

# Sentron

## SI line pH PROBE MANUAL

*For products:*

ConeFET	3280-010
CupFET	3200-010
LanceFET	2270-010
LanceFET+H	2274-010
MicroFET	9270-010
MiniFET	9202-010

**Warning!** There are no user replaceable parts in this probe. Do not open the probe as this may cause damage and will void the guarantee.

All information provided in this manual is applicable at the moment of publication. Sentron holds the right to change components, functions and procedures as required.

Manual SI line pH probe  
Ref. number E7500331.02

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# 1 General

The Sentron SI line probes allow you to perform accurate pH measurements together with Sentron SI line meters. We advise you to read the 'Quick Start' guide before use and keep this guide for future reference. We also advise you to read this manual to learn about the probe's maintenance and cleaning instructions.

The Sentron pH meter and probes are designed for pH measurements. Do not use the meters or probes for other applications as this may cause damage.

## 1.1 Declaration of compliance

Sentron Europe B.V. located in Leek, the Netherlands, declares that the Sentron SI line pH meters are designed and produced in accordance with EMC-standards EN 50081-1 and EN 50082-1.

As a result of this and adherence to other standards this meter is permitted to carry the CE-mark.

## 1.2 Guarantee

All Sentron SI line pH probes are produced, packaged and transported with the utmost care and Sentron provides a 6 month guarantee for material or manufacturing defects.

Sentron will, according to its own judgment, either replace or repair a defect probe within 6 months of shipment, provided the cause is a defect in material of manufacturing and the defect appeared during correct use of the probe. The guarantee explicitly excludes normal wear and tear and misuse of the probe. The decision whether or not the guarantee is applicable is subject to Sentron's assessment for the defect cause.




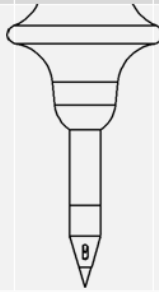


Sentron holds the right, at wholly its own discretion, to refuse guarantee claims in the event it suspects the probe has been used incorrectly. In cases of incorrect use Sentron may, but is not obliged to, offer to repair the meter at its regular repair fees.

Any representations and guarantees made by any person, including distributors, representatives and employees of Sentron that are contradictory to the abovementioned guarantee conditions are void unless these are made in writing and signed by an authorized person.

Sentron holds the right to request proof of purchase in the event guarantee claims are made.

Sentron is not liable to users for any damages, either direct or indirect, relating to the use or intended use of Sentron probes or accessories.

### 1.3 Specifications

	ConeFET 3280-010	CupFET 3200-010	LanceFET 2270-010	LanceFET+H 2274-010	MiniFET 9202-010	MicroFET 9270-010
<b>General description</b>						
General fluids ( <i>low viscosity</i> )	✓	✓	✓	✓	✓	✓
Semi fluids ( <i>low to medium viscosity</i> )	✓	✓	✓	✓	✓	
Pastes and semi solids ( <i>medium to high viscosity</i> )	✓		✓	✓		
Piercing applications ( <i>normal to medium force penetration</i> ) ( <i>high force and stabbing penetration</i> )			✓	✓		
General beakers and containers	✓	✓	✓	✓	✓	✓
Deep containers (up to 140 mm)	✓	✓	✓			✓
Small sample volumes (one drop ~20 µl)		✓				✓
Narrow vials / test tubes (as small as Ø 3 mm)						✓
<b>pH</b>						
Sensor	Glass-free Ion Sensitive Field Effect Transistor (ISFET) semiconductor					
Range	pH 0.00...14.00					
Drift	less than 0.14 pH/24h					
<b>Reference system</b>						
Type	non-flow					
Diafragma	porous PTFE					
Reference solution	gelled KCl					
<b>Temperature</b>						
Sensor	PT1000					
Range	0...80 °C (32...176°F)					
<b>Physical properties</b>						
Tip						
<b>Dimensions</b>						
Total length	183 mm (7.2")	183 mm (7.2")	190 mm (7.5")	223 mm (8.8")	83 mm (3.3")	157 mm (6.2")
Barrel length (immersible)	137 mm (5.4")	134 mm (5.3")	144 mm (5.7")	52 mm (2.0")	36 mm (1.4")	110 mm (4.3")
Barrel diameter	10 mm (0.4")	10 mm (0.4")	10 mm (0.4")	10 mm (0.4")	5 mm (0.2")	3 mm (0.1")
Cable length	1600 mm (63")	1600 mm (63")	1600 mm (63")	1600 mm (63")	1600 mm (63")	1600 mm (63")
<b>Materials</b>						
Tip/barrel	PEEK / ABS		PEEK / ABS + Stainless steel point		PEEK / ABS	PEEK
Handle and strain relief	PVC		PVC		PVC	PEEK
Cable	PVC		PVC		PVC	PVC
<b>Weight</b>	35 gr. (1.2 oz)	35 gr. (1.2 oz)	35 gr. (1.2 oz)	165 gr. (5.8 oz)	8 gr. (0.3 oz)	8 gr. (0.3 oz)
<b>Protection rating</b>	IP68 (connector IP67)					
<b>Connector</b>	5-pin, push-pull type connector					
<b>Meter compatibility</b>	SI meter series					

## 2 Use

The pH-sensitive element in a SI line Sentron pH probe is an ISFET semi-conductor sensor. This sensing element needs to be driven by an electronic circuit that is built into the Sentron SI line pH meter. This probe can only be used in combination with one of the Sentron SI line pH-meters. Any other combination will cause erroneous measurement values and irreversible damage to both probe and meter.

Sentron probes are robust and build to last. The pH probe nonetheless requires periodic maintenance. Please read the Operating Tips later in the this manual to ensure your probe is properly maintained.

Do not use the probe outside the specified temperature range as this might result in probe failure or irreversible damage to the probe.

Samples must be aqueous solutions or semi-solids and compatible with the probe's materials.

If information is required regarding the chemical resistance of the probe, please contact your local dealer or Sentron.

### 2.1 Installation

Push the probe's connector into the socket on the upper side of the meter. The (white) notch on the probe connector needs to be aligned with the meter, having the notch facing towards the front side of the meter. The connector is pushed down until it clicks into the meter's socket.

The probe can be disconnected from the meter by simply pulling the probe connector.



**Connect the probe to the meter**

**Note:** Do not turn the probe connector once inserted into the meter's socket. Also, make sure both meter and probe connector are clean and free from debris before connection. Do not pull the probe's cable, always pull the connector.

## **2.2 Preparing for use**

Remove the protective cover from the probe prior to use. Keep this protective cover as you can use it again when storing the probe.

Prior to use, flush and rinse the probe tip with tap water and scrub the probe tip with a soft bristled brush to remove possible residues. Use some mild detergent if required.

**Note:** After longer storage, reference gel may be observed as a viscous material on the tip of the probe. Some gel seepage from a new probe is normal and will not affect the lifetime or performance of the probe.

Subsequently rinse with deionized or distilled water. Soak the probe in pH 7.00 buffer or pH 4.00 buffer with the meter ON (in any mode) for at least 10 minutes.

If the probe has not been used for two or more days and stored dry, a revitalization is recommended, See section 3.2 for revitalization instruction.

Once soaking is completed, always perform a calibration before starting measurements. Failure to perform a calibration may result in inaccurate pH measurement. The procedure for performing calibrations is described in your Sentron pH meter manual.

## 2.3 *Operating tips*

- ① Clean your probe regularly during use. For cleaning instructions see section 3.
- ② Ensure samples or buffers are well mixed to obtain correct measurement values. This may be done by a magnetic stirrer or by stirring with the probe for at least 5 seconds. Stop stirring and record results when the read-out is stable.
- ③ Make sure that the medium which is being measured, is providing a “bridge” between the ISFET and the diaphragm. Without a proper fluid (or semi-solid) connection between these both, no (stable) measurement can be performed. A good rule of thumb is to have at least the first 10 mm from the probe tip to be immersed during measurements and calibrations.
- ④ When using CupFET or MicroFET probes, especially when performing single droplet measurements, make sure the medium is in contact with both the ISFET and the diaphragm simultaneously. The CupFET should contain the medium within the “cup” shaped tip of the probe.
- ⑤ When using ConeFET or LanceFET probes with semi-solids, insert probe to desired depth, then rotate left and right several times and tilt to ensure sample contact.
- ⑥ Buffer-handling: pH 7.00 buffers (phosphate-based) and pH 4.00 buffers (biphtalate-based) are less susceptible to carbon dioxide contamination than pH 10.00 buffers (borax or carbonate based). When slope errors occur, it usually indicates a failing probe or a contaminated buffer. If slope errors occur when using a pH 10.00 buffer, try calibrating with pH 7.00 and pH 4.00 buffer. If a good slope is achieved, try a new bottle of pH 10.00 buffer. Buffers in a convenient twin-neck bottle are available from Sentron or our dealers.
- ⑦ When testing in direct sunlight or on a bright reflecting surface, please use brown, opaque or shielded sample containers. Very bright light might influence the performance of the sensor.
- ⑧ Tris buffers and samples containing proteins form impermeable layers on surfaces, and require special attention when being used. These types of samples should be measured quickly and the probe should be rinsed thoroughly with deionized water between samples. Avoid prolonged immersion in samples containing Tris or proteins. When testing is complete, first clean the probe with water and a laboratory detergent and subsequently rinse with deionized or distilled water.
- ⑨ Avoid prolonged immersion in samples expected to have pH-values at the ends of the specified pH-range. When prolonged exposure to very high or very low pH values does take place rinse the probe with neutralizing agents and distilled water when the measurement is completed.



### **3 Cleaning**

Proper maintenance of a probe is important. If the probe is not cleaned properly and regularly, probe malfunction can occur due to a polluted diaphragm or ISFET. The cause for this pollution is usually the sample.

Pollution on/or blockage of the sensor and reference electrode diaphragm surface is the most likely cause for probe failure. If any of the following events occur: low slope, drift, instability of the reading, slow calibration, probe will not calibrate, pH value doesn't change as expected when changing samples, start the cleaning procedure as described below and perform a revitalization.

Probe wear is another cause for probe failure. Probe wear is often, but not necessarily, preceded by a period of declining calibration slope values. Probe wear is dependent on how the probe is used, stored. Worn probes need to be replaced.

#### **3.1 Daily cleaning**

The appropriate cleaning frequency is dependent on the type of sample being measured. A good rule of thumb to use when sampling colored liquids is when the reference diaphragm is no longer white, the probe should be cleaned.

Both the surface of the chip (the shiny dot at the probe's tip) and the diaphragm (the white surface on the probe tip) are to be cleaned with a brush. Place the probe in warm tap water (around 60°C / 140°F) with a mild detergent for 5 minutes, stir periodically. Scrub the probe tip with a soft brush and water with a mild detergent. After scrubbing rinse with deionized water.

Never brush the probe tip, especially the ISFET chip, before rinsing and flushing thoroughly with water (tap water, demi-water etc). Before rinsing debris and particles may be on the sensor surface and brushing them into the sensor may damage it. When in doubt, soak the probe for a while in warm water with a mild detergent.

#### **3.2 Revitalizing**

Revitalization is performed to regenerate the diaphragm in the pH probe. The diaphragm is part of the so called reference electrode and necessary for pH measurements.

For best results, clean the probe first as described in section 3.1 before revitalizing. Make sure the probe is still warm (around 60°C / 140°F) and place the probe directly (without flushing it with deionized water or cooling it down) in a saturated KCl-solution at room temperature and let it stand for 20 minutes. This 'cold' KCl-dip will regenerate the reference system and the diaphragm.

- To prepare saturated KCl (potassium chloride) solution: Add KCl-granules to distilled water until no more KCl will dissolve. Adding 38 grams of KCl to 100 ml water is sufficient. Let this stand for at least two hours and decant the clear solution. Now you have saturated KCl.

### **3.3 Cleaning tips**

- ❶ To avoid scratches on the sensor surface rinse the probe thoroughly using water before cleaning the probe with the soft brush supplied with the meter and tap water with a mild detergent added.  
Most scratches on the sensor are caused when there are hard particles in the sample and the sample is rubbed into the sensor when cleaning with the toothbrush.
- ❷ Proteins, fats and oils may be removed by scrubbing in a solution of Terg-A-Zyme (Alconox company), a pepsin solution or a similar product. Afterwards, rinse thoroughly with deionized or distilled water. Cleaning agents are available at Sentron, ask your local dealer.
- ❸ Do not use hydrofluoric acid, acetone, MEK or similar agents to clean the probe.

## **4 Storage**

For short time periods ( $\leq 2$  Days) probes can be stored best “wet” in e.g. a beaker with pH7. Clean the probe first with water and possibly a mild detergent. Then place it in a clean container with fresh pH7 buffer to prevent pollution of the probe directly after cleaning.

For longer time periods ( $>2$  days) the probe can be stored “dry” in e.g. the shipping box. As well as with short term storage, clean the probe first. Then place the protective cap on the probe tip, containing one drop of demi-water preventing a dry out of the diaphragm.

Always revitalize the probe (see section 3.2) before using it again after a long term storage.