

HORIBA Instruments, Inc.

Scientific

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Electrode Training



pH Electrodes

What is G, R, T?

G = Glass (the pH sensor)

R = Reference sensor

T = Temperature sensor

3 in 1: includes all sensors, G,R & T

Combination Electrodes: include G & R

Glass Electrodes: pH sensor only (G)

Reference Electrodes: reference sensor only (R)

Temperature Electrodes: temperature sensor only (T)

pH Glass Electrode Method

- **A pH and reference electrode are required to measure pH**
- **The voltage (potential) is measured between the pH and reference sensors**
- **Most of HORIBA's electrodes are glass electrode**
- **Glass electrode method is the most common and reaches equilibrium quickly**

HORIBA pH Buffer Setting Options

- **Options: NIST, USA or Custom (CUST)**
- **What is NIST?** National Institute of Standards and Technology
- **NIST Values:** 2=1.679, 4=4.008, 7=6.865, 9=9.180, 12=12.454
- **USA Values:** 2=2.000, 4=4.000, 7=7.000, 10=10.000, 12=12.000
- **CUST Values:** Your choice for up to 5 calibration points

How to select HORIBA pH Buffer?

- **For a 2-point calibration, select 2-buffers around the expected/specifications of the pH of the samples to be measured**
- **Example: if the sample has a pH specification of 4.8 to 5.5, then choose pH standards as 4 and 7**

ATC or MTC Temperature Settings

- **ATC is the default setting**
- **ATC: Automatic Temperature Compensation**
Can only be used if a temperature sensor is included in the electrode (GRT or GR+T)
- **MTC: Manual Temperature Compensation**
Temperature is input using an external temperature device
Sometimes used when extremely precise measurements are required using a constant temperature bath
- **Temperature is important for pH measurements**

Semiconductor pH Electrode Method

- **ISFET: Ion Selective Field Effect Transistor**
Sensor does not have glass, popular for food samples
- **Model 300 Solution:** Included for the zero adjustment
- **Preferred for durability**
- **Protect from light:** Sensor is light sensitive
- **Principle:** Current flowing through two electrodes is measured at the “gate” electrode that is in contact with the sample

Ion Electrodes

- **Condition the electrodes before use per the instruction manual**
- **Set the valence for the electrode**
- **Only combination ion electrodes can be used with the D-73 meters**
- **A combination electrode includes a reference sensor**
- **Combination and ion electrodes with a separate reference electrode can be used with the F model meters**

ORP Electrodes

(Oxidation Reduction Potential)

- **Accurate temperature readings are critical for ORP measurements**
- **ORP standards typically have a short shelf life**
- **Select a standard that is near the expected sample measurement**
- **Standard measurements should be within +/- 15mV. If not replace the Model 300 internal solution.**

Conductivity Electrodes

- **Input the correct cell constant**
- **Input the electrode cell value**
(can be read from the electrode)
- **Ensure the temperature of the standard solution is accurate**
- **Meter default settings are ATC, 2% temperature compensation**

Thank you very much for your attention.