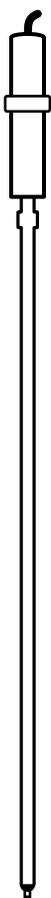


Thermo Scientific Orion Micro pH Electrode Instruction Sheet



Electrode Preparation

Note: The micro electrodes are made of very thin, delicate glass. Care should be taken when handling the electrode to prevent breakage.

1. Carefully unwind the tape from around the protective glass tube and gently slide the electrode out of the tube. Save the protective glass tube for storage.
2. Clean any salt deposits from the exterior of the electrode by rinsing it with distilled water.
3. Uncover the electrode filling hole by sliding down the translucent sleeve cover on the electrode body. The filling hole should be open whenever the electrode is in use and covered when the electrode is being stored.
4. Add electrode filling solution, Cat. No. 900011, to the electrode. To maintain an adequate flow rate, the level of filling solution must always be above the reference junction and at least one inch above the sample level.
5. Gently shake the electrode downward (similar to a clinical thermometer) to remove air bubbles.
6. Soak electrode in pH electrode storage solution, Cat. No. 910001, for 30 to 60 minutes.
7. Connect the electrode to the meter.

Measuring Hints

- The reference junction of the electrode must make contact with the sample solution. See **Figure 1**. When the electrode touches the surface of a liquid, the surface tension of the liquid result in contact with the reference junction. See **Figure 2**. To measure gel thicknesses less than 1.5 mm, the electrode can be held at an angle so the reference junction touches the gel. See **Figure 3**. The reference junction is on the same side of the electrode as the fill hole.

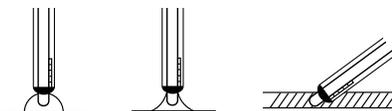


Figure 1 **Figure 2** **Figure 3**

- For precise measurements, use at least two pH buffers to calibrate the electrode. Always use fresh buffers for calibration. Choose buffers that are one to three pH units apart. Check the electrode slope daily by performing a two buffer calibration. The electrode slope should be 92 to 102%.

- Stir all buffers and samples at a uniform rate.
- Place a piece of insulating material, such as Styrofoam or cardboard, between the magnetic stirrer and beaker to prevent measurement errors from the transfer of heat to the sample.
- To reduce the chance of error due to polarization, avoid rubbing or wiping the electrode bulb. Use a lint-free tissue and gently blot the electrode bulb.

pH Calibration and Measurement

1. Select two buffers that bracket the expected sample pH. The first buffer should be near the electrode isopotential point (pH 7) and the second should be near the expected sample pH (pH 4 or pH 10). The buffers should be at same temperature as the sample. If the buffers and samples are at varying temperatures, temperature compensation is recommended.
2. Rinse the electrode first with distilled water and then with the first buffer.
3. Place the electrode into the first buffer. When the reading is stable, set the meter to the pH value of the buffer at the measured temperature. Refer to the meter user guide for a detailed procedure.
4. Rinse the electrode first with distilled water and then with the second buffer.
5. Place the electrode into the second buffer. When the reading is stable, set the meter to the pH value of the buffer at the measured temperature. Refer to the meter user guide for a detailed procedure.
6. The electrode is ready to take sample measurements. Rinse the electrode with distilled water and then with the sample. Place the electrode into the sample and when the reading is stable, record the pH and temperature of the sample.

Filling the Electrode

The reference chamber of the electrode should be filled as needed with electrode filling solution, Cat. No. 900011. Use the plastic pipette shipped with the electrode to slowly fill the electrode. If the electrode filling solution is added too quickly, air may become trapped in the reference chamber and cause the filling solution to squirt out of the fill hole instead of entering the reference chamber. Do not use syringe needles or plastic tubes to fill the electrode, since they may break the inner glass capillary and render the electrode inoperative. Do not apply pressure against the inner glass capillary tube.

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Electrode Storage

To ensure a quick response and free-flowing junction, the sensing element and reference junction must not dry out. Always clean the electrode before storing it.

Short-term storage (up to one week) – soak the electrode in pH electrode storage solution, Cat. No. 910001. To prevent crystallization of the filling solution, cover the fill hole whenever the electrode is being stored and open the fill hole when calibrating and measuring.

Long-term storage (more than one week) – fill the electrode and securely cover the filling hole. Cover the electrode with the protective glass tube containing a few drops of storage solution. Before returning the electrode to use, prepare it as a new electrode.

Electrode Maintenance

1. Inspect the electrode for scratches, cracks, salt crystal buildup, or membrane/junction deposits.
2. Rinse off any salt with distilled water. Remove any membrane/junction deposits as directed in the electrode cleaning section.
3. Drain the electrode, flush it with fresh filling solution and refill the chamber with fresh filling solution.

Electrode Cleaning

1. Soak the electrode in 0.1 M HCl or HNO₃ for half an hour.
The electrode can also be soaked for 15 minutes in a 1:10 dilution of household laundry bleach or a 0.1 to 0.5% liquid detergent solution mixed with hot water. The solution should be stirred at a moderate to fast rate.
2. Drain the electrode and refill it with fresh filling solution.
3. Soak the electrode in storage solution for at least one hour.

Troubleshooting

To test electrode operation:

1. Connect the electrode to a working meter that has a mV measuring mode.
2. Set the meter to the mV measuring mode.
3. Rinse the electrode with distilled water and then insert the electrode into fresh pH 7 buffer.
4. When the reading is stable, record the mV value of the pH 7 buffer. The mV value should be -30 to +30 mV.
5. Rinse the electrode with distilled water and then insert the electrode into fresh pH 4 buffer.

6. When the reading is stable, record the mV value of the pH 4 buffer. The mV value should be +150 to +210 mV.
7. Calculate the absolute mV difference between the two buffers. The mV difference should be 160 to 180 mV. The actual mV values will change as the electrode ages, but the mV difference between the two buffers should always be 160 to 180 mV.

If the electrode fails this procedure, perform electrode maintenance and electrode cleaning procedures. If the electrode response is slow or drifting, drain and refill the electrode with fresh filling solution, Cat. No. 900011. Replace the electrode if cleaning and maintenance fail to rejuvenate it.

Symptom– Little or No Response

- Inspect the electrode for visible cracks, usually occurring around the tip of the electrode. The slightest crack in or around the electrode tip will cause the electrode to read similar values in all solutions. Replace the electrode if it has any cracks.
- Gently shake the electrode downward (similar to a clinical thermometer) to remove air bubbles that may be trapped in the reference chamber of the electrode.
- Perform electrode maintenance and electrode cleaning procedures.

Symptom– Off Scale Readings

- Inspect the electrode for any broken or dissolving internal elements. Replace the electrode if it has any broken or dissolving internal elements.
- Ensure that there is an adequate volume of filling solution. The level of filling solution must always be above the reference junction and at least one inch above the sample level.
- Gently shake the electrode downward (similar to a clinical thermometer) to remove air bubbles that may be trapped in the reference chamber of the electrode.
- Inspect the reference junction for salt buildup or clogs. Soak the tip of the electrode in warm (50 °C) distilled water for 5 to 10 minutes. If the reference junction is still clogged, perform electrode maintenance and electrode cleaning procedures.

Symptom– Sluggish Response

- Perform electrode maintenance and electrode cleaning procedures.

Assistance

After troubleshooting all components of your measurement system, contact Technical Support. Within the United States call 1.800.225.1480 and outside the United States call 978.232.6000 or fax 978.232.6031. In Europe, the Middle East and Africa, contact your local authorized dealer. For the most current contact information, visit www.thermo.com/contactwater.

Warranty

For the most current warranty information, visit www.thermo.com/water.

Ordering Information

Cat. No.	Description
9802BN	Micro pH electrode with glass body and BNC connector
9803BN	Micro pH electrode with glass body, small length and BNC connector
9810BN	Micro pH electrode with glass body, small tip and BNC connector
9826BN	Micro pH electrode with glass body, long length and BNC connector
9863BN	Micro pH electrode with glass body, needle tip and BNC connector
900011	Micro electrode filling solution, 5 x 60 mL bottles
910001	pH electrode storage solution, 475 mL bottle
900020	pH electrode cleaning kit, includes 1 x 30 mL bottle each of cleaning solution A and C, 1 x 60 mL bottle each of cleaning solution B and D, beaker and pipette
900021	pH electrode cleaning solution A, for removing proteins, includes 4 x 30 mL bottles, beaker and pipette
900022	pH electrode cleaning solution B, for removing bacteria, includes 4 x 60 mL bottles, beaker and pipette
900023	pH electrode cleaning solution C, for general cleaning, includes 4 x 30 mL bottles, beaker and pipette
900024	pH electrode cleaning solution D, for removing oil and grease, includes 4 x 60 mL bottles, beaker and pipette
910199	All-in-One pH buffer kit, includes 475 mL bottle each of pH 4.01, 7.00 and 10.01 buffers and pH electrode storage solution, and pH electrode storage bottle

Visit www.thermo.com/water for additional buffers and buffer sizes.

Specifications

	9802BN	9803BN	9810BN
pH Range	0 to 14	0 to 14	0 to 14
Temperature Range	0 to 100 °C	0 to 100 °C	0 to 100 °C
Length	150 mm	83 mm	120 mm
Tip Diameter	2.5 mm	2.5 mm	1.3 mm
Tip Length	18 mm	48 mm	37 mm
Minimum Depth of Immersion	2 mm	2 mm	1 mm
	9826BN	9863BN	
pH Range	0 to 14	0 to 14	
Temperature Range	0 to 100 °C	0 to 100 °C	
Length	228 mm	137 mm	
Tip Diameter	2.5 mm	1.7 mm	
Tip Length	2.5 mm	40 mm	
Minimum Depth of Immersion	2 mm	3 mm	