



# pH Electrode Maintenance Guide

Before use

1. Remove the wetting cap

2. Shake to remove bubbles

3. Rinse with deionized water

4. Open SafeLock™

5. Check the electrolyte level\*

6. Connect the electrode

[www.mt.com/phlab-electrodepreparation](http://www.mt.com/phlab-electrodepreparation)

\* Artificially colored green for illustration purpose

Electrode Calibration

1. Take a minimum of two pH buffers bracketing the sample pH.

2. Use a fresh amount of aliquot of non-expired pH buffer for every calibration point.

3. Pour enough to submerge the sensor junction.

4. Stir the buffers (if required).

5. Start the calibration and take the temperature of buffers into account.

6. Rinse electrode thoroughly with deionized water and blot dry with tissue.

7. Repeat steps 2–6 for next buffer.

8. Evaluate as shown in table below.

| Slope/Offset   | ± 0–20 mV | ± 20–35 mV | > 35 mV |
|----------------|-----------|------------|---------|
| 95–105%        | ✓         | ✓          | ✓       |
| 90–95%         | ✓         | ✓          | ✓       |
| 85–90%         | ✓         | ✓          | ✓       |
| < 85% or >105% | ✗         | ✗          | ✗       |

✓ Electrode in good condition

✓ Electrode requires cleaning soon\*

✓ Cleaning and regeneration required\*

✗ Electrode worn out and needs replacement

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\* Refer to the Electrode Troubleshooting section below

During use

1. Take suitable electrode according to the sample to be measured.

2. Rinse the electrode with deionized water and blot dry with tissue.

3. Ensure that the electrode junction is immersed in sample/buffer.

4. Ensure that the reference electrolyte level is above the sample solution level.

5. Calibrate the sensor before use.

6. Perform kinetic electrode test if required (for titration only).

7. Maintain uniform stirring and temperature conditions for calibration and sample measurement (pH/Titration).

8. Rinse the electrode thoroughly between consecutive measurements.

[www.mt.com/phlab-electrodeuse](http://www.mt.com/phlab-electrodeuse)

Electrode Storage

When not in use (long term storage)

Buffer pH 4 (short term storage)

Dry storage (without wetting cap)

In deionized water

In sample

[www.mt.com/phlab-electrodestorage](http://www.mt.com/phlab-electrodestorage)

Incidence

Electrode Troubleshooting

1. Symptoms, causes and regeneration procedure for pH sensitive glass membrane

| Symptom                 | Cause                              | Ageing of glass                               | Scratches on membrane           | Broken membrane or shaft                      | Gel layer destroyed or dehydrated | Dry storage of electrode                                                                                          | Calcium on glass membrane (whitish film)                                                       | Oil, fat or tar residues (visible?)                                                            | Deposits of unknown substances (visible?) |
|-------------------------|------------------------------------|-----------------------------------------------|---------------------------------|-----------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------|
| Reduced slope (80–90%)  |                                    | ●                                             | ●                               | —                                             | —                                 | —                                                                                                                 | ●                                                                                              | ●                                                                                              | ●                                         |
| Very small slope (<80%) |                                    | ●                                             | —                               | ●                                             | ●                                 | ●                                                                                                                 | —                                                                                              | —                                                                                              | —                                         |
| Slow response           |                                    | ●                                             | ●                               | —                                             | ●                                 | ●                                                                                                                 | ●                                                                                              | ●                                                                                              | ●                                         |
| Fluctuating reading     |                                    | ●                                             | ●                               | ●                                             | ●                                 | ●                                                                                                                 | ●                                                                                              | ●                                                                                              | ●                                         |
| Zero point shift        |                                    | ●                                             | ●                               | —                                             | ●                                 | ●                                                                                                                 | ●                                                                                              | ●                                                                                              | ●                                         |
| Reason                  | High temperature, age of electrode | Abrasion, solid particles, incorrect cleaning | Mechanical or temperature shock | Ion deficient media, non-aqueous applications | Wrong storage                     | Measurement media                                                                                                 | Measurement media                                                                              | Measurement media                                                                              | Measurement media, no cleaning            |
| Restoration procedures  | Regeneration*                      | Replace electrode                             | Replace electrode               | Rehydration with electrolyte                  | Rehydration with electrolyte      | Dip the glass in acetic acid / dilute hydrochloric acid until deposits are dissolved. Follow up with regeneration | Clean with degreasing agent, then with deionized water. Condition the electrode in pH buffer 4 | Clean with degreasing agent, then with deionized water. Condition the electrode in pH buffer 4 |                                           |

● Possible ● Probable ● Highly probable

\* Immerse the electrode glass membrane in regeneration solution for not more than 2 minutes

2. Clogged junction: Causes and cleaning procedures

| Type of contamination               | Cleaning agent                | Reaction time            | Remarks                                                                                         |
|-------------------------------------|-------------------------------|--------------------------|-------------------------------------------------------------------------------------------------|
| Silver sulfide                      | Thiourea                      | 5–60 minutes             | Leave until coloration disappears                                                               |
| All possible types of contamination | HCl 0.1 M                     | Approximately 12 hours   | Can also be used for internal cleaning                                                          |
|                                     | Chromic-sulfuric acid mixture | Approximately 30 minutes | Also cleans deposits very well. Electrode must be regenerated after this                        |
| Proteins                            | Pepsin/HCl cleaning solution  | >1 hour                  | Can also be used for internal cleaning                                                          |
|                                     | NaOH 2%                       | Approximately 20 minutes | Rinse the electrode with deionized water followed by conditioning in pH buffer 4                |
| Lipophilic substances               | Ethanol, acetone              | Approximately 30 minutes | Highly suitable for edible oils. Always recondition the pH electrode in buffer pH 4 or 0.1M HCl |
| Calcium, scale                      | Acetic acid                   | Approximately 30 minutes | Electrode must be regenerated after this procedure                                              |
| Soaps, tensides                     | Hot water (80 °C)             | Approximately 12 hours   | Thorough washing with deionized water followed by conditioning in pH buffer 4                   |

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METTLER TOLEDO

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