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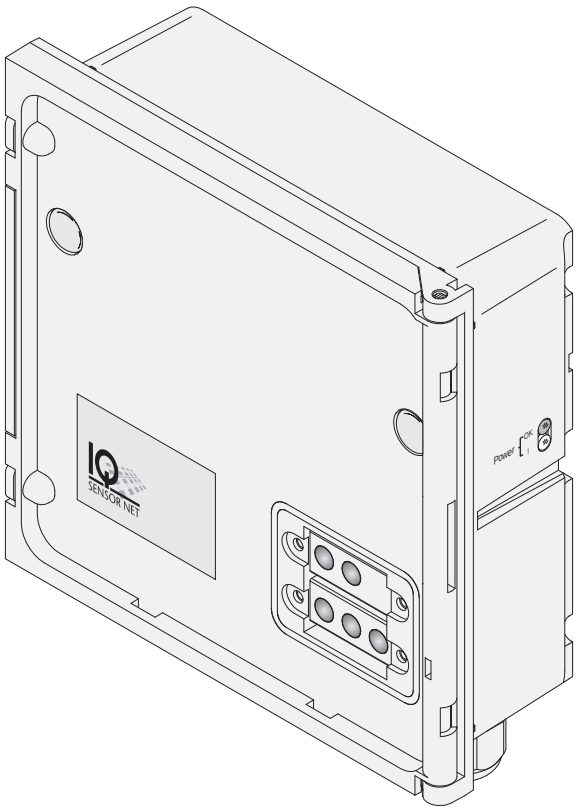
Operating Manual

IQ SENSOR NET
MIQ/IC2



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

with power supply/isolator feed-in

ba76034e01 01/2012

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

Contact

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MIQ/IC2 - List of contents

1 Overview

1.1 How to use this component operating manual

Structure of the IQ SENSOR NET operating manual

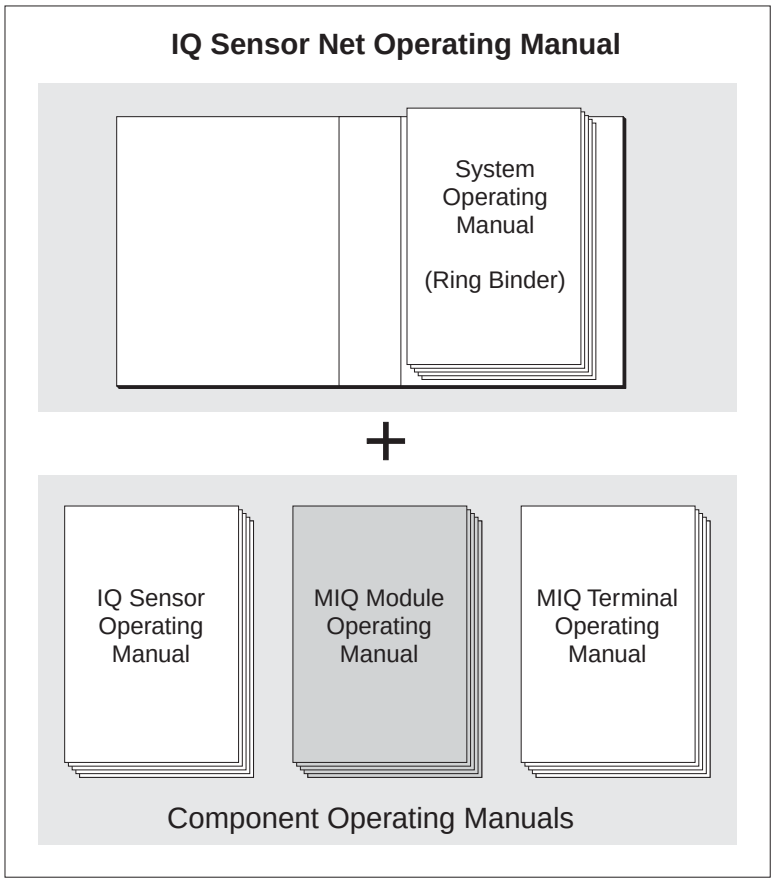


Fig. 1-1 Structure of the IQ SENSOR NET operating manual

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

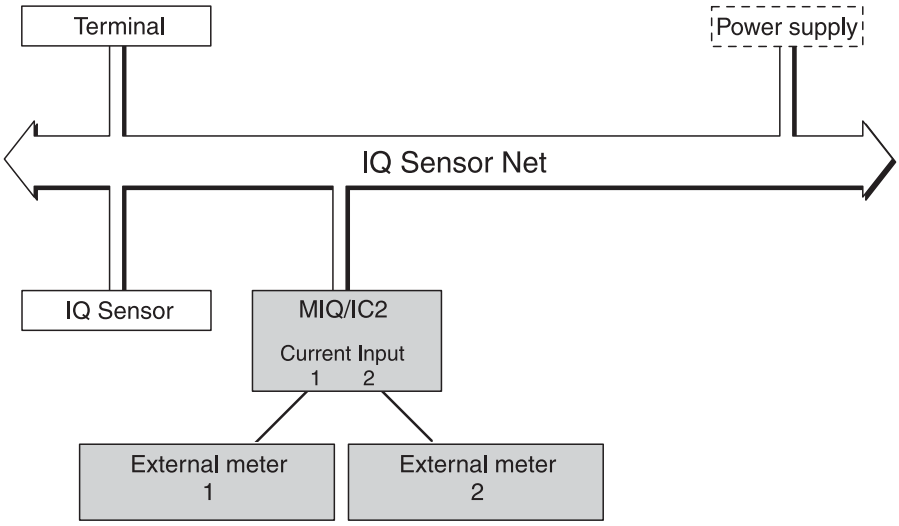


Fig. 1-2 Connection of external meters to the IQ SENSOR NET

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

This operating manual contains special instructions that must be followed during the installation of the MIQ/IC2 current input module. Thus, it is essential for the operator to read this component operating manual before carrying out any work with the system. In addition to this manual, the SAFETY chapter of the IQ SENSOR NET system operating manual must be followed.

Always keep this component operating manual together with the system operating manual and all other component operating manuals in the vicinity of the IQ SENSOR NET system.

General safety instructions

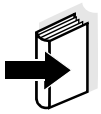
Safety instructions in this operating manual are identified by the warning symbol (triangle) in the left column. The signal word (e. g. "Caution") indicates the level of danger:

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

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

Other labels

Note
This symbol indicates instructions that describe special features.



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

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.
Please keep to the technical specifications according to chapter 7 TECHNICAL DATA. Only operation according to the instructions in this operating manual is authorized.

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

2.2 General safety instructions

The MIQ/IC2 is constructed and inspected according to the relevant guidelines and norms for electronic instruments (see chapter 7 TECHNICAL DATA).
It left the factory in a safe and secure technical condition.

Function and operational safety

The failure-free function and operational safety of the MIQ/IC2 is only guaranteed if the generally applicable safety measures and the special safety instructions in this operating manual are followed during its use.

The failure-free function and operational safety of the MIQ/IC2 is only guaranteed under the environmental conditions that are specified in chapter 7 TECHNICAL DATA.

Safe operation

If safe operation is no longer possible, the MIQ/IC2 must be taken out of operation and secured against inadvertent operation.
Safe operation is no longer possible if the MIQ/IC2:

- has been damaged in transport
- has been stored under adverse conditions for a lengthy period of time
- is visibly damaged
- no longer operates as described in this manual.

If you are in any doubt, contact the supplier of your MIQ/IC2.

3 Installation

3.1 Scope of delivery

The scope of delivery of the MIQ/IC2 is listed in the INSTALLATION chapter of the system 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.

Software requirements of the IQ SENSOR NET

Software requirements for the settings of *Unit* and *Measured parameter*:

- Controller from version 2.58
- Terminal from version 2.55

When using older software versions, it is not possible to enter texts for the settings of *Unit* and *Measured parameter*. The measured value display displays the numerical value of the correlated measured value without designation.

Note
It is possible to update the software if your components have older software versions. Contact the YSI service department.

3.3 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.

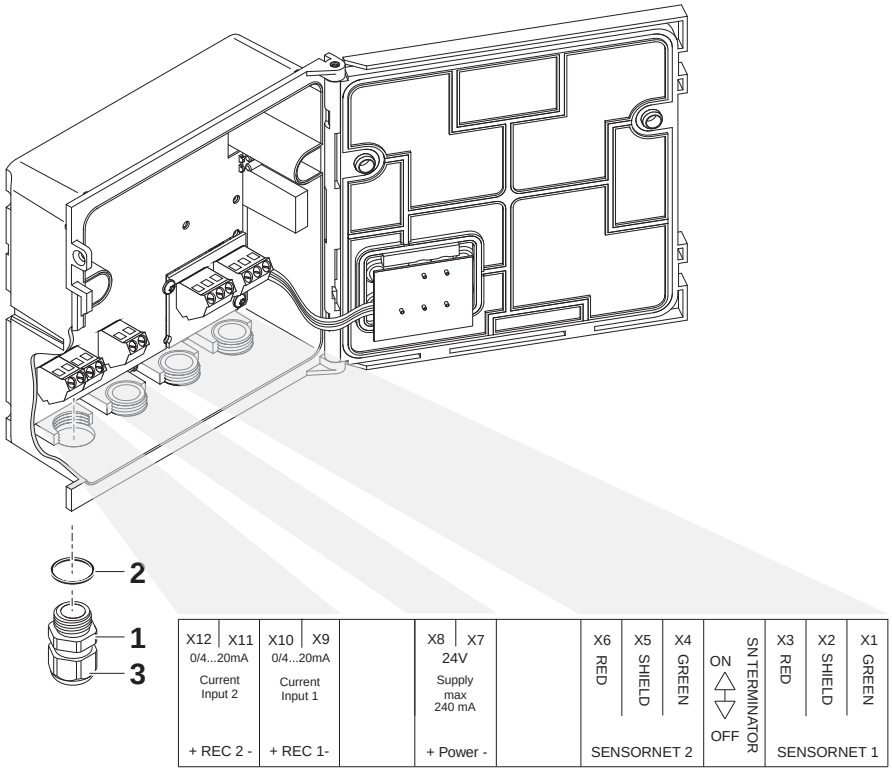


Fig. 3-1 Terminal strip MIQ/IC2

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).

Note

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.

3.4 Installation examples

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

Note
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.

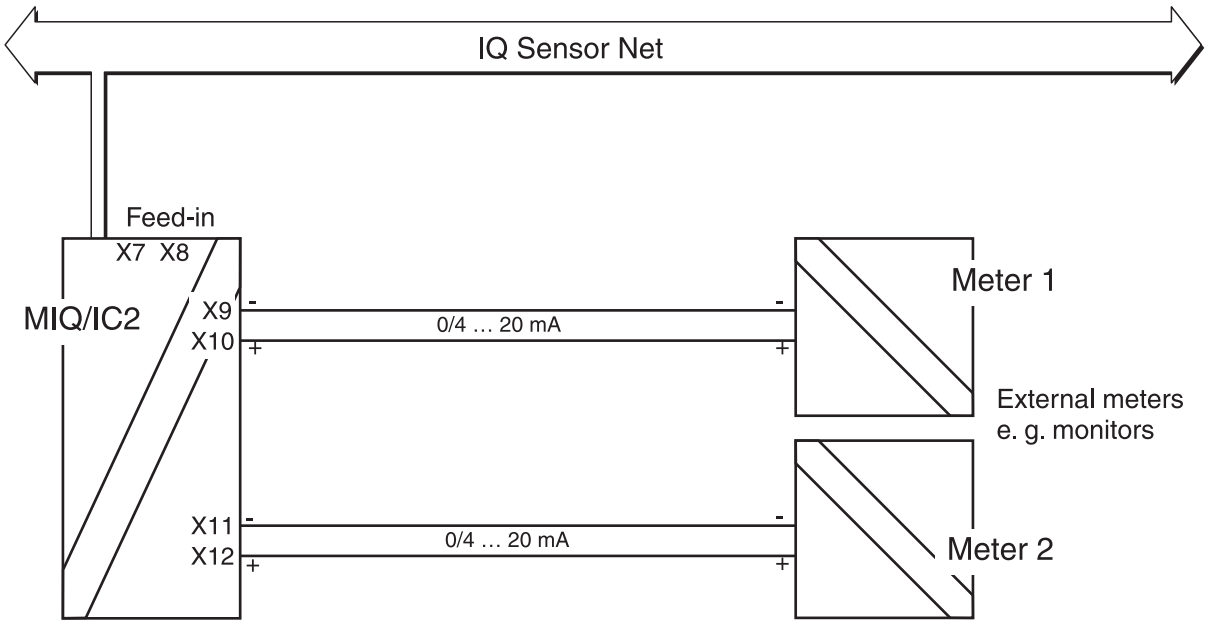


Fig. 3-2 Connection diagram for the connection of external measuring systems to the MIQ/IC2 module

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.

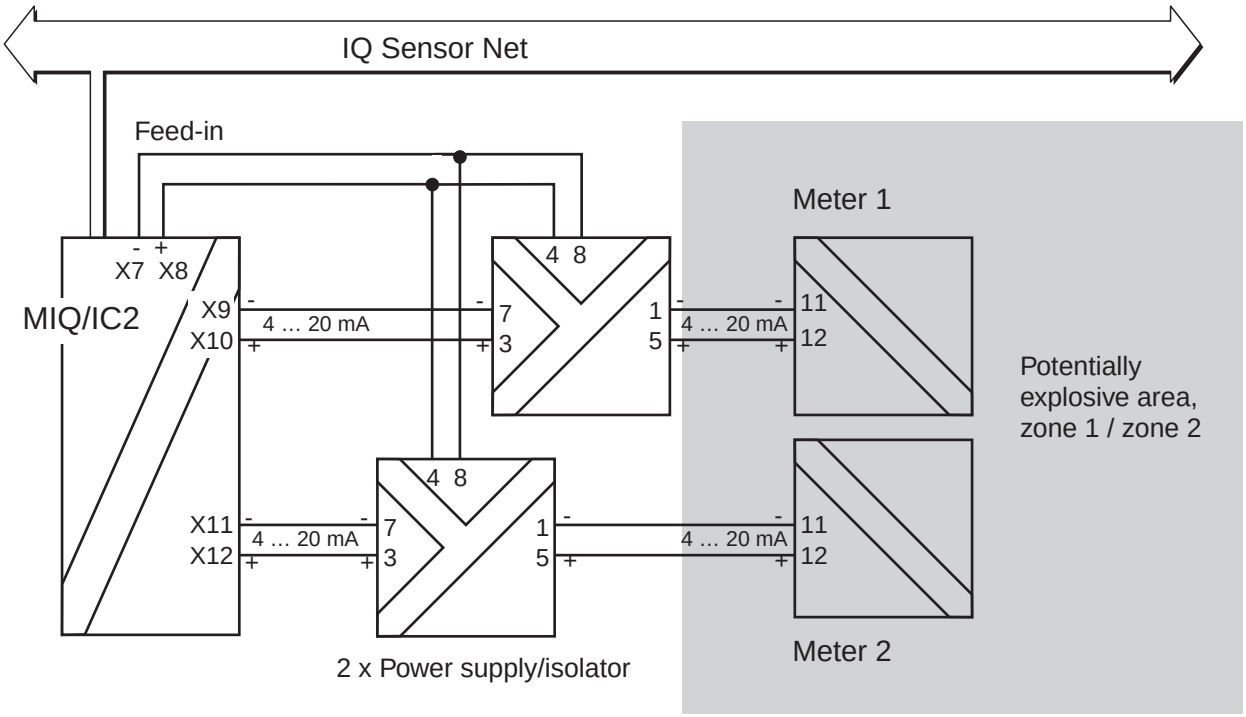


Fig. 3-3 Connection diagram for the connection of external meters situated in potentially explosive areas to the MIQ/IC2 module

Warning

In potentially explosive areas, instruments may be installed, commissioned and operated by specialist electricians only, 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:

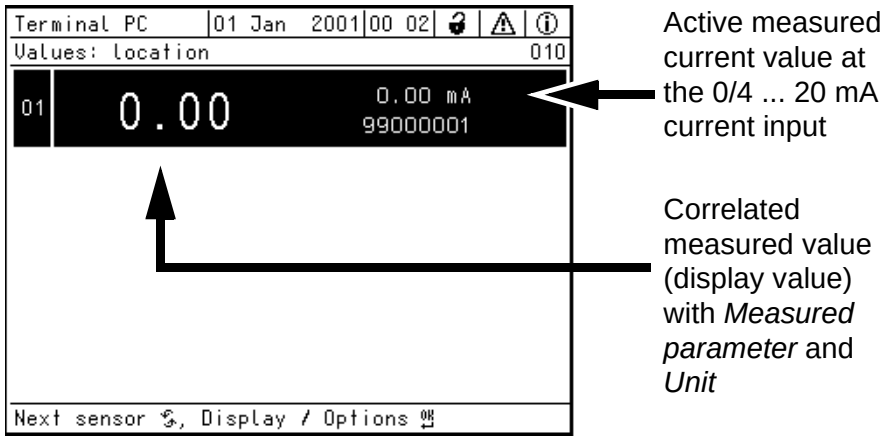


Fig. 4-1 Example: correlated measured value of a DO sensor

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).

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

Settings The following settings can be made for the sensor (default settings 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*:

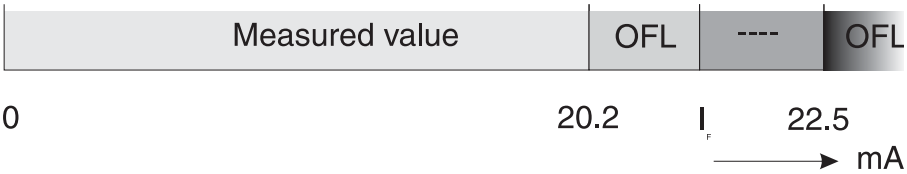


Fig. 4-2 Measuring range 0... 20 mA, Error detection >= Error threshold (I_F), I_F = 20.5 mA

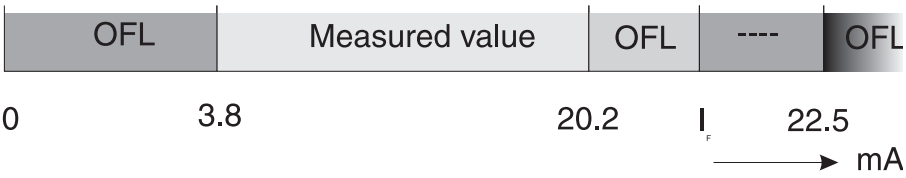


Fig. 4-3 Measuring range: 4 ... 20 mA, Error detection >= Error threshold (I_F); I_F = 20.5 mA

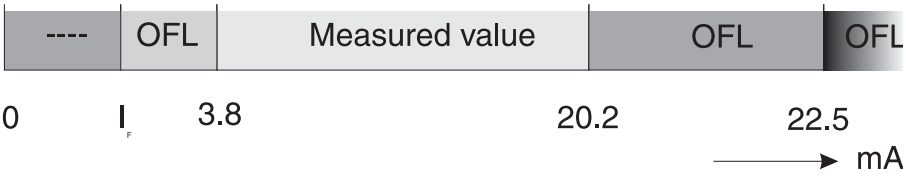


Fig. 4-4 Measuring range: 4 ... 20 mA, Error detection <= Error threshold (I_F) I_F = 3.5 mA

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.

Carrying out settings

1	Switch to the measured value display with M.
2	Open the *Settings* menu with S.
3	Select and confirm the menu item *Settings of sensors and diff. sensors* -> column *Measuring range* with ⟲ and OK.
4	Select an entry with ⟲.

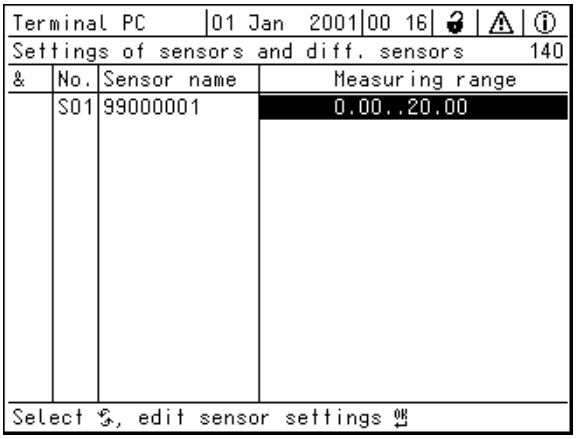


Fig. 4-5 140 - Settings of sensors and diff. sensors

5	Confirm the selection with OK. The settings of the sensor are displayed.

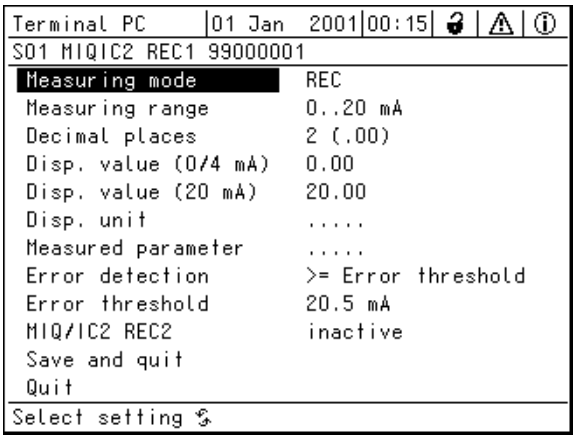


Fig. 4-6 140 - Settings of sensors and diff. sensors

6	Make the sensor settings with and confirm each of them with OK.
7	Select the *Save and quit* menu item with and confirm with OK. The new settings are stored in the sensor.

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

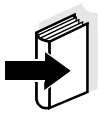
6.1 Maintenance

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



Note
General technical data on MIQ modules are given in the TECHNICAL DATA chapter of the IQ SENSOR NET system operating manual.

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

Instrument safety

Applicable norms	– EN 61010-1 – UL 3111-1 – CAN/CSA C22.2 No. 1010.1

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: Flexible wires:	0.2 ... 4.0 mm^2 AWG 24 ... 12 0.2 ... 2.5 mm^2
Line cross-section of cables carrying mains voltage	Europe: USA:	1.5 ... 4.0 mm^2 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 Contact Information

8.1 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

8.2 Service Information

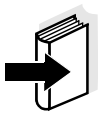
YSI has authorized service centers throughout the United States and Internationally. For the nearest service center information, please visit www.ysi.com and click ‘Support’ or contact YSI Technical Support directly at 800-897-4151.

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.

9 Lists

9.1 Explanation of the messages

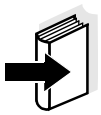
In this chapter you will find a list with all the message codes and corresponding message texts that may occur in the log book of the IQ SENSOR NET system for the MIQ/IC2 current input module.



Note
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.



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

9.1.1 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*
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*

Message code	Message text
ES1381	*Component hardware defective* ** Contact service*

9.1.2 Informative messages

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

9.2 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)

Note
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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