pH SensorPlug SPL-ML-HP5

SENSOR PROBES

Instruction Manual

PreSens
PRECISION SENSING

pH SensorPlug SPL-ML-HP5

Specification:

SensorPlug based on Mini Luer for pH monitoring in milli- & microfluidics

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Specifications may change without prior notice.

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1 Preface

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

Chemical optical sensors (also called optodes) 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 minisensors, flow-through cells and integrated sensor systems 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 ITEM.

2 Description of the pH SensorPlug

The SensorPlug for pH is based on a color coded Mini Luer (red = pH) which is carrying a sensor spot of about 2 mm on the tip. The SensorPlug is inserted in an appropriate port on your chip so the spot is in contact with your sample inside the channel (please contact our service team for design details). The channel diameter has to be at least 2 mm at this position so the complete spot is in contact with the sample. When inserted, the SensorPlug is sealing the port and the tip carrying the sensor is slightly protruding into the channel. A polymer fiber connects the SensorPlug to the respective measurement device (e.g. pH-1SMA HP5). SensorPlugs come pre-calibrated and beta irradiated.

Fig. 1 pH SensorPlug SPL-ML-HP5

2.1 Scope of Delivery

The SPL-ML-HP5 are double-packed. They are delivered in unit of 10 plugs in a transparent plastic box (to enable unpacking of irradiated SensorPlugs in cleanroom environment) which is again packed in a lightproof packaging (to protect the sensor material).

Fig. 2 Packed pH SensorPlugs. The respective polymer optical fiber has to be ordered separately.

Additionally required equipment (not supplied):

- Polymer optical fiber (POF) with ST connector on one side, and an uncovered ending with polymer sleeve, length 2.5 m (for other lengths, please contact our service team)
- SMA-ST Adapter
- Fiber optic pH transmitter, pH-1 SMA HP5
- PC / Notebook
- Microfluidic chip with an appropriate port

2.2 Measurement Set-up

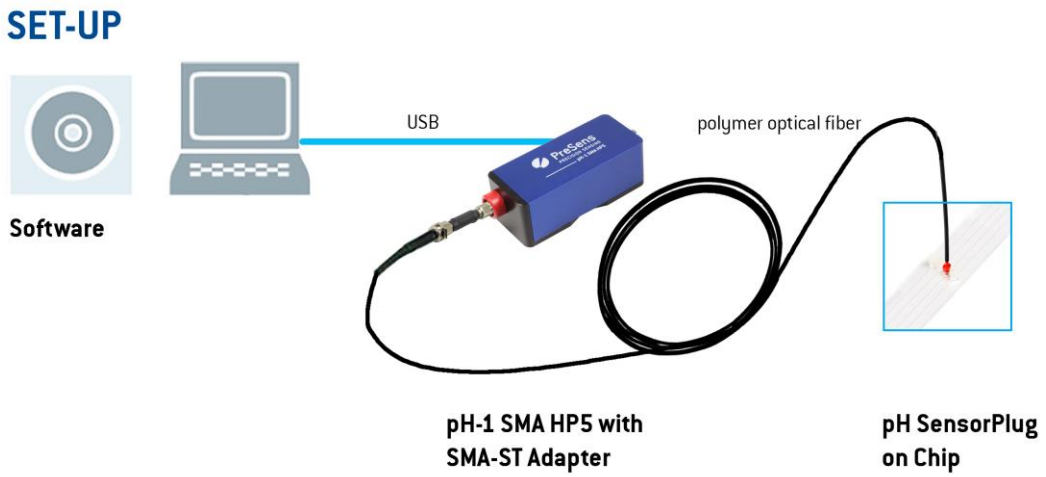

Fig. 3 Set-up for measurement with a pH SensorPlug

A polymer optical fiber, which is connected to pH-1 SMA HP5 via a SMA-ST Adapter, is attached to the SPL-ML-HP5. The SensorPlug is inserted in the port on your microfluidic chip.

3 Operation

3.1 Unpacking the pH SensorPlugs

The SPL-ML-HP5 are delivered in a lightproof packaging to ensure a long shelf-life, so do not open this packaging immediately at delivery. It is recommended to unpack the SensorPlug just before using it.

! Take care when opening the lightproof packaging with scissors. Cut close to the welding seam of the packaging, not to damage the plastic box inside.

Fig. 4 Opening the lightproof outer packaging. Inner packaging: 10 pH SensorPlugs in a plastic box

! If you want to use the irradiated SensorPlug in cleanroom environment, open the plastic box with the plugs in a laminar flow box, or in a similar controlled environment, and wear gloves!

3.2 Important Notes for optical pH Measurement

3.2.1 Equilibration

! The sensor needs to be equilibrated before use. In order to do so you have to place the SensorPlug in your medium and wait for at least 15 minutes so that the sensor can equilibrate.

3.2.2 Ionic Strength

The SensorPlug works best in solutions with ionic strength > 50 mM and buffer capacity > 2 mM; in case of lower salt concentrations or buffer capacity pH may fluctuate or get displayed incorrectly.

! Please note that the SPL-ML-HP5 is not suited for measurements in tap / fresh water.

3.2.3 Colored Media

! Colored media, e.g. containing phenol red, can interfere with chemical optical sensors. Please do not use colored media when measuring with chemical optical pH sensors.

3.3 Connecting the SPL-ML-HP5

The SPL-ML-HP5 can be integrated in a port on your chip.

When the SPL is integrated the chip is closed and the polymer optical fiber can be attached.

! Do not attach the polymer optical fiber before closing the flow path, if you want to avoid contamination; the fiber is not irradiated.

Insert the uncoated end of the fiber into the socket of the SensorPlug until the SPL touches the edge of the black fiber coating.

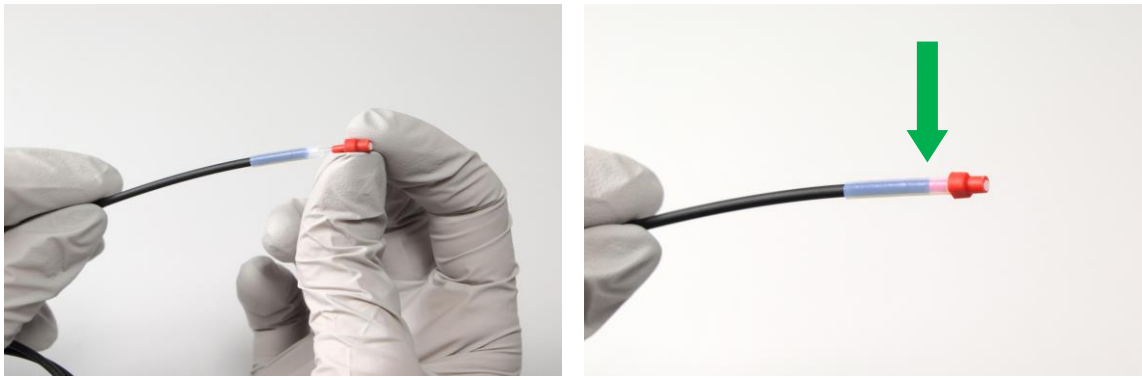

Fig. 5 Insert the uncoated end of the fiber in the SPL until the plug touches the black fiber coating.

! Do not remove the polymer sleeve but place it over the junction to avoid breaking the fiber by leverage effects.

Connect the polymer optical fiber to the SMA-ST Adapter and the adapter to the SMA connector on the front panel of your pH transmitter.

Medium can be pumped through the chip now.

3.4 Calibration

The SPL-ML-HP5 is delivered pre-calibrated. The enclosed Final Inspection Protocol contains the calibration values, which have to be entered into the pH meter software. (Please see the respective meter or software instruction manual for more detailed information on calibration.)

In case of samples differing significantly from physiological buffers a multi-point calibration is recommended. Prepare at least five solutions, of similar composition like the sample and different pH, covering the range of interest. Place the SensorPlug in the vessels containing the solutions of known pH – one after another - and perform the multi-point calibration like described in the respective meter / software instruction manual.

If the vessel is large enough to place a pH electrode, we recommend titrating directly in the vessel and following the instructions for multi-point calibration in the transmitter manual.

! Colored buffers often used for pH electrodes or colored media can interfere with chemical optical sensors. Please do not use colored buffers or media for calibrating chemical optical pH sensors.

3.5 One point adjustment

pH one point adjustment is advised in addition to factory calibration to obtain optimal sensor performance. Ideally the starting pH of the sample is known.

If the phase value is constant, follow the instructions for auto zero in the transmitter manual.

4 Technical Data

Specifications*	
Measurement range	pH 5.5 – 8.5
Resolution	at pH = 7: ± 0.01 pH
Accuracy	at pH = 7: ± 0.05 after single point calibration
Measurement temperature range	from + 5 ºC to + 50 ºC
Response time (t_{90})**	< 120 sec.
Compatible O_2 meter	pH-1 SMA HP5
Properties**	
Compatibility	Aqueous solutions, ethanol (max. 10 % v/v), methanol (max. 10 % v/v), pH 2 - 10
Cross-sensitivity	Reduced ionic strength (salinity); a high concentration of small fluorescent molecules in the visible range can interfere
Cleaning procedure	pH SensorPlugs are irradiated; a second irradiation or autoclaving is not recommended
Calibration	pH SensorPlugs are pre-calibrated
Storage stability	18 months provided the sensor is stored in the dark at room temperature
Plug type	Male Mini Luer fluid connector

*provided pH sensor is used without further handling in physiological solutions
**equilibrated sensor kept in well stirred solution at 37 °C

5 Concluding Remarks

Dear Customer,

With this manual, we hope to provide you with an introduction to work with the pH SensorPlugs (SPL-ML-HP5).

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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