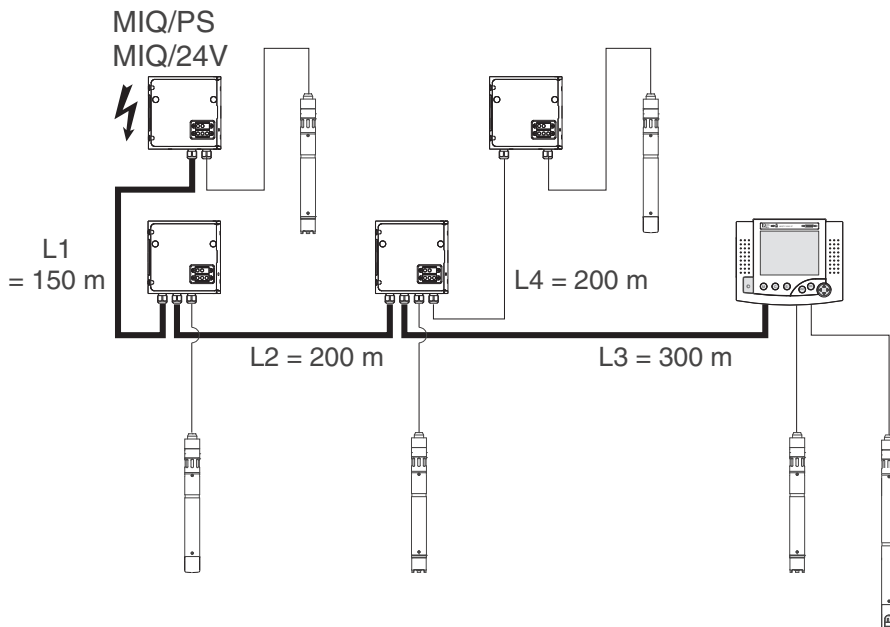


Fig. 3-2 Example of determining the cable section

Checking the power supply

1	Determine the length of the cable section for the planned installation.
2	Determine the sum of the power consumption of all consumers along the cable section (including IQ sensors).
3	Enter both determined values as a point in the following diagram.



Note

To make it easier it is assumed that all consumers are located at the end of the cable section.

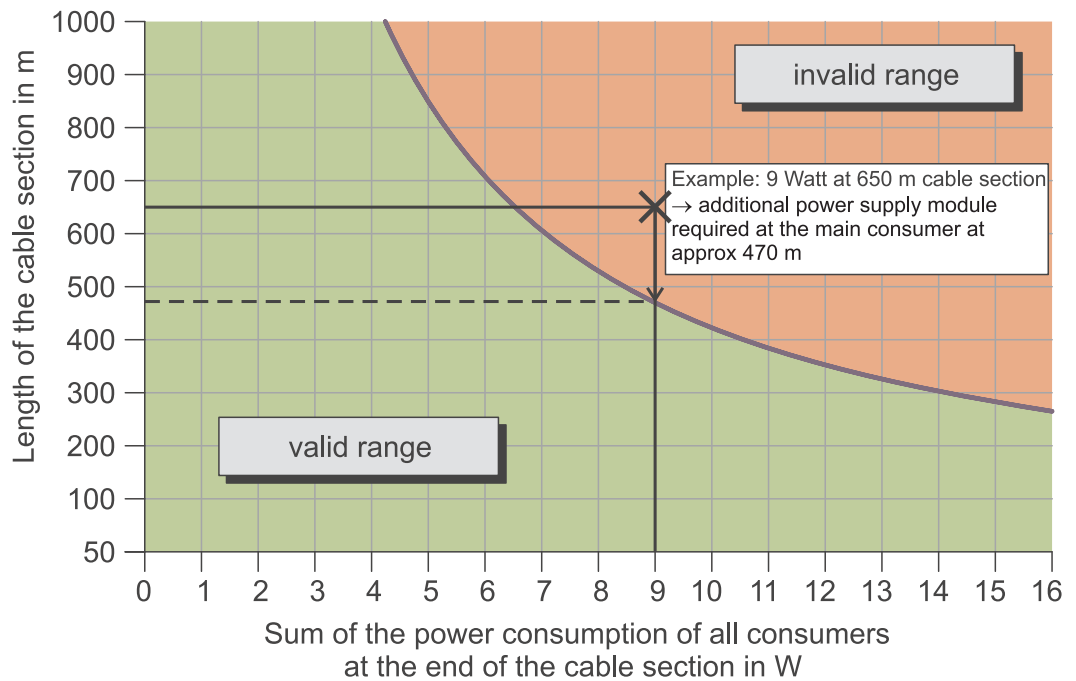


Fig. 3-3 Diagram to check the power supply

4	<p>Evaluation:</p> <p>If the point is in the lower, valid range, no additional power supply module is required.</p> <p>If the point is in the upper, invalid range, an additional power supply module is required. Install this power supply module in the vicinity of the main consumers of this section, or, if not possible, - starting from the primary MIQ power supply module - approx. at that point of the section where the maximum cable length is exceeded (see following example).</p>
---	---

Example

Problem:

Consumers with a total power requirement of 9 W are positioned on a cable section of 650 m. Is the power supply with one power supply module sufficient? At which point must a further power supply module be installed if necessary?

Proceeding:

- Enter both values as a point in the diagram (point "x" in Fig. 3-3).
- Result: the point is in the invalid range. I. e. the power supply is not sufficient.
- Draw down a vertical line from the point until the line crosses the limit between the upper and lower range. The intersecting point specifies the maximum cable length for the existing power requirement (at approx. 470 m). This is the place where the additional power supply module is required.
- If any main consumers are near the place, the power supply module should be installed in their vicinity (ideally, directly on them).

**Note**

After commissioning, you can check the voltage directly on the MIQ modules or on the terminal connections of the IQ sensors (see section 7.2.2). The limits of the voltage levels are given in section 7.2.2 MEASURING THE VOLTAGE of this operating manual.

Quality of data transmission

If the sum of all line lengths (including the SACIQ sensor connection cable) exceeds 1000 m, an MIQ/JBR signal amplifier module must be installed in the system. More details of this are given in the MIQ/JBR component operating manual.

3.4.4 Optimum installation of MIQ power supply modules

Basic rules

- Install the MIQ power supply modules as near as possible to the IQ SENSOR NET components with the highest power consumption. This also applies in the case of several MIQ power supply modules in the system.
- If possible, assemble the IQ SENSOR NET in a star configuration from the MIQ power supply modules.

3.4.5 Installation guidelines for lightning protection

When using the IQ SENSOR NET measuring technique, 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:

- technical protective measures inside the instrument, and
- exterior protective measures of the installation environment.

With YSI online measuring technique, the technical protective measures inside the instrument are already integrated as the so-called lightning protection (see chapter 8 TECHNICAL DATA).

The exterior protective measures of the installation environment can be carried out observing 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 small distance from the grounded metal construction or the installation in the ground prevents the development of induction loops between the cable and the ground hazardous in the case of lightning strikes.

- 2 The SNCIQ or SNCIQ-UG cable material must be used exclusively. 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. We strongly recommend not to use any other cables, which normally have a considerably lower shielding wire cross-section.
- 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 IQ SENSOR NET cable and via the valuable sensors in the measuring medium.
- 4 The contacts of the MIQ modules always have to be protected with the respective contact covers when they are not used by terminal components. The contact covers improve the insulation against electric fields of a thunderstorm by enlarging air gaps and creepage distances.
- 5 We recommend to install a metal or nonmetal sun shield at each open air location of 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 line voltage that supports the measuring system must correspond to overvoltage category II. Normally this is ensured by the public operators of the supply network systems. 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 asurge protection system for the plant.

- 7 The IQ SENSOR NET safety and lightning protection concept is partly based on the high-quality protective insulation of the line power supply units and the total 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 realisation 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 shielding terminals for the contacting of the shield (e.g. those of the PROFIBUS-System). 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.
 - PROFIBUS cables and Modbus cables have to be installed according to the prescriptions of the respective bus system.
 - 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 General information

The IQ SENSOR NET system components are connected to form a functioning unit in the following ways:

- **Stacked mounting of MIQ modules**

Up to three MIQ modules can be installed and mechanically connected with one another to form a stack at a single location. The contacts on the front and rear automatically create the electrical connection between the MIQ modules in the stack (section 3.5.2).

- **Distributed mounting of MIQ modules**

Individual MIQ modules or an assembled module stack are installed at various locations (for example, a central control unit and an MIQ branching module for connecting IQ sensors at the edge of the basin). The spatial distance is bridged with the aid of the SNCIQ or SNCIQ/UG cable (section 3.5.3).

- **Connection of IQ sensors:**

IQ sensors are connected to an MIQ module with the aid of the SACIQ cable. This cable is available in different lengths. The MIQ module must have a free SENSORNET connection on the terminal strip. On the sensor side, the connection is made via a plug that is standard for all IQ sensors (section 3.5.4).

- **Docking of a terminal unit:**

A terminal unit is attached to the lid of a free MIQ module with the aid of a quick-release locking mechanism (section 3.5.5).



Caution

Distributed mounting is only allowed in a star configuration. The system must nowhere be closed to form a ring. Only use the assembly material provided for the installation.

3.5.2 Stacked mounting of MIQ modules:



Caution

For optimum stability, a maximum of three MIQ modules can be mounted in any one stack. Only one MIQ power supply module may be mounted per module stack.

Mounting direction

MIQ modules can be stacked on top of one another from both sides. All the required installation materials are contained in the scope of delivery of the MIQ modules.

<p>Variant 1 - stack expansion forwards.</p> <p>The back of an MIQ module is attached to the lid of another MIQ module (page 3-15).</p>	
<p>Variant 2 - stack expansion backwards.</p> <p>The lid of an MIQ module is attached to the back of another MIQ module (page 3-18).</p>	

Which variant is suitable for a specific case depends on whether and how an MIQ module is already permanently installed at a location (e.g. on a wall or in a panel), among other factors.



Note

In the case of panel mounting, the front MIQ module can only be installed individually in the switch cabinet aperture. Only then can further MIQ modules be added to its back (variant 2). If necessary, dismantle the front MIQ module from an already mounted stack before mounting.

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.

Tools

- Phillips screw driver.

Both installation variants are described below. To dismantle a module stack, proceed in the reverse order to mounting the stack.

Variant 1: Stack expansion forwards

Preparing the stack mounting

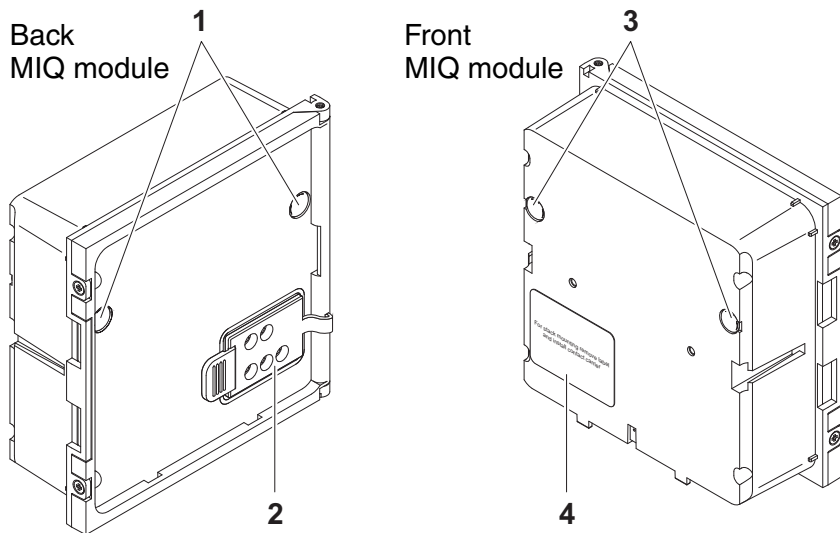


Fig. 3-4 Preparing MIQ modules for stack mounting (variant 1)

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

Mounting the contact base

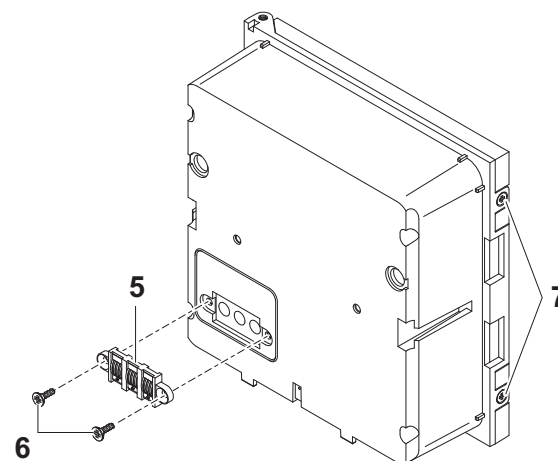


Fig. 3-5 Mounting the contact base (variant 1)

**Caution**

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

- | | |
|---|--|
| 4 | Attach the contact base (pos. 5 in Fig. 3-5) on the front MIQ module with the two plastic tapping screws (pos. 6). |
| 5 | On the front MIQ module, remove the two countersunk screws (pos. 7 in Fig. 3-5) and swing open the module lid. |

**Premounting the ISO
blind nuts**

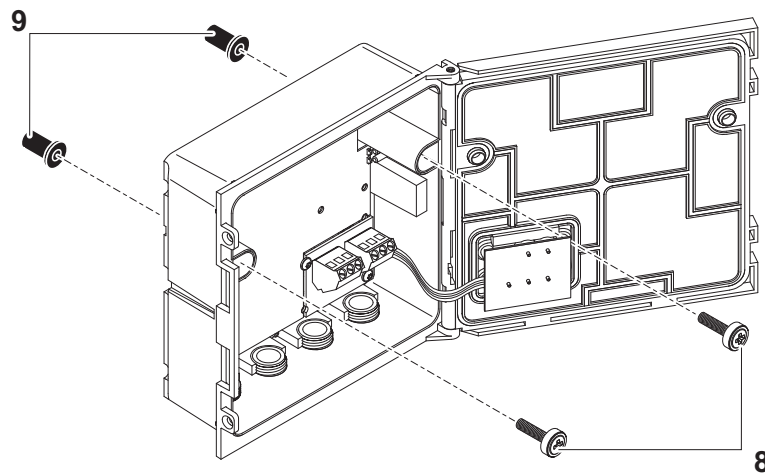


Fig. 3-6 Premounting the ISO blind nuts (variant 1)

- | | |
|---|--|
| 6 | Insert the cheese-head screws (pos. 8 in Fig. 3-6) 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

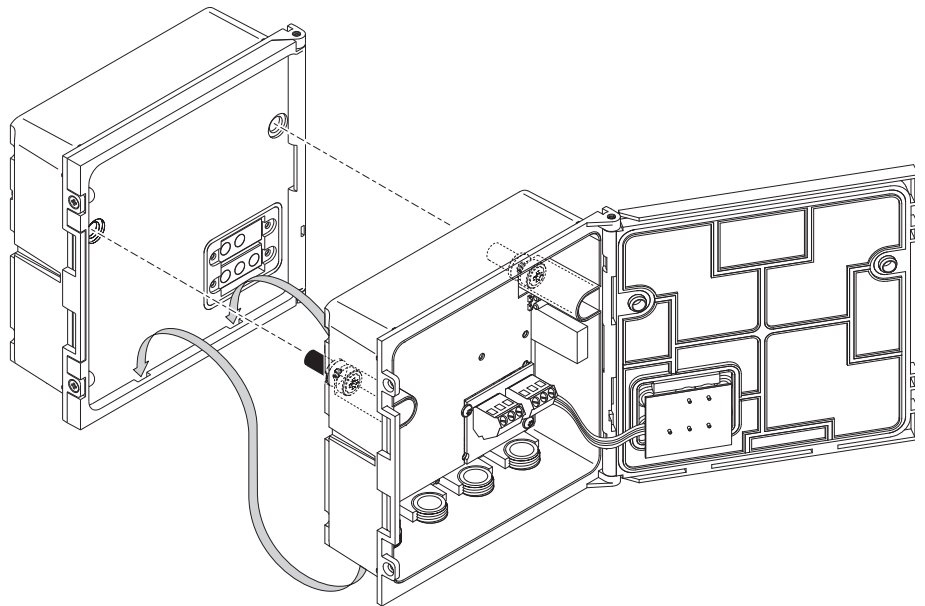


Fig. 3-7 Stacking the MIQ modules (variant 1)

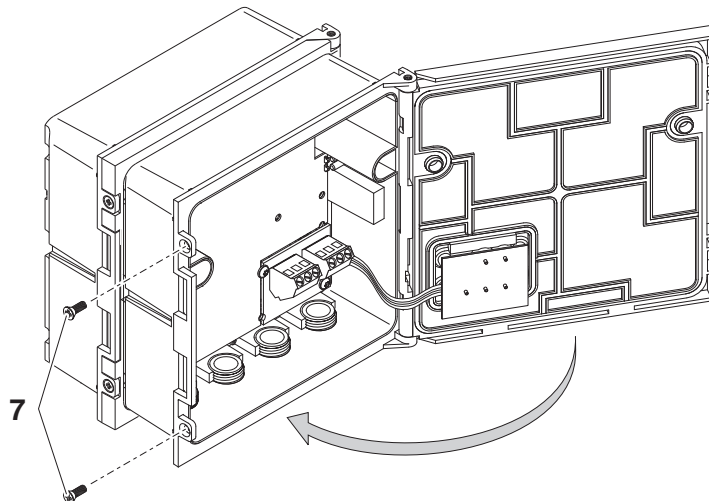


Fig. 3-8 Closing the enclosure (variant 1)

- | | |
|---|--|
| 7 | Attach the prepared MIQ module to the lid of the back MIQ module. At the same time, ensure that the two clips on the front MIQ module click into place in the lid of the back MIQ module. Subsequently, tighten the two screws (pos. 8 in Fig. 3-6). |
| 8 | Check the position of the SN terminator switch and correct it if necessary (see section 3.9.1). |
| 9 | Close the lid of the front MIQ module and fix it with the two countersunk screws (pos. 7 in Fig. 3-8). |

Variant 2: stack expansion backwards

Preparing the stack mounting

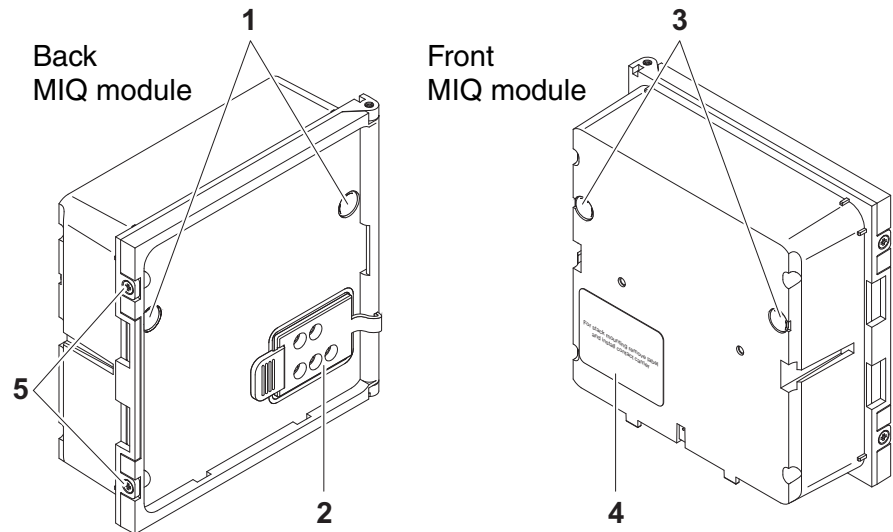


Fig. 3-9 Preparing the MIQ modules for stack mounting (variant 2)

1	Remove the covers from the drilled mounting holes (pos. 1 and 3 in Fig. 3-9).
2	Remove the contact cover (pos. 2).
3	Pull off the adhesive label (pos. 4).
4	On the back MIQ module, remove the two countersunk screws (pos. 5) and swing open the module lid.

Mounting the contact base

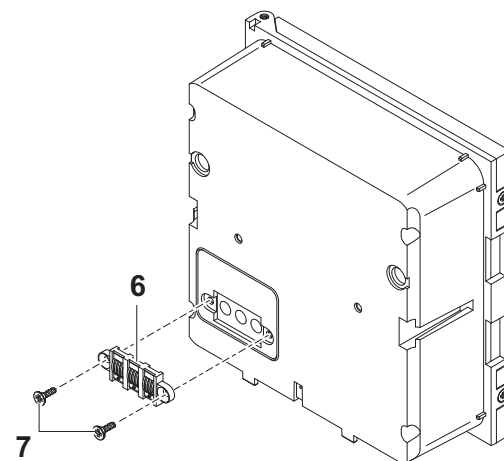


Fig. 3-10 Mounting the contact base (variant 2)

**Caution**

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

- 5 Attach the contact base (pos. 6 in Fig. 3-10) on the front MIQ module with the two plastic tapping screws (pos. 7).

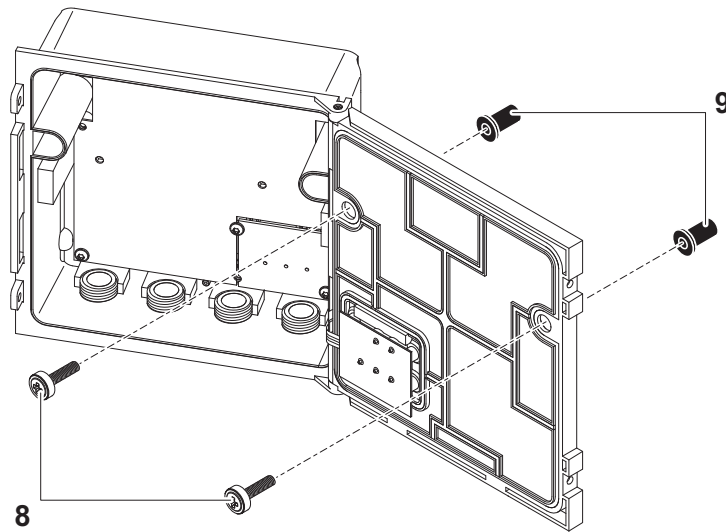
Premounting the ISO blind nuts

Fig. 3-11 Premounting the ISO blind nuts (variant 2)

- 6 Insert the cheese-head screws (pos. 8 in Fig. 3-11) 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

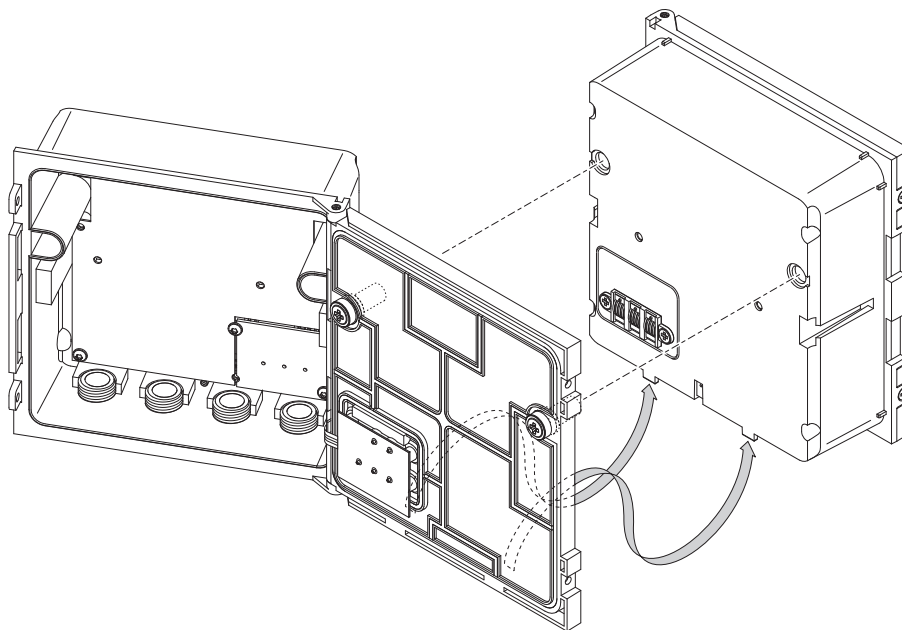


Fig. 3-12 Stacking the MIQ modules (variant 2)

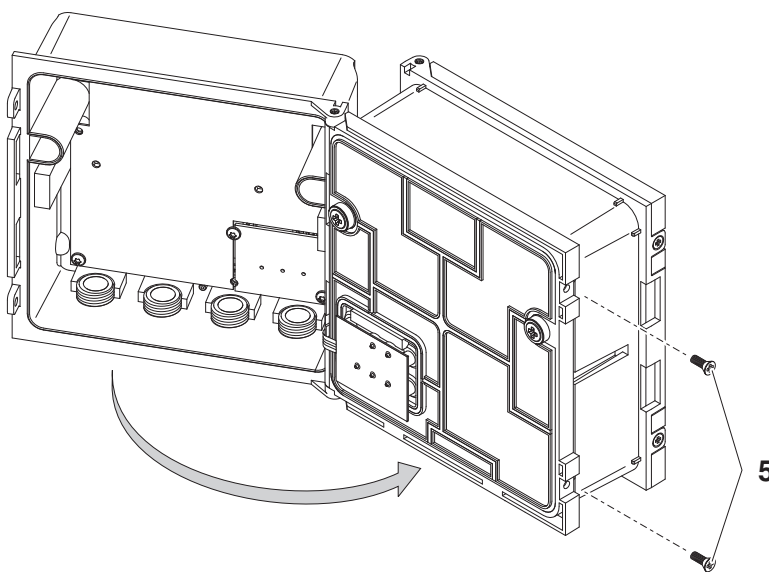


Fig. 3-13 Closing the enclosure (variant 2)

- | | |
|---|---|
| 7 | Attach the prepared MIQ module to the back of the front MIQ module. At the same time, ensure that the two clips on the front MIQ module click into place in the lid of the back MIQ module. Subsequently, tighten the two screws (pos. 8 in Fig. 3-11). |
| 8 | Check the position of the SN terminator switch and correct it if necessary (see section 3.9.1). |

- | | |
|---|---|
| 9 | Close the back MIQ module and fix it with the two countersunk screws (pos. 5 in Fig. 3-13). |
|---|---|

General information

3.5.3 Distributed mounting of MIQ modules

The following IQ SENSOR NET cables can be used for distributed mounting:

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

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

Each MIQ module has a row of terminal strips in the housing. The two 3-fold terminal strips on the right are always reserved for the connection of further IQ SENSOR NET components (designation "SENSORNET 1" and "SENSORNET 2").

Some MIQ modules have additional "SENSORNET" connections ("SENSORNET 3" and "SENSORNET 4") on the left of the terminal strip.



Caution

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



Note

IQ SENSOR NET cables 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 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 with seal (scope of delivery of MIQ module).

Tools

- Cable stripping knife
- Wire stripper
- Phillips screw driver
- Small screw driver.

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 <u>and</u> outer insulation).
3	Only for the SNCIQ/UG earth cable: strip the outer insulation for 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.

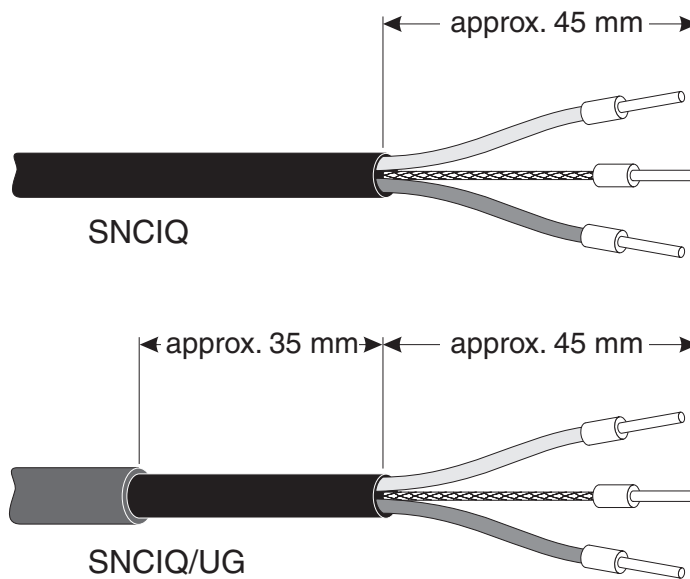


Fig. 3-14 Prepared cable end

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 3.5.4):

1	Open the MIQ module.
2	Select any SENSORNET connection. At the same time, look out for the SENSORNET designation.

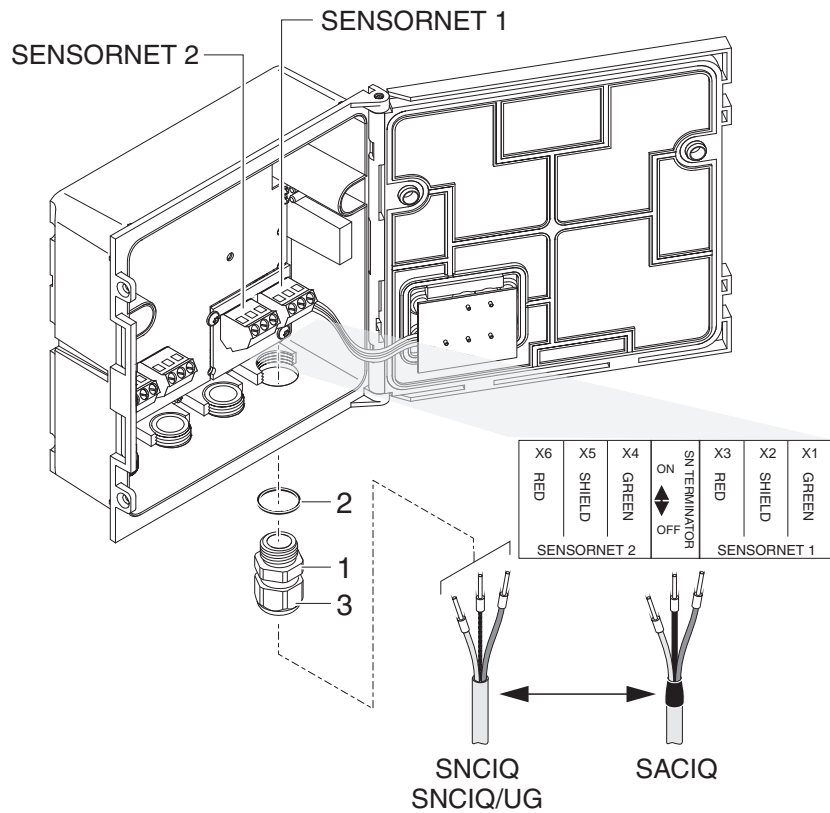


Fig. 3-15 Connecting cables to the MIQ module

3	Screw the cable gland (pos. 1 in Fig. 3-15) with the sealing ring (pos. 2) into the module housing.
4	Loosen the coupling ring (pos. 3 in Fig. 3-15).
5	Feed the cable through the cable gland into the module housing.
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. 3-15).
8	Check the position of the SN terminator switch and correct it if necessary (see section 3.9.1).
9	Close the MIQ module.

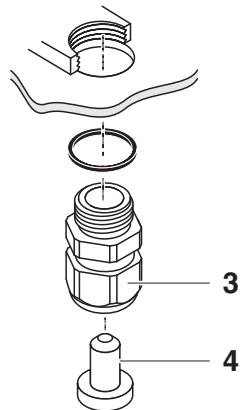


Fig. 3-16 Closing the cable opening

- 10 | Screw the remaining cable glands with the sealing rings into the remaining free openings and close them with the enclosed blind plugs (pos. 4 in Fig. 3-16) and tighten the coupling ring (pos. 3) if they are not used.

3.5.4 Connecting IQ sensors

Materials required

- 1 x SACIQ connection cable (see chapter 10 ACCESSORIES AND OPTIONS)
- 1 x cable gland with seal

The module 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 screw driver
- Small screw driver.

Differentiating IQ sensors of the same type in the system

For the simpler correlation of measured value and measurement location, the system provides the option of giving each IQ sensor a user-defined name (see section 5.5.1). This name appears in the measured value display.

When the IQ sensor is delivered, the name is identical with the serial number. Therefore, after the initial commissioning, IQ sensors of the same type can only be differentiated by the serial number that appears on the measured value display. In order to prevent confusing the IQ sensors when assigning the name, you can proceed according to one of the two methods:

- Note the serial number of the IQ sensor at the respective measurement location before installation. Then, install all IQ sensors. After the commissioning, open the list of sensors on the controller. Then assign a suitable sensor name using the sensor type and the noted serial number.
- Disconnect the IQ sensors of the same type from the connection cables before commissioning the system. Then, put the system into operation. After the commissioning, connect the IQ sensors individually to the SACIQ connection cable. To do so, proceed step-by-step sensor for sensor. After each newly connected IQ sensor, select the *Edit list of sensors* menu on the terminal and assign a suitable sensor name to the sensor.



Connecting the SACIQ cable to the MIQ module

Note

The list of sensors and the assignment of sensor names is described in section 5.5.1 on page 5-12.

The connection of the SACIQ cable to the terminal strip of an MIQ module is described in section 3.5.3 (see CONNECTING THE CABLES, Seite 22).



Caution

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



Note

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

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.

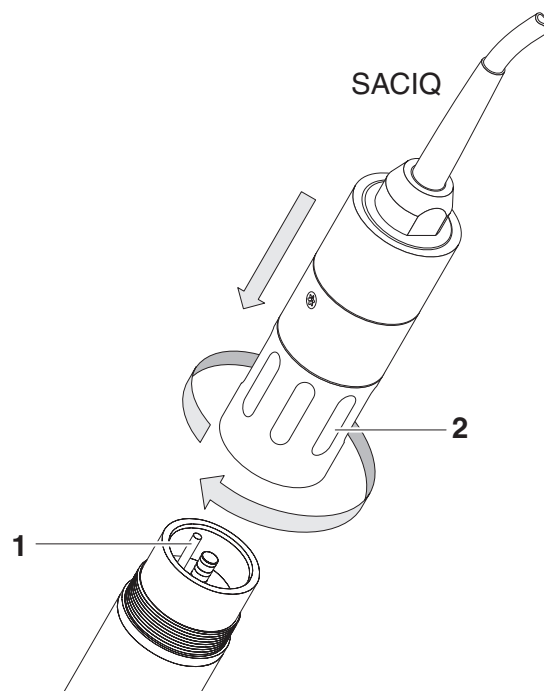
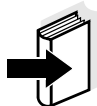


Fig. 3-17 Connecting the SACIQ cable with the IQ sensor



Note

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

3.5.5 Installing terminal components

The terminal component is the operating and control unit of the IQ SENSOR NET. It serves as an input and output device and is necessary to operate the IQ SENSOR NET.

You can install the following terminal components:

- Terminal MIQ/TC 2020 XT
(compatible terminals, see section 1.4)
- MIQ/IF232 interface component with software terminal (see MIQ/IF232 component operating manual)

The terminal component is installed on the lid of any free MIQ module.

The MIQ/TC 2020 XT configured as a terminal is docked on the lid of any free MIQ module.

If the MIQ/TC 2020 XT is configured as a controller, the MIQ/TC 2020 XT, as opposed to a mobile terminal (e.g. MIQ/TC 2020 XT configured as terminal) must not be removed during operation. To protect against any inadvertent removal, the MIQ/TC 2020 XT can be secured with a locking screw.

Materials required

- none -

Tools

- Phillips screw driver.

Docking the terminal component

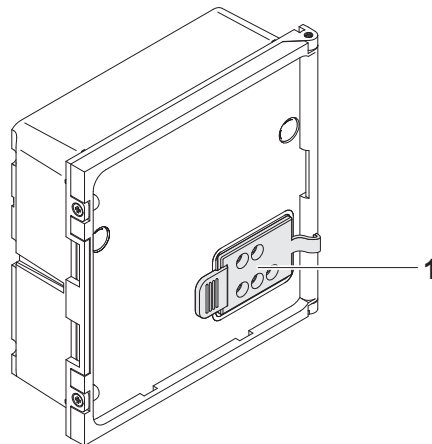


Fig. 3-18 Preparing the MIQ module for docking

- | | |
|---|---|
| 1 | Pull the cover off the contacts (pos. 1 in Fig. 3-18) on the lid of the MIQ module. |
|---|---|



Note

For the temporary docking of a mobile terminal, do not remove the

whole contact cover. Leave it hanging on the side of the MIQ module. After removing the terminal, replace the cover again to protect the contacts.

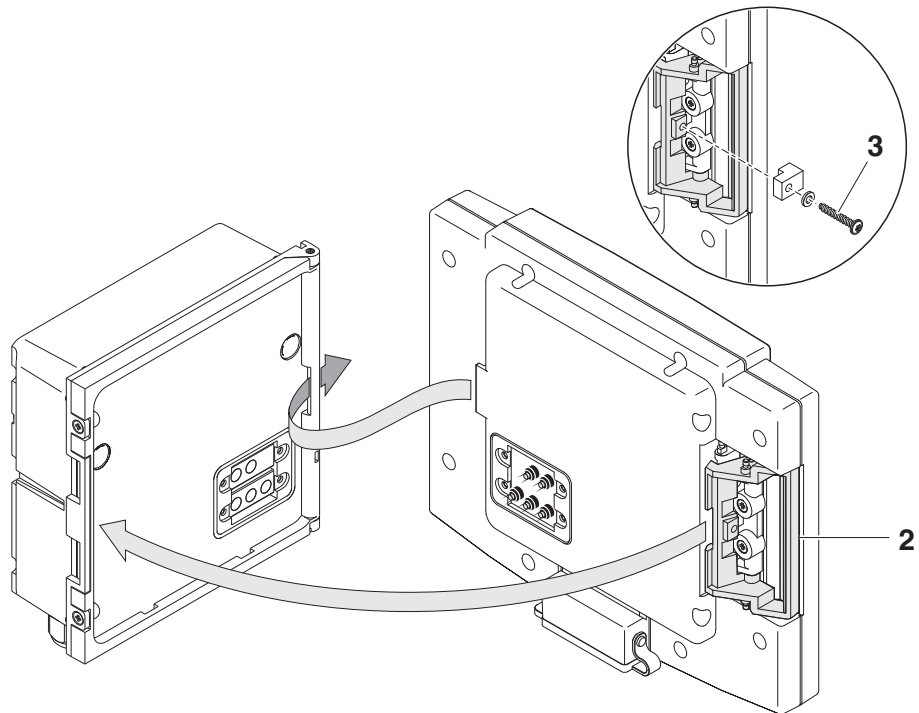


Fig. 3-19 Docking the terminal component

- | | |
|---|---|
| 2 | Attach the terminal component to the module lid. To do so, insert the flap on the back of the terminal into the slot on the door hinge of the MIQ module. Then, pull back the interlocking lever (pos. 2 in Fig. 3-19), place the terminal completely on the MIQ module and release the interlocking lever. |
| 3 | To protect any inadvertent removal of the terminal component, the interlocking lever can be fixed in place with the screw (pos. 3 in Fig. 3-19). |

Configuring the MIQ/TC 2020 XT as a mobile terminal

During the commissioning of the MIQ/TC 2020 XT at the IQ SENSOR NET a query appears asking whether the MIQ/TC 2020 XT should work as a terminal or controller. Select *Terminal*: (see section 3.11).

3.6 Installation of the MIQ modules at the installation location

3.6.1 General information

The IQ SENSOR NET system has a comprehensive program of mounting accessories, which can be used to adapt the installation to the most varied requirements.



Caution

MIQ modules 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 MIQ modules 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).

Installation options

The most important types of installation for MIQ modules and module stacks 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 one unit of up to three stacked MIQ modules and a docked terminal (section 3.6.2).
- **Mounting on the SD/K 170 sun shield**
The SD/K 170 sun shield provides enough space for a single MIQ module with a docked terminal. 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 back MIQ module of a module stack or a single 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 front MIQ module of a module stack or a single MIQ module is installed in the aperture of a panel. The aperture dimensions are 138 x 138 mm + 1 mm (maximum thickness 15 mm) according to DIN 43700 or IEC 473 (section 3.6.4).
- **Top hat rail mounting:**
The back MIQ module of a module stack or a single MIQ module is mounted on a 35 mm top hat rail with the aid of a bracket in accordance with EN 50022, e.g. in a control cabinet. The connection can be released again with one simple movement (section 3.6.5).



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.

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 screw driver.

Mounting the sun shield on a mounting stand

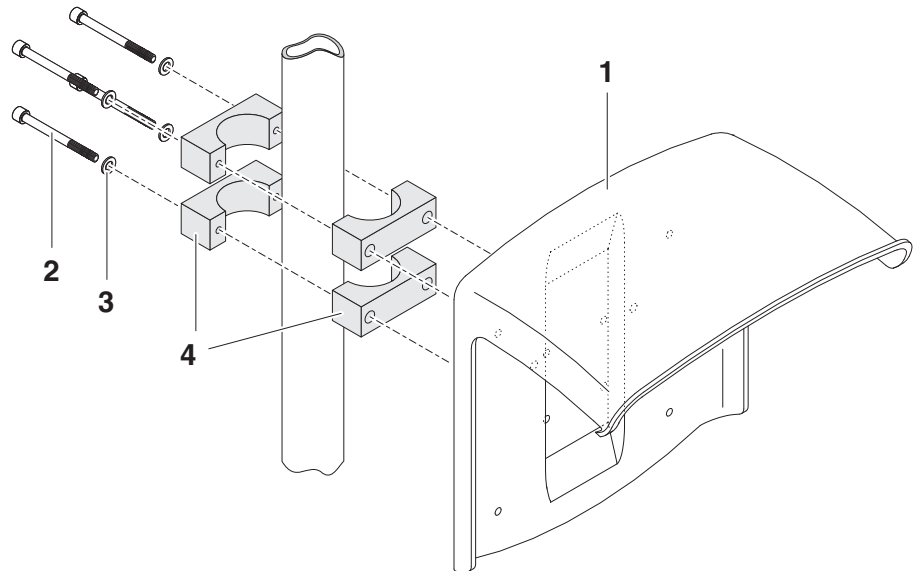


Fig. 3-20 Mounting the SSH/IQ sun shield on a mounting stand

- 1 | Screw the sun shield (pos. 1 in Fig. 3-20) 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

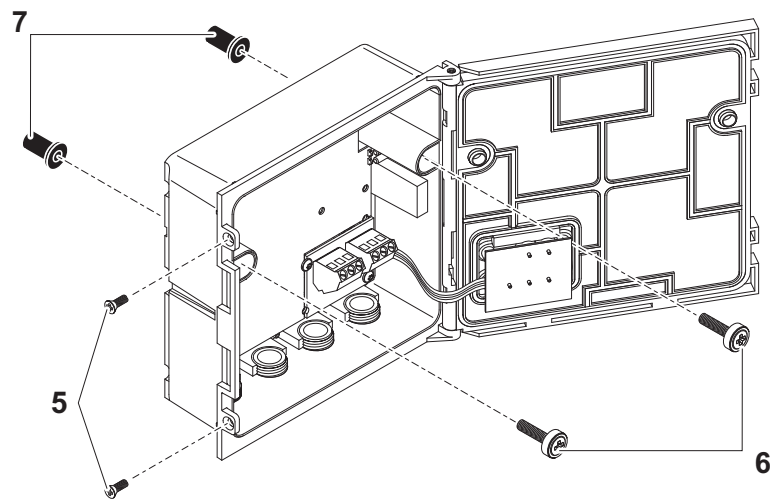


Fig. 3-21 Mounting the sun shield: Premounting the ISO blind nuts

- | | |
|---|--|
| 2 | Remove the two countersunk screws (pos. 5 in Fig. 3-21) and swing open the module lid. |
| 3 | Insert the cheese-head screws (pos. 6 in Fig. 3-21) with the plastic washers in the drilled mounting holes and loosely screw in the ISO blind nuts (pos. 7). |

Mounting the MIQ module under the sun shield

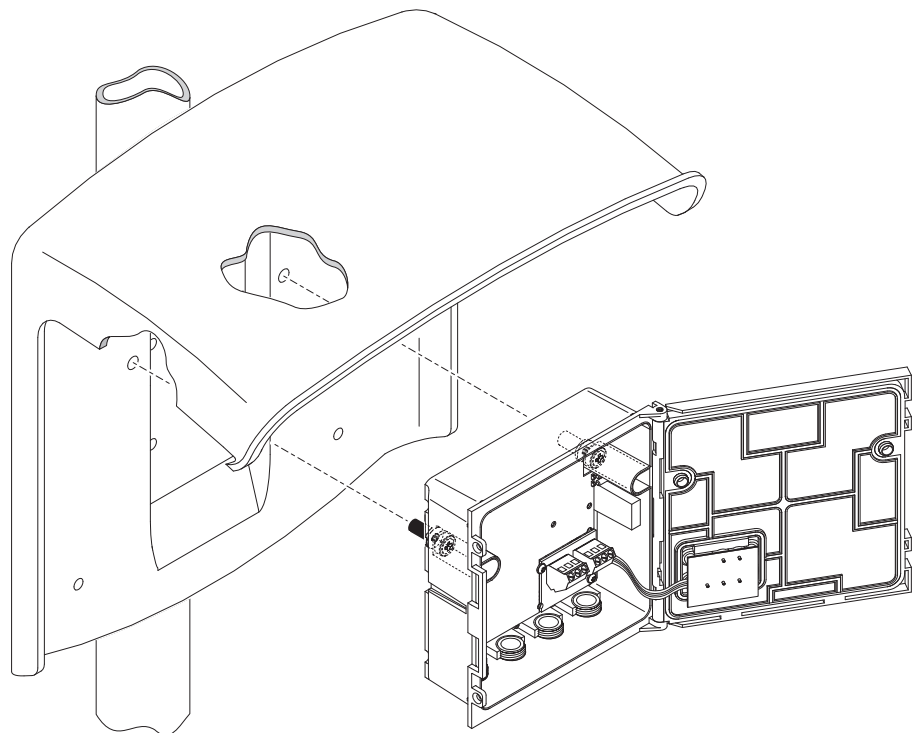
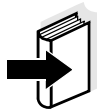


Fig. 3-22 Mounting the MIQ module on the SSH/IQ sun shield

4	Position the MIQ module on the sun shield and fix it into place with the two screws (pos. 6 in Fig. 3-21).
5	Close the module lid and fix it with the two countersunk screws (pos. 5 in Fig. 3-21).

3.6.3 Mounting under the SD/K 170 sun shield

If a single MIQ module is to be installed outside, it must be provided with a sun shield that protects it against the effects of weather. 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.



Note

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 screw driver.

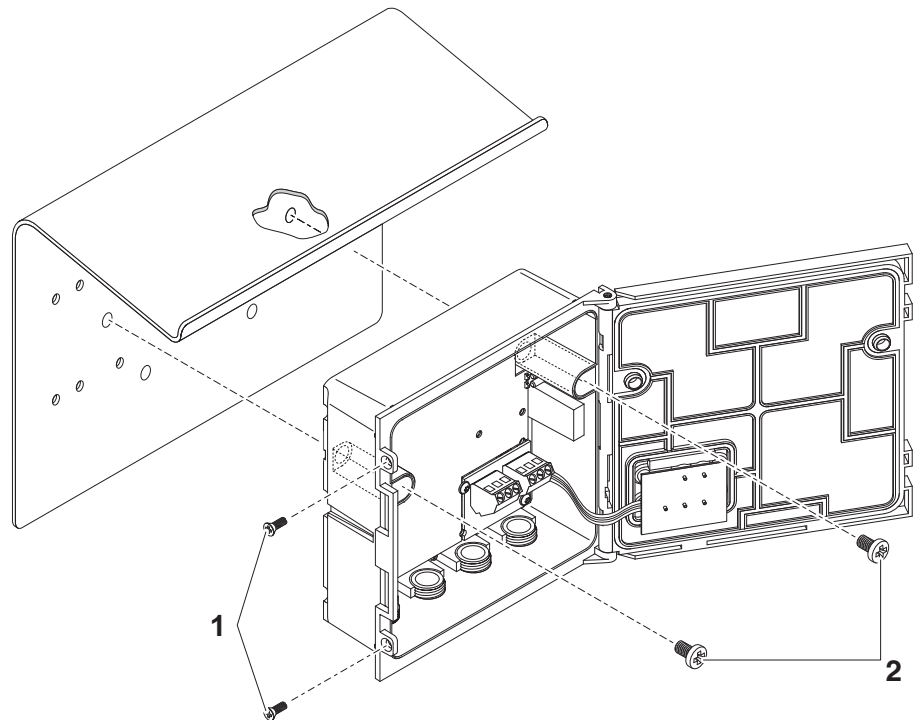
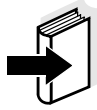
Mounting the MIQ module under the sun shield

Fig. 3-23 Mounting the MIQ module on the SD/K 170 sun shield

1	Remove the two countersunk screws (pos. 1 in Fig. 3-23) and swing open the module lid.
2	Position the MIQ module on the sun shield and fix it into place with the two screws (pos. 2 in Fig. 3-23).
3	Close the module lid and fix it with the two countersunk screws (pos. 1 in Fig. 3-23).

3.6.4 Panel mounting



Note

The space required on the panel for a module stack is given in the dimension drawings in section 8.3.



Note

The front MIQ module of the preassembled module stack must be removed in order to install the stack. After the installation of the front MIQ module, the remaining part of the stack can be added to the installed MIQ module (see section 3.5.2 STACKED MOUNTING OF MIQ MODULES: - Variant 2).

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).

Mounting the MIQ module on a panel

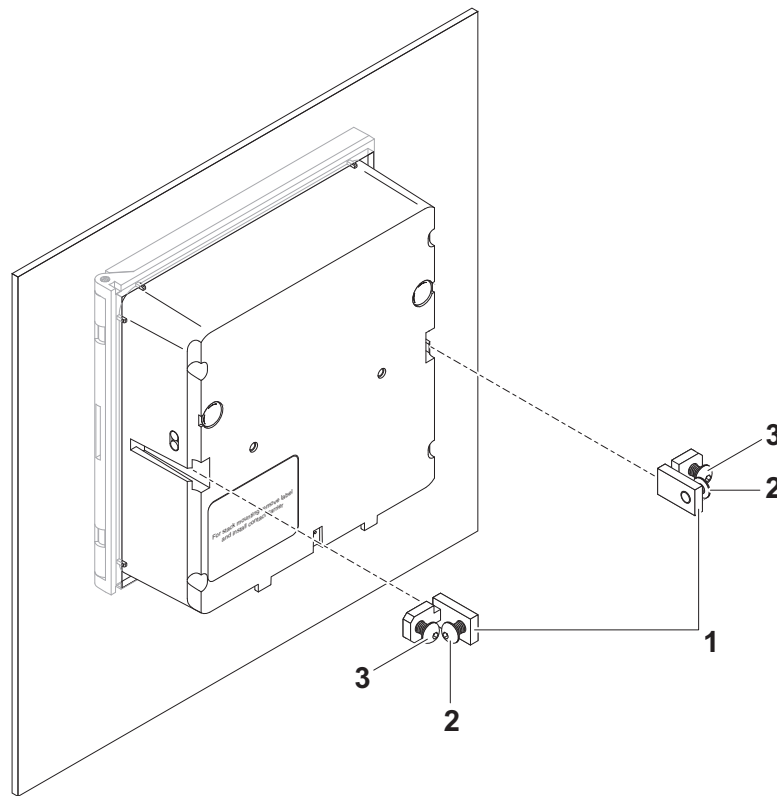


Fig. 3-24 Mounting the MIQ module on a panel

1	Insert the MIQ module in the panel aperture from the front.
2	Slightly unscrew the screws (pos. 2 and 3) of the two angle brackets (pos. 1 in Fig. 3-24), but do not remove them.

3	Push in the two angle brackets - as shown in Fig. 3-24 - into the lateral guides of the MIQ module up to the stop.
4	Tighten the screws (pos. 2).
5	Screw in the screws (pos. 3) until the screws rest snugly against the panel.

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 screw driver.

Mounting the MIQ module on a top hat rail

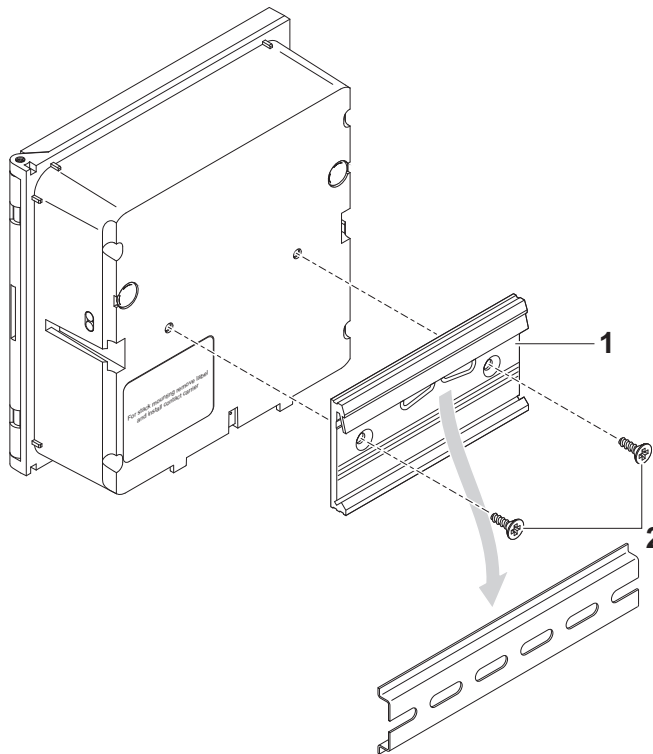


Fig. 3-25 Mounting the MIQ module on a top hat rail

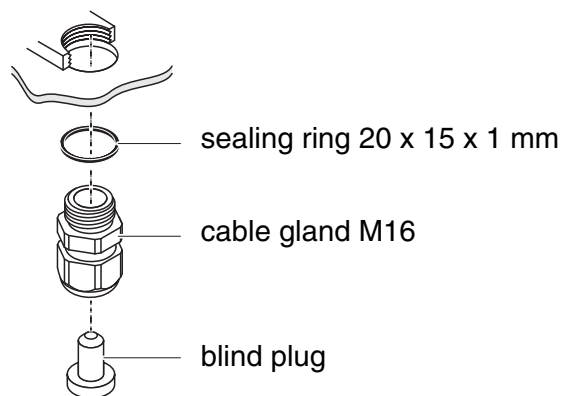
1	Screw the clamping assembly (pos. 1 in Fig. 3-25) onto the back of the MIQ module with the two plastic tapping screws (pos. 2).
2	Attach the MIQ module onto the top hat rail from above using the clamping assembly and press against the rail until the clamping assembly clicks into place. The MIQ module can be moved sideways afterwards.
3	To unhook the MIQ module, press it downwards and pull it forwards at the bottom.

3.7 Electrical connections: General instructions

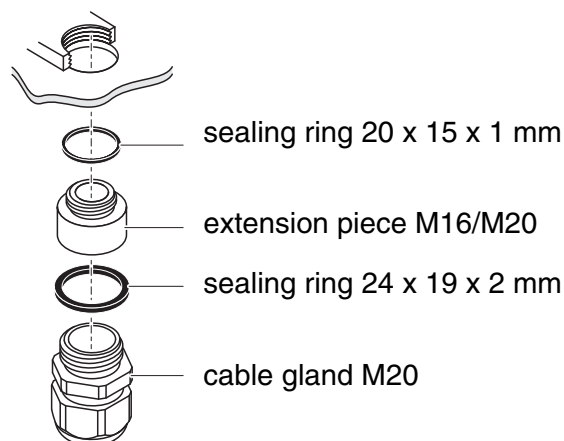
Cable glands

All electric cables are fed from below via prepared openings in the enclosure of the MIQ modules. Cable glands with different clamping ranges are included with most MOQ modules 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 3.5.3) 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.



Note

If necessary, you can order further large cable glands (see chapter 10 ACCESSORIES AND OPTIONS).

General installation instructions

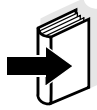
Observe the following points when attaching connecting wires to the terminal strip:

- Shorten all the 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 housing 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. This could result in life threatening electric shock when working with the IQ SENSOR NET. Always cut off any wires that are not in use as closely as possible to the cable gland.

3.8 Connecting the voltage supply



Note

How to connect the voltage supply is comprehensively described in the operating manual of the MIQ power supply module.

3.9 Commissioning

3.9.1 Topology and terminator switch

For failure-free operation, the terminator switches (terminating resistors) must always be set to ON on two MIQ modules. On which modules this has to be done can be taken from the topology of the IQ SENSOR NET system:

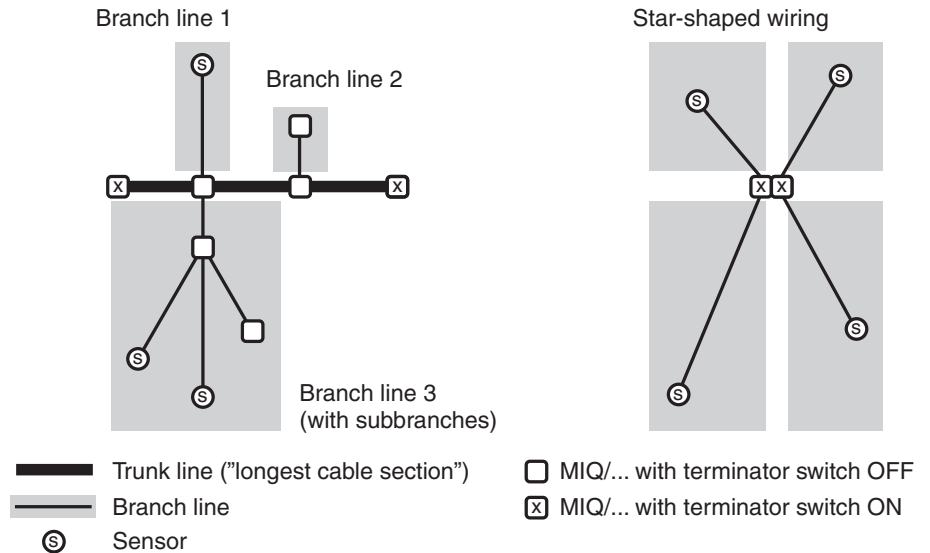


Fig. 3-26 Correct setting of the terminator switches

Main line

Longest cable section with terminator switches at its ends.

The terminator switches on both ends must be set to ON.

If all MIQ modules are at one location, i. e. in a module stack, the length of the main line is zero (star-shaped wiring).

Branch line

All lines that branch from the main line. Branch lines can be branched further.



Note

In the MIQ/TC 2020 XT multiparameter measuring transmitter, the SN terminator switches of the two MIQ modules are set to ON in the delivery state. This is the correct setting provided that the system is not further branched. In the case of additional branching, the SN terminator switches must be newly set.

Example of determining the main line

The following figure shows the length of the main line L made up of the partial lengths L1, L2 and L3 as the cable section L4 is shorter than L3:

$$\text{Length of the main line} = L1 + L2 + L3$$

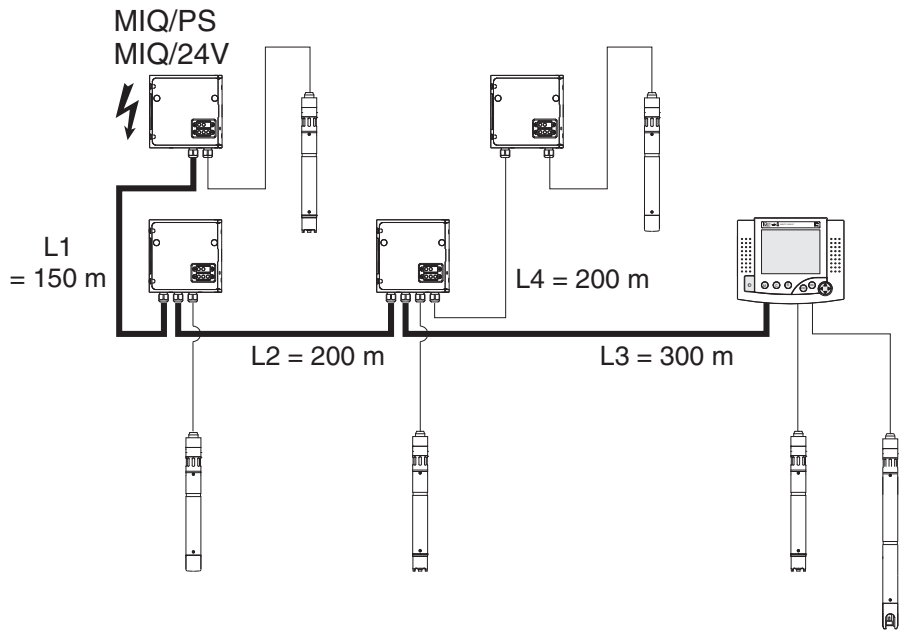


Fig. 3-27 Example of determining the length of the main line

Terminator switch

Terminator switches are located in each MIQ module between the two SENSORNET connections on the right of the terminal strip (designation "SN TERMINATOR"):

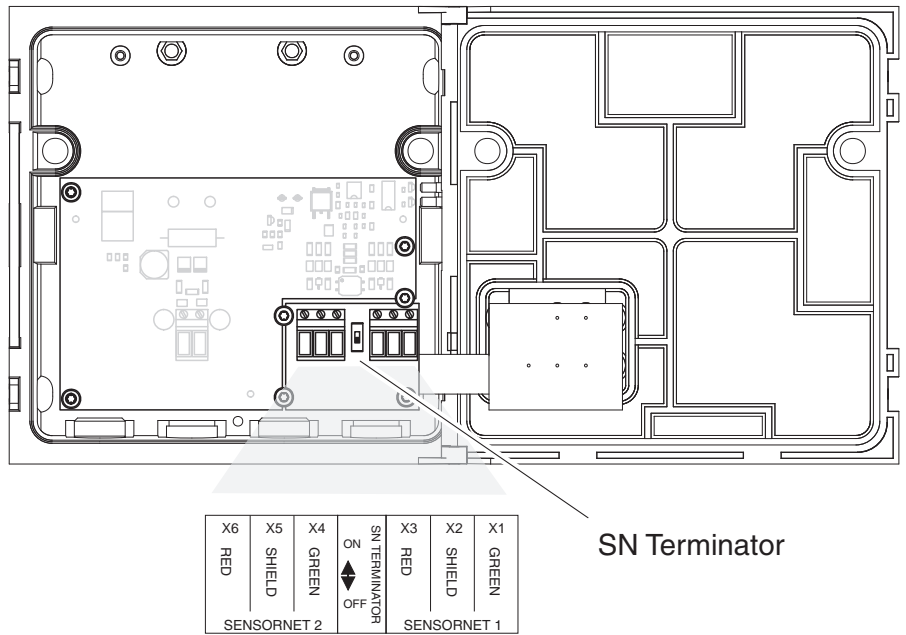


Fig. 3-28 Terminator switch

3.9.2 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 Is the sum of the power consumption of the components smaller than the sum of the power delivery of all power supply modules (see section 3.3)?
- 2 Are all IQ SENSOR NET components correctly connected with one another (see section 3.5)?
- 3 Are all SN terminator switches correctly set (see section 3.9.1)?
- 4 Is the MIQ power supply module correctly connected to the voltage supply?
- 5 Do the line voltage and line frequency agree with the data on the name plate of the MIQ power supply module?
- 6 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 MIQ power supply module(s).

Configuration of the MIQ/TC 2020 XT

During the commissioning of the MIQ/TC 2020 XT at the IQ SENSOR NET a query appears asking whether the MIQ/TC 2020 XT should work as a controller or just as a terminal. Select the required function for each MIQ/TC 2020 XT.

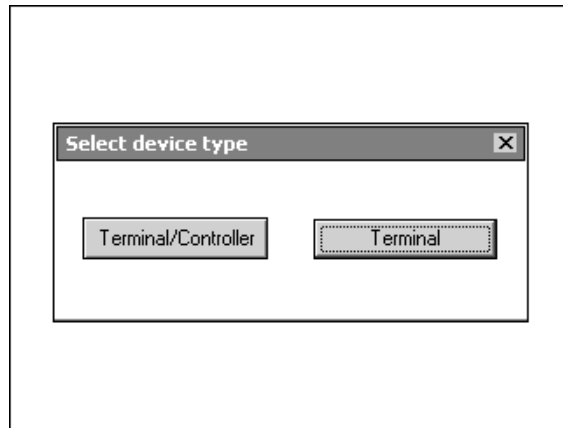


Fig. 3-29 Selecting the instrument type

The MIQ/TC 2020 XT will then try to register with the selected functionality on the IQ SENSOR NET. Note that only one controller can be active in an IQ SENSOR NET.

Details on the configuration of the MIQ/TC 2020 XT, see section 3.11.

Initial start phase

In the initial start phase, all IQ SENSOR NET components are automatically registered on the MIQ/TC 2020 XT controller module and the terminal is initialized. Then, the system performs a self test. This process may last a few seconds. During this period, the following display appears:

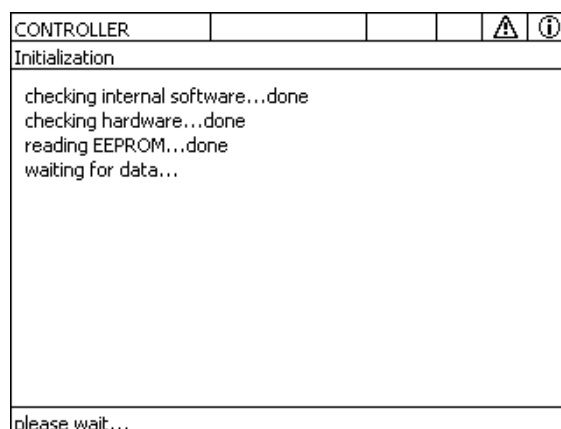


Fig. 3-30 Display during the initialization process

Second start phase

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

Terminal 1		15 May 2001 01:39		[Icons]	
Values: all sensors 020					
01	Init		02	01341000	
02	0.346	mS/cm	22.8 °C	99190001	
	Cond				
03	Init		pH	99160001	
Next sensor \$, display options 00					

Fig. 3-31 Display after initialization of the terminal



Note

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 5.5.1 on page 5-12.



Note

If the system start failed, see chapter 7 WHAT TO DO IF

3.9.3 Checking the voltage supply

This test should always be performed:

- after the initial commissioning
- after any system extension or modification.

This test checks the power supply and the communication of the components after the system has been started.

Test procedure

1	<p>Check the status of the LEDs on the MIQ power supply modules (Fig. 3-32):</p> <ul style="list-style-type: none"> – Yellow lights up Operational voltage OK. The operational voltage supplied is constant and is max. 24 V. – Red lights up Operational voltage with power limitation. The operational voltage supplied is adjusted to the load conditions. – no LED lights up: Operational voltage too low. The operational voltage supplied is too low or the MIQ power supply module is defective.
2	<p>Dock any existing mobile terminals on the system as far away as possible from a MIQ power supply module (i.e. test of the power supply in the most unfavorable possible conditions)</p>
3	<p>Check the status of the LEDs on all MIQ modules (except for the MIQ power supply modules, see step 1) (Fig. 3-32):</p> <ul style="list-style-type: none"> – Yellow lights up Operational voltage OK – Red lights up Operational voltage in warning range. The component is fully functional. However, any further slight drop in voltage can lead to failure – no LED lights up: Operational voltage in error range



Note

The relationship between the supply voltage, the LED status and the log book entries is described in the section 8.1 GENERAL SYSTEM DATA.

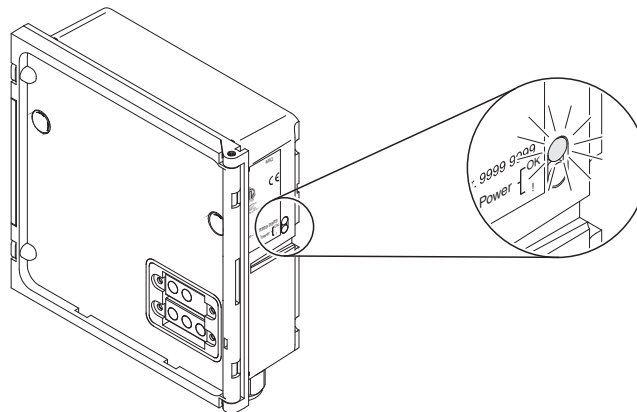
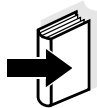


Fig. 3-32 Voltage LED on the MIQ module



Note

You can measure the voltage that is actually available at the MIQ modules or IQ sensors (see section 7.2.2).

4	Wait until the system start is completed and the measured value display appears.
5	If necessary, select another display language (see section 5.1 SELECTING THE LANGUAGE).
6	Check that all the IQ sensors are listed in the measured value display.
7	Check that all the MIQ output modules are listed in the <i>Edit list of outputs</i> menu (see section 5.8 EDITING THE LIST OF OUTPUTS).
8	If a component is not listed, carry out troubleshooting according to chapter 7 WHAT TO DO IF
9	Open the log book and acknowledge the messages. In the case of error messages, follow the instructions for clearing the error. For more details on the log book, see section 4.5.

3.10 System extension and modification

3.10.1 General information

The modular structure of the IQ SENSOR NET system makes it easy to carry out subsequent extensions and modifications. The system automatically identifies new active modules and includes them in the list of modules. Added IQ sensors immediately deliver measured values without the necessity for special settings.



Warning

When the system is switched on, if the MIQ/PS power supply module is opened, there is a danger to life due to possible hazard of electric shock from line voltage. There is also a danger to life inside the relay output modules (e.g. MIQ/ CR3) if voltages are applied to the relay contacts that may present a hazard of electric shock. Before opening the MIQ modules, switch off the system and all external voltages that present a hazard of electric shock and secure the system against being inadvertently switched on again.

Installation instructions

Note the following points in any system extension or modification:

- Before any extension or modification, check that the planned number of MIQ power supply modules is sufficient for the planned installation (see section 3.3 SYSTEM PLANNING)
- Before beginning the installation tasks, always switch off the system. Also, switch off all external voltages
- Clean the MIQ module stack to remove the worst of any dirt before taking it apart or opening it (see section 6.2 CLEANING)
- Before mounting the stack, check the contacts on the front and back of any MIQ modules that were already in use somewhere else. Clean any dirty contacts
- After any change to the system, check the setting of the SN terminator switches and adjust it if necessary (see section 3.9.1 TOPOLOGY AND TERMINATOR SWITCH).

Installing new components

Install new components as described in section 3.5 CONNECTING SYSTEM COMPONENTS. Then put the system into operation again (section 3.9 COMMISSIONING). Active modules are automatically recognized by the controller and included in the corresponding module lists.

**Note**

If a new component is not included, the maximum number of datasets (active and inactive datasets) may be exceeded.

The maximum number of datasets for IQ sensors is 20. For MIQ output modules, the maximum number of datasets (active and inactive datasets) is 8.

When this number of datasets is already stored, no further component can be installed.

If necessary, an inactive dataset has to be erased to make an extension possible (how to erase inactive datasets is described in section 5.5.3 or section 5.8.2).

**Note**

New modules are first registered on the system when the measured value display is opened.

Replacing components

The replacement of components is described in detail in section 7.4 REPLACING SYSTEM COMPONENTS.

3.11 Configuration of the MIQ/TC 2020 XT as a terminal/controller or terminal

During the initial commissioning of the MIQ/TC 2020 XT a query appears asking whether the MIQ/TC 2020 XT should work as a terminal/controller or just as a terminal. Select the required function for each MIQ/TC 2020 XT.

The MIQ/TC 2020 XT will then try to register with the selected functionality on the IQ SENSOR NET. Note that only one controller can be active in an IQ SENSOR NET.

When the MIQ/TC 2020 XT is once configured, the MIQ/TC 2020 XT saves this configuration. Thus, no further query appears during the docking on and off of terminals.

4 Operation

4.1 MIQ/TC 2020 XT terminal/controllers

During the initial commissioning of the MIQ/TC 2020 XT, a query appears asking you in which function you want to use the MIQ/TC 2020 XT in the system.

Two configurations can be selected:

- Configuration as terminal and controller
- Configuration as a mobile terminal

The MIQ/TC 2020 XT (configured as terminal/controller) is the operating and control unit of the IQ SENSOR NET.

You can install further terminal components:

- MIQ/TC 2020 XT (configured as terminal) (more compatible terminals, see section 1.4)
- MIQ/IF232 interface component with software terminal (see MIQ/IF232 component operating manual)

The terminal can be used to:

- Display measurement results
- Start calibration
- Perform system and terminal settings
- Display messages.



Note

To guarantee data safety within the IQ SENSOR NET, access to the following functions is only possible from one terminal at the same time:

- Opening the *Settings* menu
- Start calibration
- Assigning IQ sensors or MIQ output modules as substitutes.

If one of these functions is already active at another terminal, a note appears on the display.



Note

General key symbols are used in this operating manual for all operating steps. Details and differences when using the software terminal can be found in the MIQ/IF232 component operating manual.

4.1.1 Overview of the operating elements

This section gives basic information on the operation of the IQ SENSOR NET system via the MIQ/TC 2020 XT.

The operating elements on the terminal are described here using the MIQ/TC 2020 XT terminal as an example.

Details and differences when using the software terminal can be found in the MIQ/IF232 component operating manual.

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

The IQ SENSOR NET system is operated with the five keys, <M>, <C>, <S>, <ESC>, <OK> and the arrow keys <▲▼◀▶>.

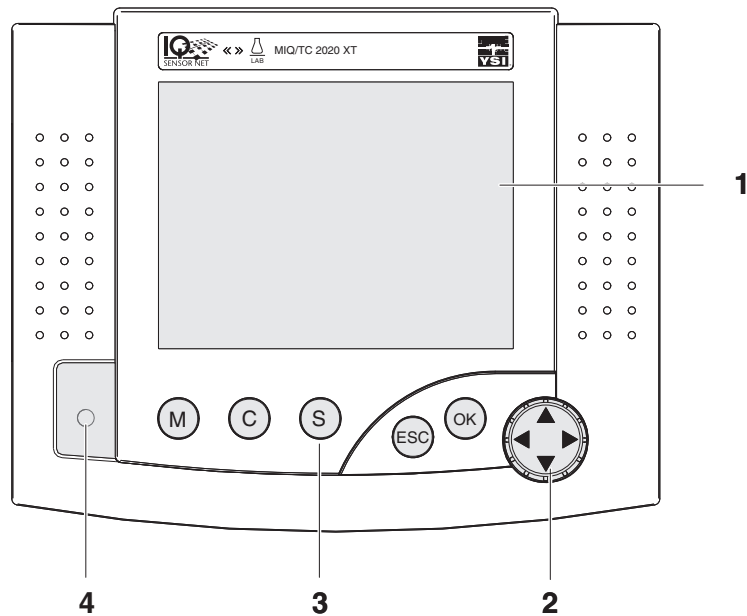


Fig. 4-1 View of the terminal/controller MIQ/TC 2020 XT

1	Display (see section 4.1.2 DISPLAY)
2	Arrow keys (see section 4.1.4 ARROW KEYS)
3	5 keys, <M>, <C>, <S>, <ESC>, <OK> (see section 4.1.3 KEYS)
4	Status LED

4.1.2 Display

The display contains the following information:

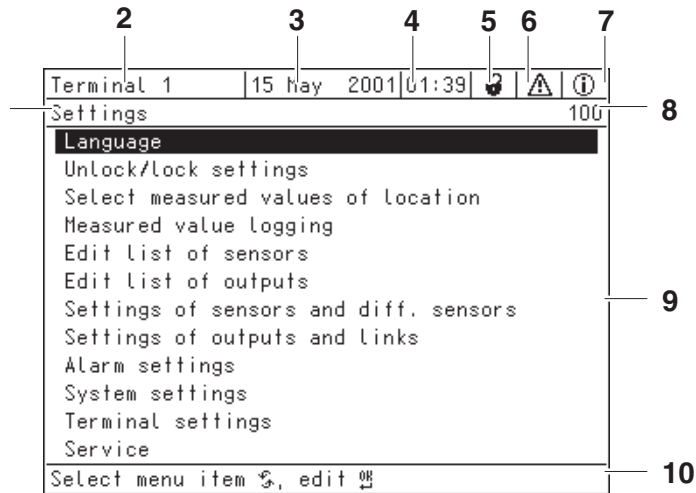









Fig. 4-2 View of the display

1	Name of the display
2	Name of the terminal and controller function alternately (CONTROLLER or BACKUP CONTROLLER)
3	Date
4	Time
5	User authorization:
	<p>Simple access control</p> <ul style="list-style-type: none">  Lock open: Settings are unlocked <ul style="list-style-type: none"> – System settings can be changed  Lock closed: Settings are locked <ul style="list-style-type: none"> – All system settings can only be read
	<p>Extended access control:</p> <ul style="list-style-type: none">  Crown: Administrator authorization Configuration and continuous operation of the system  Tool: Maintenance authorization Continuous operation of the system and maintenance activities  Eye: View authorization Only read permission, no operation of the system

6	<p>Error symbol :</p> <p>If the error symbol flashes, a new or unacknowledged error message is present in the log book that requires immediate action (see section 4.5.3).</p>
7	<p>Info symbol :</p> <p>If the info symbol flashes, new or unacknowledged information is present in the log book (see section 4.5.3).</p>
8	Number of the display
9	Display range for measured values, menus, lists, etc.
10	Help line with operating instructions

Measured value display

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

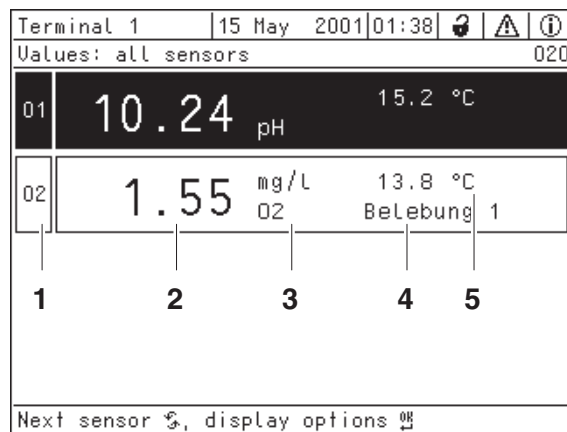


Fig. 4-3 Display - measured value display

1	Consecutive numbering of the measured values
2	Main measured value
3	Unit and parameter of the main measured value
4	Name of the sensor (to enter name: see section 5.5.1)
5	Adjoining measured value with unit

Special displays

<i>Init</i>	Sensor is being initialized <ul style="list-style-type: none"> ● during commissioning or ● if a new IQ sensor is recognized that is not yet giving measured values
----	Invalid measured value
<i>Cal</i>	Sensor is being calibrated
<i>Clean</i>	Cleaning system active, sensor is offline
<i>Error</i>	Sensor is inactive or defective
<i>OFL</i>	Measuring range undercut or exceeded (overflow)
Display flashes	Sensor in maintenance condition

4.1.3 Keys

Key	Function
<M>	Display measured values
<C>	Start calibration of the IQ sensor selected in the measured value display
<S>	Open the <i>Settings</i> menu
<ESC>	Change to the higher menu levels or abort entries without storing them
<OK>	Confirm selection

4.1.4 Arrow keys

Arrow keys	Function
<▲▼◀▶>	Highlight and select: <ul style="list-style-type: none"> ● Menu items ● Entries ● Columns or fields ● Letters or numerals

**Note**

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

4.2 General operating principles

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

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



Note

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

Examples of the operating principles are given below:

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



Note

General key symbols are used for all operating steps in this operating manual. Details and differences when using the software terminal can be found in the MIQ/IF232 component operating manual.



Note

If two or more terminals are used in a IQ SENSOR NET access to the functions <C> and <S> is blocked if the functions are already being used at another terminal.

4.2.1 Navigating in menus, lists and tables

- 1 Using **<S>**, open the *Settings* menu. Menus appear in the form of a list on the display, e.g. the *Settings* menu shown here.

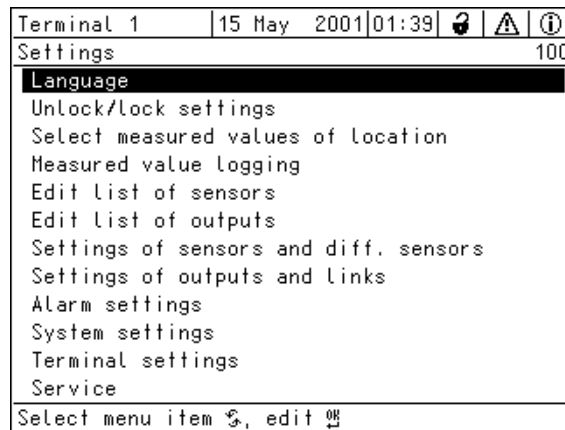


Fig. 4-4 100 - Settings

- 2 Use **<▲▼◀▶>** to select a menu item (e.g. *System settings*). Use the arrow keys **<▲▼◀▶>** to move the highlighting (reverse video display, black background) in the list of menu items.
- 3 Use **<OK>** to confirm the menu item (e.g. *System settings*). The display (e.g. *System settings*) opens up. Pressing the **<OK>** key confirms the selection and goes to a new display representation.
- 4 Return to a higher level with **<ESC>**.
or:
Switch to the measured value display with **<M>**.

4.2.2 Entering texts or numerals

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

- 1 Using <S>, open the *Settings* menu.
- 2 Use <▲▼◀▶> to select the menu item, *Edit list of sensors*.
- 3 Use <OK> to confirm the menu item, *Edit list of sensors*. The *Edit list of sensors* display opens. A column is highlighted.
- 4 Use <▲▼◀▶> to select the *Sensor name* column.
- 5 Use <OK> to confirm the *Sensor name* column. A sensor name is highlighted.
- 6 Select a sensor name with <▲▼◀▶>.

Terminal 1	15 May 2001	01:43	🔒	⚠	ℹ
Edit list of sensors					120
No.	Model	Ser. no.	Sensor name		
S02	SensoLyt700IQ	99085555	Zulauf		
S03	TriOxmatic701IQ	99086666	Belebung 1		
S04	TetraCon700IQ	99085678	Zulauf		
?01	TetraCon700IQ	99085678	Zulauf		
Select character ⤴, confirm character ⏎					

Fig. 4-5 Edit list of sensors

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

Terminal 1	15 May 2001	01:43			
Edit list of sensors					120
No.	Model	Ser. no.	Sensor name		
S01	TriOxmatic700IQ	01341000	99010700		
?02	DefaultName	99010700	99010700		
S03	TetraCon700IQ	99190001	99190001		
S04	SensoLyt700IQ	99160001	99160001		
Select character , confirm character					

Fig. 4-6 Edit list of sensors



Note

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

- 8 Select a letter or numeral with **<▲▼◀▶>**.
- 9 Confirm the letter with **<OK>**.
 The character appears behind the last letter.

Terminal 1	15 May 2001	01 43			
Edit list of sensors					120
No.	Model	Ser. no.	Sensor name		
S01	TriOxmatic700IQ	01341000	99010700		
?02	DefaultName	99010700	99010700		
S03	TetraCon700IQ	99190001	99190001		
S04	SensoLyt700IQ	99160001	99160001		
Select character , confirm character					

Fig. 4-7 Edit list of sensors

- | | |
|----|--|
| 10 | <ul style="list-style-type: none">● Add a new character
Select the character to be added with <▲▼◀▶> and confirm with <OK>.<p>or</p>● Delete the last character
Use <▲▼◀▶> to select the character ← and confirm with <OK>.<p>or</p>● Adopt the name
Use <▲▼◀▶> to select the character ^{OK} and confirm with <OK>. |
| 11 | Repeat steps 8 to 10 until the whole name has been entered. |

**Note**

Break off entering the name with <ESC>. The old name is retained.

4.3 Access to the IQ SENSOR NET with enabled access control



Note

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

As soon as any access control is enabled, access to the IQ SENSOR NET is protected completely or partly. Access is only possible after a password has been entered.

Access to the system (entry of a password) is different for the various types of access control.

- Simple access control:
the lock symbol (open, closed) is visible
(see section 4.3.1)
- Extended access control:
one of the following symbols is visible: Crown, tool, eye
(see section 4.3.2)
- Extended access control with instrument block:
only the IQ SENSOR NET logo is visible (see section 4.3.3)

4.3.1 Simple access control

If simple access control is enabled and the system settings are locked, a lock symbol appears on the display. If a closed lock is displayed, the IQ SENSOR NET informs you that settings cannot be changed in the protected mode before you can adopt a changed system setting.

Releasing the system settings

You can unlock the system settings as follows:

- Enter the password for simple access control with the arrow keys in the menu, *Settings / Unlock/lock settings / Unlock settings*.
The system settings are unlocked.
- Connect the electronic key to the USB interface
(if the administrator has unlocked this function)

Locking the system settings

You can lock the system settings as follows:

- Enter the password for simple access control with the arrow keys in the menu, *Settings / Unlock/lock settings / Lock settings*.
The system settings are locked.
- Remove the electronic key from the USB interface
- If no key is pressed for 10 minutes the system settings are automatically locked.

4.3.2 Extended access control

If extended access control (without instrument block) is enabled, a symbol for the currently enabled access authorization is displayed.

Crown: Administrator logged in, all functions allowed

Tool: User with authorization for maintenance activities logged in (e.g. calibration)

Eye: Viewer without any authorization

The relevant symbol is displayed, depending on the currently enabled user authorization. Functions that are not allowed are hidden in the menu.

User or administrator access

If authorization is required for a task, log-in with the password is required. This can be done as follows:

- Open the menu, *Display/Options / Change user rights*.
A password query appears.
Enter the password with the arrow keys and confirm with OK.
The respective user rights are unlocked.
- Connect the electronic key to the USB interface
(if the administrator has unlocked this function)
The respective user rights are unlocked.

Protecting the system

The following options to protect the system are available:

- Select the menu, *Display/Options / Viewing only*.
The system is protected.
- Remove the electronic key from the USB interface
- If no key is pressed for 10 minutes, the user or administrator is automatically logged off and the system protection is automatically activated.

4.3.3 Extended access control with instrument block

If the extended access control with instrument block is enabled, the display of the terminal where the instrument block was enabled only indicates the IQ SENSOR NET logo.

As soon as a password was entered the symbol for the currently active access authorization is displayed.

Crown: Administrator logged in, all functions allowed

Tool: User with authorization for maintenance activities logged in (e.g. calibration)

Eye: Viewer without any authorization

The relevant symbol is displayed, depending on the currently enabled user authorization. Functions that are not allowed are hidden in the menu.

Access as viewer, user or administrator

User authorization is required for all tasks, even for the viewing of measured values. Log-in with a password is required. This can be done as follows:

- Press any key.
A password query appears.
Enter the password with the arrow keys and confirm with OK.
The respective user rights are unlocked.
- Connect the electronic key to the USB interface
(if the administrator has unlocked this function)
The respective user rights are unlocked.

Log-off Protecting the system and terminal

You can protect the system and lock the terminal as follows:

- Select the menu, *Display/Options / Lock Device*.
The system is protected. The instrument is locked.
- Remove the electronic key from the USB interface
- If no key is pressed for 10 minutes, the user or administrator is automatically logged off and the system protection is automatically activated.

4.4 Display of current measured values

Several options can be selected for displaying the measured values:

- *Measured values (1 sensor)*
The measured value is shown numerically and as a bar graph on the *Measured values (1 sensor)* display (see section 4.4.1)
- *Measured values (4 sensors)*
The *Measured values (4 sensors)* display provides an overview of a maximum of four IQ sensors or differential sensors (see section 4.4.2)
- *Measured values (8 sensors)*
The *Measured values (8 sensors)* display provides an overview of a maximum of eight IQ sensors or differential sensors (see section 4.4.3)
- *Display local values or all values*
Here you can switch between the display of the IQ sensors selected for the measurement location and the display of all the IQ sensors (see section 4.4.4).

Switch between the different display types as follows:

1	Call up the measured value display with <M>.
2	Using <OK>, open the <i>Display/Options</i> menu.

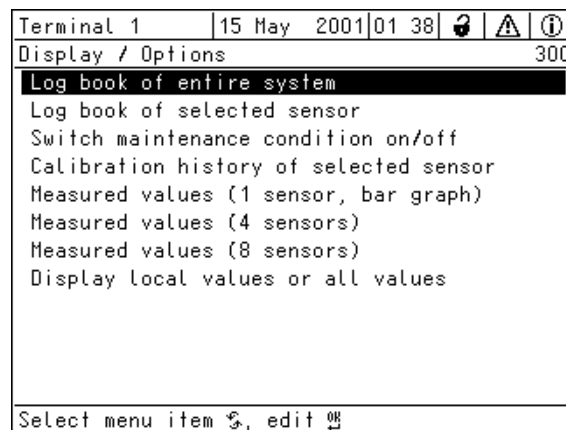


Fig. 4-8 Display/Options

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

4.4.1 Displaying a single measured value

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

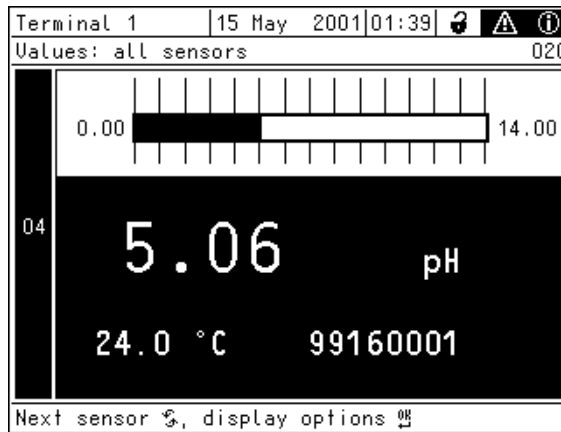


Fig. 4-9 Values: all sensors -> Measured values (1 sensor)

4.4.2 Displaying four measured values

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

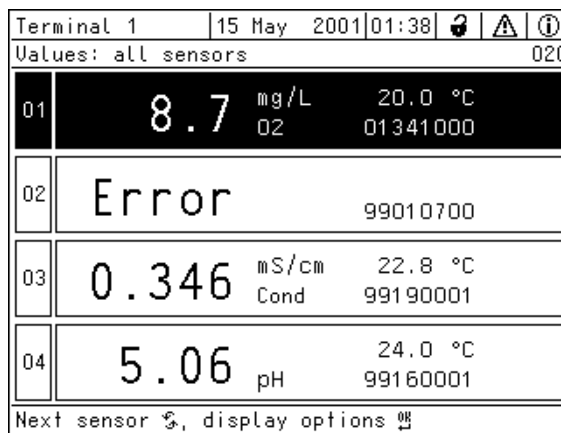


Fig. 4-10 Values: all sensors -> Measured values (4 sensors)

4.4.3 Displaying eight measured values

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

Terminal 1	15 May 2001	01 39			
Values: all sensors					020
01	8.7 mg/L	02	20.0 °C	01341000	
02	Error			99010700	
03	0.346 mS/cm	Cond	22.8 °C	99190001	
04	5.06	pH	24.0 °C	99160001	
Next sensor , display options					

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

4.4.4 Displaying recorded measured values

If the measured value recording has been activated for an IQ sensor (see section 5.12), the temporal course of the recorded measured values can be displayed numerically and graphically.

The following display options are possible:

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

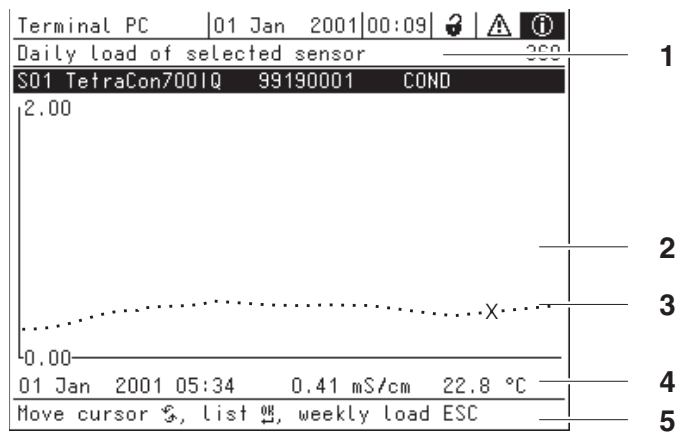


Fig. 4-12 Daily load of selected sensor (example)

1	Display
2	Range of the graphical display <ul style="list-style-type: none"> ● The time range (x axis) corresponds to the selected display option (1 day, 1 week, 1 month). ● The value range of the y-axis is automatically adjusted to min and max values
3	Position of the cursor (X)
4	Data about the position of the cursor (X) (Date, time, main measured value and adjoining measured value)
5	Navigation instructions

Displaying recorded measured values

1	Switch to the measured value display with <M> .
2	Select an IQ sensor with <▲▼◀▶> .
3	Using <OK> , open the <i>Display/Options</i> menu.
4	Select one of the display options with <▲▼◀▶> . <ul style="list-style-type: none"> ● <i>Monthly load of selected sensor</i> ● <i>Weekly load of selected sensor</i> ● <i>Daily load of selected sensor</i> ● <i>Measured value list of selected sensor</i> Select and confirm with <OK> . The selected option is displayed.

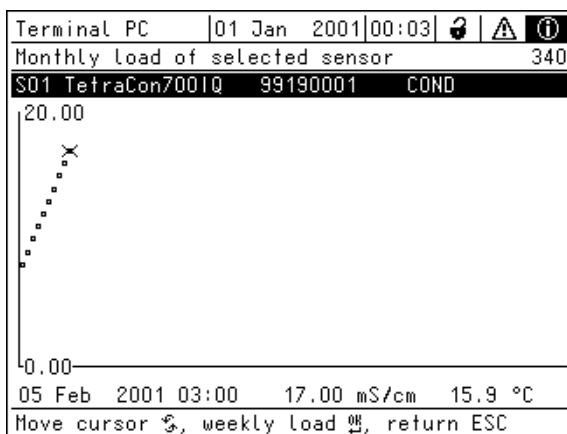


Fig. 4-13 Monthly load of selected sensor (example)

5	Move the cursor (X) along the measured value curve with <▲▼◀▶> . The cursor (X) marks the selected measured value.
6	Switch to the next display option with a shorter display period with <OK> . or Switch to the next display option with a longer display period with <ESC> .

4.4.5 Display of the measured values of a measurement location or of all IQ sensors in the system

As soon as a terminal is docked onto a measurement location, the local measured value display becomes active. The IQ sensors selected for the measurement location appear on the measured value display (see section 5.9).

Switch between the measured values for the measurement location and all IQ sensors as follows:

1	Switch to the measured value display with <M> .
2	Using <OK> , open the <i>Display/Options</i> menu.
3	Using <▲▼◀▶> , select the menu item, <i>Display local values or all values</i> and confirm with <OK> . The measured value display switches between the display of the sensors at the measurement location and all sensors.

4.5 Messages and log book

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

All messages are recorded in the log book.

In addition, a flashing status LED at the MIQ/TC 2020 XT reminds you that there is an error or alarm (see section 1.3.5).

4.5.1 Message types

The system differentiates two types of messages:

- **Errors** ⚠

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

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

- **Information** ⓘ

Information that does not require immediate action.

In the case of new information, the info symbol flashes on the display.



Note

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

4.5.2 Log book

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

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

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

Structure of the log book

Terminal 1					15 May 2001	14:53	[Icons]	
Log book of entire system								310
[Info]	SYS	I33210	14 May 2001	01:24				
[Info]	S01	I33200	12 May 2001	11:00				
[Info]	D03	I33212	08 May 2001	08:52	✓			
[Warn]	S04	E33200	02 May 2001	16:20	✓			
[Info]	S??	I33200	11 Apr 2001	05:08	✓			
[Info]	D??	I33212	02 Apr 2001	06:28	✓			
[Info]	D02	I33222	12 Mar 2001	13:57	✓			
[Info]	S08	I33200	02 Mar 2001	11:14	✓			
[Info]	S09	I33211	27 Feb 2001	22:28	✓			
[Warn]	S26	E33212	14 Feb 2001	01:24	✓			
[Warn]	D11	E332A2	13 Jan 2001	08:33	✓			
[Info]	SYS	I33200	07 Jan 2001	14:46	✓			
Open	message	/	acknowledge	message	[Icons]			
1	2	3	4	5				

Fig. 4-14 Log book of entire system

1	Message category (error or info symbol)
2	Module that triggered the message. <i>SYS</i> system (controller) <i>S01</i> IQ sensor (number 01) <i>S??</i> IQ sensor (inactive, dataset deleted) <i>D01</i> MIQ output module (number 01) <i>D??</i> MIQ output module (inactive, dataset deleted)
3	Message code
4	Date and time of the message
5	Status field of the message ✓ message is acknowledged No checkmark message is not acknowledged

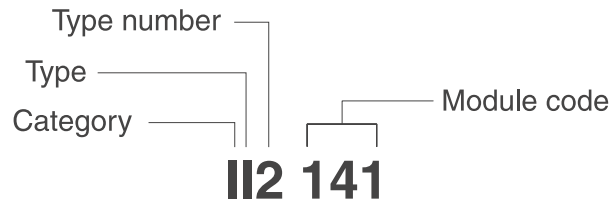
The system provides the following log books:

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

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

Structure of the message code

The message code consists of 6 characters and can contain numerals and letters, e.g.: I12141.



Pos.	Information	Explanation
1 - 3	Short message form	The short form of the message contains the following information of the message: Category, type and type number
	1: possible categories	<ul style="list-style-type: none"> ● Info message (I) ● Error message (E)
	2: possible types	<ul style="list-style-type: none"> ● Calibration data (C) ● Installation and commissioning (I) ● Instructions for service and repair (S) ● Application instructions (A)
	3: Type number	Each type contains subtypes (0..9A..Z)
4 - 6	Module code	The three-digit module code designates the module that generated the message. The module code can be found in the chapter LISTS of the respective component operating manual.

**Example:
Message code I12141**

Component "141" (MIQ/TC 2020 XT) sends a message with the short form message "I12".

This is an info message (I) of the type Installation (I) with the type number (2). The detailed message text of the short form message (I12) can be found in the log book and in the operating manual of the component that sent it.



Note

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

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



Note

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

4.5.3 Viewing detailed message texts

- 1 Switch to the measured value display with **<M>**.
- 2 Using **<OK>**, open the *Display/Options* menu.
- 3 Using **<OK>**, select and open the *Log book of entire system*. A list of log book entries appears.
- 4 Select and confirm a new log book entry (no checkmark) with **<▲▼◀▶>** and **<OK>**.
The message text with further information on the selected log book entry appears.

Terminal 1	15 May 2001	14 53			
Log book of entire system					310
	SYS	I33210	14 May 2001	01:24	
	S01	I33200	12 May 2001	11:00	
	D03	I33212	08 May 2001	08:52	✓
	S04	E33200	02 May 2001	16:20	✓
	S??	I33200	11 Apr 2001	05:08	✓
	D??	I33212	02 Apr 2001	06:28	✓
	D02	I33222	12 Mar 2001	13:57	✓
	S08	I33200	02 Mar 2001	11:14	✓
	S09	I33211	27 Feb 2001	22:28	✓
	S26	E33212	14 Feb 2001	01:24	✓
	D11	E332A2	13 Jan 2001	08:33	✓
	SYS	I33200	07 Jan 2001	14:46	✓
Open message / acknowledge message					

Fig. 4-15 Log book of entire system

- 5 Acknowledge the message with **<OK>**. A checkmark appears in the log book entry.
- 6 Leave the message text with **<ESC>**.

**Note**

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

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

**Note**

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

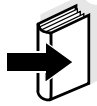
If a message text is not available because, e.g. a component is not connected with the system, you can look up the detailed text of the message as follows:

- Messages of the system are given in this operating manual (see section 11.2).
- Messages of a module are given in the respective component operating manual of the component.

4.5.4 Acknowledge all messages

1	Switch to the measured value display with <M> .
2	Using <S> , open the <i>Settings</i> menu.
3	Using <▲▼◀▶> , select the menu item, <i>Service</i> and confirm with <OK> .
4	Using <▲▼◀▶> , select the menu item, <i>Acknowledge all messages</i> and confirm with <OK> . A security prompt opens.
5	Using <▲▼◀▶> , select the menu item, <i>Acknowledge</i> and confirm with <OK> . All messages are acknowledged. Error symbol and info symbol do no longer flash.

4.6 Calibration data



Note

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

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

- Calibration date
- Calibration successful or not successful.

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



Note

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

4.6.1 Calibration entries in the log book

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

1	Call up the measured value display with <M> .
2	Using <▲▼◀▶> , highlight a sensor and confirm with <OK> . The <i>Display/Options</i> menu opens.
3	Using <▲▼◀▶> , select the menu item, <i>Log book of selected sensor</i> and confirm with <OK> . Calibration entries in the log book are held in message code (ICxxxx and ECxxxx).
4	Using <▲▼◀▶> und <OK> , select and open a calibration entry (ECxxxx or ICxxxx).
5	Press <M> to leave the <i>Calibration history of selected sensor</i> .

4.6.2 Calibration history

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

1	Call up the measured value display with <M> .
2	Using <▲▼◀▶> , highlight a sensor and confirm with <OK> . The <i>Display/Options</i> menu opens.
3	Using <▲▼◀▶> , select the menu item, <i>Calibration history of selected sensor</i> and confirm with <OK> . The calibration history with the results of the last calibrations opens.
4	Press <M> to leave the <i>Calibration history of selected sensor</i> overview.

4.7 Status info of sensors and outputs

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

The status display can be reached in the *Settings/Service/List of all components* menu (see section 4.7).

- 1 Call up the *List of all components* (see section 4.7).
- 2 Select the required component with **<▲▼◀▶>** and confirm with **<OK>**.
 - Output module: The *Status of output channels* window opens up (for details, refer to the operating manual of the output module).
 - Sensor: The sensor info opens up (for details, refer to the operating manual of the selected sensor).




CONTROLLER		26 May 2008	10:31			
Status of output channels						394
No.	Name	Chan.	Status			
D01		R1	open			
D01		R2	open			
D01		R3	open			
D01		C1	0.00 mA			
D01		C2	0.00 mA			
D01		C3	0.00 mA			
Return ESC						

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

- 3 Use **<M>** or **<ESC>** to quit the window, *Status of output channels*.

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

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

In the maintenance condition

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

The maintenance condition for IQ sensors is automatically activated

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

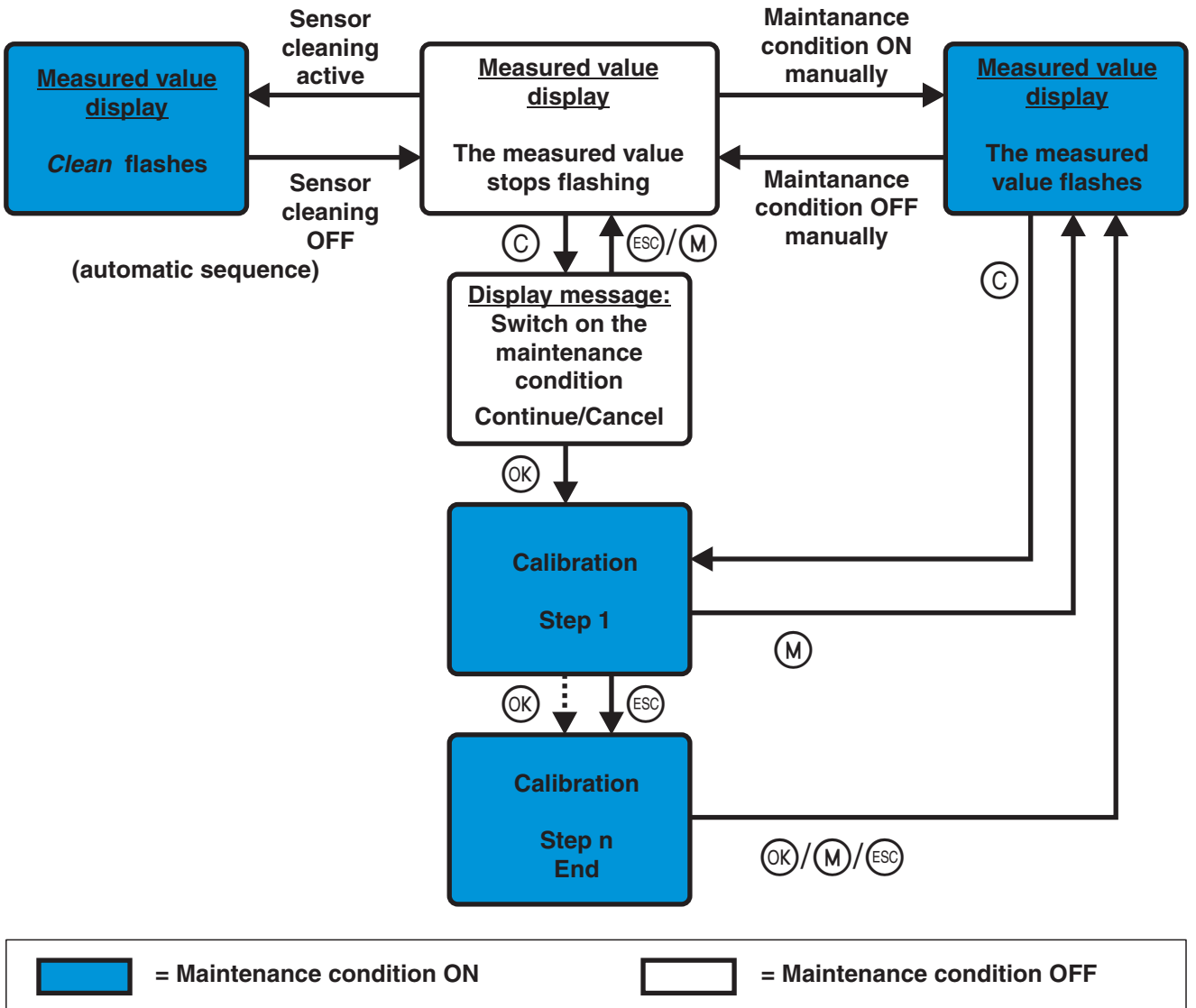
Therefore, keep to the following course when you calibrate, clean, service or repair an IQ sensor.

Course

1	Switch on the maintenance condition for the IQ sensor (see section 4.8.2). The display of the sensor in the measured value display flashes.
2	Pull the sensor out of the sample.
3	Perform the calibration in the laboratory, cleaning, maintenance or repair (removing and replacing) of the sensor (about these topics, see the component operating manual of the corresponding sensor).
4	Submerge the sensor in the sample again.
5	Wait until the measured value does no longer change.
6	Switch off the maintenance condition for the sensor (see section 4.8.3). The display of the sensor in the measured value display does no longer flash.

4.8.1 Maintenance condition of IQ sensors

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



4.8.2 Switching on the maintenance condition

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

1	Call up the measured value display with <M> .
2	Select the sensor you want to switch on the maintenance condition for with <▲▼◀▶> . The display of the sensor in the measured value display does not flash.
3	Using <OK> , open the <i>Display/Options</i> menu.
4	Using <▲▼◀▶> , select the menu item, <i>Switch maintenance condition on/off</i> and confirm with <OK> . A window that informs you about the maintenance condition opens up.
5	Confirm with <OK> <i>Continue</i> . The selected sensor is in the maintenance condition. Linked outputs are frozen.
6	Call up the measured value display with <M> . The display of the sensor in the measured value display flashes.

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

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

4.8.3 Switching off the maintenance condition

1	Call up the measured value display with <M>.
2	Select the sensor you want to switch off the maintenance condition for with <▲▼◀▶>. The display of the sensor in the measured value display flashes.
3	Using <OK>, open the <i>Display/Options</i> menu.
4	Using <▲▼◀▶>, select the menu item, <i>Switch maintenance condition on/off</i> and confirm with <OK>. A window that informs you about the maintenance condition opens up.
5	Confirm <i>Continue</i> with <OK> . The maintenance condition of the selected sensor is switched off. Linked outputs are released.
6	Call up the measured value display with <M>. The display of the sensor in the measured value display does not flash.



Note

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

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

4.9 Data exchange via the USB interface

With the USB interface the MIQ/TC 2020 XT provides a very simple way to

- Save data of the IQ SENSOR NET on a USB memory device (see section 4.9.1)
- Transmit data to a PC with the aid of a USB memory device
- Transmit configuration data to the controller

4.9.1 Saving IQ SENSOR NET data on a USB memory device

You can save the following data types:

- Configuration data (see section 4.9.3)
- Measurement data (see section 4.9.2)
- Log book
- Calibration history

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

Saving data



Saving measurement data via the USB interface is only recommended if the MIQ/TC 2020 XT is configured as terminal/controller.

Note

If it is configured as a terminal, the data is first sent from the controller to the terminal via the IQ SENSOR NET. This can take several hours with great amounts of data.

1	Switch to the measured value display with <M>.
2	Using <S>, open the 100 - Settings menu.
3	Using <▲▼◀▶> and <OK>, open the menu, <i>Data transfer to USB memory</i> .

4	<p>Select the data to be saved with <▲▼◀▶>.</p> <ul style="list-style-type: none"> ● <i>Save configuration</i> ● <i>Measured data storage</i> ● <i>Log book</i> ● <i>Calibration history</i> <p>and confirm with <OK>.</p> <p><u>Only for backing up the measurement data memory:</u></p> <table border="1"> <tr> <td data-bbox="646 672 718 761">4-1</td> <td data-bbox="718 672 1487 761">A list of sensors is displayed for which stored measured values are available.</td> </tr> <tr> <td data-bbox="646 761 718 1030">4-2</td> <td data-bbox="718 761 1487 1030">Using <▲▼◀▶>, select the <i>Selec.</i> column. Confirm with <OK>. Using <▲▼◀▶>, select the sensors. Place a checkmark with <OK>. The measurement data of the sensor is included in the backup. Include further sensors in the list of measurement data to be saved as necessary.</td> </tr> <tr> <td data-bbox="646 1030 718 1086">4-3</td> <td data-bbox="718 1030 1487 1086">Terminate the selection of sensors with <ESC>.</td> </tr> <tr> <td data-bbox="646 1086 718 1243">4-4</td> <td data-bbox="718 1086 1487 1243">Using <▲▼◀▶>, select the menu item, <i>Transfer data for selected sensors</i> and confirm with <OK>. A dialog box pops up for the selection of the decimal separator for the exported *.csv file.</td> </tr> <tr> <td data-bbox="646 1243 718 1400">4-5</td> <td data-bbox="718 1243 1487 1400">Using <▲▼◀▶>, select the decimal separator (comma or dot) for the measurement data. Confirm with <OK>. A query pops up concerning the restart of the measured value recording.</td> </tr> <tr> <td data-bbox="646 1400 718 1601">4-5</td> <td data-bbox="718 1400 1487 1601">Using <▲▼◀▶>, select <i>Yes</i> or <i>No</i>. Confirm with <OK>. If the restart of the measured value recording is selected, the measurement data stored in the IQ SENSOR NET is erased after storing. The measured value recording is restarted.</td> </tr> </table>	4-1	A list of sensors is displayed for which stored measured values are available.	4-2	Using <▲▼◀▶>, select the <i>Selec.</i> column. Confirm with <OK>. Using <▲▼◀▶>, select the sensors. Place a checkmark with <OK>. The measurement data of the sensor is included in the backup. Include further sensors in the list of measurement data to be saved as necessary.	4-3	Terminate the selection of sensors with <ESC>.	4-4	Using <▲▼◀▶>, select the menu item, <i>Transfer data for selected sensors</i> and confirm with <OK>. A dialog box pops up for the selection of the decimal separator for the exported *.csv file.	4-5	Using <▲▼◀▶>, select the decimal separator (comma or dot) for the measurement data. Confirm with <OK>. A query pops up concerning the restart of the measured value recording.	4-5	Using <▲▼◀▶>, select <i>Yes</i> or <i>No</i> . Confirm with <OK>. If the restart of the measured value recording is selected, the measurement data stored in the IQ SENSOR NET is erased after storing. The measured value recording is restarted.
4-1	A list of sensors is displayed for which stored measured values are available.												
4-2	Using <▲▼◀▶>, select the <i>Selec.</i> column. Confirm with <OK>. Using <▲▼◀▶>, select the sensors. Place a checkmark with <OK>. The measurement data of the sensor is included in the backup. Include further sensors in the list of measurement data to be saved as necessary.												
4-3	Terminate the selection of sensors with <ESC>.												
4-4	Using <▲▼◀▶>, select the menu item, <i>Transfer data for selected sensors</i> and confirm with <OK>. A dialog box pops up for the selection of the decimal separator for the exported *.csv file.												
4-5	Using <▲▼◀▶>, select the decimal separator (comma or dot) for the measurement data. Confirm with <OK>. A query pops up concerning the restart of the measured value recording.												
4-5	Using <▲▼◀▶>, select <i>Yes</i> or <i>No</i> . Confirm with <OK>. If the restart of the measured value recording is selected, the measurement data stored in the IQ SENSOR NET is erased after storing. The measured value recording is restarted.												
5	The data is prepared for transmission.												

**Note**

You can cancel the data saving process by selecting and confirming *Cancel* with <▲▼◀▶> and <OK>. The data will then not be stored on the USB memory device.

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

4.9.2 Transmitting recorded measurement data to a PC

In the IQ SENSOR NET, you can log measured values of IQ sensors or differential sensors (see system operating manual, *Measured value logging*). The recorded measured values can be transferred to a PC via the USB interface or with the aid of the component MIQ/IF232 (see section 4.4.5).

The following methods are available for this:

- **Data transfer via the USB interface (MIQ/TC 2020 XT --> USB memory device --> PC)**

This method is recommended if the MIQ/TC 2020 XT is configured as terminal/controller.

Note: If it is configured as a terminal, the data is first sent from the controller to the terminal. This can take several hours with great amounts of data.

Data transmission consists of two steps:

- Transmission of the recorded sensor data to a USB memory device.

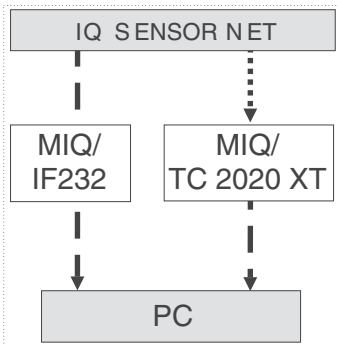
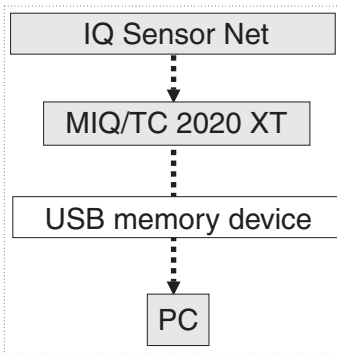
and

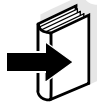
- Transmission of the intermediately stored measurement data from the USB memory device to the PC.

- **Data transfer via the MIQ/IF232 component (IQ SENSOR NET --> MIQ/IF232 --> PC) or via the USB interface on the MIQ/TC 2020 XT (MIQ/TC 2020 XT --> USB-RS232 adapter + null modem cable --> PC)**

The data transfer via the MIQ/IF232 component or via the USB interface is the method to use when a PC can be operated in the vicinity of the IQ SENSOR NET. The data transfer can be carried out in two ways:

- Transmitting recorded measuring data to the PC with the aid of the software terminal
- Transmission of the recorded measured data onto the PC with the aid of the MIQ/IF232 component and the *Data transfer* transmission software



**Note**

The data are sent first from the controller to the terminal. This can take several hours with large amounts of data.

Details about the data transfer via the MIQ/IF232 component are given in the component operating manual MIQ/IF232.

4.9.3 Manual backup of the system configuration

In regular terminal operation in addition to the automatic backup there is the option of saving the system configuration of the main controller onto a USB memory at any time.

To do so, proceed as follows:

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶>, select the menu item, <i>Service</i> and confirm with <OK>.
3	Press <▲▼◀▶> to select the menu item <i>Save configuration</i> and press <OK>. The process is started.
4	Wait for the saving process to be completed.
5	Confirm the concluding message with <OK>.

Backup copy before changes to the system configuration

If you want to carry out changes to the system configuration that may have to be canceled again (e.g. if you want to briefly try out certain functions), you can carry out a manual backup beforehand. The timer for the automatic backup is reset, i.e. the backup copy is available for a period of 60 min. It will then be overwritten with the current status.

4.9.4 Restoring the system configuration

The system configuration backed up by the MIQ/TC 2020 XT can be restored onto the main controller. Hence, after replacement of a defective controller, the original system configuration can be quickly restored. Prerequisite for this is that the two controllers are the same type and the software version of the backup controller is the same or higher than that of the original controller.

The restoration of a configuration onto the main controller is carried out manually from the USB memory device. A backup of the configuration onto USB memory device can be carried out in one of the following ways:

- Regular manual backup to USB memory device
- Regular automatic backup to MIQ/TC 2020 XT (configured as terminal)

If no current manual backup is present, the automatic backup of the MIQ/TC 2020 XT can be used.

To transfer the configuration automatically backed up on the MIQ/TC 2020 XT to a USB memory, operate the MIQ/TC 2020 XT as a controller or backup controller. In this status the configuration data of the backup controller can be backed up onto a USB memory as a manual backup.

**Manually restore after
MIQ/TC 2020 XT
controller operation**

To transfer configuration data onto the controller, proceed as follows:

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶>, select the menu item, <i>Data transfer to USB memory</i> and confirm with <OK>.
3	Using <▲▼◀▶>, select the menu item, <i>Retransfer configuration</i> and confirm with <OK>. The process is started.
4	Wait for the restore process to be completed.
5	Confirm the concluding message with <OK>.

4.10 Software update for IQ SENSOR NET components

With a Software update you can regularly update your IQ SENSOR NET System 2020 XT USB and all active components.

From software version 3.09 for the MIQ/TC 2020 XT, new instrument languages (e.g. Asian languages) are available for the IQ SENSOR NET components. The software update is subdivided into language packets.

The transfer of the new software version to the MIQ/TC 2020 XT is carried out via a USB memory device.

The update packet with the current instrument software for active IQ SENSOR NET components is available on the Internet under www.ysi.com.



Note

A Software update leaves measurement settings, measurement data and calibration data unchanged. The instrument languages included in the language packet are installed automatically. Languages that were installed before are erased except for German and English.

Prerequisites for the Software update

- USB memory device with directory and files for the Software update
- MIQ/TC 2020 XT ready for operation (the MIQ/TC 2020 XT must be configured as a controller for a software update of all components)
- If the extended access control is activated, the Software update can only be carried out with administrator authorization.

For the Software update of IQ SENSOR NET components, the software version 3.09 or higher is required for the terminal/controller MIQ/TC 2020 XT.



Note

More details about the Software update are given in the documentation of the software update.

4.10.1 Information on software versions

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

- 1 Call up the measured value display with **<M>**.
- 2 Using **<S>**, open the *Settings* menu.
- 3 Using **<▲▼◀▶>**, select the menu item, *Service* and confirm with **<OK>**. The *Service* dialog window opens.
- 4 Using **<▲▼◀▶>**, select the menu item, *List of all components* and confirm with **<OK>**.
The *List of all components* dialog window opens.

Terminal PC		01 Jan 2001	01:04			
List of all components						393
No.	Model	Ser. no.	Softw. vers.			
SYS	Controller	01450001	2.00			
SYS	Terminal	01450002	2.01			
S01	TetraCon700IQ	01450003	2.02			
D02	HIQCR3	01450004	2.03			
?03	TriOxmatic701IQ	01450005	2.04			
	TetraCon700IQ	99180006	1.05			
Return ESC, scroll ↵						

Fig. 4-17 List of all components

- 5 Use **<M>** or **<ESC>** to quit the window, *List of all components*.



Note

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

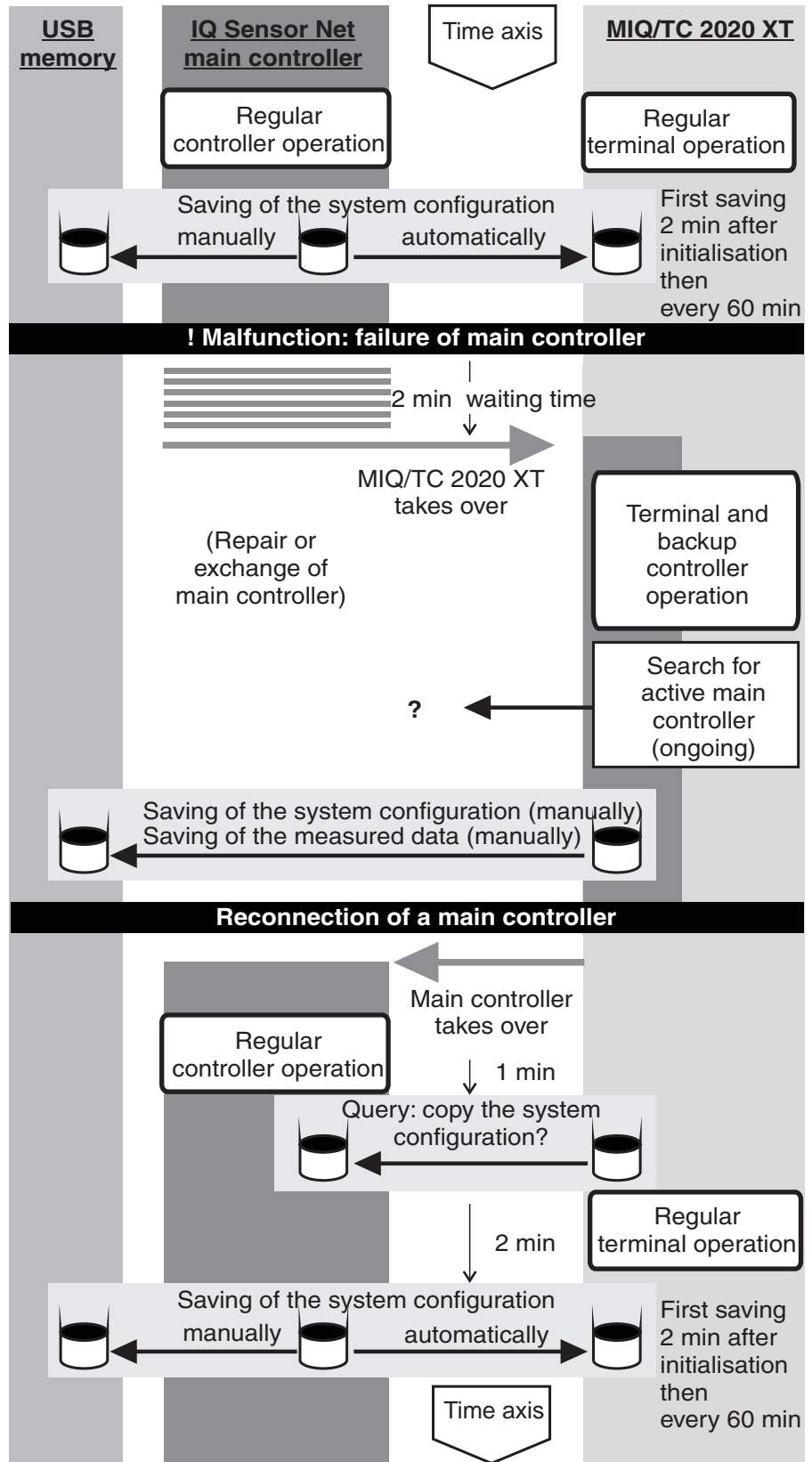
4.11 MIQ/TC 2020 XT in its function as terminal and backup controller

If the MIQ/TC 2020 XT was configured as a terminal, the integrated controller works as a backup controller. The backup controller saves the system data at regular intervals and is immediately available in the system as a backup controller if the main controller fails. If several MIQ/TC 2020 XT are configured in the IQ SENSOR NET as terminals, one MIQ/TC 2020 XT takes over the function of the backup controller. The function is shown on the display.

The diagram on the following page illustrates how the MIQ/TC 2020 XT works when it is configured as a terminal:

Sequence of MIQ/TC 2020 XT controller operation (simplified)

- Controller operation
- Terminal operation



The sequence in detail:

Normal operation

- In normal operation the main controller carries out regular controller operation.
- The MIQ/TC 2020 XT (configured as a terminal) works as a regular terminal.
- The MIQ/TC 2020 XT (configured as a terminal) backs up the system configuration:
 - Automatic backups are carried out 2 minutes after initialization and regularly every further 60 min.
 - In addition to the automatic backup the backup can also be started manually at any time (see section 4.9.3). The timer for the automatic backup is reset for this.
 - The automatic backup is always only carried out in the measuring state (normal measured value display). If the MIQ/TC 2020 XT is in another operating state, the next backup is carried out as soon as a switch is made again to the measuring state.
 - If a backup fails, e.g. because another terminal is in the setting or calibration mode, a new backup is attempted after 30 s. After three failed attempts the next automatic backup takes place after 60 min.
 - During the backup a message appears on the display. If desired, the running backup can be canceled with the <ESC> or <M>key.
- The MIQ/TC 2020 XT receives ongoing information on the status of the main controller.

**Event:
Failure of the main
controller
(MIQ/TC 2020 XT
controller operation)**

- If the MIQ/TC 2020 XT (configured as a terminal) receives no more valid telegrams from the main controller **for a period of 2 min**, it takes over the controller operation as a backup controller. The MIQ/TC 2020 XT is reinitialized.
- On takeover of the controller operation a logbook message is generated.
- In the MIQ/TC 2020 XT backup controller operation
 - the status LED flashes
 - BACKUP CONTROLLER appears on the display alternately with the terminal name
 - the MIQ/TC 2020 XT (configured as a terminal) keeps its own logbook. The logbook is empty when the controller operation is adopted. The topmost message contains the reference to controller operation. It can neither be acknowledged nor deleted. The logbook is deleted when the controller operation is terminated.

**Event: Main controller
goes back into operation**

- As soon as the MIQ/TC 2020 XT (configured as terminal) again receives a valid telegram from a main controller in the IQ SENSOR NET, it is reinitialized as a regular terminal. The main controller works again as a regular controller. It uses its own settings for this (or the factory settings in the case of a brand new controller).
- The MIQ/TC 2020 XT (configured as terminal) detects whether the system configuration in the main controller differs from the backed-up system configuration and, if necessary, offers to restore the backed-up system configuration on the main controller. If the system configuration is not restored onto the main controller, the first regular backup from the main controller to the MIQ/TC 2020 XT is immediately carried out.

5 Settings/setup

5.1 Selecting the language

A list shows all the available system languages.

- | | |
|---|---|
| 1 | Using <S>, open the <i>Settings</i> menu. |
| 2 | Using <▲▼◀▶>, select the menu item, <i>Language</i> and confirm with <OK>. The <i>Language</i> display opens. |

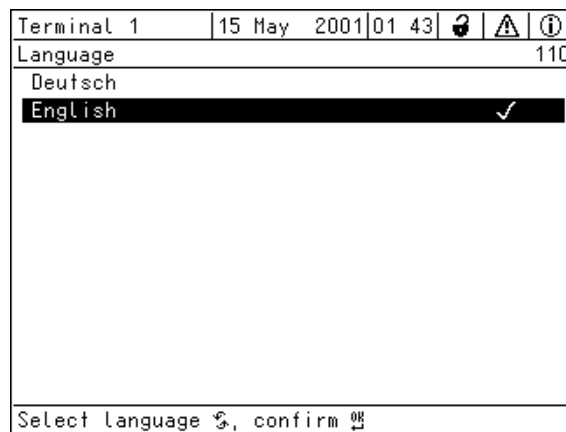


Fig. 5-1 Language

- | | |
|---|---|
| 3 | Select a language from the list with <▲▼◀▶> and confirm with <OK>. The active language is marked with a tick. |
| 4 | Switch to the higher menu level with <ESC>. or: Switch to the measured value display with <M>. |



Note

If the selected system language is not available in a component, all indications of this component (e.g. sensor, controller, terminal, output module) appear in the standard language, English. To activate the selected system language for this component, a software update of the component is required. Contact YSI.

5.2 Configuration of the MIQ/TC 2020 XT

During the commissioning of the MIQ/TC 2020 XT on the IQ SENSOR NET System MIQ/TC 2020 XT, you determine the configuration of the MIQ/TC 2020 XT as a terminal/controller or terminal (see section 3.11).

If, after the initial commissioning, you want to change the configuration, proceed as follows:

1	Reset the MIQ/TC 2020 XT to the default condition (" <i>System settings/Service/Factory reset</i> "). After the reset the instrument asks for the operating mode once again (terminal/controller or terminal).
2	Select the required function. The MIQ/TC 2020 XT will then try to register with the selected functionality on the IQ SENSOR NET.



Note

If another controller already is already running in the IQ SENSOR NET, the MIQ/TC 2020 XT cannot start working as a controller.

Remove the old controller from the IQ SENSOR NET and dock the MIQ/TC 2020 XT once again.

or

Cancel the log-in with ESC.

or

Undock the MIQ/TC 2020 XT from the IQ SENSOR NET, then redock it. Select the operating mode, "Terminal" for the MIQ/TC 2020 XT.

5.3 Terminal settings

The available terminal settings depend on the terminal installed. The following terminals can be used:

- MIQ/TC 2020 XT
- Any further compatible terminals (see section 1.4)
(see respective component operating manual)
- MIQ/IF232 interface component with software terminal (see MIQ/IF232 component operating manual)

The terminal settings at the MIQ/TC 2020 XT include:

- *Terminal name*, user-defined
- *Illumination brightness*
- *Illumination brightness (standby)*
- *Display contrast*
- *Network settings* (if the MIQ/TC 2020 XT is configured as a controller only)

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Terminal settings</i> -> . The <i>Terminal settings</i> display opens.

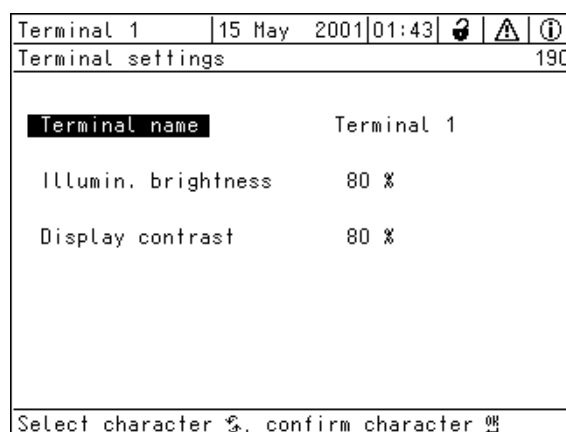


Fig. 5-2 Terminal settings

Terminal name

The name of the terminal appears in the top left corner of the display. 15 characters are available for the name.

3	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Terminal name</i> -> .
4	Enter the terminal name with <▲▼◀▶> and <OK> and confirm with <OK> (see also section 4.2.2).

Illumination brightness

When operating the terminal the brightness of the display can be continuously adjusted between 0 ... 100 %.

5	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Illumination brightness</i> -> .
6	Press <▲▼◀▶> and <OK> to select and confirm a brightness level.

Illumination brightness (standby)

When operating the terminal without making any entries on the keys the brightness of the display can be continuously adjusted between 0 ... 50 %.

7	Using <▲▼◀▶> and <OK>, select and confirm the menu item, standby <i>Illumination brightness (standby)</i> .
8	Press <▲▼◀▶> and <OK> to select and confirm a brightness level.

Display contrast

The display contrast can be continuously adjusted.

9	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Display contrast</i> -> .
10	Press <▲▼◀▶> and <OK> to select and confirm a contrast level.

Network settings (TCP/IP settings)

These settings are used to connect the MIQ/TC 2020 XT to a TCP/IP network.

5.4 Access control

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

The MIQ/TC 2020 XT, configured as a terminal/controller, provides 4 steps of system security:

Safety instructions		Password-protected functions
1	No access control	None
2	Simple access control	System settings
3	Extended access control	<ul style="list-style-type: none"> ● System settings ● Maintenance functions
4	Extended access control with instrument block	<ul style="list-style-type: none"> ● System settings ● Maintenance functions ● Measured value display



Note

Information on access to the system is given in section 4.3.

Delivery condition

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

Saving the password

If access control is enabled for the IQ SENSOR NET and the administrator password is lost, quick administrator access to the IQ SENSOR NET is not possible.

To avoid the loss of the password we recommend to create a back-up of the administrator password. This also applies to the use of the electronic key.

To be on the safe side, you can store the administrator password on an electronic key and/or note it on paper or a PC. Store the passwords in a safe place.

5.4.1 Simple access control (*Unlock/lock settings*)



Use the simple access control

- where the requirements on the security of the system are low or
- if old and new terminals or controllers are to be used together in the IQ SENSOR NET.

Password protection can be switched on or off with the *Unlock/lock settings* function. The current setting is displayed in the safety field. The lock symbol is open or closed. Before any change of the release setting, a password query appears. The password must also be entered per SMS for remote access (with operational GSM modem).


Authorization levels

The current authorization level is shown on the display with the following symbols.

Simple access control	Symbol	Authorization
Settings are unlocked (Access control switched off)		All functions in the system are accessible for all users
Settings are locked		Access to the system settings is only possible with a password Unprotected functions <ul style="list-style-type: none"> ● Calibration ● Data backup ● View measured values



Note

If the closed lock symbol  is visible on the display, changes to the system settings are only possible after entering a password.

Switching on the simple access control

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>System settings -> Access control/Unlock/lock settings</i> . The <i>Unlock/lock settings</i> dialog window opens.



Fig. 5-3 100 - Settings -> Unlock/lock settings

- 3 Press <▲▼◀▶> and <OK> to select a function and <OK> to confirm.
The dialog window for entering the password opens.
- 4 Press <▲▼◀▶> and <OK> to enter the valid password and press <OK> to confirm. The setting is changed.



Note

Forgotten the password? You can display the valid password on the screen (see section 12.1).

Switching off the simple access control (open system)

Password protection is switched off as follows:




- 1 Using <S>, open the *Settings* menu.
- 2 Press <▲▼◀▶> to select the menu item, *System settings -> Access control* and confirm with <OK>.
- 3 If extended access control is activated:
Deactivate extended access control.
- 4 Press <▲▼◀▶> to select the menu item, *Release/lock settings* and confirm with <OK>.
- 5 Press <▲▼◀▶> to select the menu item, *Release/lock settings* and confirm with <OK>.
All system functions can be accessed without a password.

5.4.2 Extended access control

The extended access control provides three preconfigured user types in the system. Each user type can be protected with its own password.

Authorization

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

Validity	User type	Symbol	Authorization
System wide	<i>Administration</i>		<ul style="list-style-type: none"> ● Access only with password ● Change system settings ● Assign user rights ● Calibration ● Data backup ● Reset configuration ● View measured values
	<i>Maintenance</i>		<ul style="list-style-type: none"> ● Access only with password ● Calibration ● Data backup ● View measured values
	<i>Viewer</i>		<ul style="list-style-type: none"> ● Without instrument block: Access without password ● With instrument block: Access only with password ● Data backup ● View measured values
For the terminal on which the function was activated	Instrument block		<ul style="list-style-type: none"> ● Instrument block switched off: Authorization as for <i>Viewer</i>. ● Instrument block active: The MIQ/TC 2020 XT is blocked. Only the IQ SENSOR NET logo is displayed. Access only with password.

Switching on the extended access control

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Access control</i> -> . The <i>Simple access control</i> dialog window opens.

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

CONTROLLER	08 Aug 2008	09 50	🔒	⚠	ℹ
Extended access control					
User right		Access code			
Administration		t686			
Maintenance		9ia5			
Viewer		20k7			
Device lock		not active			
Extended access control		not active			
Apply settings					
Select menu item ◀▶, edit ⌨					

Fig. 5-4 100 - Settings -> Access control -> Extended access control

The instrument automatically generates a password for each authorization level. This password can be accepted or changed.

- 4 Press <▲▼◀▶> to select an authorization level and confirm with <OK>. If necessary, change the password in the selection dialog and/or save the password on a connected USB memory device.
- 5 Note passwords. For reasons of safety at least the administrator password should be saved in such a way that it can be accessed in an emergency.
- 6 Press <▲▼◀▶> to select the *Apply settings* function and confirm with <OK>. A security prompt opens.
- 7 Press <▲▼◀▶> to select *OK* and confirm with <OK>. The settings are adopted. The *Extended access control* window is still open. The current passwords are visible.



Note

Forgotten the password? You can release the IQ SENSOR NET again (see section 12.1).

5.4.3 Instrument block

Use the *Device lock* function to protect the terminal on which this function is activated, not only against unauthorized operation, but also against unauthorized reading of the current measured values. By activating the instrument block the password for viewing the measured values is activated.

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

1	Call up extended access control (see section 5.4.2).
2	Press <▲▼◀▶> to select the <i>Device lock</i> function and confirm with <OK>. A checkmark appears next to the function.
3	Press <▲▼◀▶> to select the <i>Apply settings</i> function and confirm with <OK>. A security prompt opens.
4	Press <▲▼◀▶> to select <i>OK</i> and confirm with <OK>. The settings are adopted. The <i>Access control</i> dialog box is still open. The current passwords are visible.

5.4.4 Electronic key

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

When the electronic key is inserted in the MIQ/TC 2020 XT the authorization level saved there is automatically read out with the associated password. The user of the electronic key is logged onto the system with his authorization level without any further password query.

When the electronic key is removed, the IQ SENSOR NET automatically switches back to the lowest authorization level again.

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

Saving a password on an electronic key

Simple access control

1	Connect the USB memory device to the USB-A interface.
2	Using <S>, open the <i>Settings</i> menu.
3	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Access control</i> -> . The <i>Access control</i> dialog window opens.
4	Press <▲▼◀▶> and <OK> to select and confirm the menu item, <i>Change access control</i> .
5	Press <▲▼◀▶> and <OK> to select and confirm the menu item, <i>Save access code on USB memory</i> . The password for the system settings is saved on the USB memory device.

Extended access control:

1	Connect the USB memory device to the USB-A interface.
2	Using <S>, open the <i>Settings</i> menu.
3	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Access control</i> -> . The <i>Access control</i> dialog window opens.
4	Press <▲▼◀▶> to select an authorization level and confirm with <OK>.
5	Using <▲▼◀▶>, select the menu item, <i>Save access code on USB memory</i> and confirm with <OK>. The password for the system settings is saved on the USB memory device.

5.5 Editing the list of sensors

The *Edit list of sensors* display provides an overview of all IQ sensors, differential sensors and inactive datasets (see section 7.4.2).

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

- assign sensor names (see section 5.5.1)
- delete inactive datasets (see section 5.5.1)
- change the order of the display of measured values on the measured value display (see section 5.5.2).

5.5.1 Entering / editing a name for an IQ sensor

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

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>System settings -> Edit list of sensors</i> . The <i>Edit list of sensors</i> display opens.
3	Using <▲▼◀▶>, highlight the <i>Sensor name</i> column. Confirm with <OK>.
4	Using, <▲▼◀▶> highlight the name of a sensor and confirm with <OK>.

Terminal 1		15 May 2001	01:43	🔒	⚠	ℹ
Edit list of sensors						120
No.	Model	Ser. no.	Sensor name			
S01	TriOxmatic700IQ	01341000	08			
?02	DefaultName	99010700	99010700			
S03	TetraCon700IQ	99190001	99190001			
S04	SensoLyt700IQ	99160001	99160001			
Select character Ⓢ, confirm character Ⓚ						

Fig. 5-5 Edit list of sensors

5	Enter the name with <▲▼◀▶> and <OK> and confirm with <OK> (see section 5.5.1).
---	--

5.5.2 Changing the display position

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

1	Using <S> , open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK> , select and confirm the menu item, <i>System settings -> Edit list of sensors</i> . The <i>Edit list of sensors</i> display opens.
3	Using <▲▼◀▶> , highlight the <i>Model</i> column. Confirm with <OK> .
4	Press <▲▼◀▶> to highlight a <i>Model</i> and confirm with <OK> . A dialog window opens.

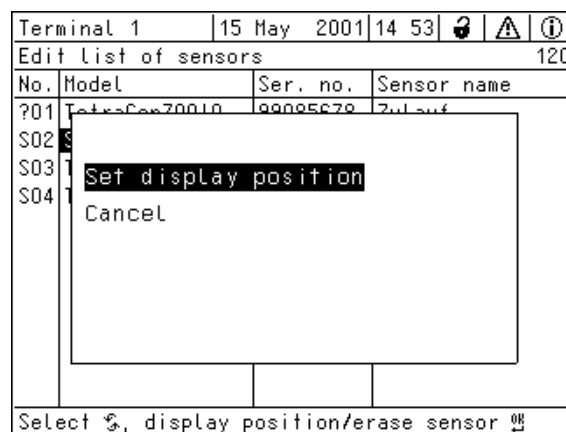


Fig. 5-6 *Edit list of sensors -> Set display position*

5	Using <▲▼◀▶> , select the menu item, <i>Set display position</i> and confirm with <OK> . A dialog window opens.
6	Press <▲▼◀▶> to select the required number for the display position and confirm with <OK> . The sensor is displayed at the new position in the list of sensors. The other sensors are moved accordingly.

5.5.3 Erasing inactive sensor datasets

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

An inactive dataset can be reactivated by assigning it, e.g. to an IQ sensor of the same type (see section 7.4.2). All settings are retained. If you no longer require these data, you can erase them. All the data and settings belonging to this IQ sensor, as well as differential sensors and the link with an output, are erased by this action.

- 1 Using <S>, open the *Settings* menu.
- 2 Using <▲▼◀▶> and <OK>, select and confirm the menu item, *System settings* -> *Edit list of sensors*. The *Edit list of sensors* display opens.
- 3 Using <▲▼◀▶>, highlight the *Model* column. Confirm with <OK>.
- 4 Press <▲▼◀▶> to highlight a *Model* and confirm with <OK>.

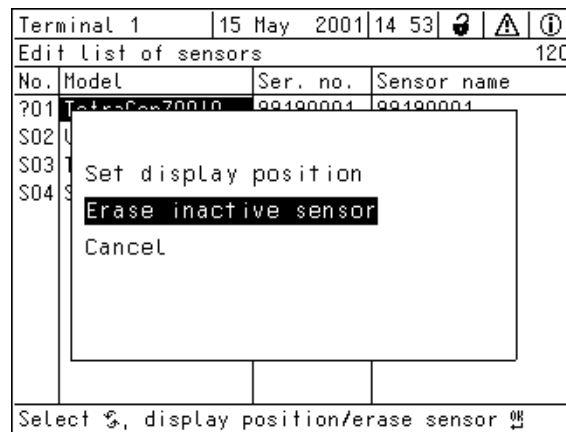


Fig. 5-7 Edit list of sensors -> Erase inactive sensor

- 5 Press <▲▼◀▶> to select *Erase inactive sensor* and confirm with <OK>. The dialog window for the security prompt appears.
- 6 Press <▲▼◀▶> to select *Erase inactive sensor* and confirm with <OK>. The inactive sensor is erased.

5.6 Setting up IQ sensors/differential sensors

5.6.1 Creating a differential sensor

A differential sensor is a virtual sensor. It shows the differential value of two IQ sensors that measure the same parameter and have the same settings. This is used to display the difference, e.g. before and after a water treatment.

Differential IQ sensors can be recognized in the *Edit list of sensors* overview in the *Ser. no.* field by the specification of the two sensors involved. A link with another IQ sensor in the *Settings of sensors and diff. sensors* menu can be recognized in the *&* field by the sensor number of the linked sensor.

1	Using <S> , open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK> , select and confirm the menu item, <i>System settings -> Settings of sensors and diff. sensors</i> . The <i>Settings of sensors and diff. sensors</i> display opens.
3	Using <▲▼◀▶> , select a sensor and confirm with <OK> . The display for the selection of the second sensor opens.

Terminal 1	01 Jan 2001 00 00	[Icons]	
Link with...			
&	No.	Sensor name	Measuring range
	S02	99160002	pH 0..14
Select sensor B [F], confirm [OK]			

Fig. 5-8 *Settings of sensors and diff. sensors -> Link with...*

4	Using <▲▼◀▶> , select a sensor and confirm with <OK> . The sensors are linked. The link in both sensors is entered in the <i>Edit list of sensors</i> overview. The linked sensor is created as a new sensor and also appears in the measured value display.
---	--

5.6.2 Erasing a differential sensor

If a differential sensor is no longer required, it can be erased from the list of sensors.

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>System settings -> Settings of sensors and diff. sensors</i> . The <i>Settings of sensors and diff. sensors</i> display opens.
3	Press <▲▼◀▶> to highlight the & column and confirm with <OK>.
4	Press <▲▼◀▶> to highlight a differential sensor and confirm with <OK>.

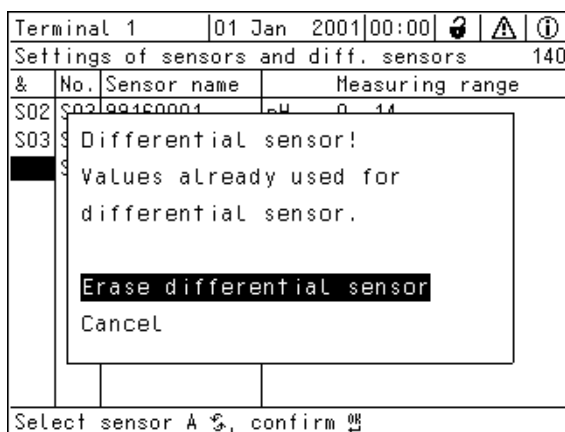
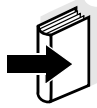


Fig. 5-9 *Settings of sensors and diff. sensors -> Erase differential sensor*

5	Press <▲▼◀▶> to select <i>Erase differential sensor</i> and confirm with <OK>. The differential sensor is erased.
---	---

5.6.3 Adjusting the settings for sensors/differential sensors

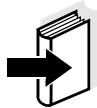
Sensor settings include the measured parameter, measuring range and, if necessary, compensations.



Note

General steps for the selection of sensor settings are given below. Details on sensor settings are given in the operating manual for the IQ sensor.

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>System settings -> Settings of sensors and diff. sensors</i> . The <i>Settings of sensors and diff. sensors</i> display opens.
3	Using <▲▼◀▶>, highlight the <i>Measuring range</i> column. Confirm with <OK>. An information window opens up.



Note

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

4	Confirm the information with <OK>. The <i>Link with...</i> display opens.
---	---

MIQ/T2020	30 Sept 2005 16 08	🔒 ⚠️ ⓘ
Alarm link overview		
Alarm	Sensor	Designation
A01		
A02	S02 01341000	Oxygen depletion
A03	S03 99190001	Cond too high
A04		
A05		
A06		
A07		
A08		
A09		
A10		
< 2.2 Hyst.: 0.9 mg/L		
Select Ⓢ, Set alarm Ⓢ		

Fig. 5-10 Settings of sensors and diff. sensors

5	Using <▲▼◀▶>, select a sensor and confirm with <OK>. The current settings are displayed.
---	--

5.7 *Sensor-sensor link* (automatic inclusion of an influence quantity)

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

Example Measurement of the D.O. concentration

D.O. sensors measure the D.O. partial pressure and use the solubility function of oxygen in the test sample to calculate the D.O. concentration (mg/L).

The solubility of oxygen in water is influenced by the salt content (the salinity) of the solution and other factors such as the temperature or air pressure.

Static salinity correction

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

This type of static salinity correction is especially suitable for test samples with almost unchanging salinity.

To obtain optimum measurement results even with changing salinity values, the actual salinity has to be determined and entered for each measurement of the D.O. concentration.

Dynamic salinity correction

A dynamic salinity correction is provided by the *Sensor-sensor link* function.

This function supplies the D.O. sensor continuously with the current salinity value and is thus especially suitable for the continuous measurement of the D.O. concentration with changing salinity values.

Requirements for a sensor-sensor link**5.7.1 Establishing a sensor-sensor link**

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

- Hardware
 - A sensor for which an influence quantity can be corrected (e.g. FDO[®] 700 IQ, TriOxmatic[®] 700 IQ) is in the IQ SENSOR NET system.
 - A sensor that measures the influence quantity (e.g. TetraCon[®] 700 IQ) is in the IQ SENSOR NET system.
- Software
 - The software of the sensor with correction function (e.g. FDO[®] 700 IQ) supports the function, *Sensor-sensor link*.
 - The software of the sensor measuring the influence quantity (e.g. TetraCon[®] 700 IQ) supports the function, *Sensor-sensor link*.
- Sensor settings
 - The correction function is enabled in the setting menu for the sensor with correction function (e.g. FDO[®] 700 IQ).
 - The automatic (dynamic) correction is enabled in the setting menu for the sensor with correction function (e.g. FDO[®] 700 IQ).
 - A sensor measures the influence quantity and displays it with the unit which is used for manual input in the menu of the sensor with correction function (e.g. TetraCon[®] 700 IQ measures the salinity in mg/L).
 - The manually entered value for the static correction is set to the mean value of the influence quantity (e.g. salinity value) of the test sample.
If no measured value for the influence quantity is available, the correction is made with the value that was manually entered (static correction).

Establishing a link

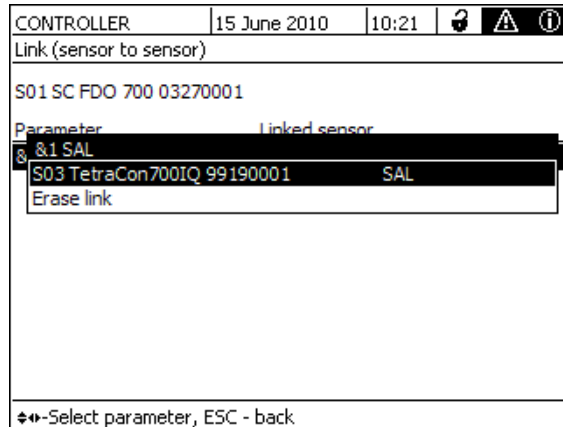
- 1 Using <S>, open the *Settings* menu.
- 2 Using <▲><▼> and <OK>, select and confirm the menu item, *System settings -> Sensor-sensor link*.
The *Sensor-sensor link* overview opens.
The displayed list includes all sensors with which the correction of an influence quantity is possible (e.g. FDO[®] 700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

CONTROLLER	15 June 2010	10 48			
Link (sensor to sensor)					
No.	Model	Sensor name	&		
S01	SC FDO 700	03270001	-		
↔-Select parameter, ESC - back					

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

CONTROLLER	15 June 2010	10:55			
Link (sensor to sensor)					
S01 SC FDO 700 03270001					
Parameter	Linked sensor				
&1 SAL	-				
↔-Select parameter, ESC - back					

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



- 5 Using <▲><▼>, highlight a sensor that can be linked, and confirm with <OK>. The sensors are linked. The influence quantity to be linked and the linked sensor are displayed.
- 6 Leave the system settings with <M>. In the measured value display, the corrected measured value is marked by an asterisk (*).

Behavior if there is no measured value for the influence quantity

Cause	Behavior
– Sensor failure	<ul style="list-style-type: none"> – The manually entered value for the influence quantity is automatically used for correction. An exclamation mark (!) indicates the interrupted link. – The sensor-sensor link is reactivated as soon as the measured value for the influence quantity is available again.
– Maintenance condition active	<ul style="list-style-type: none"> – The value last measured for the influence quantity is automatically used for correction. – The current measured value is used for correction as soon as the measured value for the influence quantity is available again.

5.7.2 Erasing a *Sensor-sensor link*

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲><▼> and <OK>, select and confirm the menu item, <i>System settings -> Sensor-sensor link</i> . The <i>Sensor-sensor link</i> overview opens. The displayed list includes all sensors with which the correction of an influence quantity is possible (e.g. FDO [®] 700 IQ).
3	Using <▲><▼>, highlight a sensor and confirm with <OK>. The displayed list includes all linked sensors.
4	Using <▲><▼>, highlight a sensor and confirm with <OK>. The displayed list includes all sensors that measure an influence quantity with the correct unit (e.g. TetraCon [®] 700 IQ, which measures the salinity in mg/L), and the menu item, <i>Erase link</i> .
5	Using <▲><▼>, highlight the menu item, <i>Erase link</i> , and confirm with <OK>. The sensor-sensor link is deleted.
6	Leave the system settings with <M>. In the measured value display, the measured value is corrected by the manually entered value.



Note

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

5.8 Editing the list of outputs

The *Edit list of outputs* display provides an overview of all outputs, links and inactive datasets (see section 7.4.3).

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

- assign output names (see section 5.5.1) and
- erase inactive datasets (see section 5.5.2).

5.8.1 Entering / editing the name of an output

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

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>Edit list of outputs -></i> . The <i>Edit list of outputs</i> overview opens.
3	Press <▲▼◀▶> to highlight a name in the <i>Name</i> column and confirm with <OK>.

No.	Model/Channel	Ser. no.	Name
D01	ADCR/C1	12345678	02
D01	ADCR/C2	12345678	02-Belebung
D01	ADCR/C3	12345678	02-Belebung
D01	ADCR/R1	12345678	GW Lüfter I
D01	ADCR/R2	12345678	GW Lüft II
D01	ADCR/R3	12345678	GW Lüft III
?02	ADCR/R1	22222222	GW1 Trübung
?02	ADCR/R2	22222222	GW2 Trübung
D03	ADCR/C1	66666666	Schlammpl
D03	ADCR/C2	66666666	Trüb Abl
D03	ADCR/R1	66666666	Trüb Zul

Select character ☞, confirm character ☜

Fig. 5-11 *Edit list of outputs -> enter a name*

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

Terminal 1		15 May 2001 01:43	
Edit List of sensors			120
No.	Model	Ser. no.	Sensor name
S01	TriOxmatic700IQ	01341000	08
?02	DefaultName	99010700	99010700
S03	TetraCon700IQ	99190001	99190001
S04	SensoLyt700IQ	99160001	99160001

Select character $\$,$ confirm character $\$$

Fig. 5-12 Edit list of sensors

5.8.2 Erasing an inactive dataset for an MIQ output module

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

An inactive dataset can be reactivated by assigning it, e.g. to an MIQ output module of the same type (see section 7.4.3). All settings are retained. If you no longer require the stored data, you can erase them.

1	Using <S> , open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK> , select and confirm the menu item, <i>System settings -> Edit list of outputs</i> . The <i>Edit list of outputs</i> display opens.
3	Using <▲▼◀▶> and <OK> , highlight the <i>Model/Channel</i> column. Confirm with . This column can only be highlighted if an inactive dataset (?xx) is present.
4	Press <▲▼◀▶> to highlight a <i>Model/Channel</i> and confirm with <OK> .

Terminal 1 15 May 2001 14:53			
Edit list of outputs 130			
No.	Model/Channel	Ser. no.	Name
D01	ADCR/C1	12245678	02-Relay...
D01	A		
D01	A		
D01	A		
D01	A		
D01	A		
?02	A		
?02	A		
D03	A		
D03	ADCR/C1	00000000	Trüb Adc
D03	ADCR/R1	66666666	Trüb Zul

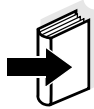
Erase output module
 Cancel

Select \$, erase inactive module

Fig. 5-13 Edit list of outputs -> Erase output module

- 5 Press <▲▼◀▶> to select *Erase output module* and confirm with <OK>. The dialog window for the security prompt appears.
- 6 Press <▲▼◀▶> to select *Erase output module* and confirm with <OK>. The output is erased.

5.8.3 Output links/settings



Note

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

5.9 Settings for a measurement location

Primarily, the settings for a measurement location simplify the calibration of IQ sensors if several IQ sensors of the same type are operated on the system. The option of hiding IQ sensors on the measured value display that are not operated at the measurement location helps to find IQ sensors at the measurement location quickly.

Measurement location-related settings become effective as soon as a terminal is docked on an MIQ module. Measurement location-related settings include:

- the location name (module name)
- the selection of the sensors for the measured value display.

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>System settings -> Select measured values of location</i> . The <i>Location display</i> display opens.

Terminal 1	15 May 2001	14:53			
Location display:					170
Loc	Model	Ser. no.	Sensor name		
✓	TetraCon700IQ	99085678	99085678		
✓	SensoLyt700IQ	99085555	99085555		
✓	TriOxmatic701IQ	99086666	99086666		
✓	TetraCon700IQ	99085678	99085678		
Add/remove sensor from local display					

Fig. 5-14 Location display

Entering the name of a measuring location

The name of the measurement location is displayed in the line with the name of the display. 15 characters are available for the name of the measurement location.

- | | |
|---|--|
| 3 | Press <▲▼◀▶> to select the name of the display, <i>Select measured values of location</i> and confirm with <OK>. |
| 4 | Press <▲▼◀▶> and <OK> to enter the location name and finally confirm with <OK> (see also section 4.2.2). |

Selecting sensors for the measured value display on the measurement location

The measured value display provides the option of displaying either all sensors or a selection of sensors (see section 4.4.4).

As soon as a terminal is docked on any MIQ module, the selected sensors at the measurement location are displayed. All sensors for the display at the measurement location are activated in the delivery state.

The sensors are selected in the *Select measured values of location* menu. This selection is stored in the MIQ module on which the terminal is docked.

- | | |
|---|---|
| 5 | Select and confirm sensors for the local measured value display with <▲▼◀▶> and <OK>. This sets or removes a tick (✓) for the individual sensors.
Sensors selected for the display are marked with a tick (✓). |
|---|---|

5.10 Alarm settings

5.10.1 General information

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

An alarm event is when a certain measured value (limiting value) of a sensor is exceeded or undercut. You can configure up to 20 alarm events.

Alarm events can be relayed as follows:

- as a message on the display
- as a relay action (with corresponding output module)
- as SMS (with ready-to-operate GSM modem)



Note

An alarm message via display or relay cannot be acknowledged or switched off. An alarm only disappears if the cause for the alarm was eliminated or the *Alarm settings* were changed or erased. An SMS alarm message is only sent once when an alarm event occurs.

5.10.2 Setting up / editing alarms

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

MIQ/T2020		30 Sept 2005 16 08	🔒 ⚠️ ⓘ
Alarm Link overview			
Alarm	Sensor	Designation	
A01			
A02	S02 01341000	Oxygen depletion	
A03	S03 99190001	Cond too high	
A04			
A05			
A06			
A07			
A08			
A09			
A10			
< 2.2 Hyst.: 0.9 mg/l			
Select Ⓢ, Set alarm Ⓢ			

Fig. 5-15 Alarm settings -> Alarm link overview



Note

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

- 3 Select an alarm A01 to A20 to be edited with <▲▼◀▶>. To set up a new alarm without entry select in the *Sensor* column. Then confirm with <OK>. When a new alarm is set up a list with all sensors appears first.
Alarm links that are already available can be erased or edited (for editing continue with step 5).

HIQ/T2020		30 Sept 2005	16 08			
Select Sensor for alarm link						
No.	Model	Ser. no.	Sensor name			
S01	HIQIC2 REC1	99000001	99000001			
S02	TriOxmatic700IQ	01341000	01341000			
S03	TetraCon700IQ	99190001	99190001			
Select sensor , confirm						

Fig. 5-16 Select Sensor for alarm link

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

HIQ/T2020		30 Sept 2005	16 08			
Set alarm link						
Measured variable	Main variable					
Limit value	Lower limit					
Lower limit	2.2 mg/L					
Hysteresis	0.90 mg/L					
Designation	Oxygen depletion					
Relay output	001 R2					
Accept						
Cancel						
Adjust setting , confirm						

Fig. 5-17 Set alarm link

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

Alarm links setting table

Menu item	Selection/Values	Explanations
<i>Measured variable</i>	<ul style="list-style-type: none"> ● <i>Main variable</i> ● <i>Adjoining variable</i> 	<p><i>Main variable</i> designates the actual measured parameter of the sensor (e.g. pH, oxygen, etc.).</p> <p><i>Adjoining variable</i> designates an additional measured parameter (e.g. temperature).</p>
<i>Limit value</i>	<ul style="list-style-type: none"> ● <i>Lower limit</i> ● <i>Upper limit</i> 	<p>Type of the alarm event.</p> <p><i>Lower limit</i>: An alarm is triggered if the defined limit value is undercut.</p> <p><i>Upper limit</i>: An alarm is triggered if the defined limit value is exceeded.</p>
<i>Lower limit / Upper limit</i>	<i>within the measuring range (sensor-dependent)</i>	Limit value for the alarm event
<i>Hysteresis</i>	<i>0 - 10 % of the measuring range</i>	Hysteresis for the limit value
<i>Designation</i>	(max. 20 characters)	User-defined designation for easier identification in the alarm message (display and SMS).
<i>Relay output</i>	Dxx / .../ Ry <i>No relay output</i>	<p>Opens a list with all relay outputs where the <i>Alarm contact</i> is set.</p> <p>Dxx: number of the output module .../Ry: relay output channel</p> <p>Here you can select a relay output. When the alarm event occurs, it carries out the specified action (Open or Close). Details see section 5.10.3 ALARM OUTPUT TO DISPLAY.</p>
<i>Accept</i>		The settings are taken over in the setting table by pressing <OK>. The display switches to the next higher level.
<i>Cancel</i>		The display switches to the next higher level without storing the new settings.

5.10.3 Alarm output to display

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

```
ALARM A02  00:04  30 Sept 2005
Oxygen depletion

SO2 TriOxmatic700IQ
01341000 Site 1

< 2.2 mg/l O2

1/1
```

Fig. 5-18 Example of an alarm message on the display

The alarm message contains the following information:

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

Operating instructions

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

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

5.10.4 Alarm output as relay action

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

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

5.10.5 Alarm message as an SMS

All alarm messages can be sent as SMS via a GSM modem. The same information that is output on the display is transmitted when doing so. Details of how to connect the IQ SENSOR NET to a GSM modem are given in the operating manual "Remote connection to the IQ SENSOR NET 2020 XT USB".



Caution

For critical alarm events take into account that - due to radio transmission - SMS messages may possibly be received delayed.

5.11 System settings

System settings include:

- *Language* (see section 5.1)
- *Date/Time* (see section 5.11.1)
- *Loc. altitude:* (see section 5.11.2)

5.11.1 Setting the date and time

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

1	Using <S>, open the <i>Settings</i> menu.
2	Using <▲▼◀▶> and <OK>, select and confirm the menu item, <i>System settings</i> -> <i>Date/Time</i> . The <i>Date/Time</i> display opens.
3	Press <▲▼◀▶> to select <i>Set date</i> or <i>Set time</i> .
4	Confirm the selection with <OK>. A field is highlighted, e.g. <i>Year</i> .

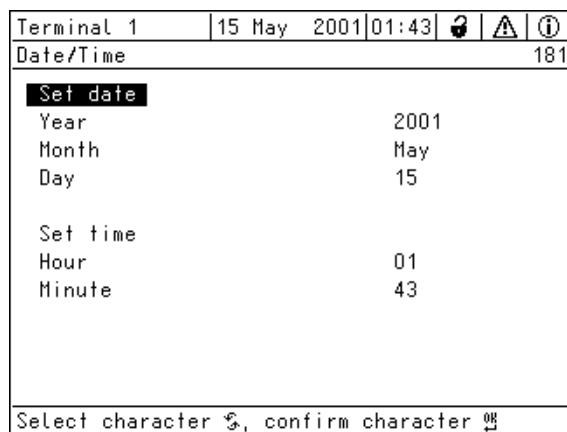


Fig. 5-19 *Date/Time*

5	Press <▲▼◀▶> and <OK> to select and confirm a number. The next field is highlighted, e.g. <i>Month</i> .
6	Complete the entries on the display <i>Date/Time</i> .

**Note**

The clock in the MIQ/TC 2020 XT bridges periods of power failure of up to 24 hours. After a longer power failure, the clock starts precisely at the time of the failure. A message and an entry in the log book provide information on the power failure and the necessity for resetting the clock.

5.11.2 Site altitude / setting the medium air pressure**Note**

When using a module for automatic air pressure compensation (MIQ/A-(PR/MOD)), the *Location altitude/Air pressure* menu item with associated values is displayed, but cannot be adjusted.

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

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

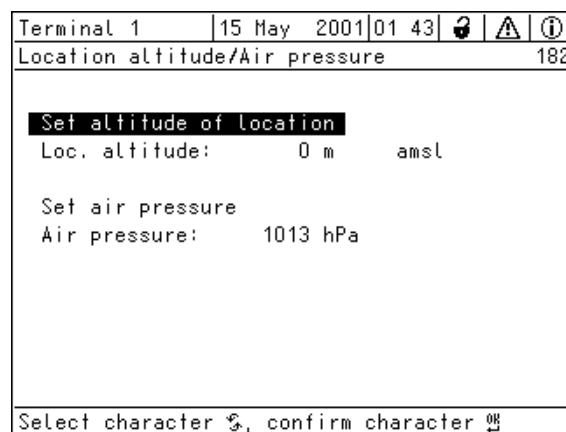


Fig. 5-20 *Location altitude/Air pressure*

3	Press <▲▼◀▶> and <OK> to select and confirm <i>Set altitude of location</i> or <i>Set air pressure</i> .
4	Press <▲▼◀▶> and <OK> to adjust and confirm the values for <i>Loc. altitude:</i> or <i>Air pressure:</i> .

5.12 Measured value logging

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

You can display the stored measured values

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

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

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

Recording interval	Possible recording duration with the given recording interval					
1 min	0 d	1 d	2 d	3 d	...	360 d
5 min	0 d	5 d	10 d	15 d	...	1800 d
10 min	0 d	10 d	20 d	30 d	...	3600 d
15 min	0 d	15 d	30 d	45 d	...	5400 d
30 min	0 d	30 d	60 d	90 d	...	10800 d
60 min	0 d	60 d	120 d	180 d	...	21600 d
Number of allocated memory blocks	0	1	2	3	...	360

Minimum recording duration

Approx 1 year with a recording interval of 1 min and one allocated memory block.

Maximum recording duration

Approx. 59 years with a recording interval of 60 min and 360 allocated memory blocks for a sensor.

If several sensors are recorded at the same time, the number of memory blocks available for one sensor decreases and, therefore, the longest possible recording duration decreases as well.

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

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

No.	Model	Sensor name	dt	Dur.
?01	TetraCon7001Q	Zulauf	1 min	1 d
S02	SensoLyt7001Q	Zulauf	5 min	5 d
S03	TriOxmatic7011Q	Belebung 1	10 min	30 d
S04	TetraCon7001Q	Zulauf	15 min	15 d
S05	SensoLyt7001Q	Ablauf	30 min	30 d
S06	TetraCon7001Q	Ablauf	60 min	120 d
S07	TriOxmat7011Q	Belebung 2	1 min	0 d
S08	VisoTurb7001Q	Filterung	1 min	0 d
S09	VisoTurb7001Q	Zulauf	1 min	0 d

Terminal PC | 01 Jan 2001|00:50| [Icons] | 160

Measured value logging

Save and quit | Quit

Free storage: 100 %

select \$, edit log interval [Icon]

Fig. 5-21 Measured value logging

- 3 Press <▲▼◀▶> and <OK> to select and confirm the *dt* column.
- 4 Press <▲▼◀▶> and <OK> to select and confirm a sensor.
- 5 Determine the recording interval with <▲▼◀▶> and <OK>. When the recording interval is changed, the recording duration changes at the same time (*Dur.*), because the recording duration results from the recording interval due to a fixed number of memory blocks.
- 6 Switch to the selection of columns with <ESC>.
- 7 Press <▲▼◀▶> and <OK> to select and confirm the *Dur.* column.
- 8 Press <▲▼◀▶> and <OK> to select and confirm a sensor.
- 9 Select the recording duration with <▲▼◀▶> and <OK>. The recording duration is always increased or decreased in the same steps.

**Note**

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

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

**Note**

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

10	Switch to the selection of columns with <ESC>.
11	Press <▲▼◀▶> and <OK> to select and confirm the <i>Save and quit</i> column. The changes are stored. The <i>Settings</i> display opens.

**Note**

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

6 Maintenance and cleaning

6.1 Maintenance

Maintenance activities

Component	Maintenance
IQ sensors	Depending on the type of sensor (see the component operating manual of the sensor)
Other components	No maintenance required

6.2 Cleaning

MIQ modules and control units

Clean components mounted in the open of gross contamination as necessary. We recommend to clean the worst of the dirt on the MIQ module and the area around it each time before opening in order to prevent gross contamination from entering the open enclosure.

To clean the module, wipe the housing surfaces with a damp, lint-free cloth. If compressed air is available on site, blow off the worst of the dirt beforehand. Keep the housing closed while doing so.



Caution

Do not use high-pressure water blasters for cleaning (danger of water penetration!).

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.

A valve module for the compressed air-operated cleaning of sensors is available as an accessory.

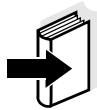
7 What to do if ...

7.1 Information on errors

Log book

The IQ SENSOR NET system performs a comprehensive cyclical self test during operation. While doing so, the system identifies all states that deviate from normal operation and enters corresponding messages in the log book (information or error message).

With the aid of the log book, you can call up instructions on how to clear the error directly on the terminal. The log book is described in detail in section 4.5 MESSAGES AND LOG BOOK.



Note

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.

Status LED of the MIQ/ TC 2020 XT

In addition to the logbook entries current errors and alarms or system faults are indicated by the flashing of the status LED on the MIQ/TC 2020 XT (see section 1.3.5).

As soon as the fault is no longer present, the status LED lights again permanently.

7.2 Diagnosing faults in the voltage supply

7.2.1 Options for checking the voltage

The following options are available for checking the correct voltage supply of the individual components:

- **Checking the log book entries**

Log book entries can only be generated by components with a processor (e.g. IQ sensors and MIQ output modules). The log book entries contain information on how to clear errors. For more details on the log book, see section 4.5.

- **Checking the LED status on the MIQ module housing**

This check is described within the framework of the commissioning in section 3.9.3 CHECKING THE VOLTAGE SUPPLY.

- **Measuring the voltage on the MIQ modules**

(see section 7.2.2 MEASURING THE VOLTAGE).



Note

The relationship between the supply voltage, the LED status and the log book entries is described in the section 8.1 GENERAL SYSTEM DATA.

7.2.2 Measuring the voltage

If an MIQ module shows an error condition (both LEDs off), this can be due to the following causes:

- The voltage supply has been interrupted
- The available voltage is not sufficient; the voltage is below the warning range.

These two cases can be differentiated with a voltmeter.

Measuring points of MIQ modules

The supply voltage is tapped at the following points (Fig. 7-1 on page 7-3):

- Outside on the free contacts on the front of the SENSORNET module
- Inside on the SENSORNET connections of the terminal strip (see section 7.2.2 MEASURING THE VOLTAGE).

Measuring points for IQ sensors

The supply voltage is measured on the MIQ module to which the IQ sensor is connected via the SACIQ sensor connection cable.

Systematic voltage measurement

Dock all mobile components (terminals) onto the modules with the greatest distance to the next power supply module. Begin measuring the voltage at the MIQ modules that are directly connected with an MIQ power supply module. Continue to measure the voltage systematically to the end of each cable section, i. e. along the voltage drop. Thus, in combination with the log book entries, you can narrow down the error location.



Warning

If the MIQ/PS power supply module is opened during operation, there is a danger to life due to possible hazard of electric shock. There is also a danger to life from voltages that may present a hazard of electric shock on the relay contacts of open MIQ output modules (e.g. MIQ/CR3). Note the following points in the case of voltage measurement during operation:

- **The voltage measurement may not be performed on the open MIQ/PS power supply module. The MIQ/PS may only be opened when the line voltage is switched off.**
- **The voltage measurement at an open MIQ output module with relays may only be performed if all external voltages have been previously switched off.**
- **Secure all voltages that have been switched off against being switched on again for the duration of the work.**

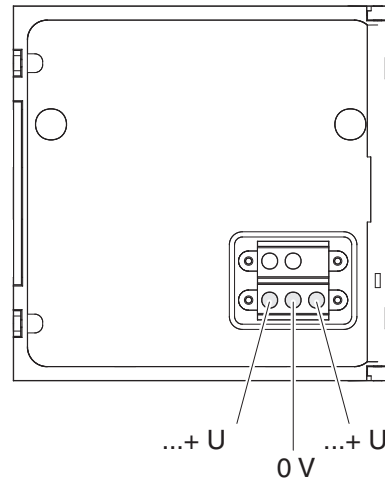


Note

Safe voltage measurement is possible on the module contacts on the outside of MIQ/PS and relay output modules (see Fig. 7-1).

Tapping points for measuring the voltage

Front:



SENSORNET connections on the terminal strip (example):

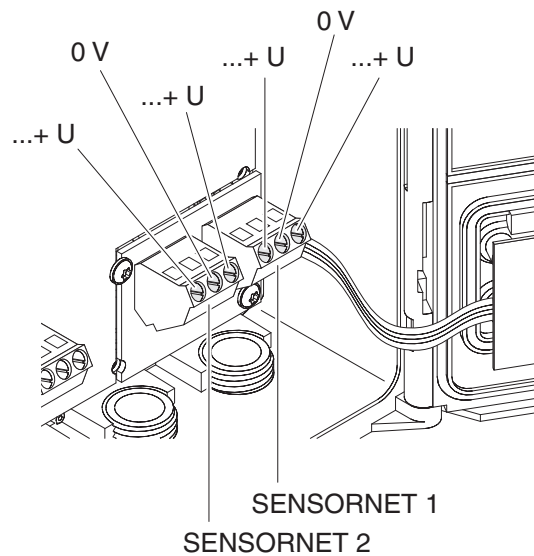


Fig. 7-1 Tapping points for measuring the voltage



Note

The supply voltage (...+ U) must be measurable at both SENSORNET wires, i. e. left and right of the shielding. Otherwise, the functioning of the component is not ensured. Admissible values for the internal voltage supply (+U) are given in section 8.1.

7.2.3 Tips for clearing errors in the voltage supply



Note

Admissible values for the internal voltage supply (+U) are given in section 8.1.

Supply voltage not present or in the warning or error range

Cause	Remedy
<ul style="list-style-type: none"> - Number of power MIQ power supply modules is not sufficient 	<ul style="list-style-type: none"> - Check power rating. If necessary, install another MIQ power supply module (for details of how to do this, see section 3.4.2 DRAWING UP THE POWER RATING).
<ul style="list-style-type: none"> - Cable section is too long 	<ul style="list-style-type: none"> - Check length of the cable section. If necessary, install another MIQ power supply module (for details of how to do this, see section 3.4.3 EFFECT OF THE CABLE LENGTH).
<ul style="list-style-type: none"> - Electrical connection between MIQ power supply module and component is defective (distributed mounting) 	<ul style="list-style-type: none"> - Check cable connection step-by-step starting with the MIQ power supply module, and replace defective cable sections. - Check contacts on the MIQ modules (stack mounting). Clean any dirty contacts. Carefully bend back contact springs that have been pressed flat or bent (pay attention to sufficient spring tension). - Tighten all screws on the terminals.

Malfunctions despite adequate supply voltage on both +U V wires

Cause	Remedy
<ul style="list-style-type: none"> – Signal transmission faulty 	<ul style="list-style-type: none"> – For terminal components, check/correct their seating on the MIQ module. – Check the log book for error messages (for details on the log book, see section 4.5). – Check/correct the position of the SN terminator switches (for the correct settings, see section 3.9.1). – Check the total line length within the IQ SENSOR NET. For a total line length of more than 1000 m, an MIQ/JBR signal amplifier module is required.
<ul style="list-style-type: none"> – Component is defective 	<ul style="list-style-type: none"> – Check the log book for error messages (for details on the log book, see section 4.5). – If no log book entry exists, send the component back.

Component is not registered on the system despite sufficient supply voltage on both +U V wires (with no error message)

Cause	Remedy
<i>IQ sensors</i>	
<ul style="list-style-type: none"> – IQ sensor connection cable is not correctly connected or defective 	<ul style="list-style-type: none"> – Check IQ sensor cable connection on the terminal strip. – Check IQ sensor cable and, if necessary, replace it. Another IQ sensor can be used for the test.
<ul style="list-style-type: none"> – IQ sensor is defective 	<ul style="list-style-type: none"> – Test IQ sensor at another measurement location. – If IQ sensor still does not function, contact YSI.
<i>Other components</i>	
<ul style="list-style-type: none"> – Component is defective 	<ul style="list-style-type: none"> – If possible, test component at another measurement location. – If component still does not function, contact YSI.

7.3 Other errors

Status LED of the MIQ/TC 2020 XT flashes	Cause <ul style="list-style-type: none"> – A fault is present 	Remedy Fault remedy according to the logbook: <ul style="list-style-type: none"> – More detailed information on the current fault and its remedy is given in the logbook (see section 4.5.2)
The system does no longer react on entries	Cause <ul style="list-style-type: none"> – System error 	Remedy Reset the system: <ul style="list-style-type: none"> – Remove the Terminal/ Controller and dock it again after 10 s or: – Switch off the power supply and switch it on again after 10 s
"Error" in the measured value display	Cause <ul style="list-style-type: none"> – Communication with the IQ Sensor interrupted – Error in the IQ sensor 	Remedy <ul style="list-style-type: none"> – Check the cable connection – Disconnect the IQ sensor and reconnect it after 10 s
Local settings cannot be displayed	Cause <ul style="list-style-type: none"> – The contacts of two MIQ modules are not correctly connected to each other 	Remedy <ul style="list-style-type: none"> – Clean the contacts

"no sensor" in the measured value display though an IQ sensor is connected

Cause

- Local display has been set up and the IQ sensor is not included in the local display

Remedy

- Add the sensor to the local display (see section 5.9)
- Switch to the *All sensors* display with *Display local values or all values* (see section 4.4.5)

The selected system language was not activated for all components

Cause

- A system language was selected that is not available in one component (sensor, controller, terminal, output module). The standard language, English, was activated instead of the selected system language.

Remedy

- Contact YSI, a software update is required for the respective components

7.4 Replacing system components



Note

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.

7.4.1 Replacing passive components

Passive components include all components that the controller cannot recognize.

These include:

- MIQ power supply modules
- MIQ branching module
- Cables (SNCIQ, SACIQ).



Warning

If the MIQ/PS power supply module is opened during operation, there is a danger to life due to possible hazard of electric shock. The MIQ/PS may only be opened when the line voltage is switched off. Secure the line voltage against being switched on again.

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

7.4.2 Adding and replacing IQ sensors

Inactive datasets of IQ sensors

If an IQ sensor is removed from the system, its settings remain stored in the IQ SENSOR NET controller. A "?" appears in the left column of the *Edit list of sensors* menu. This indicates an "inactive dataset". A dataset contains the following information:

- Serial number of the IQ sensor (and, with it, the type of sensor)
- Display position
- All sensor settings including differential sensor
- All characteristics of the link with an output.

If no suitable inactive dataset is available, a newly connected IQ sensor is automatically recognized as a new module and added to the list of sensors (see section 3.10 SYSTEM EXTENSION AND MODIFICATION).



Note

The maximum number of data sets (active and inactive datasets) for IQ sensors is limited to 20 in the IQ SENSOR NET system 2020 XT USB.

When this number is reached, no further IQ sensor can be installed. If necessary, an inactive dataset has to be erased to make an extension possible.

**Note**

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, it can be used immediately without the need for recalibration.

**Note**

To erase inactive datasets, see section 5.5.3.

If an IQ sensor is connected to the system when an inactive dataset is present, the following cases are possible:

Case 1:

The serial number of the IQ sensor is identical with the serial number of an inactive dataset.

The connected IQ sensor is automatically assigned to the inactive dataset and starts to operate again.

Example: Maintenance or repair.

This mechanism ensures that all IQ sensors retain their settings and links if an IQ sensor was removed for maintenance, or if the system was temporarily switched off.

Case 2:

The type of sensor is identical with the type of sensor in an inactive dataset (or several inactive datasets), but the serial numbers differ.

Operator intervention is required here. The connected IQ sensor can:

- be assigned to the inactive dataset (or one of the inactive datasets).
Example: Replacing an IQ sensor.
Make sure that the substitute sensor has at least the software status of the active IQ sensor.
- be included as a new module in the list of the sensors.

The operating sequence to do this is described below.

Operating sequence in case 2

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

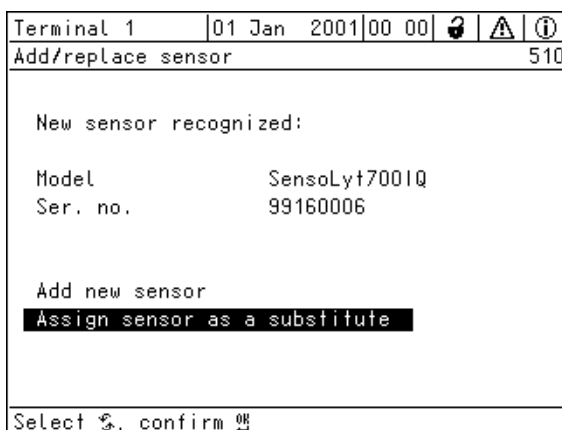


Fig. 7-2 Add/replace sensor

- 3 Select the required option with <▲▼◀▶> and confirm with <OK>.
 - If *Add new sensor* was selected, the system changes directly to the measured value display. As soon as the IQ sensor is ready for operation, it delivers a measured value.
 - If *Assign sensor as a substitute* was selected, a list of matching inactive datasets appears:

Terminal 1	01 Jan 2001	00:00	🔒	⚠	ℹ
Assign sensor as a substitute					520
No.	Model	Ser. no.	Sensor name		
?02	SensoLyt700IQ	99160002	99160002		
Substitute sensor					
	SensoLyt700IQ	99160006			
Select sensor ⏪, confirm ⏩					

Fig. 7-3 Assign sensor as a substitute

- 4 Select the required inactive dataset with <▲▼◀▶> and confirm with <OK>. The system changes to the measured value display. The IQ sensor takes over all settings of the inactive dataset. As soon as the IQ sensor is ready for operation, it delivers a measured value.

7.4.3 Adding and replacing MIQ output modules



Warning

There is also a danger to life from voltages that may present a hazard of electric shock on the relay contacts of open MIQ output modules (e.g. MIQ/CR3). MIQ output modules with relays may only be opened if all external voltages have previously been switched off. Secure all external voltages against being switched on again for the duration of the work.



Note

When replacing MIQ modules make sure that the substitute module has at least the software status of the active module.

Only replace MIQ output modules (all MIQ modules with relay contacts and/or electrical signal outputs) when the IQ SENSOR NET system is switched off. Defective MIQ output modules are removed in the reverse order to the installation. The installation is described in the INSTALLATION chapter of the respective component operating manual.

Inactive datasets in MIQ output modules

If an MIQ output module is removed from the system, its settings remain stored in the IQ SENSOR NET controller. A "?" appears in the left column (= inactive dataset) of the *Edit list of outputs* menu. The dataset contains the following information:

- All settings of the relays
- All settings of the current outputs.

If no inactive dataset is available, a newly connected MIQ output module is automatically recognized as a new module and added to the list of outputs (see section 3.10 SYSTEM EXTENSION AND MODIFICATION).



Note

The maximum number of data sets (active and inactive datasets) for MIQ output modules is limited to 8 in the IQ SENSOR NET system 2020 XT USB. When this number is reached, no further MIQ output module can be installed. If necessary, an inactive dataset has to be erased to make an extension possible.



Note

To erase inactive datasets, see section 5.8.2.

If an MIQ output module is connected to the system when an inactive dataset is present, the following cases are possible:

Case 1:

<p>The serial number of the MIQ output module is identical with the serial number in an inactive dataset.</p>	<p>The connected MIQ output module is automatically assigned to the inactive dataset and starts to operate again.</p> <p><u>Example:</u> In the case of repair.</p>
--	---

Case 2:

<p>The type of the MIQ output module is identical with the type in an inactive dataset (or several inactive datasets), but the serial numbers differ.</p>	<p>Operator intervention is required here. The connected MIQ output module can:</p> <ul style="list-style-type: none"> – be assigned to the inactive dataset (or one of the inactive datasets). <p><u>Example:</u> Replacing an MIQ output module.</p> <ul style="list-style-type: none"> – be included as a new module in the list of outputs. <p>The operating sequence to do this is described below.</p>
--	--

Operating sequence in case 2

<p>1</p>	<p>Remove the (defective) MIQ output module. The output module is removed in the reverse order to the installation. The installation is described in the INSTALLATION chapter of the respective component operating manual.</p>
<p>2</p>	<p>Install the new MIQ output module (INSTALLATION chapter of the respective component operating manual).</p>
<p>3</p>	<p>Change to the measured value display with <M>. The module database is updated. The following display appears (example):</p>

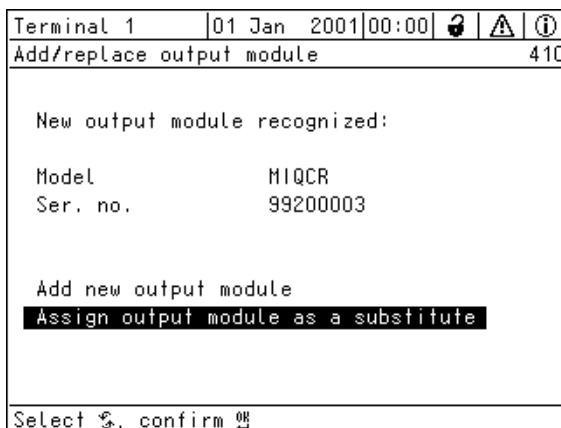


Fig. 7-4 Add/replace output module

- 4 Select the required option with <▲▼◀▶> and confirm with <OK>.
 - If *Add new output module* was selected, the system changes directly to the measured value display.
 - If *Assign output module as a substitute* was selected, a list of the matching inactive datasets appears:

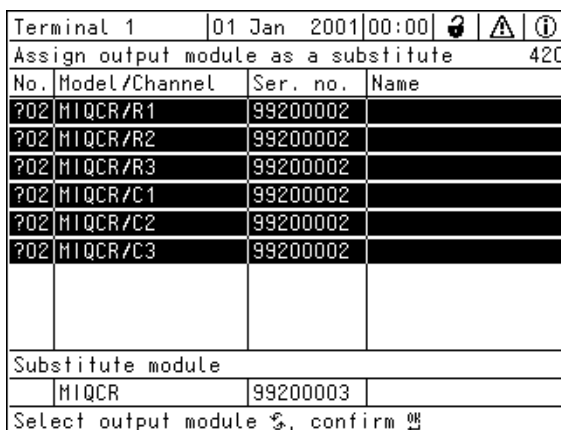


Fig. 7-5 Assign output module as a substitute

- 5 Select the required inactive dataset with <▲▼◀▶> and confirm with <OK>. The system changes to the measured value display. The MIQ output module takes over all settings of the inactive dataset.

8 Technical data

8.1 General system data

Test marks cETLus, CE

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

Nominal voltage of the power supply	See operating manual of the MIQ power supply modules used
-------------------------------------	---

Protective class	II
------------------	----

Overvoltage category	II
----------------------	----

Maximum power consumption	Depending on the number of MIQ power supply modules
---------------------------	---

Number of MIQ power supply modules in an IQ SENSOR NET system	Up to 6, depending on the total power requirement of the system (see section 3.3 SYSTEM PLANNING)
---	---

Voltage monitoring	<ul style="list-style-type: none"> – Optically via 2 LEDs on each MIQ module – Additional monitoring of all components by the controller software
--------------------	---



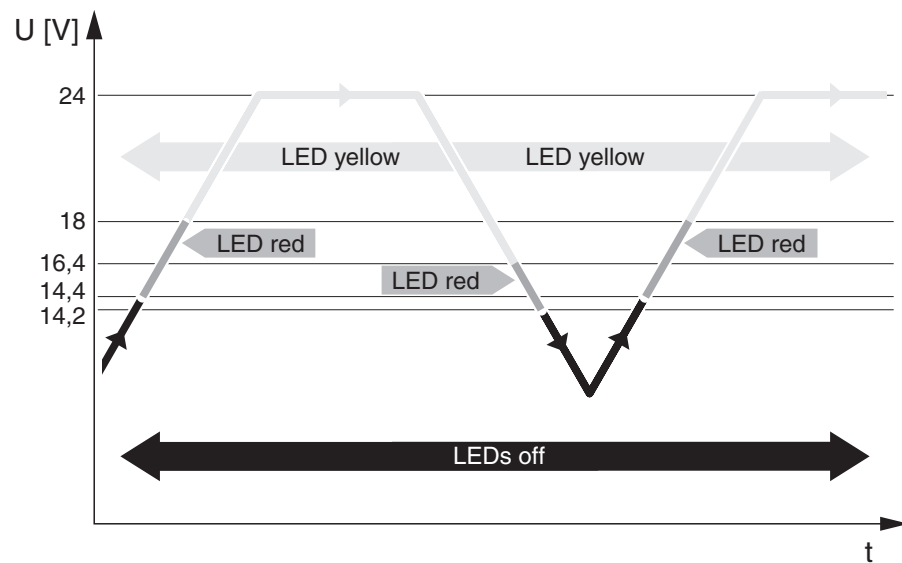
Warning

A circuit (except for the power supply connections), that is connected to an IQ SENSOR NET 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

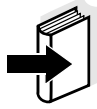
Internal voltage supply

Relationship between the supply voltage U, the LED status on the MIQ module and the log book entries (Fig. 8-1):



LED state	Log book
LED yellow	No entry (= OK)
LED red	1st error message
Both LEDs off	2nd error message (or switch-off)

Fig. 8-1 Relationship of supply voltage - LED states - log book



Note

Instructions of how to measure the actual supply voltage on individual IQ SENSOR NET components are given in this operating manual in section 7.2 DIAGNOSING FAULTS IN THE VOLTAGE SUPPLY.

Instrument safety	Applicable norms	<ul style="list-style-type: none"> – EN 61010-1 – UL 3111-1 – CAN/CSA C22.2 No. 1010.1
EMC product and system characteristics	EN 61326	<p>EMC requirements for electrical resources for control technology and laboratory use</p> <ul style="list-style-type: none"> – Resources for industrial areas, intended for indispensable operation – Interference emission limits for resources of class B
	System lightning protection	Significantly extended qualitative and quantitative protective characteristics as opposed to EN 61326
	FCC, class A	



Note

Any combination of IQ SENSOR NET products in a user-specific system fulfills these listed EMC characteristics.

8.2 General data of MIQ modules



Note

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

Dimensions

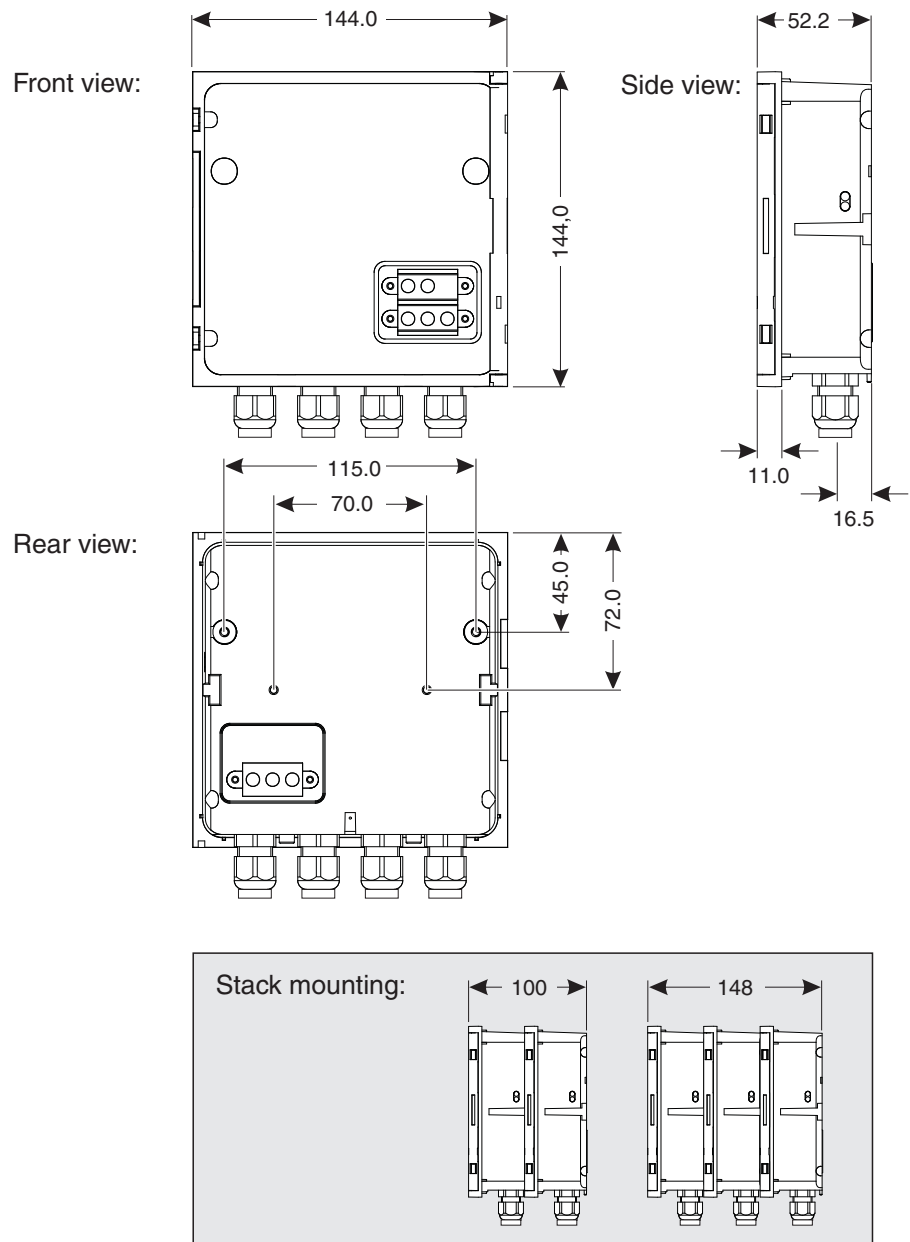


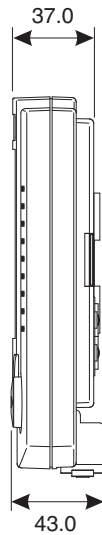
Fig. 8-2 Dimension drawing of MIQ module (dimensions in mm)

Mechanical construction	Maximum number of MIQ modules in a module stack	3 plus terminal component
	Enclosure material	Polycarbonate with 20 % glass fiber
	Weight	Approx. 0.5 kg
	Type of protection	<ul style="list-style-type: none"> – IP 66 – In accordance with NEMA 4X MIQ modules are not suitable for conduit connection – NEMA 3S
Electrical data	Nominal voltage	Max. 24 VDC via the IQ SENSOR NET (for details, see section 8.1 GENERAL SYSTEM DATA)
	Power consumption	Module-dependent (see section 3.4.2 DRAWING UP THE POWER RATING)
Terminal connections	IQ SENSOR NET connections	At least two in each MIQ module. Additional connectable SENSORNET terminator (terminating resistor)
	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 sheath diameter	4.5 - 10 mm or 9.0 - 13 mm

8.3 MIQ/TC 2020 XT terminal/controller

Dimensions

Side view:



Front view:

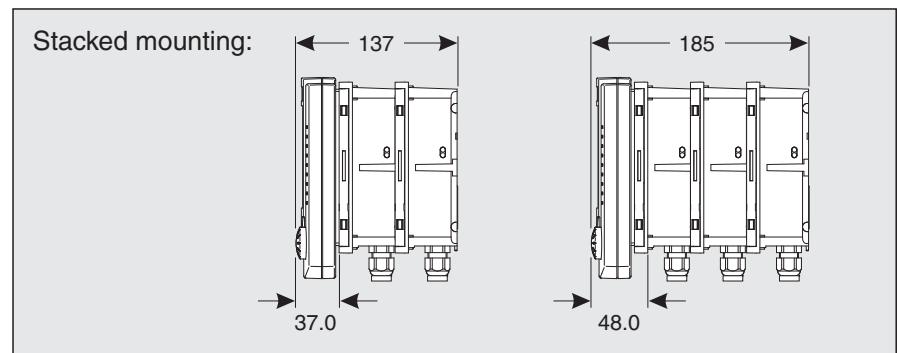
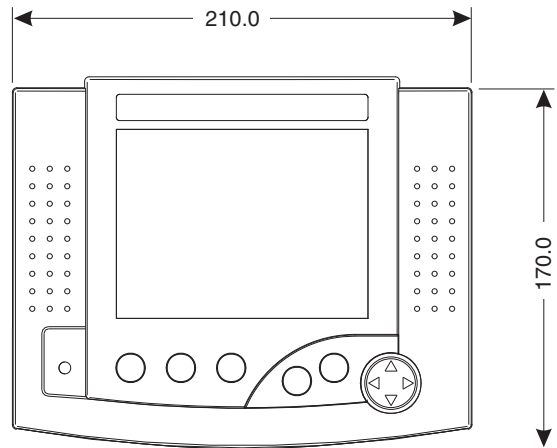


Fig. 8-3 Dimension drawing of the MIQ/TC 2020 XT (dimensions in mm)

Mechanical construction

Enclosure material	ASA (Acrylonitrile Styrene Acrylesterpolymer)
Weight	Approx. 0.9 kg
Type of protection	<ul style="list-style-type: none"> - IP 66 - corresponds to NEMA 4X The MIQ/TC 2020 XT is not suitable for conduit connection - NEMA 3S

Electrical data	Supply voltage	Max. 24 VDC via the IQ SENSOR NET (for details, see section 8.1 GENERAL SYSTEM DATA)
	Power consumption	3.0 W
Interfaces	Type	USB-A (<i>USB Host</i>)
Air pressure	Measuring range (if an MIQ/A module for air pressure compensation is installed in the system)	500 mbar ... 1100 mbar
	Setting range (if no MIQ/A module for air pressure compensation is installed in the system)	500 mbar ... 1100 mbar

8.4 Space required by mounted components

Wall mounting and top hat rail mounting

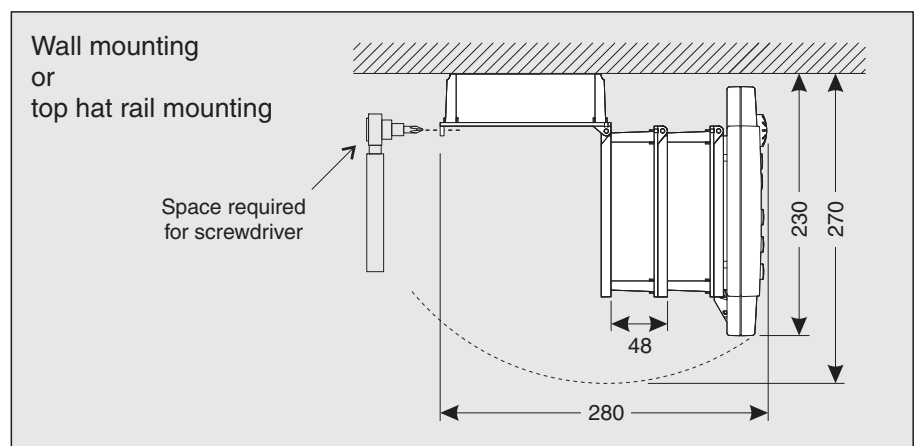


Fig. 8-4 Space required for wall and top hat rail mounting: (dimensions in mm)

Panel mounting

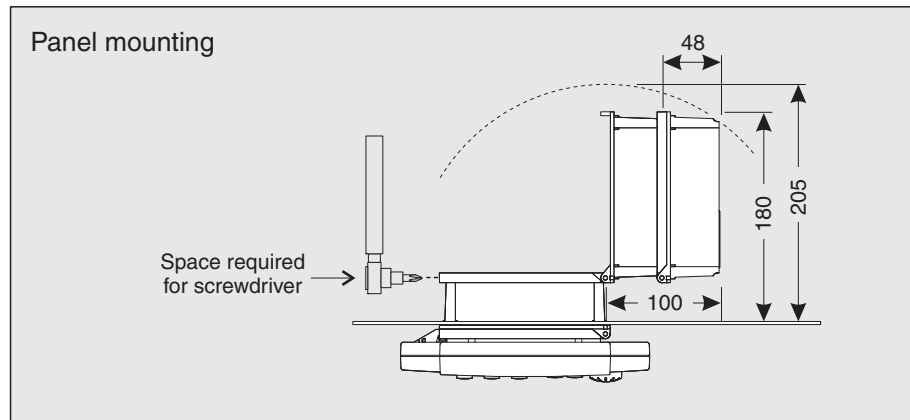


Fig. 8-5 Space required for panel mounting (dimensions in mm)

FCC Class A Equipment Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

9 Contact Information

9.1 Ordering & Technical Support

Telephone: (800) 897-4151
(937) 767-7241
Monday through Friday, 8:00 AM to 5:00 PM ET

Fax: (937) 767-1058

Email: environmental@ysi.com

Mail: YSI Incorporated
1725 Brannum Lane
Yellow Springs, OH 45387
USA

Internet: www.ysi.com

When placing an order please have the following information available:

YSI account number (if available)	Name and Phone Number
Model number or brief description	Billing and shipping address
Quantity	Purchase Order or Credit Card

9.2 Service Information

YSI has authorized service centers throughout the United States and Internationally. For the nearest service center information, please visit www.ysi.com and click 'Support' or contact YSI Technical Support directly at 800-897-4151.

When returning a product for service, include the Product Return form with cleaning certification. The form must be completely filled out for an YSI Service Center to accept the instrument for service. The Product Return form may be downloaded at www.ysi.com and clicking on the 'Support' tab.

10 Accessories and options

Description	Model	Order no.
IQ SENSOR NET cable - please specify required length in m when ordering	SNCIQ SNCIQ/UG	480 046Y 480 047Y
IQ sensor connection cable		
– 1.5 m	SACIQ-1.5	480 040Y
– 7.0 m	SACIQ-7.0	480 042Y
– 15.0 m	SACIQ-15.0	480 044Y
– Special length up to max. 100 m	SACIQ-SO	480 041VY
– 20 m (seawater version)	SACIQ-20.0 SW	480 045Y
– 25 m (seawater version)	SACIQ-25.0 SW	480 066Y
– 50 m (seawater version)	SACIQ-50.0 SW	480 060Y
– 75 m (seawater version)	SACIQ-75.0 SW	480 067Y
– 100 m (seawater version)	SACIQ-SO SW	480 062Y
– Special length (seawater version)	SACIQ-SO SW	480 064VY
Set with four cable glands for cable sheath diameter of 7 to 13 mm	EW/1	480 051Y
Sun shield for a unit of up to three stacked MIQ modules plus docked terminal	SSH/IQ	109 295Y
Sun shield for a single MIQ module plus docked terminal	SD/K 170	109 284Y
Mounting kit for fixing the SD/K 170 sun shield on horizontal or vertical pipes	MR/SD 170	109 286Y
Kit for wall mounting of a MIQ module	WMS/IQ	480 052Y
Set for panel mounting of MIQ modules; switch panel aperture 138 x 138 mm according to DIN 43700 or IEC 473 (max. thickness 15 mm)	PMS/IQ	480 048Y
Kit for mounting of MIQ modules on a 35 mm top hat rail in accordance with EN 50022	THS/IQ	480 050Y
Set for remote transmission	MIQ/TM/SET	902 887Y



Note

Other accessories for the IQ SENSOR NET are given in the YSI catalog or on the Internet.

11 Indexes

On the following pages, you will find the following indexes:

- Index of all displays (see section 11.1)
- Explanation of the message codes (see section 11.2)

11.1 Index of all displays

This index contains a selection of displays showing important indications or settings.

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11.2 Explanation of the message codes

The log book contains a list with all the messages from all modules. Each message consists of message code, date and time. You can obtain more detailed information by opening the full message text (see section 4.5).

The full message text comes from the component that has triggered the message. Therefore, these texts are only available from components which are connected to the system and ready for operation.

If a message text is not available, because the component is not connected to the system, you can look up the texts of the messages in the operating manual of the respective component.

The following lists contain the message codes and the related message texts that are shown on the display. Error messages and info messages are listed separately.

General explanations on the subjects of messages, message codes and log book are given in section 4.5 of this system operating manual.

11.2.1 Error messages

Message code	Message text
EAB141	<i>Error at automatic air pressure measurement An air pressure value of 1013 mbar is used for air pressure compensation * Component has been removed from the system, insert component again * Component defective, contact service</i>
EI4141	<i>Max. components of this component type exceeded Danger of system overload * Check and adapt the components for this type</i>
EI5141	<i>Component cannot be reached or not present * Component has been removed from the system, insert component again * Connex. to component cut., Check sys. installation acc. to op. manual</i>
EI6141	<i>Incompatible terminal software * Contact service</i>
EI7141	<i>Incompatible controller software * Contact service</i>

Message code	Message text
EI8141	<i>Connection to the component instable * Check installation and cable lengths, Follow installation instructions * Set SN terminator switch acc. to operating manual * Check environmental effects * Component defective, contact service</i>
EI9141	<i>Power failure occurred * Check date and time and, if necessary, adjust them</i>

11.2.2 Info messages

Message code	Message text
IA2141	<i>Automatic air pressure measurement component identified The measured values of the air pressure compensation component are used</i>
II1141	<i>Language not available, Default language German * Contact service</i>
II2141	<i>New IQ Sensor Net component identified</i>
II3141	<i>New IQ Sensor Net component recorded * See component lists</i>
II4141	<i>IQ Sensor Net component recorded as replacement component * See component lists</i>
II5141	<i>Link sensor - output has been erased * if necessary, link sensor again</i>
II9141	<i>Date and time have been set</i>

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12 Appendix

12.1 Forgotten the password? (store separately if required)

Extended access control

The administrator can view and change all stored passwords (see section 5.4).

If the IQ SENSOR NET is locked and the administrator password lost, you can unlock the system with a master password. The master password is available from your instrument manufacturer.

The master password is valid for 7 days.

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

Simple access control

Proceed as follows to show the currently valid password on the display:

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

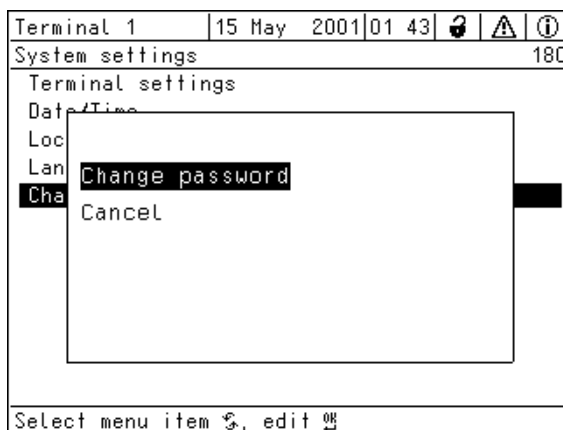


Fig. 12-1 System settings -> Change password

- 3 Press **<C>** and then **<S>**. The current password is displayed.

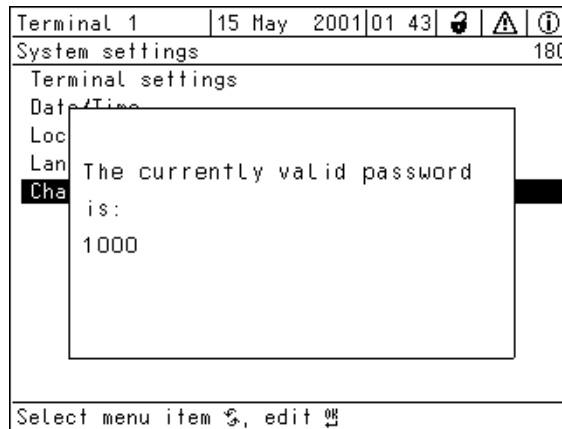


Fig. 12-2 System settings -> Display password

- 4 Quit the display of the password with <OK>.

12.2 Default password

Simple access control

The password of the MIQ/TC 2020 XT is set to 1000 in the delivery state.



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