

MIQ/WL PS

MIQ/WL PS SET

MODULE (SET) FOR WIRELESS DATA TRANSMISSION IN THE IQ SENSOR NET



a xylem brand



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1 Overview

1.1 How to use this component operating manual

Structure of the IQ SENSORNET operating manual

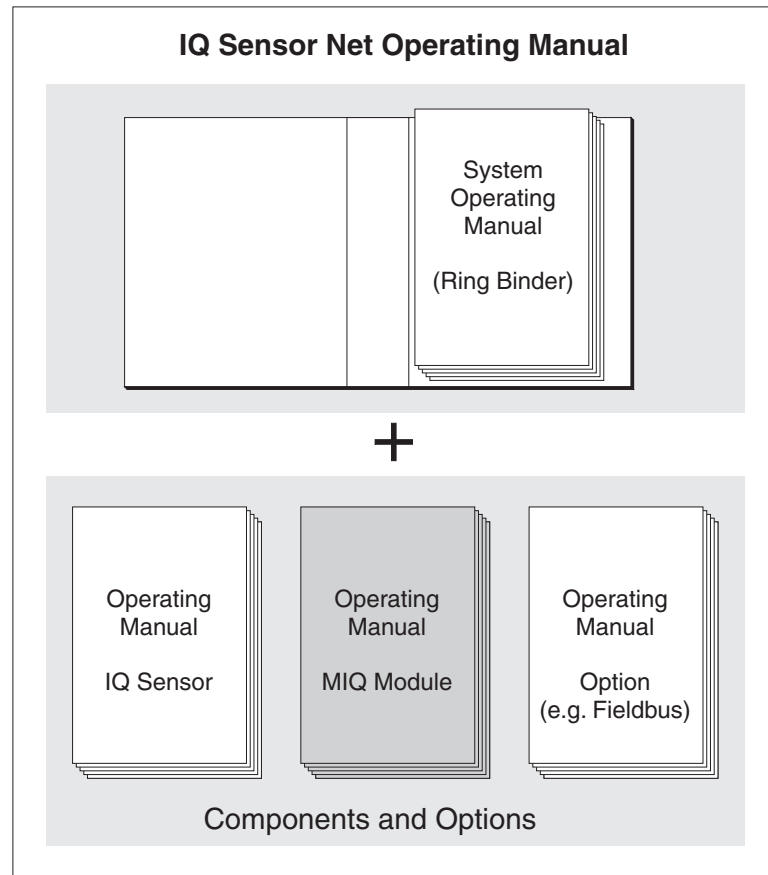


Fig. 1-1 Structure of the IQ SENSORNET operating manual.

The IQ SENSORNET operating manual has a modular structure like the IQ SENSORNET system 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 Characteristics of the MIQ/WL PS modules

1.2.1 General characteristics

With the aid of the MIQ/WL PS modules you can replace IQ SENSORNET line sections by radio links. If you use two MIQ/WL PS modules, a simple IQ SENSORNET radio network develops. The IQ SENSORNET is extended by an IQ SENSORNET island (Fig. 1-2).

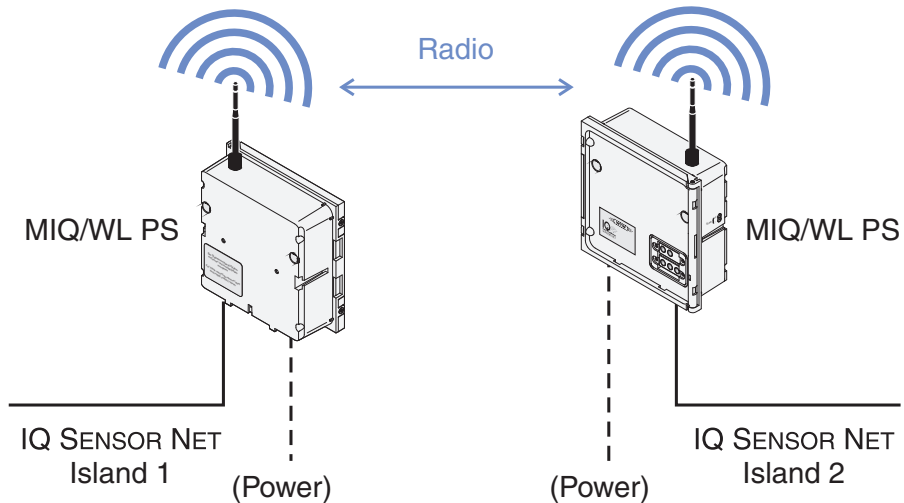


Fig. 1-2 Structure of a radio link with MIQ/WL PS modules



The MIQ/WL PS SET includes two MIQ/WL PS modules preconfigured for immediate use.

Radio network An existing radio network of MIQ/WL PS modules can very easily be extended by adding another MIQ/WL PS module. Thus another IQ SENSORNET island develops.

The maximum number of radio links within a radio network is limited by the spatial conditions (visual contact, minimum and maximum space between the MIQ/WL PS modules).

You can operate up to eight radio networks in the vicinity of each other.

Radio technology The antennas of the MIQ/WL PS modules are omni-antennas without directivity. The transmission is done in the 2.4 GHz ISM band with the frequency hopping procedure.

Power supply To supply an IQ SENSORNET island with power, a power supply unit is integrated in the MIQ/WL PS. It can supply components with a total power consumption of up to 7 watt, which is sufficient for most applications. The power supply unit of the MIQ/WL PS can be supplied with line power or with 24 V.

Additionally the power can also be supplied via the IQ SENSORNET with the aid of an MIQ/PS module.

Terminal strip The MIQ/WL PS has the following electrical connections on the terminal strip inside the enclosure:

- 1 x line power connection 100 ... 240 VAC, two-pole
- 1 x line power connection 24 VDC, two-pole
- 3 x SENSORNET connections

1.2.2 Application examples

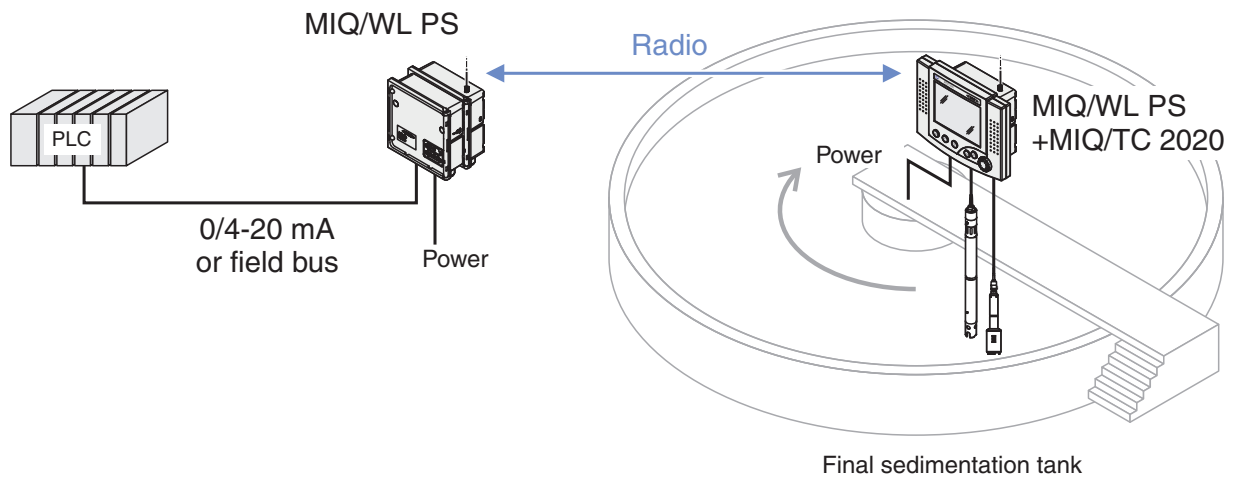


Fig. 1-3 Example 1: Basin with rotating scraper bridge

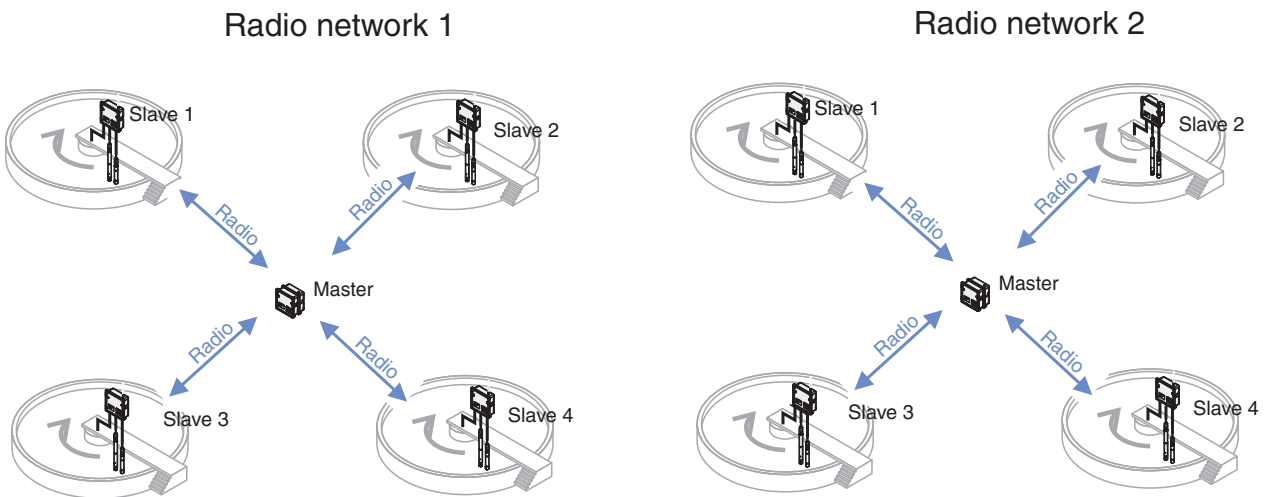


Fig. 1-4 Example 2: Star-shaped structure - controller in the center

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 danger level:

**WARNING**

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

**CAUTION**

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

NOTE

indicates a 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 SENSORNET system (power packs, controller, accessories)
- Safety datasheets of calibration and maintenance equipment (e.g. cleaning solutions).

2.2 Safe operation

2.2.1 Authorized use

Authorized use of the MIQ/WL PS is its use as a radio module with optional line power supply unit in the IQ SENSORNET. Only the operation according to the instructions and technical specifications given in this operating manual is authorized (see chapter 6 TECHNICAL DATA). Any other use is considered unauthorized.

2.2.2 Requirements for safe operation

Note the following points for safe operation:

- The product may only be operated according to the authorized use specified above.
- The product may only be supplied with power by the energy sources mentioned in this operating manual.
- The product may only be operated under the environmental conditions mentioned in this operating manual.
- The product may not be opened.

2.2.3 Unauthorized use

The product must not be put into operation if:

- it is visibly damaged (e.g. after being transported)
- it was stored under adverse conditions for a lengthy period of time (storing conditions, see chapter 6 TECHNICAL DATA).

2.3 User qualification

Target group	The IQ SENSORNET 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: <ul style="list-style-type: none">● Connection of the MIQ/WL PS to the power supply.● Connection of external, line voltage-carrying circuits to relay contacts (see module manual of the relay output module).

**WARNING**

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

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

3 Installation

3.1 Scope of delivery

The scope of delivery of the MIQ/WL PS module includes:

- MIQ/WL PS (in the set: 2 MIQ/WL PS)
- Accessory kit per module MIQ/WL PS, including
 - 4 x cable glands (clamping range 4.5-10 mm) with seals and blind plugs
 - 4 x ISO blind nuts M4 with suitable socket head screws and plain washers
 - 2 x countersunk screws M3x8 to close the module lid (+ 2 spare ones)
 - 1 x contact base with fixing screws
- Accessory kit, including
 - 1 x extension M16x1.5 to M20x1.5 with O-ring
 - 1 x cable gland black IP 68 or nut M20x1.5
- Operating manual.
- 3 x terminating resistor 100 ohm, 1 W

3.2 Basic principles of installation

3.2.1 Requirements of the measurement location

The measurement location must meet the environmental conditions specified in section 6.1 GENERAL DATA.

Controlled environmental conditions

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

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

3.3 Safety requirements of the electrical installation

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

- Compliance with national regulations (e.g. NEC, VDE and IEC)
- Suitability for the electrical conditions at the place of installation
 - Maximum operational voltage
 - Maximum operational current

- Suitability for the ambient conditions at the place of installation
 - Temperature resistance (minimum and maximum temperature)
 - Stability against UV light in the case of outdoor usage
 - Protection against water and dust (Nema or IP type of protection).
- Suitable fuse protection of the electrical circuit
 - Overcurrent protection devices (according to the technical data of the instrument input or output)
 - Overvoltage limitations of overvoltage category II
- Suitable external separator (e.g. switch or circuit-breaker) for the power supply of permanently installed instruments with separate power connection
 - compliant with the following regulations
 - IEC 60947-1
 - IEC 60947-3
 - in the vicinity of the instruments (recommendation)
- Flame resistant (cable and lines), compliant with the following regulations
 - UL 2556 VW-1 (for USA, Canada)
 - IEC 60332-1-2 (outside the USA, Canada)

3.4 Basic principles of installation

3.4.1 General information

The MIQ/WL PS radio modules in the MIQ/WL PS SET are preconfigured in pairs and ready for installation. Installation consists only of the connection to the IQ SENSORNET.



To prevent the radio transmission from being affected by water or snow collecting on the antenna, we urgently recommend protecting the MIQ/WL PS radio modules against precipitation with the aid of a plastic canopy (SSH/IQ).

3.4.2 Power supply

The line power supply unit of the MIQ/WL PS can be used for the exclusive supply of an IQ SENSORNET island. The line power supply unit of the MIQ/WL PS provides 7 watts. Thus it can be used to operate the following components, for example:

Component	Power requirement [W]
IFL [®] 700 IQ	3.0
MIQ/TC 2020 XT (docked temporarily)	3.0

For installations with greater power requirements, further MIQ power supply modules are required for the power supply (see system operating manual).

3.4.3 Topology and terminator switch

For failure-free operation, the terminator switches (terminating resistors) must always be set to ON on two MIQ modules of the IQ SENSORNET island. On which modules this is required results from the topology of the IQ SENSORNET island (for details see system operating manual of the IQ SENSORNET).

Additional terminating resistor on the MIQ/WL PS

An additional terminating resistor is only required if, except in the MIQ/WL PS, no other terminator switch is available on the IQ SENSORNET island. The terminating resistor is connected to one of the three SENSORNET connectors (Fig. 3-1). The terminating resistor must bridge the two outside terminals of the SENSORNET connector. The SENSORNET connector can still be used to connect a sensor.

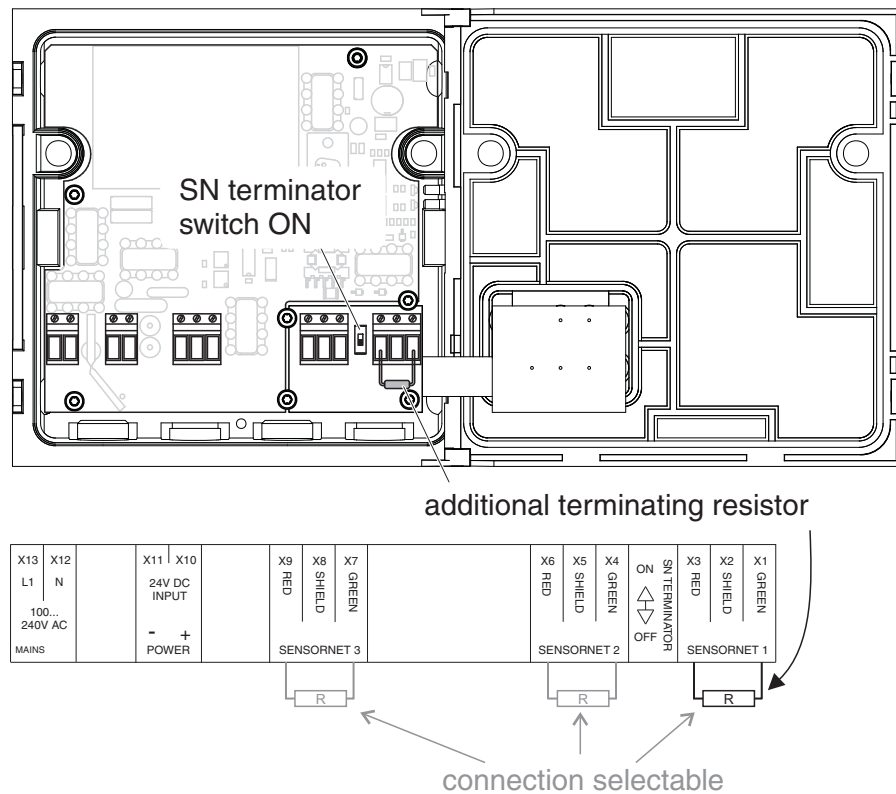


Fig. 3-1 MIQ/WL PS with additional terminating resistor

3.4.4 Configuration of the MIQ/WL PS modules

To enable wireless communication of the MIQ/WL PS modules, the MIQ/WL PS modules have to be configured to meet the following requirements:

- All MIQ/WL PS modules that should communicate with each other have to be in one radio network with the same radio network number. Radio network numbers from 1 to 8 can be configured.
- Within a radio network of a radio network number, exactly one MIQ/WL PS module has to be configured as the master. All other MIQ/WL PS modules have to be configured as slaves.



The MIQ/WL PS SET includes two MIQ/WL PS modules preconfigured for immediate use.

The radio network number 1 is preconfigured for both modules. One module is configured as master, one as slave. Thus both modules can immediately communicate with each other if they are installed correctly.

The number of MIQ/WL PS modules configured as slaves in a radio network is limited only by the spatial conditions.

If in the vicinity a second MIQ/WL PS module should be operated as master, it has to be operated as master in a radio network with a different radio network number.

The MIQ/WL PS module is configured with coding switches in the MIQ/WL PS module.

LEDs inside the MIQ/WL PS module indicate the current state of the module.

Encoding

- 1 If the MIQ/WL PS module is already in operation:
Set the IQ SENSORNET to a safe state as necessary.
- 2 Disconnect the MIQ/WL PS module from the power supply.
- 3 Open the enclosure.
- 4 Use a small, sharp object to set the coding switches on the radio PCB (coding table see below).

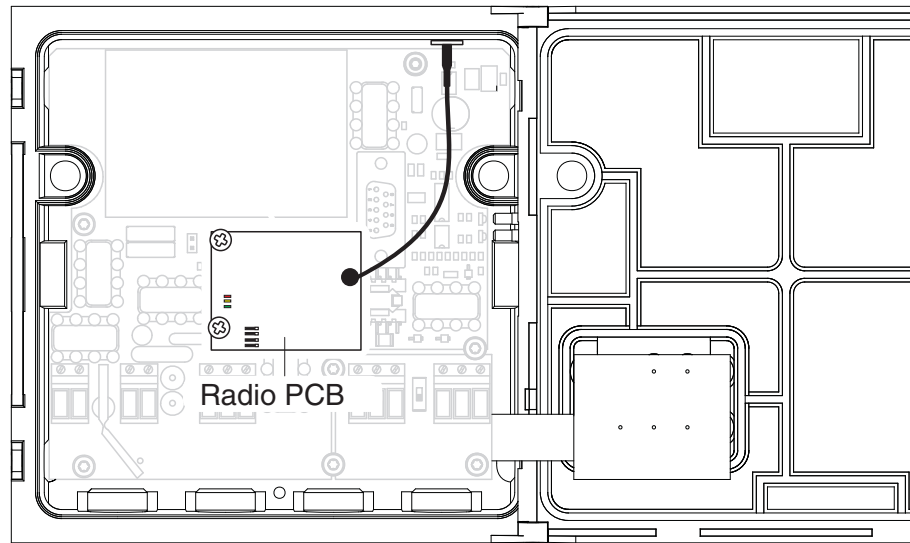


Fig. 3-2 Module with radio PCB

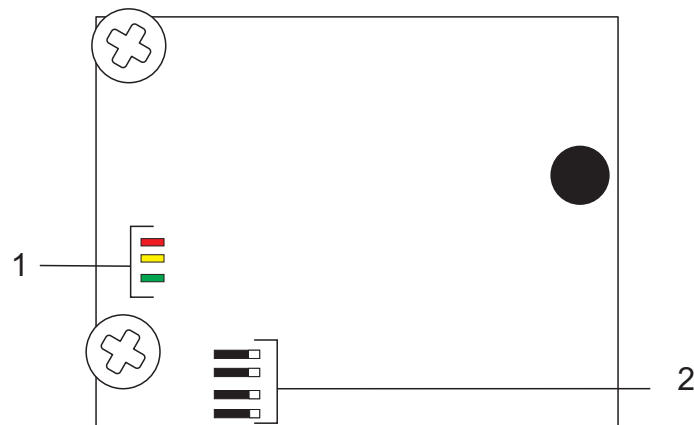


Fig. 3-3 Radio PCB with status LEDs (1) and coding switches (2)

Coding table The radio network number is determined with the three upper coding switches. The bottom coding switch configures the module as master or slave.

Radio network	Master	Slave	Radio network	Master	Slave
1			5		

Radio network	Master	Slave	Radio network	Master	Slave
2			6		
3			7		
4			8		

3.5 Radio range / installation instructions

System requirements of the IQ SENSORNET

For operation of a Terminal/Controller (MIQ/TC 2020 XT, MIQ/TC 2020 3G), configured as terminal, on an MIQ/WL PS module configured as slave:

- 1 On the Terminal/Controller, deactivate the function *Backup controller* (menu *Settings/Service/Deactivate backup controller function*)



If the menu item *Deactivate backup controller function* is not available, carry out a software update for the Terminal/Controller.

Position of master and slave

To be able to extend a radio network easily, it is useful to select the position of the master according to the following criteria:

- central and visible to all slaves
- in the vicinity of the IQ SENSORNET controller
- far away from other masters or interfering radio sources

Minimum and maximum distance of the MIQ/WL PS modules

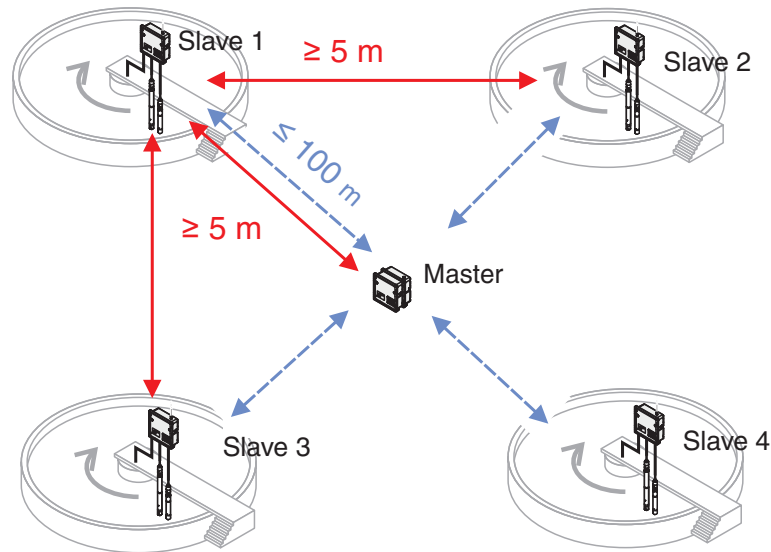


Fig. 3-4 Minimum distance of two MIQ/WL PS modules: 5 m
Maximum distance master - slave: 100 m
(during radio interferences the maximum distance possible is less)

Radio range

The range of a radio link with MIQ/WL PS SET in the free field is up to 100 m with installation and testing according to this chapter (see chapter 6 TECHNICAL DATA).

As with any other radio technology, the following points have to be observed when installing the MIQ/WL PS (SET):

- All materials (even window glass) in the radio link reduce the range. Therefore, keep the radio link free of barriers (even temporary ones). All MIQ/WL PS modules configured as slaves should have permanent "visual contact" through the air to the MIQ/WL PS module in their radio network configured as master. Take into account that there may be short-time events such as trucks driving by that interrupt the radio link.
- Water, snow and ice on the antenna will reduce the range. When it is installed in the free field, protect the MIQ/WL PS against water, snow and ice. Use the plastic canopy SSH/IQ for this. Canopies made out of metal or PVC reduce the range!
- A high location of the MIQ/WL PS modules increases the range. If necessary, install the MIQ/WL PS higher over ground.

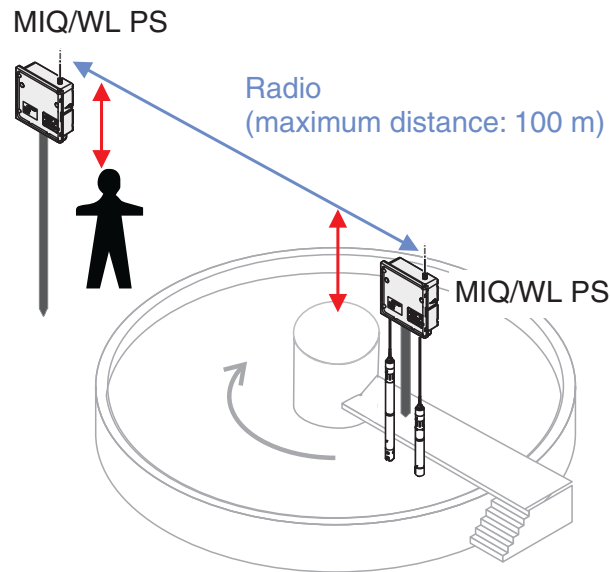


Fig. 3-5 Height of the location for the MIQ/WL PS module

- On a rotating bridge, install the MIQ/WL PS module as near to the center support as possible. Thus the change of the distance of the modules is kept to a minimum.
- Install the MIQ/WL PS modules where the mentioned requirements are met best and establish the connection to the IQ SENSORNET island.
- Mount the MIQ/WL PS module outside of a building on a pole and run the SNCIQ cable through the wall to the next MIQ module.

**Example:
IQ SENSORNET
island in a
building.**

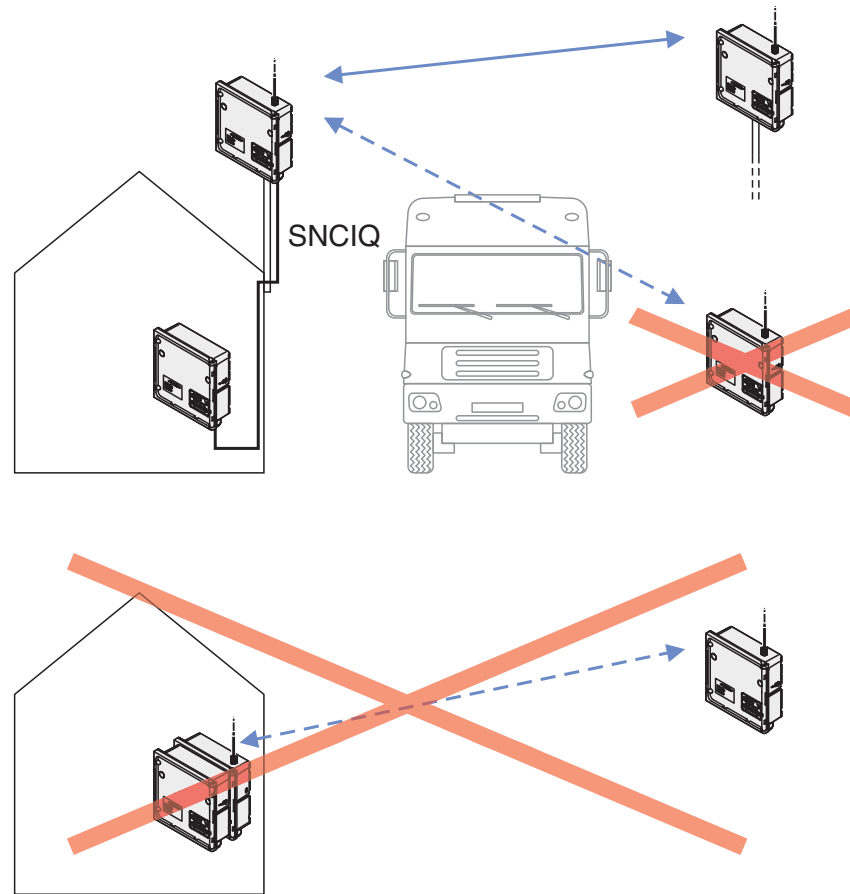


Fig. 3-6 InstallationMIQ/WL PS



When installing several radio links:

Note the configuration of the individual MIQ/WL PS modules as "master" or "slave" and which radio network 1 - 8 they belong to (see section 3.4.4).

Mount each MIQ/WL PS module with a minimum distance of 5 m to the next MIQ/WL PS module. This distance has to be kept independent of the configuration and usage of the MIQ/WL PS modules.

Radio link check list

For safe operation of a radio link, check the system with the following check list.

The following checklist supports you when planning, projecting and installing a radio link with the MIQ/WL PS radio modules.

For smooth operation, you should be able to answer all questions with "Yes".

Radio link check list:

- 1 Is the distance of all MIQ/WL PS modules at least 5 m at any time?
- 2 Is there direct visual contact between the antennas of both MIQ/WL PS modules at any time (e.g. with installation on moving scraper bridges)?
- 3 Is the radio link free from permanent disturbances? Examples:
 - Obstacles (such as buildings, windows, etc.)
 - Shielding (such as a metal or PVC canopy)
- 4 Is the radio link free from temporary disturbances? Examples:
 - Regular temporary disturbances (e.g. center support or mounting stand, with installation on a moving scraper bridge)
 - Irregular temporary disturbances (e.g. vehicles or persons crossing the radio link)
- 5 Was the signal quality checked (see section 5.1.1, *MIQ-WL Info*)?
- 6 Are the antennas of the MIQ/WL PS modules free of water, snow, ice?
- 7 When using a canopy:
Is the SSH/IQ plastic canopy used
(no metal or PVC canopy)?
- 8 With installation on a moving scraper bridge:
Was the signal quality checked for a complete rotation of the moving scraper bridge (see section 5.1.1, *MIQ-WL Info*)?



Interferences are possible also with short radio links if the radio signal is reflected by walls that are outside the direct radio link. Due to reflections, radio signals may reach the receiver alleviated. In this case, even changing the location of a MIQ/WL PS module only slightly can improve the transmission.

3.6 Installation in the IQ SENSORNET

The IQ SENSORNET provides a number of options for integrating the MIQ/WL PS mechanically and electrically in the system (stacked mounting, distributed mounting, etc.). The individual types of installation are described in detail in the INSTALLATION chapter of the system operating manual.



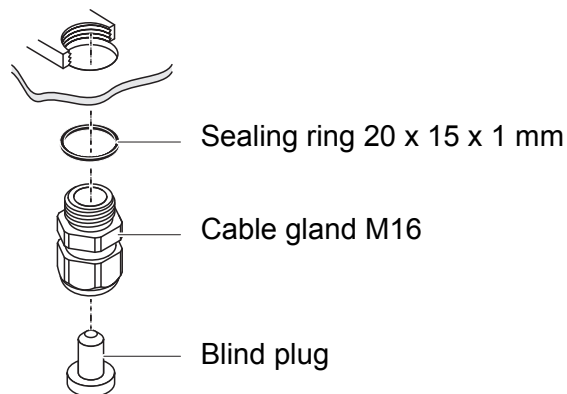
If there are several power supply modules in the IQ SENSORNET, it is helpful if all the power supply modules are connected to a single power supply. As a result, the system can be easily switched on and off from a single location.

3.7 Electrical connections: General instructions

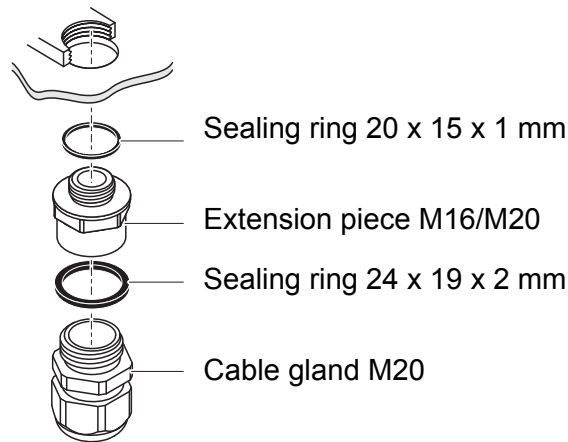
Cable glands

All electric cables are fed from below through prepared openings in the enclosure of the MIQ/WL PS. Cable glands with different clamping ranges are provided with the MIQ/WL PS to provide sealing between the cable and enclosure as well as for strain relief. Select the suitable 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.



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



If necessary, you can order additional large cable glands as a set of 4 pieces (model EW/1, order number 480 051).

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 enclosure must be cut off as closely as possible to the cable gland.
- In each of the remaining free openings, screw in a small cable gland with sealing ring and close them 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 SENSORNET. Always cut off any wires that are not in use as closely as possible to the cable gland.

3.8 Connecting the voltage supply

The following two sections need only be observed if the IQ SENSORNET island should be supplied with power by the MIQ/WL PS.

3.8.1 Connection to 100 ... 240 V AC



WARNING

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

- The MIQ/WL PS may only be connected by a trained electrician.
- The connection of the MIQ/WL PS to the power supply may only be carried out when it is not carrying any voltage.
- The power supply must fulfill the specifications given on the nameplate and in chapter 6 TECHNICAL DATA.
- When installed in a building, a switch or power switch must be provided as an interrupt facility for the MIQ/WL PS.
The interrupt facility must
 - be installed in the vicinity of the MIQ/WL PS, easily accessible by the user, and
 - be labeled as an interrupt facility for the MIQ/WL PS.
- After it has been installed, the MIQ/WL PS may only be opened if the line voltage has been switched off beforehand.

Materials required

- Wire end sleeves, suitable for the power line, with suitable crimping tool
- 1 x cable gland, suitable for the cable diameter (see section 3.7 on page 21).

Tools

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

Preparing the power cable

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

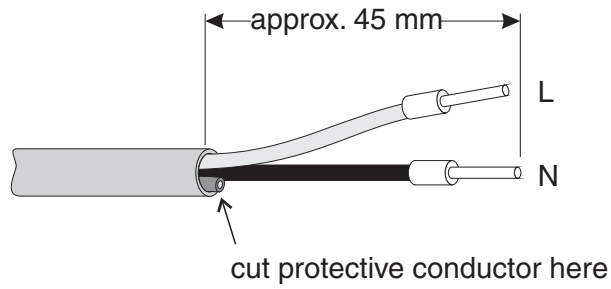


Fig. 3-7 Prepared power cable.

NOTE

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

Connecting the power line

- 5 Open the enclosure.

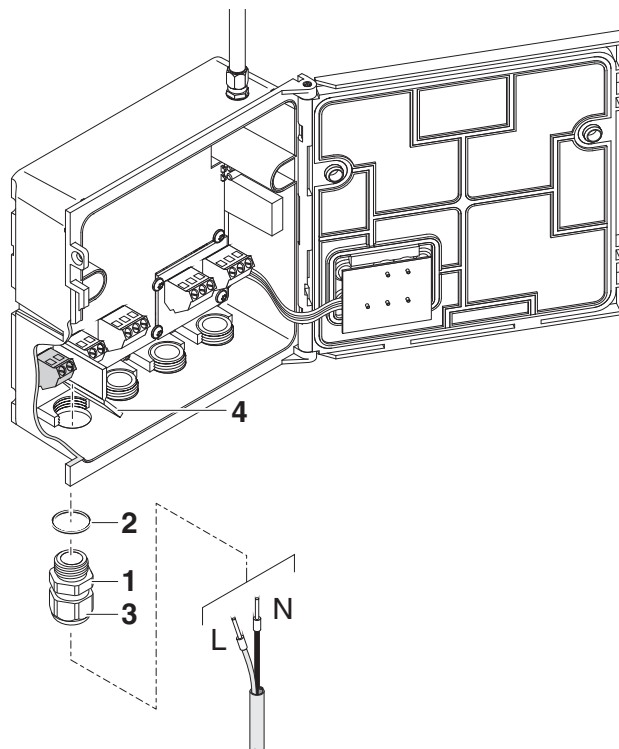


Fig. 3-8 Inserting the supply line.

- 6 Screw a cable gland (pos. 1 in Fig. 3-8) with sealing ring (pos. 2) into the enclosure below the power supply connection.
- 7 Loosen the coupling ring (pos. 3).

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

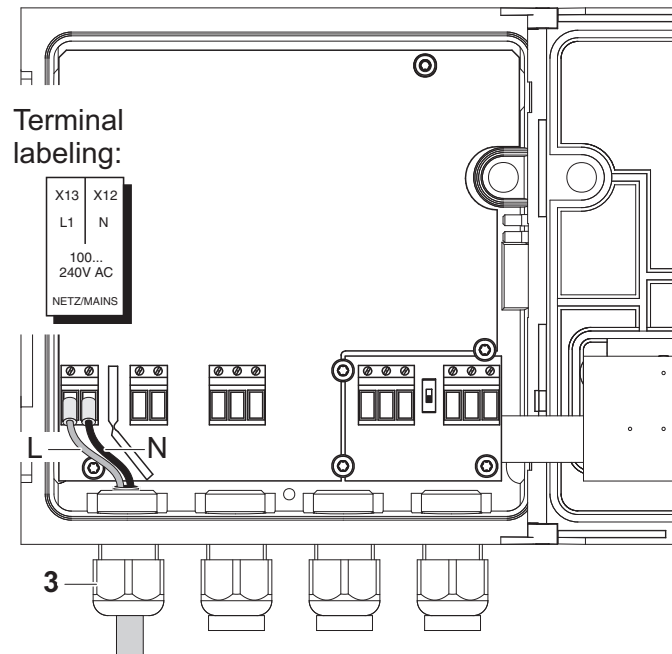


Fig. 3-9 Line power connection.



The complete assignment of the terminal strip is shown in section 3.9.

- 9 Connect phases L and N to the terminal strip. Make sure that the cable assignment agrees with the specification on the terminal label under the terminal strip.
- 10 Tighten the coupling ring (pos. 3).



WARNING

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

- 11 Close the enclosure.

3.8.2 Connection to 24 V DC



WARNING

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

- The MIQ/WL PS may only be connected by a trained electrician.
- The 24 V DC supply must meet the specifications quoted on the nameplate and in chapter 6 TECHNICAL DATA (protective low voltage SELV).
- The connection of the MIQ/WL PS to the power supply may only be carried out when it is not carrying any voltage.
- When installed in a building, a switch or power switch must be provided as an interrupt facility for the MIQ/WL PS.
 - The interrupt facility must
 - be installed in the vicinity of the MIQ/WL PS, easily accessible by the user, and
 - be labeled as an interrupt facility for the MIQ/WL PS.



Battery systems should be protected against total discharge. The MIQ/WL PS has no integrated deep discharge protection.

Materials required

- Wire end sleeves, suitable for the 24 V DC feed line, with suitable crimping tool
- 1 x cable gland, suitable for the cable diameter (see section 3.7 on page 21).

Tools

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

Preparing the 24 V DC line

- 1 Cut off the cable to the required length.
- 2 Strip the cable insulation for approx. 45 mm.
- 3 Bare the wires 1 and 2 and fit them with wire end sleeves.

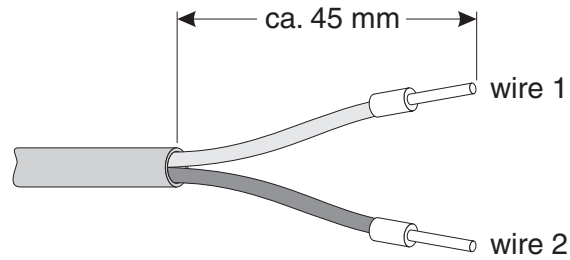


Fig. 3-10 Prepared 24 V DC line.

Connecting the 24 V DC line

- 4 Open the enclosure.

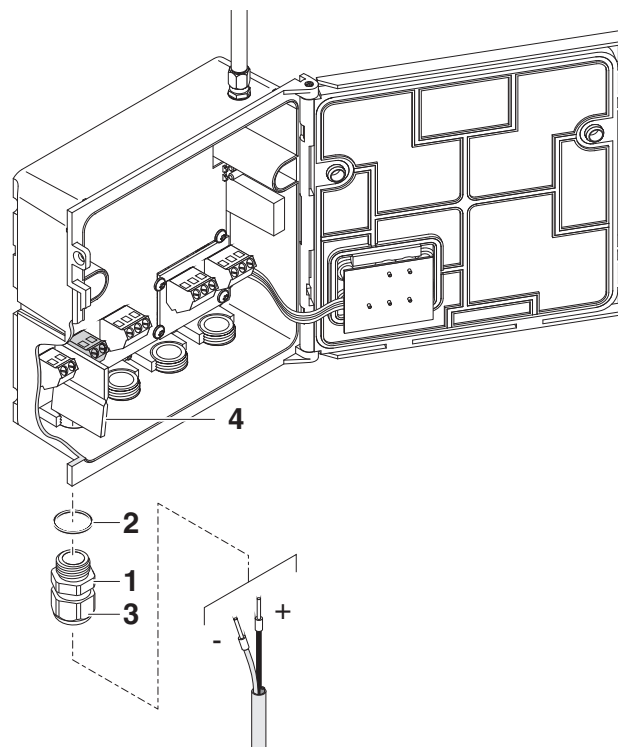


Fig. 3-11 Inserting the 24 V DC line.

- 5 Screw a cable gland (pos. 1 in Fig. 3-11) with sealing ring (pos. 2) into the enclosure below the 24 V DC connection.
- 6 Loosen the coupling ring (pos. 3).
- 7 Feed the 24 V DC line through the cable gland into the enclosure. When doing so bend the flexible divider (pos. 4) to the left.

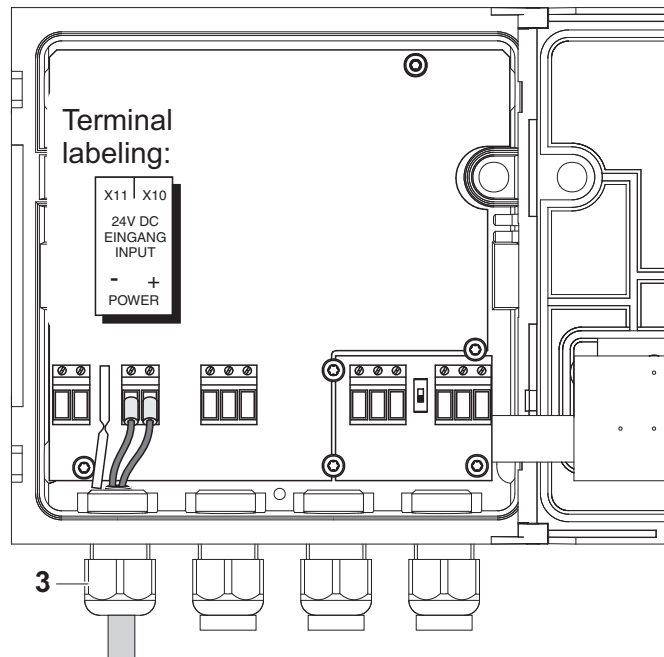


Fig. 3-12 Line power connection.



The complete assignment of the terminal strip is shown in section 3.9.

- 8 Connect wires 1 and 2 to the terminal strip. Make sure that the cable assignment agrees with the specification on the terminal label under the terminal strip.
- 9 Tighten the coupling ring (pos. 3).



WARNING

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

- 10 Close the enclosure.

3.9 Figure of the terminal strip

X13	X12		X11	X10		X9	X8	X7		X6	X5	X4	 SN TERMINATOR	X3	X2	X1
L1	N		24V DC			RED	SHIELD	GREEN		RED	SHIELD	GREEN		RED	SHIELD	GREEN
100... 240V AC			INPUT			SENSORNET 3				SENSORNET 2				SENSORNET 1		
NETZ/MAINS			-	+												
			POWER													

Fig. 3-13 MIQ/WL PS terminal strip

4 Maintenance and cleaning

4.1 Maintenance

The MIQ/WL PS requires no special maintenance. The general maintenance of IQ SENSORNET components is described in the IQ SENSORNET system operating manual.

4.2 Cleaning

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

5 What to do if ...

5.1 Checking the radio connection

5.1.1 Information on MIQ/WL PS modules

In the menu *Einstellungen/Settings / Service / Tools / MIQ-WL Info* you will find more information on the radio links of your IQ SENSORNET.

- 1 Open the menu *Einstellungen/Settings / Service / Tools / MIQ-WL Info*. The list of MIQ/WL PS modules opens up.

TERMINAL	07 Juli 2015	11 39			
MIQ/WL PS Info					v1.03
Serial	Signal strength	Error rate			
99800900 (ID5)	MASTER				
99800800 (ID5)	57 %	0.1 %			
99800300 (ID5)	52 %	0.3 %			
99800600 (ID5)	55 %	0.3 %			
Select module with <UP>/<DOWN> and press <OK> for history diagrams. Press <ESC> to quit.					

Fig. 5-1 List of MIQ/WL PS modules

Information of MIQ-WL Info

Information	Explanation
<ul style="list-style-type: none"> ● List of all MIQ/WL PS modules <ul style="list-style-type: none"> – Series number – Configuration (MASTER / slave) – Radio network number (ID1 ... 8) 	Identification and configuration of the MIQ/WL PS modules on the IQ SENSORNET. Master modules are labeled as <i>MASTER</i> Slave modules are given numbers for signal strength and error rate.
<ul style="list-style-type: none"> ● Signal strength of the radio connection between master and slave (<i>Signal strength [%]</i>) 	This value should be between 30 and 90 for a good radio connection. In the relevant diagram any repeated interferences can be clearly seen.

Information

- Frequency of communication interruptions (*Error rate [%]*)

Explanation

This value should be lower than 10 for a good radio connection. In the relevant diagram any interferences caused by other radio networks can be clearly seen.

Opening the diagram

- 1 In the list of MIQ/WL PS modules:
Using <▲ ><▼ >, select a MIQ/WL PS module (slave).
- 2 Confirm the selection with <OK>.
The relevant diagram is opened.

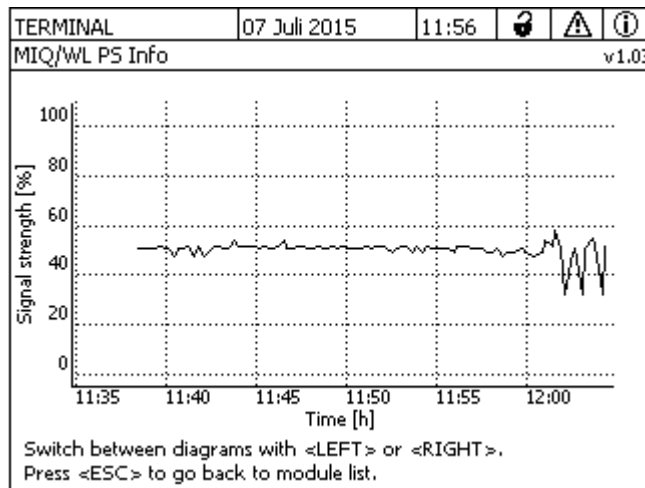


Fig. 5-2 Diagram: Signal strength

- 3 Using <◀ ><▶ >, select the diagram *Signal strength* or *Error rate*.
- 4 Leave the diagram with <ESC>.
The list of MIQ/WL PS modules is opened.

5.1.2 Status LEDs in the module MIQ/WL PS

The status of the radio contact is displayed with three LEDs inside the MIQ/WL PS modules:

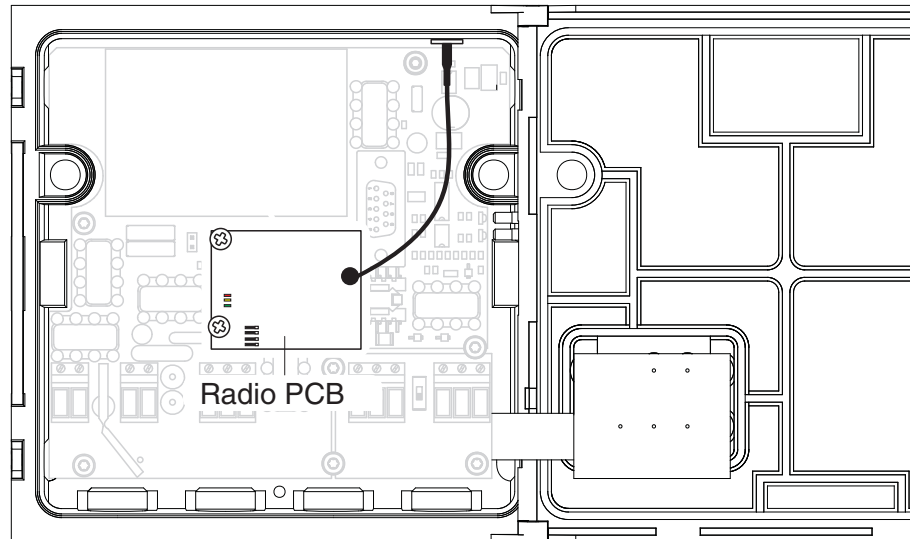


Fig. 5-3 MIQ/WL PS module with radio PCB

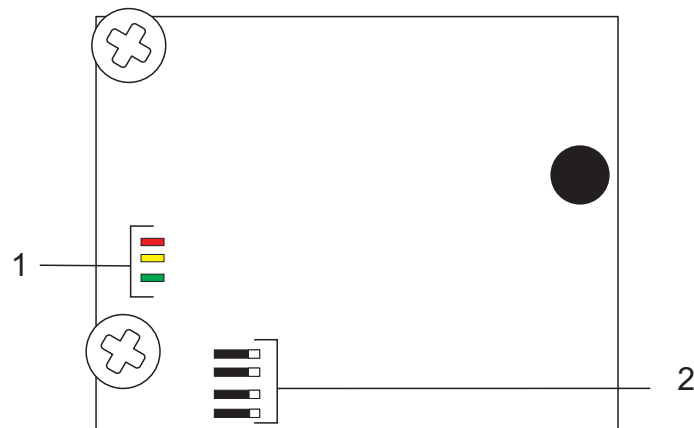


Fig. 5-4 Radio PCB with status LEDs (1) and coding switches (2)

Meaning of the status LEDs

LED	Status	Connection status
Red	Illuminated	No connection to master (only slave)
Yellow	Illuminated	Data are received via radio
Green	Illuminated	Data are transmitted via radio
Red, yellow, green	Flashing alternately	No radio contact

5.2 Error causes and remedies

Red LED in the module illuminated or flashing	Cause	Remedy
	Radio contact disturbed	Check the installation of the radio link with the aid of the checklist
Already established radio connection does no longer work	Cause	Remedy
	Obstacle in the radio link	Remove the obstacle
	Range at the limit	See RANGE INSUFFICIENT
	Moisture on antenna surface	<ul style="list-style-type: none"> – Wipe the antenna dry – Remove the snow – Use a canopy
Range insufficient	Cause	Remedy
	Obstacle in the radio link	<ul style="list-style-type: none"> – Remove the obstacle – Mount the MIQ/WL PS module in a higher position (e.g. on a pole) – Make sure there is "visual contact" between the MIQ/WL PS modules
	Weak radio signal, e.g. due to reflections of buildings	Change the position of the MIQ/WL PS (e.g. shift it)
	MIQ/WL PS too close to the ground	Mount the MIQ/WL PS in a higher position (e.g. on a pole)
	Shielding by metal canopy	Use plastic canopy SSH/IQ
Interferences in the IQ SENSORNET	Cause	Remedy
	A Terminal/Controller (MIQ/TC 2020 XT, MIQ/TC 2020 3G) connected to an MIQ/WL PS slave temporarily works as a backup controller (e.g. when the radio connection is unstable)	On the Terminal/Controller, deactivate the function <i>Backup controller</i> (menu <i>Einstellungen/Settings/Service/Deactivate backup controller function</i>)



If the menu item *Deactivate backup controller function* is not available, carry out a software update for the Terminal/Controller MIQ/TC 2020 XT.

6 Technical data

6.1 General data

Dimensions

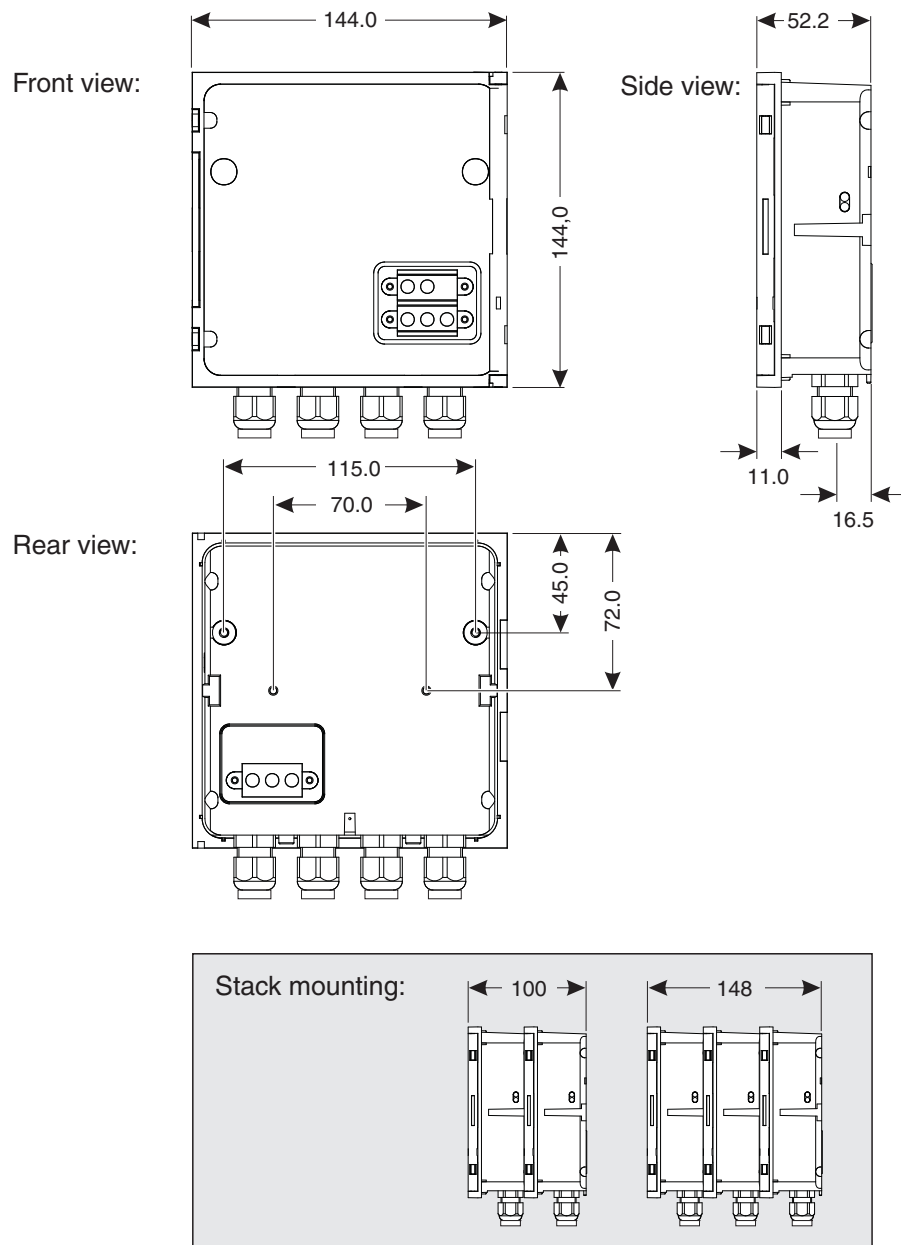


Fig. 6-1 Dimension drawing of MIQ module (dimensions in mm)

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 67 (not suitable for direct 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	<ul style="list-style-type: none"> - EN 61010-1 - UL 61010-1 - CAN/CSA C22.2#61010-1
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 A
	System lightning protection	Noticeably extended qualitative and quantitative protective characteristics as opposed to EN 61326

	FCC, class A	
Radio transmission	Radio frequency	2.4 GHz ISM band
	Maximum distance of 2 MIQ/WL PS modules	max. 100 m (328 ft) The specified maximum range applies if the radio link was installed and tested according to this operating manual (see section 3.5).
	Minimum distance of 2 MIQ/WL PS modules	5 m
	Guidelines and norms used	<ul style="list-style-type: none"> – EU directive 2014/53/EU (Radio Equipment Directive (RED)) – EN 300 328

6.2 MIQ/WL PS

6.3 Electrical data

Power supply via the IQ SENSORNET	Nominal voltage	Max. 24 V DC via the IQ SENSORNET (for details, see chapter TECHNICAL DATA of the IQ SENSORNET system operating manual).
	Power consumption	0.6 W

Operation with internal line power supply unit (100 ... 240 V AC)	Supply	<p>Nominal voltage: 100 ... 240 V AC ± 10 %</p> <p>Frequency: 50/60 Hz according to DIN IEC 60038</p> <p>Line power connection: 2 pin, N and L</p> <p>Line cross-section of mains connection: Europe: 1.5 ... 4.0 mm² USA: AWG 14 ... 12</p> <p>Fuse rating on the operator side: max. 16 A</p>
	Power consumption	Approx. 12 W

Output voltage	Max. 24 VDC via the IQ SENSORNET (for details, see chapter TECHNICAL DATA of the IQ SENSORNET system operating manual).	
Power output	<p>Up to 47 °C (117 °F) ambient temperature 7 W; over 47 °C (117 °F) the power output is reduced linearly to 4.4 W at 55 °C (131 °F):</p> <p>Power output [W]</p> <p>Ambient temperature [°C]</p> <p>Admissible ambient temperature -20 ... +55 °C</p>	
Protective class	II	
Overvoltage category	II	
Operation with external line power supply unit (24 V DC)	Supply	<p>Input: 23 ... 26.5 V DC / max. 1 A protective low voltage SELV (Safety Extra Low Voltage)</p> <p>Ripple: < 5 %</p> <p>Connection: 2 pin</p> <p>Line cross-section of connections: Europe: 1.5 ... 4.0 mm² USA: AWG 14 ... 12</p> <p>Fuse rating on the operator side: max. 16 A</p>
	Power consumption	Max. 24 W
	Output voltage	Max. 24 VDC via the IQ SENSORNET (for details, see chapter TECHNICAL DATA of the IQ SENSORNET system operating manual).
	Power output	Max. 24 W

6.3.1 Electrical connections

Terminal strip inside the enclosure

X13	X12		X11	X10		X9	X8	X7		X6	X5	X4	ON	S/	X3	X2	X1
L1	N		24V DC	EINGANG		RED	SHIELD	GREEN		RED	SHIELD	GREEN	IN	TERMINATOR	RED	SHIELD	GREEN
			INPUT			ROT	SCHIRM	GRÜN		ROT	SCHIRM	GRÜN	△		ROT	SCHIRM	GRÜN
			-	+									OFF	AUS			
NETZ/MAINS			POWER				SENSORNET 3										SENSORNET 1

Connecting terminals

Terminal type	Screw-type terminal strip, accessible by opening the lid	
Terminal ranges	Solid wires:	0.2 ... 4.0 mm ² AWG 24 ... 12
	Flexible wires:	0.2 ... 2.5 mm ²

Cable glands

Suitable for cable diameter	4.5 ... 10 mm or 7 ... 13 mm
-----------------------------	------------------------------

7 FCC / IC

7.1 General information

Antenna	Antenna used for	No.
	IC	20401-MIQWLPS001
	FCC ID	2AFB2-MIQWLPS001

Antenna Type	Type designation	Manufacturer	Antenna Gain	Connector
Halfwave dipole	WLAN/WiFi antenna omnidirectional WiMo Type 17010.10REV	Pro-cell Co., Ltd Taiwan	2.5 dBi	SMA

Other antennas are not allowed!

Installation This device must be fixed installed to provide sufficient space to humans to meet the RF exposure limits.

To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification.

It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States.

The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

7.2 IC Compliance Notice

IC Compliance Notice

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Compliance level CAN ICES-3 (B) / NMB-3 (B)

7.3 FCC Compliance Statement

FCC Compliance Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Section 15.21 Information to user

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Section 15.105 (b)

Note: This equipment has been tested and found to comply with the Limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television Reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the re-ceiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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: info@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.

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- 2) a leading global water technology company.

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