

A. Introduction

The MVP pH/Temperature Probe is designed for general purpose measurements in a temperature range from -5° to 105°C. The MVP pH/Temperature Probe is an ISFET (ion sensitive field effect transistor) semi-conductor. It features a silver/silver chloride/potassium chloride reference system and a thermistor to allow for Automatic Temperature Compensation and temperature readings. Temperature and pH measurements may be taken simultaneously.

Solid state componentry built into the MVP instrument controls this sensing element. The MVP pH/Temperature Probe can only be used in combination with the MVP instrument. Any other combination might cause loss of performance or irreversible damage to both probe and meter.

B. Using the MVP pH/Temperature Probe

1. Remove and save the protection tube from the probe prior to use.

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 longevity or performance of the probe.

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

MVP pH/Temperature Probe must be calibrated prior to its first use. See Calibration section below for details.

2. If the probe has not been used for two or more days, clean as above, place in saturated KCl (potassium chloride) solution (see operating tips) for 10 to 15 minutes, then in pH 7.00 or pH 4.00 buffer for at least 10 minutes.
3. Ensure that the MVP pH/Temperature Probe is securely connected to the MVP instrument. Insert probe into sample. Follow instructions on the MVP instrument to complete reading. Both pH and temperature readings will be displayed on the MVP.

When using the MVP pH/Temperature probe with semi-solids, insert probe to desired depth then rotate left and right several times and tilt to ensure sample contact.

To ensure correct measurement values, samples or buffers need to be mixed well. This may be done by a magnetic stirrer or by gentle stirring with the probe for at least 5 seconds. You may continue to stir while the reading is taking place.

4. The MVP pH/Temperature Probe should be rinsed thoroughly with deionized or distilled water between samples.

C. Calibration for pH

The MVP pH/Temperature Probe features a 3-point calibration at pH 7.00, 10.00, and 4.00.

Note: It is important that the buffer 10 solution is borate based.

1. Rinse the MVP pH/Temperature Probe with deionized or distilled water. Soak probe in pH 7.00 buffer **for at least 10 minutes** prior to calibration.
2. Insert the probe into pH 7.00 buffer to begin. Ensure that the buffer is well mixed. Follow calibration instructions on MVP.
3. Repeat with pH 10.00 and 4.00 buffers when prompted.
4. Rinse probe with distilled or deionized water between buffers.

D. Calibration for Temperature

The temperature sensor within the pH/Temperature probe is factory calibrated. It only needs calibration if being used at

temperatures 20°C above or below room temperature. The probe features single point calibration at a known temperature.

Any known temperature within the operating range may be selected for calibration. Note that calibration is most accurate when a temperature point close to the sample temperature is selected.

1. Insert the probe into a liquid of desired temperature for calibration.
2. From the MVP main menu, select "Mode" and then "3. Temperature". Press "Enter".
3. Select "Calibration" from the main menu.
4. Follow the instructions on the MVP screen. When prompted, enter the known calibration temperature obtained from reference thermometer and press "Enter".

E. Safety and Care

The MVP pH/Temperature Probe is rugged and durable and requires little maintenance. To ensure lasting performance read and follow all operating guidelines.

- Avoid prolonged immersion in samples containing Tris or proteins. Tris buffers and samples containing proteins should be read quickly and the probe should be rinsed thoroughly with deionized water between samples. When testing is complete, clean with water and a laboratory detergent and rinse with deionized or distilled water.
- Avoid prolonged immersion in samples expected to have pH values at the ends of the pH range of 0 to 14. When unavoidable, rinse with ample water between samples. Rinse with neutralizing agents and distilled water when the measurement is complete and prior to storage.
- Avoid prolonged exposure to extreme temperatures. Above 50°C, limit the immersion of probe to the time needed to obtain a stable reading. Do not use the probe outside the specified temperature range (see I) as this might result in probe performance failure or irreversible damage to the probe.
- Samples must be aqueous liquids or semi-solids and compatible with the probe's wetted materials.
- The useful life of the MVP pH/Temperature Probe is determined by the frequency and type of samples tested and the level of cleaning between uses. Contact BioControl Technical Support for more information.
- If information is required regarding the chemical resistance of the probe, contact BioControl.

F. MVP Probe Storage

To store the probe, clean it thoroughly with water and a soft bristled brush (again a mild detergent may be used) and rinse with deionized or distilled water. **DO NOT IMMERSER PROBE IN ANY SOLUTIONS WHEN STORING!** Leave 1 or 2 drops of deionized or distilled water in the protective tube to prevent dehydration of the reference electrode. This allows faster start-up times.

Replace the protective tube. When doing so, slide the screw cap onto the probe body followed by the sealing O-ring. Slide cap and ring onto the rim of the protective tube, slightly press the cap down and only then tighten the screw cap.

G. Operating tips

- To prepare saturated KCl (potassium chloride) solution: Add KCl-granules to distilled water until no more will dissolve. Adding 38 gram of KCl to 100 mL water is sufficient. Let solution stand for at least two hours and decant the clear solution. Use as described above.
- To ensure correct measurement values, mix samples or buffers well.

- 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 from your laboratory supply vendor. Contact BioControl for additional information.
- When testing in direct sunlight or on a bright reflecting surface use brown, opaque, or shielded sample containers. Very bright light might influence the performance of the sensor.
- Buffer-handling: pH 7.00 buffers (phosphate-based) and pH 4.00 buffers (biphthalate-based) are less susceptible to carbon dioxide contamination (from exposure to air) than pH 10.00 buffers (borax or carbonate-based). Keep buffers sealed when not in use. If probe will not calibrate, it usually indicates a failing probe or a contaminated buffer. Try calibrating with fresh buffers.
- For best results, use buffers that have already been reconstituted (not powdered tablets or packets). Also use buffers with specified values of 4.00, 7.00, and 10.00 (each ± 0.02) at 25°C. Borate-based pH 10 buffers also give better calibration slopes than carbonate buffers. Contact BioControl Systems Technical Services for more information.
- Best results are obtained by stirring the probe in the solution for a minute prior to calibrating or taking a reading, then continuing to stir while reading is being taken.

H. Troubleshooting

Slope values can be interpreted as follows:

Slope%	Interpretation
98-105%	Probe gives maximum performance.
94-97%	Acceptable performance, typical for a probe which has been in use for some time. Clean with water, soft brush, and a mild detergent to ensure optimum performance, then recalibrate.
90-93%	Accurate results but the probe may require cleaning. Clean with water, soft brush, and a mild detergent as described in section F to ensure optimum performance, then recalibrate. If the slope remains low, use fresh buffers and recalibrate. If the slope still remains low, confirm the use of borate-based pH 10 buffer (see Section G) or the probe may be aging and a replacement should be purchased.

Problem: Any of the following: drift, instability of the reading, slow calibration, probe will not calibrate, pH value doesn't change as expected when changing samples.

Solution:

- Clean probe with tap water and a soft bristled brush. Use a mild detergent (e.g. a non abrasive soft soap).
- Soak the probe in warm (40°C/104°F) tap water for 5 to 10 minutes, and then place in a saturated KCl (Potassium Chloride) solution (see operating tips) at room temperature for 10 to 15 minutes.

I. Specifications

Sensor:	Semi-conductor Ion Sensitive Field Effect Transistor (ISFET) sensor with patented ESD protection circuit
Operating temperature	-5°C to 105°C
pH range	pH 0 to pH 14
Resolution	0.01
Accuracy	± 0.02
Reference compartment	Saturated KCl gel, non-refillable
Wetted materials:	Barrel and tip: PEI Packaging material: epoxy-resin Reference liquid: gelled KCl Diaphragm: porous PTFE

LIGHTNING MVP pH/Temperature Probe Limited Warranty

BioControl Systems, Inc. (BCS) warrants this product to be free from defects in materials and workmanship, when stored under labeled conditions and used as intended for 6 months from date of purchase. BCS agrees during the applicable warranty period to replace all defective products after return to BCS. BCS shall not have obligation under this Limited Warranty to make replacements which result, in whole or in part, from negligence of the Buyer, or from improper use of the products, or use of the product in a manner for which it was not indicated. Buyer shall notify BCS of any products which it believes to be defective during the warranty period. At BCS option, such products shall be returned to BCS, transportation and insurance prepaid. BCS shall replace any such product found to be defective, at no charge. Should BCS examination not disclose any defect covered by the foregoing warranty, BCS shall so advise Buyers and dispose of the product in accordance with Buyer's instructions.

©BioControl Systems, Inc. 2003. Printed in USA. LIGHTNING MVP is a trademark of BioControl. U.S. and foreign patents pending. All rights reserved.

IF YOU REQUIRE MORE INFORMATION ABOUT THE LIGHTNING MVP pH/TEMPERATURE PROBE, ITS USE OR OTHER BIOCONTROL PRODUCTS, PLEASE CONTACT:

BIOCONTROL
Results. Right now.

Worldwide Headquarters Bellevue, WA USA tel 425.603.1123 fax 425.603.0070 www.biocontrolsys.com
European Office Montesson, France tél +33 (0)1 30 15 78 08 fax +33 (0)1 30 15 78 09 europe@biocontrolsys.com
Latin America Office Campinas, Brasil tel +55 19 3237 8185 fax +55 19 3233 7988 latinamerica@biocontrolsys.com
United Kingdom Office London, UK tel +44 (0) 1473 461800 fax +44 (0) 1473 747200 uk@biocontrolsys.com

