MCR Series

TRANSMITTERS

Instruction Manual

PreSens
PRECISION SENSING

MCR Series

Specification:

MCR Multiparameter / Multi-Channel Readers for Oxygen, pH and CO_2 Monitoring

Software:

PreSens Measurement Studio (PMS2)

Document filename: IM_MCR_dv1

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1 Preface

You have chosen a new, innovative technology for measuring oxygen, pH and CO_2.

The MCR series devices are compact fiber optic meters. They are based on a novel technology, which creates very stable, internally referenced measured values. This allows a more flexible use of oxygen sensors in various fields of interest.

Optical oxygen, pH & CO_2 sensors (also called optrodes) have several important features:

- They are small.
- Their signal does not depend on the flow rate of the sample.
- They can be physically divided from the measuring system which allows a non-invasive measurement.
- They can be used in disposables.

Therefore, they are ideally suited for the examination of small sample volumes, for highly parallelized measurements in disposables, and for biotechnological applications. A set of different oxygen, pH & CO_2 minisensors, flow-through cells and non-invasive sensors is available to make sure you have the sensor which matches your application.
Please feel free to contact our service team to find the best solution for your application.

Your PreSens Team

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE WORKING WITH THIS DEVICE. WHEN DISREGARDING THESE INSTRUCTIONS, THE SAFETY OF THE DEVICE CAN BE IMPAIRED.

2 Intended Use

The MCR series devices are USB powered multichannel desktop meters for indoor use and wired O_2, pH, CO_2, and temperature measurements. The devices are designed for end users in the academic field, as well as for use in research and development. For pH and CO_2 measurements only aqueous solutions with sufficient ionic strength (> 50 mM) and buffer capacity (> 2 mM) can be used as medium. Measurements in liquid and gas are only possible with the oxygen channel. The meters are operated via a commercially available laptop or PC with Windows and the PreSens Measurement Studio software. The instruments are only to be operated with PreSens sensors with SMA connectors and sensor types PSt3 for O_2, HP5/8 or LG1 for pH and CD1 for CO_2 measurement. The use of other sensors is explicitly excluded.

For best accuracy and resolution, calibration of the sensors by the customer is recommended:

- For O_2 a two-point calibration in oxygen-free environment (nitrogen, sodium sulfite) and air-saturated environment should be performed.
- For pH a minimum 5-point calibration with pH buffer of similar ionic strength and buffer capacity of the measurement medium should be performed which includes the pH range of interest (see sensor instruction manual chapter ‘Calibration’).
- For CO_2 a minimum 5-point calibration should be performed with a gas mixing unit which includes the CO_2 range to be measured (see sensor instruction manual chapter ‘Calibration’).

If a calibration with multiple calibration points is not possible, a single point adjustment of the supplied pre-calibration (see FIP) is recommended (see sensor and software instruction manual chapter ‘One-Point Adjustment’).

Intended application fields for this device are biology, medical science & pharma (basic research only!), and food technology, more specifically in the following areas:

- Animal & plant physiology
- Basic research (cell culture, microfluidics, etc.)
- Biotech (pharma, fermenters, bioreactors, etc.)
- Liquid analysis (physiology, sea water, wastewater, beverages, etc.)
- Environmental sciences (sediments, soils, etc.)

3 Safety Notes

! It is the customer's responsibility to validate the sensor and transmitter under end-user conditions according to safety precautions of the application to ensure that the use of the sensor is safe and suitable for the intended purpose.

! Any medical use on humans is categorically excluded! The device and its sensors must not be used for diagnostic or therapeutic purposes on humans or for clinical decision making. This also prohibits the use of the device on non-human samples or experiments which would have direct diagnostic or therapeutic consequences on humans or for clinical studies.

Basic research on non-human samples is not affected.

! Control of the device is only permitted via the PreSens Measurement Studio software. The manufacturer accepts no liability for control via other means.

! Process monitoring in industrial plants is explicitly excluded. This also includes the control and monitoring of food and its manufacturing processes. OEM / EOM use as well as use of the MCRCO outside of the housing is not permitted.

! Monitoring of critical safety processes, such as monitoring of room air or breathing air, with the device is also prohibited.

! Monitoring critical safety processes with the device is prohibited.

! The device is not suitable for temperature regulation or temperature control.

! Use of the device and its sensors in connection with medium and high voltage (> 1000 volts), high pressure (> 100 bar) as well as use in potentially explosive atmospheres (e.g. ATEX 2014/34/EU as well as 1999/92/EC) is excluded.

! The manufacturer accepts no liability for the operation of the device with strong ionizing radiation (see radiation protection ordinance) as well as radioactive radiation (X-ray ordinance and similar).

! Use in biological safety laboratories of level 3 & 4 (S3, S4 as well as BSL-3, BSL-4), with assured exposure to toxic substances, as well as strong ionizing radiation (radiation protection ordinance and X-ray ordinance) is categorically excluded for **devices RENTED from PreSens Precision Sensing GmbH**.

PreSens is explicitly not liable for direct or indirect losses caused by the application of these measurement systems. In particular it has to be considered that malfunctions can occur due to the naturally limited lifetime of the sensor depending on the respective application. The set-up of backup measurement stations is recommended when using the sensors in critical applications to avoid consequential losses. It is the customer's responsibility to install a suitable safety system in the event of sensor failure.

4 Description of the MCR Series Devices

Fig. 1 MCR-O1P1C1 and MCR-O2P1C1

The MCR series are compact multi-channel meters for indoor use which have channels for oxygen (0 – 100 % O_2), pH (5.5 – 8.5 pH) and CO_2 (1 – 25 % CO_2) as required. They are compatible with non-invasive sensors, dipping probes and flow-through cells and can be used in multiple applications, like benchtop bioreactor monitoring, respirometry or microfluidics. Each channel has separate temperature compensation, so most precise measurements in environments with changing temperatures can be taken. The meters are USB-powered and operated with the PreSens Measurement Studio 2 software, which enables simultaneous control of several devices, so measurement networks can be set-up. With numerous features and additional pressure and salinity compensation, the software makes the MCR series devices applicable in almost any application.

! Several single- and multichannel PreSens devices can be connected to the PreSens Measurement Studio 2 software.

MCR series features:

- Parallel O_2, pH & CO_2 monitoring with one device
- Individual temperature compensation for each channel
- Pressure & salinity compensation
- For use with non-invasive sensors, dipping probes & flow-through cells

5 Set-Up

4.1 Connecting MCR Series Devices

1. Remove the protective cap from the male plug on the polymer optical fiber (or the probe) and insert it in the SMA connector of the MCR device. The safety nut must be screwed on.

Fig. 1 Connecting the SMA plug to the connector on an MCR-O2P1C1

For further information on sensor handling and calibration please refer to the respective sensor instruction manual.

2. Connect the USB cable to the connector on the MCR and to an USB port of your PC / notebook.

Fig. 2 Connecting the USB cable

3. If required, you can now connect (a) Pt100 temperature sensor(s) to the device. There is a red mark on the temperature sensor plug; the red mark on the temperature sensor plug must point downward. Turn the plug, so the red mark points down and carefully insert it into the connector on the MCR.

Fig. 4 Connecting the temperature sensor to an MCR-O2P1C1

4. Now start the PreSens Measurement Studio (PMS2) software on your PC / notebook. (The MCR always must be connected via USB before the software is started.) After successful initialization the software main screen is displayed and the MCR will show in the **Device** section.

   For further details on how to use the PreSens Measurement Studio please refer to the software instruction manual.

4.2 Troubleshooting for USB Handling

If multiple MCRs and / or single-channel devices are connected to one PC, and not all devices are visible in the PreSens Measurement Studio 2 Devices section, please consider making the following changes:

- PreSens recommends the use of a dedicated USB 2.0 PCI Card to connect and handle USB PreSens Devices with a Desktop PC.
- In order to enhance the system stability, avoid the use of USB hubs and connect PreSens Devices directly to your PC / notebook USB Ports.
- If possible, disconnect all other USB devices that are not in use, as they may reduce or disturb the USB resources of your PC / notebook.
- Docking stations may also reduce or disturb the USB resources of your PC / notebook and therefore affect the correct function of the software.
- It is also recommended to disable the Power Saving Settings of your USB Root controller.

6 Technical Data

Tab. 1 Sensor specifications

OPTICAL SENSOR		
Sensor	O_2: pH: CO_2:	PSt3 HP5 or LG1 CD1
Optical connector	SMA	
Channels	Up to 4; up to 10 MCRs or single-channel devices can be controlled simultaneously via PMS2 software	
LED peak wavelength	O_2: pH: CO_2:	505 nm 470 nm 470 nm

Tab. 2 Temperature sensor specifications

TEMPERATURE SENSOR		
Potentiometric temperature sensor (Pt100)	Range Resolution	0 – 50 °C ± 0.1 °C

Tab. 3 Power supply specifications

POWER SUPPLY	
Supply voltage	5 VDC (USB-2.0-Mini-B, cable included)
Current / Power	400 mA

Tab. 4 Digital interface specifications

DIGITAL INTERFACE	
	USB interface cable to PC (cable included)

Tab. 5 Environmental conditions

ENVIRONMENTAL CONDITIONS	
Operating temperature	0 °C to + 50 °C
Storage temperature	- 20 °C to +70 °C
Relative humidity	0 % to 80 % (non-condensing)
Protection class	No IP protection class

Tab. 6 Device dimensions & weight

DIMENSIONS / WEIGHT	
W x L x H	ca. 164 mm x 80 mm (with SMA connectors) x 50 mm
Weight	430 g

Tab. 7 Device labelling

DEVICE LABELLING (Example)
PreSens PRECISION SENSING PreSens Precision Sensing GmbH Germany, Regensburg www.presens.de Type: MCR-O1/P1/C1/T3 S/N: SAGP000100001 Rating 5V ⎓ / 500mA CE MADE IN GERMANY

7 Operational Notes

6.1 Optical Output

The SMA connector is a high precision optical component. Please keep it clean and dry. Always use the rubber cap to close the output when not in use.

6.2 Maintenance

The transmitter is maintenance-free.
The housing should be cleaned with cloth only. Avoid any moisture entering the housing. Never use benzine, acetone, alcohol, or any other organic solvents.
The SMA fiber connector of the sensor can be cleaned with lint-free cloth or a cleaning implement for SMA connectors only.

6.3 Service

Alignment, rework or repair work may only be carried out by the manufacturer:

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Please contact our service team in case of any questions. We look forward to helping you and are open to any proposition or criticism.

8 Concluding Remarks

Dear Customer,

With this manual, we hope to provide you with an introduction to work with the MCR series fiber optic multiparameter meters.

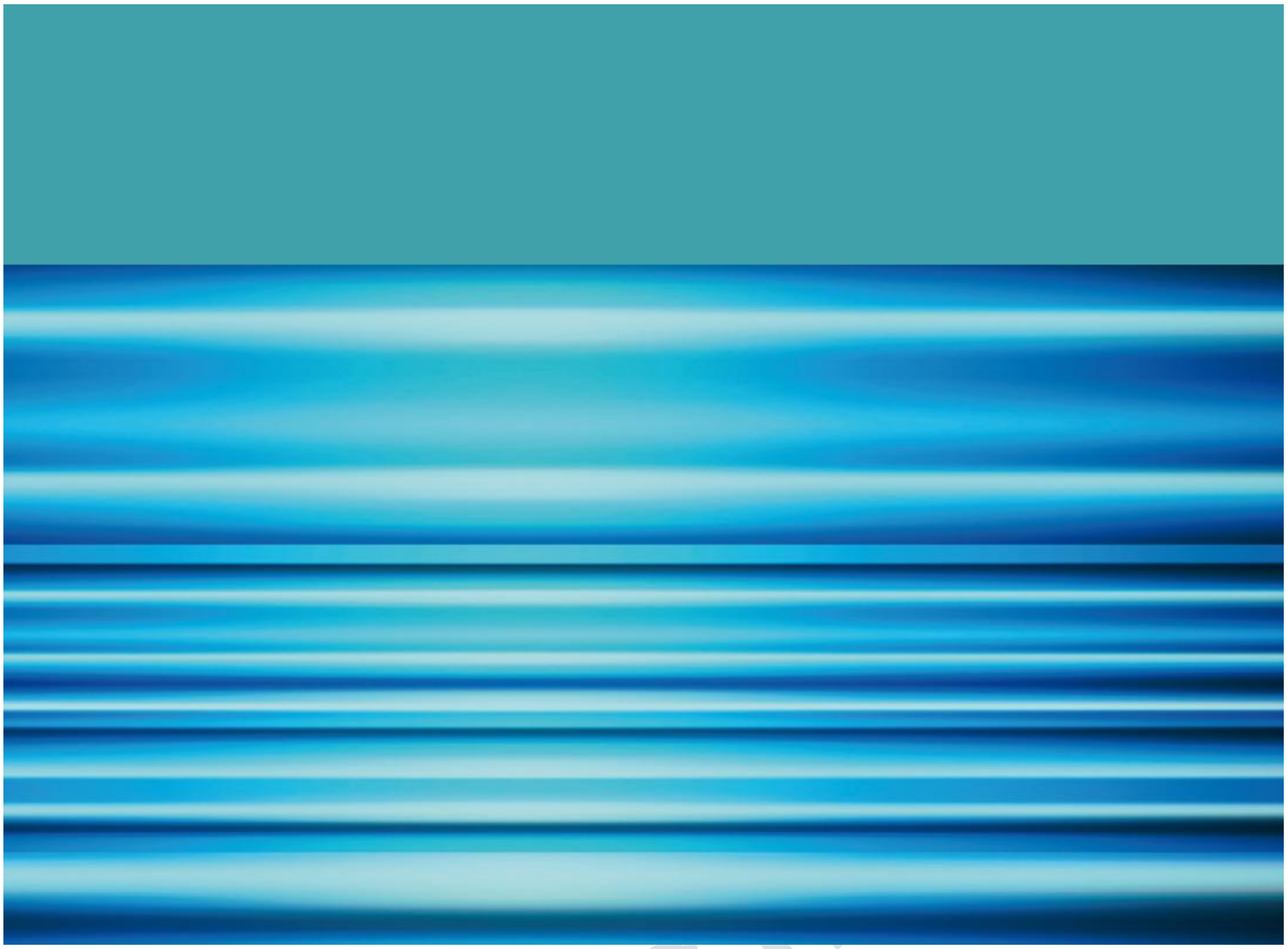
This manual does not claim to be complete. We are endeavored to improve and supplement this version.

We are looking forward to your critical review and to any suggestions you may have.

You can find the latest version at www.PreSens.de.

With best regards,

Your PreSens Team



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