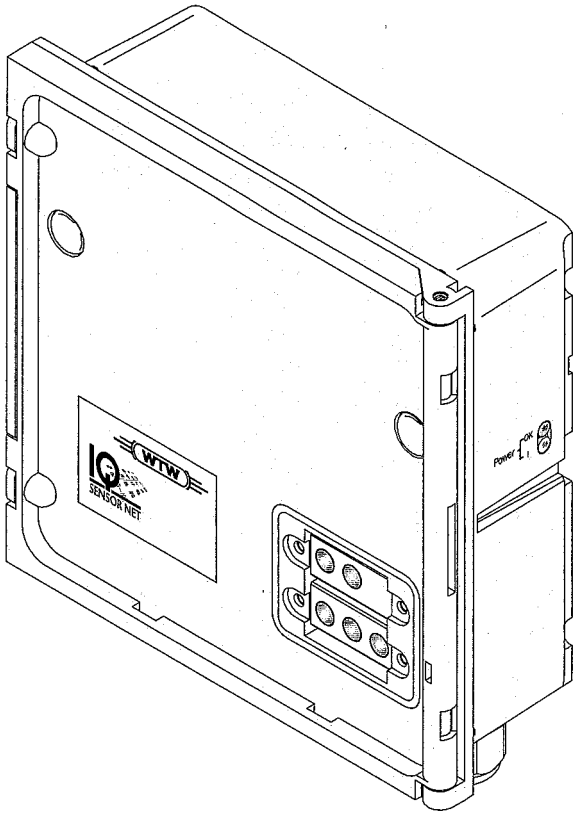


OPERATING MANUAL

ba64125e04 03/2018

IQ SENSOR NET current input module 2 x 0/4 ... 20 mA

WITH POWER SUPPLY/ISOLATOR FEED-IN

WTW

a xylem brand

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1 Overview

1.1 How to use this component operating manual

Structure of the IQ SENSOR NET operating manual

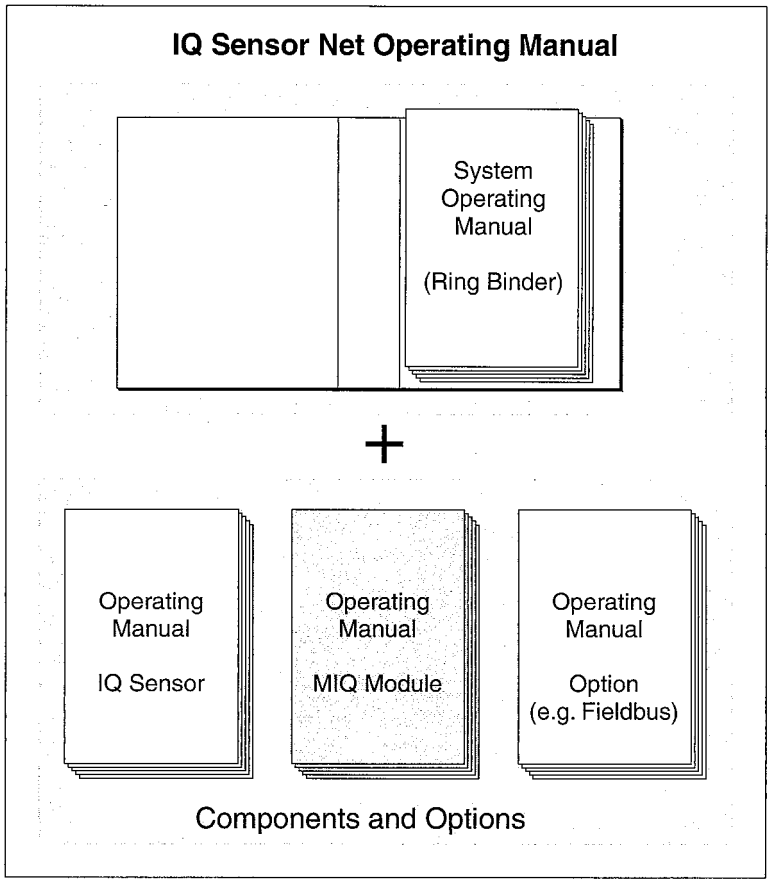


Fig. 1-1 Structure of the IQ SENSOR NET operating manual

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

Please file this component operating manual into the ring binder of the system operating manual.

1.2 Features of the MIQ/IC2

General characteristics

The MIQ/IC2 current input module provides two 0/4 ... 20 mA current inputs for the IQ SENSOR NET and thus enables to connect external meters via their current output. Measured values of the external meters can be displayed, recorded and processed like the measured values from IQ SENSOR NET sensors.

Examples of external meters:

- Measuring transmitters by WTW
- Measuring transmitters by other manufacturers
- Measuring transmitters with explosion protection via a power supply/isolator
- Analyzers

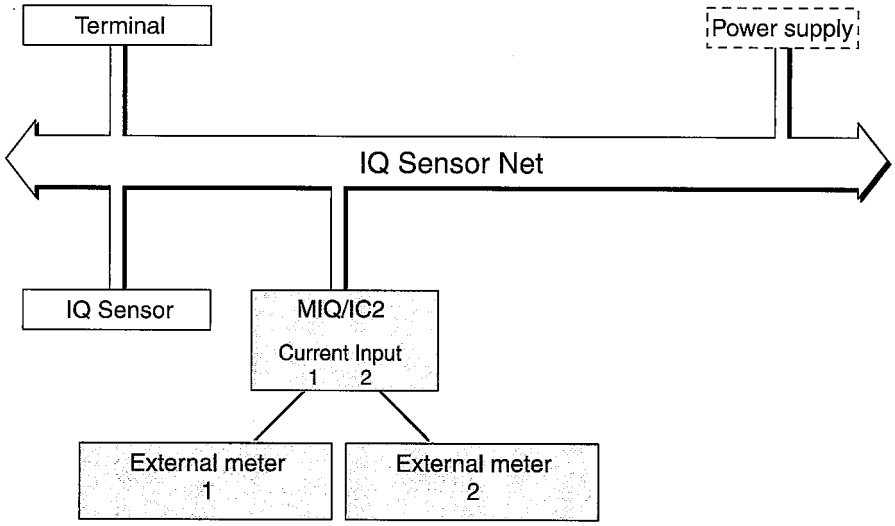


Fig. 1-2 Connection of external meters to the IQ SENSOR NET

With the standard MIQ module housing, the MIQ/IC2 has the same characteristics as all MIQ modules regarding stability, leakproofness and weather resistance. It also provides the same wide variety of installation options (stacked mounting, canopy mounting, tophat rail mounting, etc.).

Terminal strip

The MIQ/IC2 has the following electrical connections on the terminal strip inside the housing:

- 2 x current input (0/4 ... 20 mA)
- 2 x SENSORNET connection
- 1 x power supply/isolator feed-in

2 Safety instructions

2.1 Safety information

2.1.1 Safety information in the operating manual

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

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



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



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

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

2.1.2 Safety signs on the product

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

2.1.3 Further documents providing safety information

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

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

2.2 Safe operation

2.2.1 Authorized use

The authorized use of the MIQ/IC2 consists of the provision of two 0/4 ... 20 mA current inputs for the IQ SENSOR NET. Only the operation according to the instructions and technical specifications given in this operating manual is authorized (see chapter 7 TECHNICAL DATA). Any other use is considered unauthorized.

2.2.2 Requirements for safe operation

Note the following points for safe operation:

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

2.2.3 Unauthorized use

The product must not be put into operation if:

- it is visibly damaged (e.g. after being transported)
- it was stored under adverse conditions for a lengthy period of time (storing conditions, see chapter 7 TECHNICAL DATA).

2.3 User qualification

Target group

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/IC2 to the power supply.
- Connection of external, line voltage-carrying circuits to relay contacts (see module manual of the relay output module).

3 Installation

3.1 Scope of delivery

- MIQ module
- Accessory set, including:
  - 4 x cable glands (clamping range 4.5-10 mm) with seals and blind plugs
  - 4 x ISO blind nuts M4 with suitable cheese-head screws and plain washers
  - 2 x countersunk screws M3x6 to close the module lid (+ 2 replacement screws)
  - 1 x contact base with fixing screws
- Operating manual.

3.2 Installation in the IQ SENSOR NET

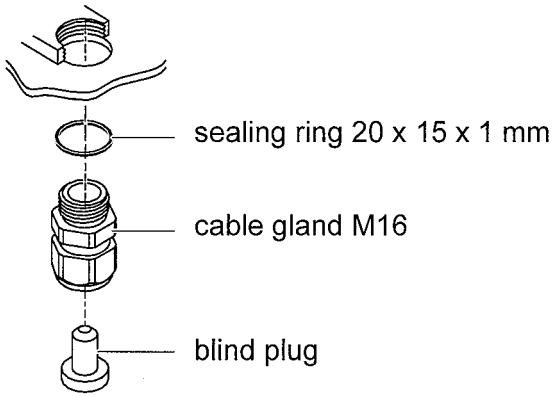
The IQ SENSOR NET provides a number of options to integrate the MIQ/IC2 mechanically and electrically in the system (stacked mounting, distributed mounting, etc.). The various types of installation are described in detail in the INSTALLATION chapter of the system operating manual.

3.3 Electrical connections: General instructions

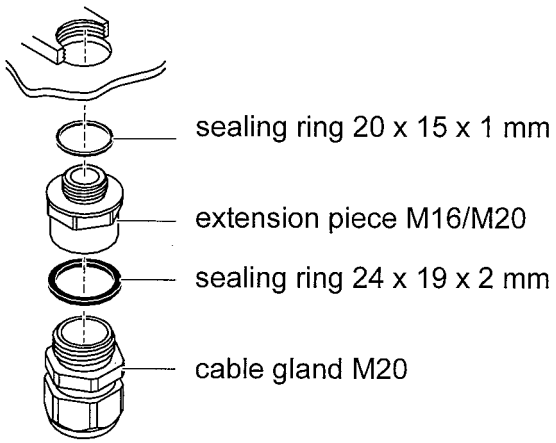
Cable glands

All electric cables are fed from below via prepared openings in the enclosure of the MIQ/IC2. Cable glands with different clamping ranges are included with the MIQ/IC2 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 sensor cables.



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



If necessary, you can order more large cable glands in a set of 4 pieces (Model EW/1, Order No. 480 051).

General installation instructions

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

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

3.4 Connecting external meters to the current inputs

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

General installation instructions

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

- Shorten all the wires used to the length required for the installation.

- Fit all wire ends 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.

Materials required

- Wire end sleeves, suitable for the connecting wires, with suitable crimping tool
- Cable gland with sealing ring (scope of delivery of the MIQ/IC2)

Tools

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

Connecting lines to the terminal strip

1	Open the module.
2	Open the dummy screw fitting under the required input. Keep the dummy screw fitting for possible later modifications.

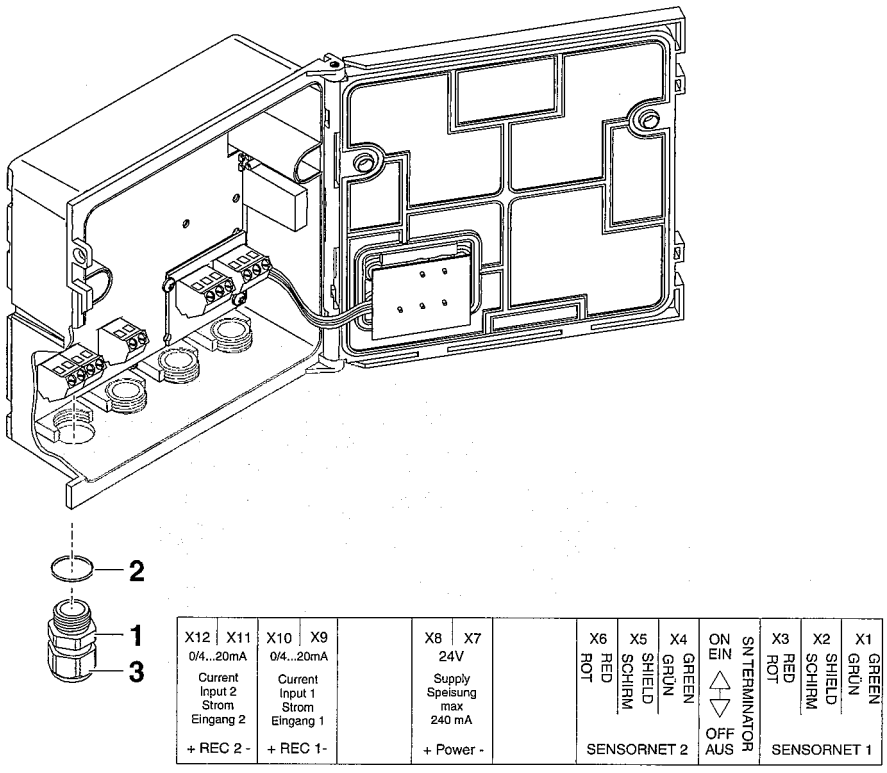


Fig. 3-1 Terminal strip MIQ/IC2

3	Screw the cable gland (pos. 1 in Fig. 3-1) with the sealing ring (pos. 2) into the module housing.
4	Loosen the coupling ring (pos. 3 in Fig. 3-1).
5	Feed the line through the cable gland in the module housing.
6	Connect the wires to the terminal strip. While doing so, pay attention to the specifications on the label located under the terminal strip.
7	Tighten the coupling ring (pos. 3 in Fig. 3-1).



No free wires must be allowed to project into the housing. Otherwise there is the risk of malfunction. Always cut off any wires that are not in use as closely as possible to the cable gland.

8	Close the module.

3.5 Installation examples

The following installation examples demonstrate the basic application of the MIQ/IC2.



For installation, please always observe the installation and operating manuals of the external meters.

Connecting external meters directly

The current outputs of external measuring systems can be directly connected to the current inputs of the MIQ/IC2 module.

If the connection data of the external meter is suitable, it is also possible to supply the external meter with power by the power supply/isolator feed-in on the MIQ/IC2 module.

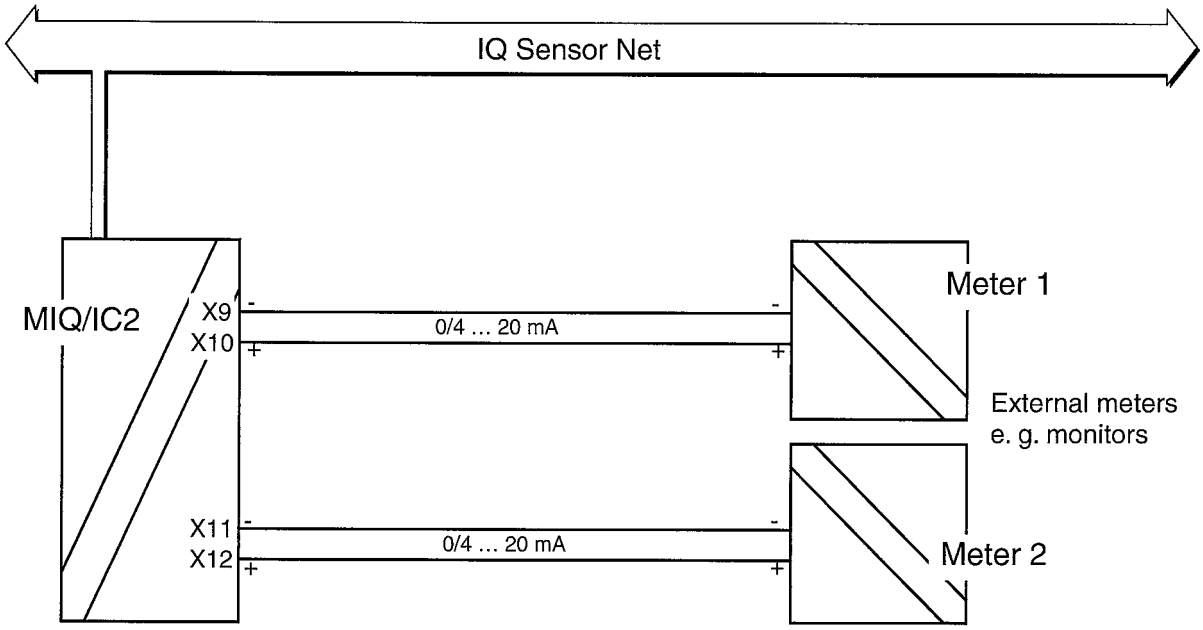


Fig. 3-2 Connection diagram for the connection of external measuring systems to the MIQ/IC2 module

Connecting external meters via a power supply/ isolator

The current outputs of external meters can be directly connected to the current inputs of the MIQ/IC2 module via a power supply/isolator. Connecting via a power supply/isolator is necessary for measurements in potentially explosive areas, for example.

If the connection data of the power supply/isolators is suitable, it is possible to supply up to two power supply/isolators with power via the feed-in connector on the MIQ/IC2 module.

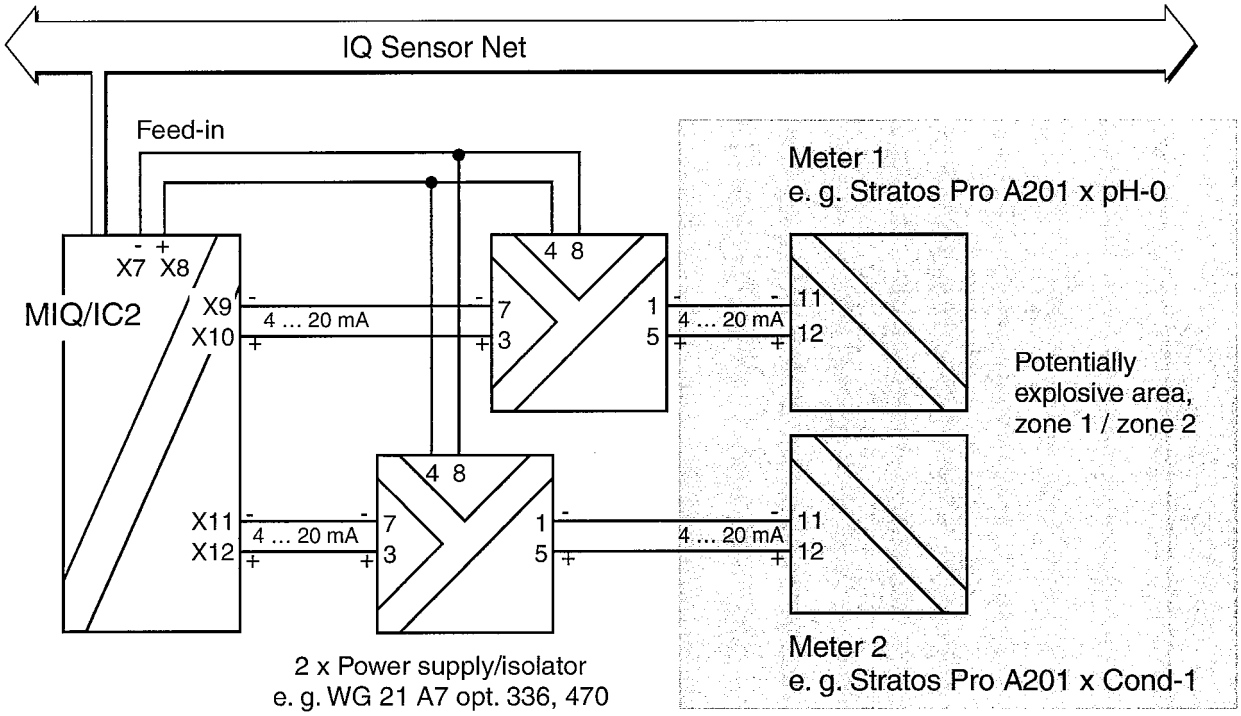


Fig. 3-3 Connection diagram for the connection of external meters situated in potentially explosive areas to the MIQ/IC2 module

WARNING
In potentially explosive areas, instruments may only be installed, commissioned and operated by specialists with the relevant training, equipment and work clothes, and according to the relevant regulations and the instructions in the relevant operating manuals.

4 Settings

Overview

The MIQ/IC2 module provides two 0/4 ... 20 mA current inputs for the IQ SENSOR NET. Each current input appears in the measured value display, the *Edit list of sensors* overview and the *Settings of sensors and diff. sensors* menu. Each current input is treated like a sensor ("current sensor") by the IQ SENSOR NET and has a separate setting menu.

On initial commissioning, only current input 1 is registered on the IQ SENSOR NET. The measured value display indicates the value of the current at current input 1 in mA.
The correlated measured value (display value) is displayed without any designation of *Unit* and *Measured parameter* and, in the delivery condition, is identical with the current value (default setting).

After the display values at the measuring range limits have been set and the *Unit* and *Measured parameter* have been specified, the correlated measured value corresponds to the measured value of the sensor, e.g. of a DO sensor:

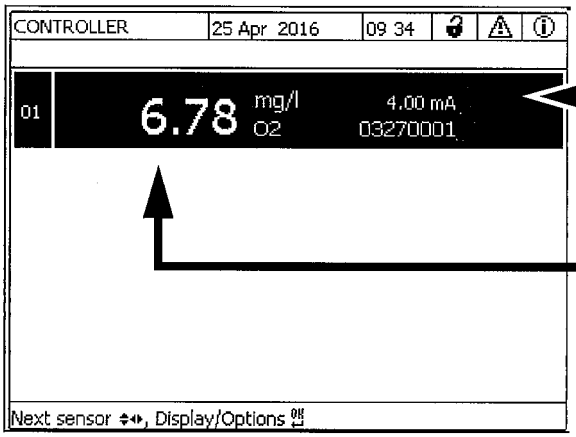


Fig. 4-1 Example: correlated measured value of a DO sensor

Activate current input 2 in the *Settings of sensors and diff. sensors* menu of current input 1. The setting menus of both current inputs are identical except for the activation of current input 2.

If the physical input current range is exceeded, OFL is displayed (measuring range exceeded or undercut).

The general operating principles are given in the system operating manual or in the component operating manual of the terminal components.

Carrying out settings

Using <S>, switch from the measured value display to the main menu of the settings. Then navigate to the setting menu (setting table) of the sensor. The

procedure is described in detail in your IQ SENSOR NET system operating manual.

Default values are marked in bold.

Menu item	Possible settings	Explanations
Measuring mode	• ***REC***	Measurement of the current at the 0/4 ... 20 mA current inputs
Measuring range	• ***0..20 mA*** • *4..20 mA*	Two measuring ranges can be selected. The setting should agree with the output range of the external sensor.
Decimal places	• *none* • *1 (.0)* • ***2 (.00)*** • *3 (.000)*	Display accuracy of the correlated measured value (display value). The setting of the *Decimal places* affects the maximum limits of the correlated measured value (see settings of display value).
Display value (0/4 mA) *Display value (20 mA)*	depending on the setting of the *Decimal places*: • -9999 ... **20** ... 99999 • -99.9 ... **20.0** ... 999.9 • -9.99 ... **20.00** ... 99.99 • 0.000 ... **2.000** ... 9.999	Lower and upper limit of the measuring range for the displayed, correlated measured value. The maximum measuring range limits to be set depend on the setting of the *Decimal places*.
Error detection	• ***>= Error threshold*** • *<= Error threshold*	Specification whether an invalid measured value ("----") is displayed if the current limit value (*Error threshold*) is **exceeded** or **undercut**.
Error threshold	• 0.5 ... **20.5** ... 21.5 mA	Current limit value. If it is **reached** and **exceeded** or **undercut,** an error should be displayed (see setting of *Error detection*).

Display indications for different settings of *Measuring range*, *Error threshold* and *Error detection*:

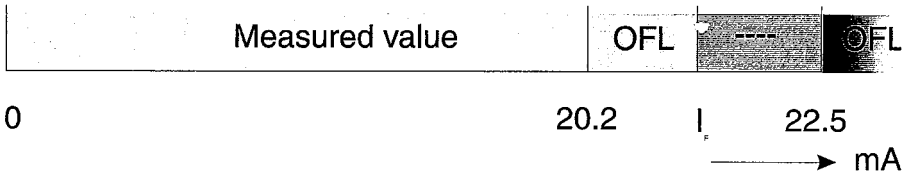


Fig. 4-2 Measuring range 0... 20 mA, Error detection >= Error threshold (I_F), I_F = 20.5 mA

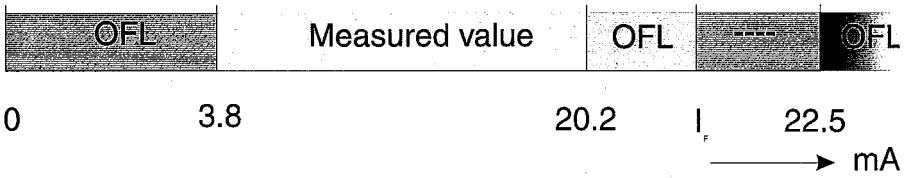


Fig. 4-3 Measuring range: 4 ... 20 mA, Error detection >= Error threshold (I_F); I_F = 20.5 mA

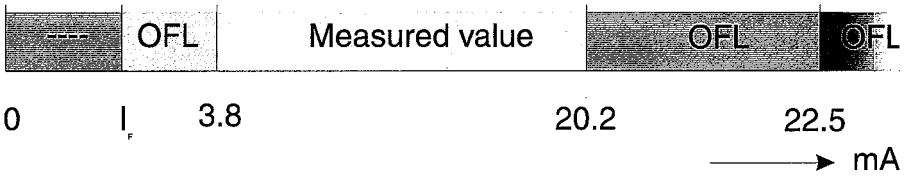


Fig. 4-4 Measuring range: 4 ... 20 mA, Error detection <= Error threshold (I_F) I_F = 3.5 mA

Menu item	Possible settings	Explanations
Unit	.....	Entry of texts for *Unit* and *Measured parameter*. The texts entered appear in the measured value display next to the measured value. The text is entered with **<▲ ▼ ◀ ▶ >** and **<OK>** (see system operating manual) e.g. *Unit* = mg/l e.g. *Measured parameter* = O2
Measured parameter	.....	
MIQ/IC2 REC2 (in the setting menu of current input 1 only)	● *active* ● ***inactive***	Activate or deactivate current input 2
Save and quit		The system confirms the saving of the settings and the display switches to the next higher level.
Quit		The display switches to the next higher level without saving the new settings.

5 What to do if ...

No measured value

Cause	Remedy
– MIQ/IC2 not connected	– Connect the MIQ/IC2
– Unknown	– Look in the log book

Measurement provides implausible measured values

Cause	Remedy
– Unsuitable settings of: – *Measuring range*, – *Display value (0/4 mA)*, – *Display value (20 mA)*	– Adjust the settings in the setting menu of the MIQ/IC2
– Current value at the current input or output of an instrument (e.g. measuring transmitter, power supply/isolator, MIQ/IC2 etc.) does not agree with the nominal value	– Change the settings of the external meters as necessary – Adjust the settings in the setting menu of the MIQ/IC2
– Calibration is not up-to-date	– Calibrate the external meter

Display of OFL

Cause	Remedy
– Allowed signal range exceeded or undercut	– Operate the 0/4 ... 20 mA current inputs of the MIQ/IC2 in the allowed current range only (see chapter 7 TECHNICAL DATA)

6 Maintenance and cleaning

6.1 Maintenance

The MIQ/IC2 requires no special maintenance. The general maintenance of IQ SENSOR NET components is described in the IQ SENSOR NET system operating manual.

6.2 Cleaning

The cleaning of IQ SENSOR NET components is described in the IQ SENSOR NET system operating manual.

7 Technical data

7.1 General data of MIQ modules

Dimensions

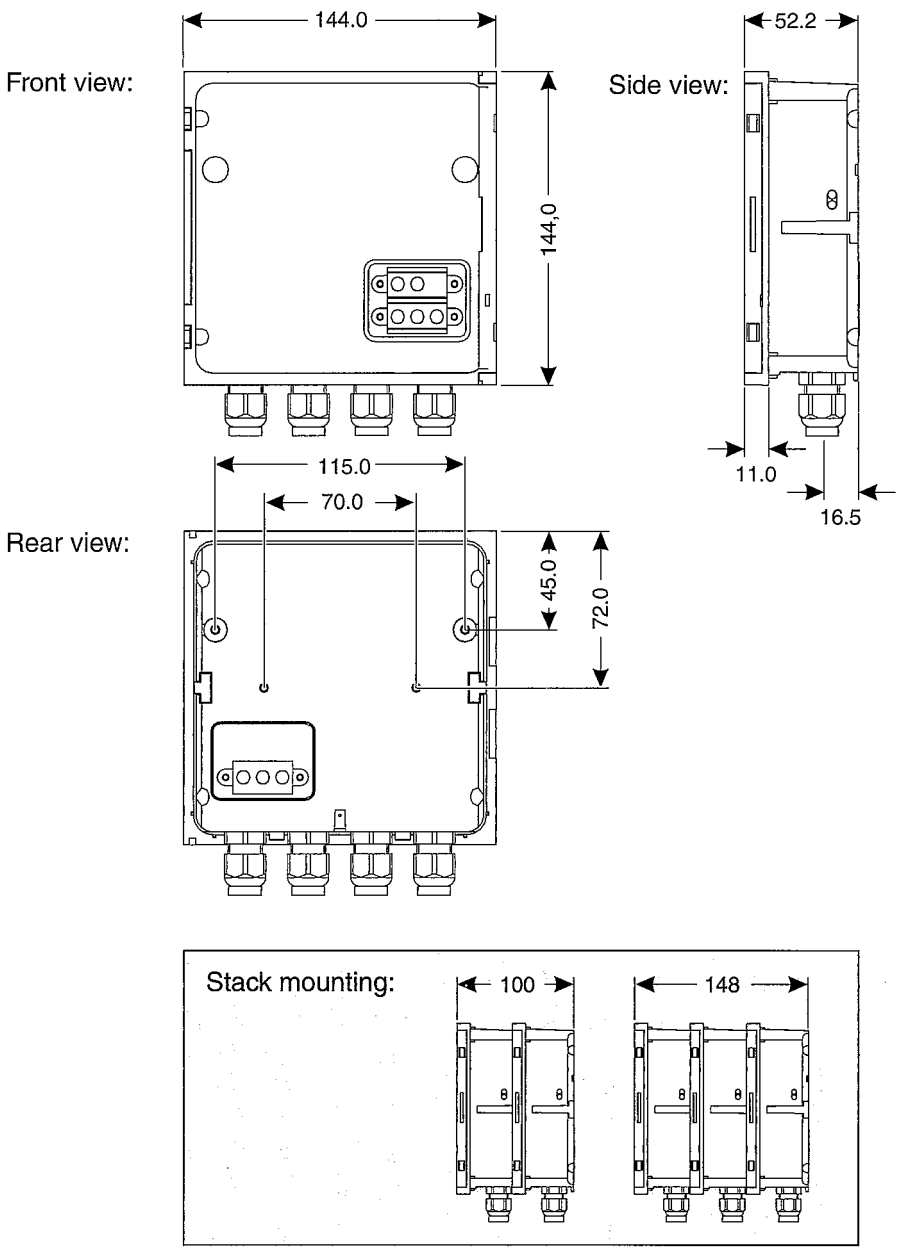


Fig. 7-1 Dimension drawing of MIQ module (dimensions in mm)

Mechanical structure

Maximum number of MIQ modules in a module stack	3
Enclosure material	Polycarbonate with 20 % glass fiber

	Weight	Approx. 0.5 kg
	Type of protection	IP 66 (not suitable for conduit connection).
Cable glands	Suitable for cable sheath diameter	4.5 - 10 mm or 9.0 - 13 mm
Ambient conditions	Temperature	
	Mounting/installation/ maintenance	+ 5 °C ... + 40 °C (+ 41 ... +104 °F)
	Operation	- 20 °C ... + 55 °C (- 4 ... + 131 °F)
	Storage	- 25 °C ... + 65 °C (- 13 ... + 149 °F)
	Relative humidity	
	Mounting/installation/ maintenance	≤ 80 %
	Yearly average	≤ 90 %
	Dew formation	Possible
	Site altitude	Max. 2000 m above sea level
Meter safety	Applicable norms	– EN 61010-1 – UL 61010-1 – CAN/CSA C22.2#61010-1
EMC product and system characteristics	EN 61326	EMC requirements for electrical resources for control technology and laboratory use – Resources for industrial areas, intended for indispensable operation – Interference emission limits for resources of class A
	System lightning protection	Noticeably extended qualitative and quantitative protective characteristics as opposed to EN 61326
	FCC, class A	

7.2 MIQ/IC2

Electrical data

Nominal voltage	Max. 24 VDC via the IQ SENSOR NET (for details, see the TECHNICAL DATA chapter of the IQ SENSOR NET system operating manual)
Power consumption	0.2 ... 4.6 W 0.2 W: without supplying any power supply/isolator ≤ 2.4 W: with one power supply/isolator ≤ 4.6 W: with two power supply/isolators
Protective class	III

Terminal connections

IQ SENSOR NET connections	2 Additional connectable SENSORNET terminator (terminating resistor)
Current inputs (0/4 ... 20 mA)	2
Connector for power supply/isolator	1
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
Line cross-section of cables carrying mains voltage	Europe: 1.5 ... 4.0 mm^2 USA: AWG 14 ... 12
Cable feeds	4 cable glands M16 x 1.5 on the underside of the module

Current inputs

Measuring channels	2 Physically separated from the IQ SENSOR NET
Physical input current range	0.0 ... 22.5 mA If this range is exceeded, the input switches itself off for approx. one minute as a protective measure
Allowed signal ranges	0 ... 20 mA: 0.0 mA ≤ I ≤ 20.2 mA 4 ... 20 mA: 3.8 mA ≤ I ≤ 20.2 mA

Undefined signal ranges Display of OFL (range within the physical input current range but outside of the allowed signal range)	At the lower end of the signal range (with signal range 4 ... 20mA only): $I_{Error\ threshold} < I < 3.8$ mA At the upper end of the signal range (with signal range 0/4 ... 20mA only): 20.2 mA < I < $I_{Error\ threshold}$
Error signal ranges Display of "----" (corresponding to setting of *Error detection*)	*Error detection* <= *Error threshold*: 0.0 mA ≤ I ≤ $I_{Error\ threshold}$ *Error detection* >= *Error threshold*: $I_{Error\ threshold}$ ≤ I ≤ 22.5 mA
Allowed common-mode difference between the measuring channels	10 VDC, 20 VAC_{P-P}
Measuring uncertainty (precision)	< 0.2 % of the measured value ± 0.01 mA
Load	max. 250 Ohm

Feed-in (power supply/ isolator)

Electrical data	20.5 - 24 V Output current max. 240 mA, permanently short-circuit proof
Requirement or monitoring of the supply voltage (only applies if a power supply/isolator is connected)	21.5 ... 24 V different from the IQ SENSOR NET voltage monitoring (see system operating manual) The voltage monitoring values are automatically changed when a power supply/isolator is connected.

8 Lists

8.1 Explanation of the messages

In this chapter you will find a list with all the message codes and corresponding message texts that may occur in the log book of the IQ SENSOR NET system for the MIQ/IC2 current input module.



Information about

- Contents and structure of the log book and
- Structure of the message code

can be found in the LOG BOOK chapter of the IQ SENSOR NET system operating manual.



All message codes of the MIQ/IC2 current input module end with the number "381" (current input 1) or "382" (current input 2).

8.1.1 Error messages

Message code	Message text
EA9381 EA9382	*Input current in undefined range* ** Check settings and, if necessary, change them* ** Check installation* ** Check connected measuring system* ** Check the MIQ/IC2*
EAA381 EAA382	*An error was reported* ** Check settings and, if necessary, change them* ** Check installation* ** Check connected measuring system* ** Check the MIQ/IC2*
EI1381	*Operational voltage too low* ** Check installation and cable lengths,* *Follow installation instructions* ** Power unit(s) overloaded, add power unit(s)* ** Check terminal and module connections* ** Defective components, replace components*

Message code	Message text
EI2381	*Operational voltage too low, no operation possible* ** Check installation and cable lengths,* *Follow installation instructions* ** Power unit(s) overloaded, add power unit(s)* ** Check terminal and module connections* ** Defective components, replace components*
ES1381	*Component hardware defective* ** Contact service*

8.1.2 Informative messages

The MIQ/IC2 current input module does not send any info messages.

8.2 Status info

The status info is a coded piece of information on the current status of a sensor. Each sensor sends this status info to the controller. The status info of sensors consists of 32 bits, each of which can have the value 0 or 1.

General structure of the status info

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(general)
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(internal)
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

The bits 0 - 15 are reserved for general information.
The bits 16 - 21 are reserved for internal service information.

The status info can be obtained as follows:

- via a manual query in the menu, *Einstellungen/Settings/Service/Liste aller Teilnehmer* (see system operating manual)
- via an automatic query
  - of a superior process control (e. g. when connected to the Profibus)
  - of the IQ Data Server (see IQ SENSOR NET Software Pack operating manual)



The evaluation of the status info, e. g. in the case of an automatic query, has to be made individually for each bit.

MIQ/IC2 status info

Status bit	Explanation
Bit 0	*Component hardware defective*
Bit 1-31	-

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1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

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