

# Electrodes for pH measurement













## Which electrode for which application?

| Application                             | Specifics   | Electrode       | Order no.  | Application   | Specifics  | Electrode           | Order no.  |
|---|---|-----------------|------------|---|--|---------------------|------------|
| <b>General</b>                          | Standard laboratory, various samples, pH 0...14, T = 0...100 °C           | Unitrode        | 6.0258.010 | <b>Leather, paper, textile industry</b>             | Bleaching & dye baths                              | Profitrode          | 6.0255.100 |
| <b>Water</b>                            | Demineralized, drinking and sea water, weakly buffered solutions          | Aquatrode Plus  | 6.0257.000 |   | Dampening solutions (offset printing), glue        | Unitrode            | 6.0258.010 |
| <b>Waste water</b>                      | General   | Unitrode        | 6.0258.010 |   | Leather, paper, textiles (surface measurement)     | Flat membrane       | 6.0256.100 |
|   | Sulfide-containing waste water  | Profitrode      | 6.0255.100 |   | Washing liquors                                    | Viscotrode          | 6.0239.100 |
| <b>Soil samples</b>                     | Surface measurement or aqueous suspensions                                | Flat membrane   | 6.0256.100 | <b>Paints, lacquers, solvents</b>                   | Dye baths, ink, wood stain, lacquers               | Profitrode          | 6.0255.100 |
| <b>Agriculture, plant breeding</b>      | Culture media, small volume samples                                       | Biotrode        | 6.0224.100 |   | Dispersions, emulsions, resins, suspensions        | Unitrode            | 6.0258.010 |
|   | Fertilizers   | Unitrode        | 6.0258.010 |   | Paint (surface)                                    | Flat membrane       | 6.0256.100 |
|   | Liquid manure   | Profitrode      | 6.0255.100 |   | Non-aqueous, polar solvents                        | Solvotrode          | 6.0229.100 |
|   | Nutrient solutions  | Viscotrode      | 6.0239.100 | <b>Electroplating, metal processing</b>             | General  | Profitrode          | 6.0255.100 |
|   | Protein-containing solutions  | Porotrode       | 6.0235.200 |   | Acidic electroplating baths                        | Unitrode            | 6.0258.010 |
| <b>Food, stimulants</b>                 | General   | Unitrode        | 6.0258.010 |   | Cutting-oil emulsions                              | Viscotrode          | 6.0239.100 |
|   | Protein-containing food, beer   | Porotrode       | 6.0235.200 | Etching baths containing fluoride/hydrofluoric acid | Sb electrode                                       | 6.0421.100          |            |
|   | Penetration measurement (dough, cheese, meat)                             | Spearhead       | 6.0226.100 | <b>Special applications</b>                         | Concentrated acids                                 | Profitrode          | 6.0255.100 |
|   | Drinking water  | Aquatrode Plus  | 6.0257.000 |   | Photographic baths                                 | Profitrode          | 6.0255.100 |
|   | Juices, wine, spirits   | Unitrode        | 6.0258.010 |   | Emulsions, suspensions, dispersions                | Unitrode            | 6.0258.010 |
| <b>Pharmaceutical industry, biology</b> | Creams, liquid formulations, medicinal syrups, mouthwashes, raw materials | Viscotrode      | 6.0239.100 |   | Samples at pH > 12                                 | Unitrode            | 6.0258.010 |
|   | Dialysis solutions, urine   | Unitrode        | 6.0258.010 |   | Temperature 50...80 °C                             | Unitrode            | 6.0258.010 |
|   | Gastric juice, serum, small-volume samples                                | Biotrode        | 6.0224.100 |   | Temperature 80...100 °C                            | Unitrode (Idrolyte) | 6.0258.010 |
|   | Infusion solutions  | Aquatrode Plus  | 6.0257.000 |   | Ion-deficient solutions, weakly buffered solutions | Aquatrode Plus      | 6.0257.000 |
|   | Protein-containing solutions  | Porotrode       | 6.0235.200 |   | Non-aqueous, polar solvents                        | Solvotrode          | 6.0229.100 |
| <b>Cosmetics</b>                        | Shampoos, emulsions, shower gels, mouth rinses, perfumes                  | Viscotrode      | 6.0239.100 |   | Penetration measurement                            | Spearhead           | 6.0226.100 |
|   | Make-up   | Micro-electrode | 6.0234.100 |   | Protein-containing solutions                       | Porotrode           | 6.0235.200 |
|   | Skin (surface measurement)  | Flat membrane   | 6.0256.100 |   | Small volume samples                               | Biotrode            | 6.0224.100 |
| <b>Detergents, surfactants</b>          | General   | Viscotrode      | 6.0239.100 | Surface measurements                                | Flat membrane                                      | 6.0256.100          |            |
|   | Samples with pH > 10  | Profitrode      | 6.0255.100 | Samples containing fluoride/hydrofluoric acid       | Sb electrode                                       | 6.0421.100          |            |



# Practical tips, care and maintenance



| Unitrode   | Aquatrode Plus   | Profitrode   | Viscotrode   | Biotrode   | Spearhead pH electrode  | Porotrode   | Flat membrane pH electrode  | Solvotrode   | Sb electrode  |
|--|--|--|--|--|---|---|---|--|---|
| <p>Combined pH glass electrode, fixed ground-joint diaphragm</p> <ul style="list-style-type: none"> <li>• very low alkali error</li> <li>• insensitive to contamination</li> <li>• high temperature resistance</li> </ul> <p><b>Ordering info</b><br/>6.0259.100 without cable, plug-in head G<br/>6.0258.010 with Pt 1000 fixed cable, plug F+ 2 x 2 mm</p> | <p>Combined pH glass electrode, fixed ground-joint diaphragm</p> <ul style="list-style-type: none"> <li>• for low-conductivity or weakly buffered solutions</li> <li>• very rapid response</li> <li>• insensitive to contamination</li> </ul> <p><b>Ordering info</b><br/>6.0253.100 without cable, plug-in head G<br/>6.0257.000 with Pt 1000 fixed cable, plug F+ 2 x 4 mm</p> | <p>Combined pH glass electrode, ground-joint diaphragm</p> <ul style="list-style-type: none"> <li>• for difficult matrices</li> <li>• easy-to-clean diaphragm</li> <li>• double-junction construction</li> </ul> <p><b>Ordering info</b><br/>6.0255.100 (fitting length: 113 mm) without cable, plug-in head<br/>6.0255.110 (fitting length: 170 mm) without cable, plug-in head G<br/>6.0255.120 (fitting length: 310 mm) without cable, plug-in head G</p> | <p>Combined pH glass electrode, ground-joint diaphragm</p> <ul style="list-style-type: none"> <li>• for viscous, protein- or sulfide-containing solutions</li> <li>• easy-to-clean diaphragm</li> </ul> <p><b>Ordering info</b><br/>6.0239.100 without cable, plug-in head G</p> | <p>Combined pH glass electrode, plied Pt-wire diaphragm</p> <ul style="list-style-type: none"> <li>• for small-volume samples</li> <li>• for protein-containing samples and samples containing organic solvents</li> <li>• shaft diameter 3 mm</li> <li>• reference electrolyte: Idrolyte<sup>1</sup> (6.2308.040)</li> </ul> <p><b>Ordering info</b><br/>6.0224.100 without cable, plug-in head G</p> | <p>Combined pH glass electrode, pinhole diaphragm</p> <ul style="list-style-type: none"> <li>• for measurement in semi-solid samples</li> <li>• maintenance-free reference electrolyte (gel)</li> <li>• easy-to-clean pinhole diaphragm</li> </ul> <p><b>Ordering info</b><br/>6.0226.100 without cable, plug-in head G</p> | <p>Combined pH glass electrode, ceramic capillary diaphragm</p> <ul style="list-style-type: none"> <li>• for protein-containing or viscous samples</li> <li>• reference electrolyte: Porolyte<sup>2</sup> (6.2318.000)</li> <li>• easy-to-clean capillary diaphragm</li> </ul> <p><b>Ordering info</b><br/>6.0235.200 without cable, plug-in head G</p> | <p>Combined pH glass electrode, fixed ground-joint diaphragm</p> <ul style="list-style-type: none"> <li>• for pH-measurement on surfaces (e.g. skin, leather, paper, textiles)</li> <li>• very rapid response</li> </ul> <p><b>Ordering info</b><br/>6.0256.100 without cable, plug-in head G</p> | <p>Combined pH glass electrode, ground-joint diaphragm</p> <ul style="list-style-type: none"> <li>• rapid response and stable measured values in organic solvents</li> <li>• easy-to-clean diaphragm</li> <li>• electrically shielded</li> <li>• for non-aqueous titrations</li> </ul> <p><b>Ordering info</b><br/>6.0229.100 without cable, plug-in head G</p>  | <p>Combined Sb electrode, ceramic pin diaphragm</p> <ul style="list-style-type: none"> <li>• for pH measurement and titration in samples containing fluoride or hydrofluoric acid.</li> </ul> <p><b>Ordering info</b><br/>6.0421.100, without cable, plug-in head G</p> |
|    |    |    |    |   |   |   |   |    |   |
| <p>Use 6.2308.040 Idrolyte<sup>1</sup>) for measurement at temperatures 80...100 °C or in samples containing organic solvents.</p> <p>Rinse with water or ethanol to remove contamination.</p> <p>Do not wipe electrode!</p> <p>Unitrodes filled with c(KCl) = 3 mol/L should be stored in 6.2323.000 storage solution.</p>                                  | <p>Store in 6.2323.000 storage solution only!</p> <p>Do not wipe electrode!</p>  | <p>Store in bridge electrolyte.</p> <p>Lift sleeve ring for cleaning ground-joint diaphragm. Use soft cloth or brush to remove any adhering material.</p> <p>If the sleeve ring is blocked, place the electrode in hot water for a few minutes and try again.</p> <p>Spare ground-joint diaphragm for Profitrodes 6.0255.1X0: order no. 6.1243.020</p>   | <p>Store in 6.2323.000 storage solution.</p> <p>Lift sleeve ring for cleaning ground-joint diaphragm. Use soft cloth or brush to remove any adhering material.</p> <p>If the sleeve ring is blocked, place the electrode in hot water for a few minutes and try again.</p>       | <p>Store in 6.2308.040 Idrolyte<sup>1</sup>).</p> <p>Rinse with water or ethanol to remove contamination.</p> <p>Do not remove contamination in pinhole diaphragm with a needle. The gel electrolyte might be damaged. Remove electrode slowly from sample to avoid underpressure in the gel electrolyte.</p>  | <p>Store in 6.2308.040 Idrolyte<sup>1</sup>).</p> <p>Rinse with water or ethanol to remove contamination.</p> <p>Do not remove contamination in pinhole diaphragm with a needle. The gel electrolyte might be damaged. Remove electrode slowly from sample to avoid underpressure in the gel electrolyte.</p>               | <p>Store in 6.2323.000 storage solution.</p> <p>Rinse with water or ethanol to remove contamination.</p>  | <p>Store in 6.2323.000 storage solution.</p> <p>Add a small drop of dist. water on the surface to be measured</p>   | <p>Store in reference electrolyte.</p> <p>Lift sleeve ring for cleaning ground-joint diaphragm.</p> <p>Condition in dist. water before next measurement (glass membrane only!).</p> <p>If the sleeve ring is blocked, place electrode in hot water for a few minutes and try again.</p> <p><b>Reference electrolytes:</b><br/>c(LiCl) = 2 mol/L in ethanol (6.2312.010)<br/>c(TEABr) = 0.4 mol/L in ethylene glycol (6.2320.000)</p> | <p>Store in c(KCl) = 3 mol/L.</p> <p><b>Important:</b><br/>Can only be used together with pH meter that can compensate an asymmetry potential of -370 mV</p>  |

<sup>1</sup>) Idrolyte is a glycerol-based electrolyte whose ion activity corresponds to that of c(KCl) = 3 mol/L.

<sup>2</sup>) Porolyte is a KCl solution that has been gelled by polymerization and is used in electrodes with a capillary diaphragm (Porotrode).