

pH Sensor Spots HP5

SENSOR PROBES

○ Instruction Manual



pH Sensor Spots HP5

Specification:

Chemical optical pH sensor spots for integration into transparent glass or plastic vessels

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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 Sensor Spots

The chemical optical pH sensor spots can be attached to the inner surface of any transparent glass or plastic vessel like e. g. shake and spinner flask, tubes, Petri dishes or cultivation bags. They are optimized for physiological solutions and culture media. pH is measured non-invasively and non-destructively through the transparent vessel wall.



Fig. 1 pH sensor spots HP5

2.1 Scope of Delivery

The pH sensor spots are delivered in a light-tight package. Each unit contains 5 sensor spots packed individually in a transparent plastic sachet. The HP5 come pre-calibrated and either beta irradiated or untreated.

Additionally required equipment (not supplied):

- Fiber optic pH transmitter, e. g. pH-1 mini (more pH transmitters can be found on www.presens.de/products)
- PC / Notebook
- Glue, e.g. SG1
- Vacuum tweezers (Aspirette)
- Tweezers
- Spatula
- Dispenser pipette

2.2 Measurement Set-up

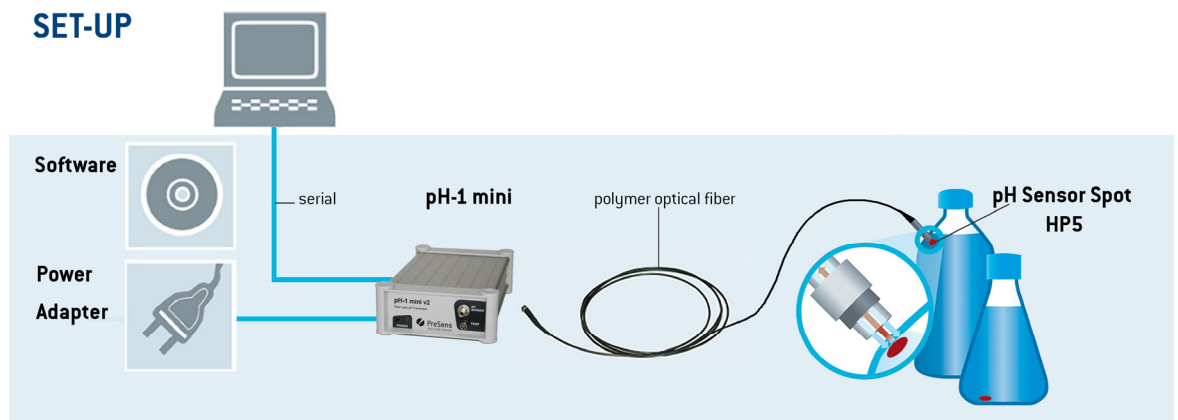


Fig. 2 Set-up for measurement with a sensor spot HP5

A polymer optical fiber (POF), which is connected to a fiber optic pH transmitter, e. g. pH-1 mini, is placed on the outer surface of the vessel, right opposite the sensor spot. The transmitter is connected via a serial COM port to a PC.

The POF can be fixed to the vessel and held in place by applying different accessories:

The stick-on adapter SOA can be adhered to the outer surface of the vessel and holds the polymer optical fiber in place.



Fig. 3 Stick on adapter (SOA)

If you have applied a sensor spot to a round vessel the adapter for round containments can be used. The ARC can be adjusted to different vessel sizes and holds the polymer optical fiber in place.



Fig. 4 Adapter for round containments (ARC)

A coaster CFG connected to a pH transmitter can also be used. Place the CFG under the vessel and make sure its optical module is right opposite the sensor spot.

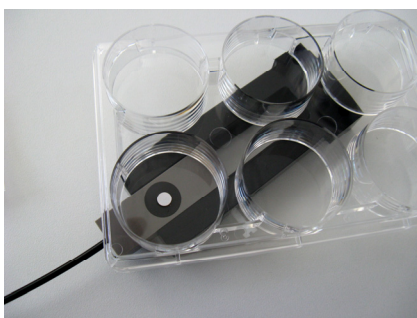


Fig. 5 Coaster CFG used to read the response of a HP5 in a 6-well multidish

3 Operation

3.1 Unpacking the Sensor Spots HP5

The sensor spots are delivered in a light-tight package to ensure a long shelf-life, so do not open this packaging immediately at delivery. It is recommended to unpack the sensor spots just before using them. Carefully remove the sensor spots from the protective external cover. Each packing unit includes 5 sensor spots packed individually in transparent plastic sachets.



Fig. 6 Opening the light-tight package



Fig. 7 Unpacking a single sensor spot

A pH sensor spot has a slightly yellow side (back) and a white side (front). The slightly yellow side has to face the vessel wall when integrating it.



Fig. 8 Sensor spot back (yellow) and sensor spot front (white)

3.2 Mounting the Sensor Spots in the Vessel

You can also watch our video about integrating a pH sensor spot into a vessel on www.presens.de/support/presens-tv.html.

The wall of the test vessel must be transparent or at least semi-transparent and not too thick. The adhesion surface of the vessel should be plane or only slightly arched; moreover the surface must be dry and clean, otherwise the sensor spot might partly detach from the vessel wall.

Place the sensor spot with its front side (white side) up on the desk; then pick it up by its front side with vacuum tweezers.

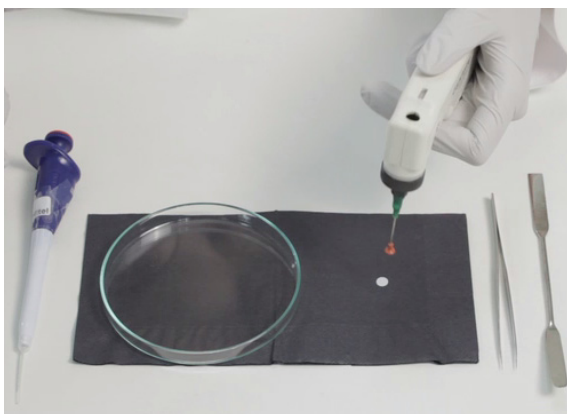


Fig. 9 Picking up the pH sensor spot with an aspirette by its front side

Holding the sensor spot with the vacuum tweezers apply approx. 1 μL of the silicon glue SG-1 (available from PreSens) on the slightly yellow side of the sensor spot using a dispenser pipette.

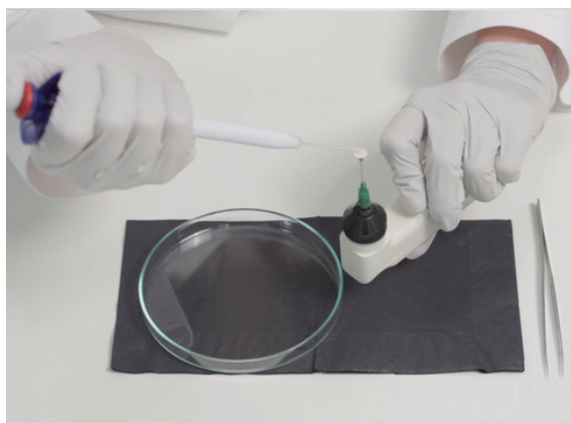


Fig. 10 Applying silicon glue to the sensor spot

Now carefully place the sensor spot on the inside vessel wall. Slightly press it onto the surface.

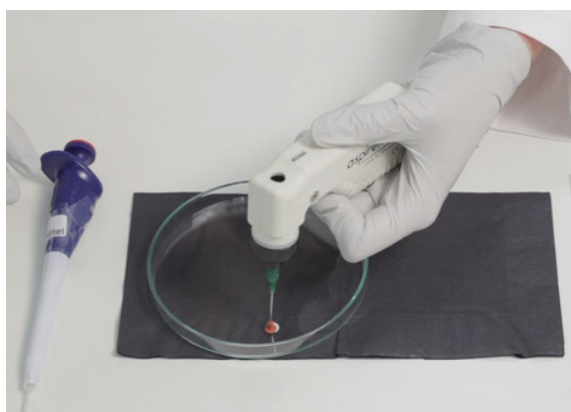


Fig. 11 Carefully place the pH sensor spot in the vessel

- !** The glue should not emerge over the edges or touch the white side of the spot as this might damage the sensor. No air should be enclosed in the silicon glue between sensor spot and vessel wall. The glue should be spread evenly over the sensor spot surface to avoid detachment. Put the vessel in a dark place and let the silicon glue SG-1 cure for at least 12 hours.

Then the vessel can be filled with your sample. Mount the respective accessory on the outer surface of the vessel right opposite the sensor spot and connect it via polymer optical fiber to the pH transmitter.



Fig. 12 Connecting the polymer optical fiber to a Adapter for Round Containers ARC

3.3 Measurement

3.3.1 Calibration

The pH sensor spots are delivered pre-calibrated. The enclosed Final Inspection Protocol contains the calibration values, which have to be entered into the software of the fiber optic pH transmitter you are using. (Please see the respective transmitter 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 of different pH, covering the range of interest. Place the prepared solutions of known pH one after another in the vessel containing the sensor spot and perform the multi-point calibration like described in the respective transmitter 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.

3.3.2 Equilibration

! The sensors need to be equilibrated before usage. In order to do so you have to fill the vessel with your media and wait for at least 180 minutes so that the sensor can equilibrate.

3.3.3 One point adjustment

pH one point adjustment is advised if your media differs from physiological conditions 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*	
Measuring range	5.5 – 8.5 pH
Response time (t_{90})**	< 120 sec.
Resolution at pH = 7	± 0.01 pH
Accuracy at pH = 7	± 0.05 sensor spot calibration ± 0.10 sensor batch calibration
Temperature range	From 5 °C to 50 °C
Properties*	
Compatibility	Aqueous solutions, ethanol (max. 10 % V/V), methanol (max. 10 % V/V), pH 2 - 10
Cross-sensitivity	Reduced to ionic strength (salinity); a high concentration of small fluorescent molecules in the visible range can interfere
Storage stability	18 months provided the sensor is stored in the dark
Calibration	pH spots are pre-calibrated; re-calibration is possible
Cleaning procedure	pH spots are delivered either beta-irradiated or untreated; a second irradiation or ethylene oxide treatment is not recommended

*provided pH sensor spots are 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 sensor spots 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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