HORIBA
Scientific

# LAQUA

## ELECTRODES


| | | | |
|---|---|---|---|
| pH | ORP | Ion | Conductivity |
| Resistivity | Total Dissolved Solids | Dissolved Oxygen | Salinity |

WARRANTY 6 MONTHS WARRANTY

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MADE IN JAPAN

# LAQUA Electrode Technology

## Born from the fusion of our technical expertise and state-of-the-art manufacturing

As a leading pH electrode manufacturer, HORIBA uses the latest technology for all your measurement needs.

Since the development of Japan's first glass electrode for pH meter, HORIBA has focused on continually improving our electrode technology, especially in materials and manufacturing. HORIBA is committed to continually explore and employ groundbreaking solutions in manufacturing next-generation electrodes so that we always provide you with the newest and best electrodes.

## pH Electrode Selection Guide

| | | | 3-in-1 ELECTRODES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PLASTIC | | | | | STANDARD ToupH | LONG ToupH | MICRO ToupH | SLEEVE ToupH |
| | | | 9651-10D / 9652-10D | 9625-10D | 9630-10D | 9631-10D | 9632-10D | 9615S-10D | 9680S-10D | 9618S-10D | 9681S-10D |
| Specification | Applicable temperature range (°C) | | 0-60 / 0-80 | 0-100 | 0-100 | 0-60 | 0-100 | 0-100 | 0-100 | 0-60 | 0-60 |
| | Diameter (mm) | | 16 | 16 | 16 | 16 | 16 | 12 | 8 | 3 | 12 |
| | Length (mm) | | 150 | 150 | 150 | 155 | 150 | 198 | 283 | 185 | 203 |
| **pH - Sample Conditions** | | | | | | | | | | | |
| Aqueous Solution | Conductivity | Normal (over 100 mS/m) | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ |
| | | Low (approx.10 ~100 mS/m | | | ◉ | | | | | | ◉ |
| | | Very low (approx. 5 ~100 mS/m | | | ○ | | | | | | ◉ |
| | | High (approx. 5 S/m) | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | |
| | Strong alkaline (pH 10-12) | | | | | | ◉ | ○ | ○ | | |
| | Strong acidity (pH 0-2) * Except HF sample | | | | | ◉ | | ◉ | | | |
| | Quick heat change (within 50°C) | | ◉ | ◉ | ◉ | ◉ | ◉ | | | | |
| | High viscosity (approx. 5 Pa·S) | | | | | | | | | | ◉ |
| | Containing non-aqueous solvent | | | | | | | ○ | ○ | ○ | ◉ |
| | Suspension | | | | | | | ○ | ○ | ○ | ◉ |
| Solid/ Semisolid | Inside | | | | | | | | | | |
| | Surface | | | | | | | | | | |
| Sample Containers | Microtube/plate (> 50 µL) | | | | | | | | | ◉ | |
| | Ampule | > ø4 mm | | | | | | | | ◉ | |
| | Micro container (> 2 mL) | | | | | | | | ○ | ◉ | |
| | Tube | ID:13 mm, L:100 ~ 150 mm | | | | | | | ◉ | | |
| | Beaker | 10 mL ~ 1 L | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ○ | ○ | ○ |
| | Large container (> 1 L) | | ○ | ○ | ○ | ○ | ○ | ○ | ◉ | | |
| | Petri dish | | | | | | | | | | |
| | Droplet | | | | | | | | | | |
| Water | Pure/ion-exchange water (approx. 0.1 mS/m)/ Distilled water (approx. 0.5 mS/m) | | | | | | | ○ | | | ◉ |
| | Tap/drinking water (approx. 10 mS/m) | | ○ | ○ | ◉ | | | ○ | | | ◉ |
| | Surface water | | | | ◉ | | | ○ | | | ◉ |
| | Pharmaceutical water/ Enviromental water/acid rain | | ○ | ○ | ○ | | | ○ | | | ○ |
| Chemical reagent/ solvent | Caustic/strong acid (Except HF sample) | | | | | ◉ | | ◉ | | | |
| | Hydrofluoric acid | | | | | ◉ | | | | | |
| | Surfactant | | | | | | | ○ | | | ○ |
| | Water-based paint | | | | | | | ○ | | | ○ |
| | Dye/coloring agent | | | | | | | | | | ○ |
| Pharmaceutical/ biological sample | Protein-containing sample | | | | | | | ○ | | ○ | |
| | Medicinal preparation | | | | | | | | | ○ | ○ |
| | Enzyme solution | | | | | | | | ○ | ◉ | |
| | Tris buffer | | | | | | | ◉ | | ○ | |
| | Suspension | | | | | | | ○ | | | ◉ |
| | Agar medium | | | | | | | | | | |
| Food | Jam | | | | | | | ○ | | | ○ |
| | Meat/fish/Fruit/vegetable/ Dough | | | | | | | | | | |
| | Honey | | | | | | | | | | ◉ |
| | Cheese/butter | | | | | | | | | | |
| | Yogurt | | ○ | ○ | ○ | | | ○ | | | |
| Beverage/ seasoning | Beer | | ○ | ○ | ○ | | | ○ | | | ◉ |
| | Milk/Carbonated drink/juice/ sauce/soy sauce | | | | | | | ○ | | | ○ |
| | Mayonnaise/ketchup | | | | | | | ○ | | | ○ |
| Cosmetic/ lotion | Beauty cream/mascara | | | | | | | ○ | | | ○ |
| | Gel/soap/shampoo/Hairdye lotion | | | | | | | ○ | | | ○ |
| | Emulsified liquid | | | | | | | ○ | | | ◉ |

| | COMBINATION ELECTRODES | | | | | | | | ISFET ELECTRODES |
|---|---|---|---|---|---|---|---|---|---|
| SLEEVE | NEEDLE | PLASTIC | STANDARD ToupH | MICRO ToupH | SLEEVE ToupH | LONG | LONG ToupH | FLAT | GENERAL |
| 6367-10D | 6252-10D | 9425-10C | 9415-10C | 9418-10C | 9481-10C | 6069-10C | 9480-10C | 6261-10C | 0040-10D |
| 0-60 | 0-60 | 0-100 | 0-100 | 0-60 | 0-60 | 0-60 | 0-100 | 0-50 | 0-60 |
| 12 | 12 | 16 | 12 | 3 | 12 | 3 | 8 | 12 | 16 |
| 150 | 150 | 150 | 198 | 185 | 203 | 291 | 283 | 150 | 190 |
| ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ | ◉ |
| | | | | | ○ | | | | |
| | | | | | ○ | | | | |
| | | ○ | ○ | | ◉ | | ○ | | |
| ○ | | | ○ | | ○ | | ○ | | |
| | | | ◉ | | | | | | |
| | | ◉ | | | | | | | |
| ○ | | | | | ◉ | | | | |
| ○ | | | ○ | ○ | ○ | | ○ | | ○ |
| | | | ○ | ○ | ◉ | | ○ | | ○ |
| | ○ | | | | | | | | |
| | | | | | | | | ◉ | ◉ |
| | | | | ◉ | | | | | |
| | | | | ◉ | | ○ | | | |
| | | | | ◉ | | ○ | ○ | | |
| | | | | | | ◉ | ◉ | | |
| ○ | ○ | ◉ | ◉ | ○ | ○ | ○ | ○ | ○ | ○ |
| | | ○ | ○ | | | | ◉ | | |
| | | | | | | | | ◉ | ◉ |
| | | | | | | | | ◉ | ◉ |
| | | | ○ | | | | | | |
| | | ○ | ○ | | ○ | | | | |
| | | | ○ | | ○ | | | | |
| | | ○ | ○ | | ○ | | | | |
| | | | ◉ | | ○ | | | | |
| | | | ○ | | ◉ | | | | |
| | | | ○ | | ◉ | | | | |
| | | | | | ◉ | | | | |
| ○ | | | ○ | ○ | ◉ | | | | |
| | | | | ○ | ○ | | | | |
| | ○ | | | ◉ | | | ○ | | |
| | | | ◉ | ○ | ○ | | | | |
| | | | ○ | | ◉ | | | | |
| | | | | | | | | ◉ | ◉ |
| | ○ | | ○ | | ◉ | | | ○ | ◉ (surface) |
| | ◉ | | | | | | | ○ | ◉ (surface) |
| | | | | | | | | | ○ (surface) |
| | ○ | | | | | | | ○ | ○ (surface) |
| ○ | ○ | ○ | ○ | | ○ | | | ○ | ◉ (surface) |
| ○ | | ○ | ○ | | ◉ | | | | |
| ○ | | | ○ | | ◉ | | | | |
| | | | ○ | | ◉ | | | | |
| | ○ | | ○ | | ◉ | | | | |
| | | | ○ | | ◉ | | | | |
| | | | ○ | | ○ | | | | |

◉ Recommended ○ Can be measured

# Expertise in Manufacturing

## Sophisticated processing technology

HORIBA's in-house expertise in the manufacture of electrodes is the accumulation of more than 60 years of experience. Our sophisticated electrode processing technology provides flexibility in designing various shapes of the electrode bulb and different structural designs of the electrodes.

### Thick membrane technology

HORIBA's glass moulding technology allows the manufacture of tougher pH glass bulbs.

### Miniaturization

Invention Award (Japan)

Unique flat electrode design as well as 3mm diameter micro-electrode with integrated temperature sensor (US Patent No. 7314541/ China Patent No. ZL0315796)

### Fast response & highly accurate

ToupH glass bulb does not compromise responsiveness and sensitivity (US Patent No. 8262877). Specially designed electrodes are available for hydrofluoric acid & strong alkaline application.

### Double-junction electrodes

All HORIBA pH combination electrodes are double-junction electrodes. Flexible to use in a wide-range of applications.

### Convenient slider

Refillable electrodes are equipped with a slider to open or close the refilling port easily.

### Built-in clip for hooking onto electrode stand arm

Top housing of electrodes is designed with a built-in clip to hook onto HORIBA's electrode stands.

## ORP Electrodes

| Model | Part No. | Material | Temp. Range (°C) | Application |
|---|---|---|---|---|
| 9300-10D | 3014046710 | Pt / Glass | 0 - 60 | Waterproof & refillable; Flat platinum tip; Suitable for lab use. |
| 9301-10D | 3200922105 | Pt / Plastic | 0 - 80 | Waterproof & maintenance-free; Flat platinum tip; Suitable for field use. |

## Ion Selective Electrodes (ISEs)

| Model | Part No. | Combination ISE | Temp. Range (°C) | Measurement Range | Replacement Tip | Part No. |
|---|---|---|---|---|---|---|
| 5002S-10C | 3200698386 | Ammonia ($NH_3$) | 0 - 50 | 0.01 - 18,000 mg/L $NH_4^+$ | $NH_3$ Membrane Caps | 3200705774 |
| 6583S-10C | 3200697410 | Calcium ($Ca^{2+}$) | 0 - 50 | 0.4 - 40,080 mg/L $Ca^{2+}$ | 7683S | 3200697414 |
| 6560S-10C | 3200697407 | Chloride ($Cl^-$) | 0 - 50 | 0.35 - 35,000 mg/L $Cl^-$ | 7660S | 3200697411 |
| 6561S-10C | 3200693774 | Fluoride ($F^-$) | 0 - 50 | 0.02 - 19,000 mg/L $F^-$ | 7661S | 3200693606 |
| 6581S-10C | 3200697408 | Nitrate ($NO_3^-$) | 0 - 50 | 0.62 - 62,000 mg/L $NO_3^-$ | 7681S | 3200697412 |
| 6582S-10C | 3200697409 | Potassium ($K^+$) | 0 - 50 | 0.39 - 39,000 mg/L $K^+$ | 7682S | 3200697413 |

## Conductivity Cells

| Type | Model | Part No. | Temp. Range (°C) | Cell Constant | Measurement Range | Application |
|---|---|---|---|---|---|---|
| Submersible | 3551-10D | 3014081712 | 0 - 60 | 0.1 $cm^{-1}$ | 0.1 µS/cm - 10 mS/cm | Low conductivity water (e.g., deionized, distilled) |
| | | | | 10 $m^{-1}$ | 10 µS/m - 1 S/m | |
| | 9371-10D | 3200878882 | 0 - 100 | 0.1 $cm^{-1}$ | 0.01 µS/cm - 500 µS/cm | Low conductivity water and ultra-pure water |
| | | | | 10 $m^{-1}$ | 1 µS/m - 50 mS/m | |
| | 9382-10D | 3014046709 | 0 - 80 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | General purpose use; Waterproof |
| | | | | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | |
| | 9383-10D | 3200780927 | 0 - 80 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | General purpose use; Waterproof |
| | | | | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | |
| | 3552-10D | 3014081545 | 0 - 100 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | General purpose use |
| | | | | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | |
| | 3553-10D | 3014081714 | 0 - 60 | 10 $cm^{-1}$ | 10 µS/cm - 1 S/cm | High conductivity water |
| | | | | 1000 $m^{-1}$ | 1 mS/m - 100 S/m | |
| Flow | 3561-10D | 3014082350 | 0 - 60 | 0.1 $cm^{-1}$ | 0.1 µS/cm - 10 mS/cm | Low conductivity water (e.g., deionized, distilled) |
| | | | | 10 $m^{-1}$ | 10 µS/m - 1 S/m | |
| | 3562-10D | 3014082513 | 0 - 60 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | General purpose use |
| | | | | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | |
| | 3573-10C | 3014082590 | 0 - 60 | 10 $cm^{-1}$ | 10 µS/cm - 1 S/cm | High conductivity water |
| | | | | 1000 $m^{-1}$ | 1 mS/m - 100 S/m | |
| | 3574-10C | 3014082592 | 0 - 60 | 10 $cm^{-1}$ | 10 µS/cm - 100 mS/cm | Small volume sample (e.g., column chromatography) |
| | | | | 1000 $m^{-1}$ | 1 mS/m - 10 S/m | |

• Material: All have platinum-platinum black / glass-body, except 9382-10D and 9383-10D (titanium-platinum black / plastic-body) and 9371-10D (stainless steel).

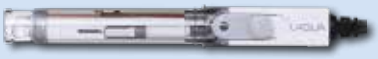
## Dissolved Oxygen Probes

| Type | Model | Part No. | Temp. Range (°C) | Measurement Range | Replacement Tip | Part No. |
|---|---|---|---|---|---|---|
| Field | 9551-20D / 9551-100D | 3014047090 / 3014047091 | 0 - 40 | 0 - 19.99 mg/L DO | 5401 | 3014072770 |
| | 9552-20D / 9552-50D | 3200780939 / 3200780941 | 0 - 50 | 0 - 20.00 mg/L DO | 5402 | 3200781553 |
| Lab | 9521-10D | 3200891722 | 0 - 50 | 0 - 20.00 mg/L DO | 7544 | 3200891724 |

# **pH Combination** Electrodes

HORIBA pH Combination electrodes manufactured with 1 meter cable terminating in BNC connector allow these electrodes to be used with any pH meter[1]. Enjoy the full spectrum of features and benefits of these electrodes on your existing pH meter[1]. (For applications where temperature measurement and compensation is required, please refer to the 3-in-1 pH electrodes).

[1] pH meters must have BNC connector

| Model | pH Range | Operating Temperature Range (°C) | Liquid Junction | Application |
|---|---|---|---|---|
| **ToupH Standard Electrode**<br>**9415-10C** General laboratory application<br>  <br>3200611623<br>Overall length: 151 mm<br>Diameter of probe: 12 mm<br>Connector: BNC | 0-14 | 0-100 | Ceramic | The electrode offers quick stability and drift reduction.<br>• Constructed with responsive glass that is 10X stronger than JIS standards<br>• The one-touch refilling port slider allows one-hand operation<br>• Waterproof, Pb-free glass<br><br>Perfect for preparing pH buffers and other aqueous test solutions. |
| **Standard Plastic Electrode**<br>**9425-10C** General field application<br>  <br>3200611625<br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connector: BNC | 0-14 | 0-100 | Ceramic | The electrode has plastic body, which is ideal for field measurement.<br>• Can be submerged up to 1m depth and 30mins (with refilling port closed)<br>• Waterproof, Pb-free glass<br><br>Recommended for field use. For measurement of tap water and drinking water. |
| **ToupH Sleeve Electrode**<br>**9481-10C** High viscosity application<br>  <br>3200611631<br>Overall length: 151 mm<br>Diameter of probe: 12 mm<br>Connector: BNC | 0-14 | 0-60 | Movable sleeve | The electrode gives stable readings in highly viscous samples.<br>• The liquid junction is designed with a movable sleeve that can be cleaned easily and prevents clogging<br>• Waterproof, Pb-free glass<br><br>For measurement of highly viscous samples and samples containing non-aqueous solvents (e.g., cosmetics, paints). |
| **ToupH Micro Electrode**<br>**9418-10C** Precious trace amount sample<br>  <br>3200611627<br>Overall length: 151.5 mm<br>Diameter of probe: 3 mm<br>Connector: BNC | 0-14 | 0-60 | Ceramic | The electrode can measure samples as small as 50µL.<br>• Compatible with extremely small containers (e.g., micro tubes)<br>• Temperature sensor is placed next to the bulb for quick response<br>• Waterproof<br><br>Suitable for low-volume samples and wide range of aqueous solutions. |
| **ToupH Long Electrode**<br>**9480-10C** For large containers and long test tubes<br>  <br>3200611628<br>Overall length: 251 mm<br>Diameter of probe: 8 mm<br>Connector: BNC | 0-14 | 0-100 | Ceramic | The long, thin body of the electrode is perfect for large containers and test tubes.<br>• 283mm length, 8mm diameter<br>• Constructed with responsive glass that is 10X stronger than JIS standards<br>• Waterproof, Pb-free glass<br><br>For measuring samples (e.g., microbial culture fluids) in test tubes and tall beakers. |
| **Long Electrode**<br>**6069-10C** For very slender test tubes<br>  <br>3014081107<br>Overall length: 291 mm<br>Diameter of probe: 3.15 mm<br>Connector: BNC | 0-14 | 0-60 | Ceramic | The long, thin body of the electrode is perfect for very slender test tubes.<br>• 291mm length, 3mm diameter<br>• Waterproof<br><br>For measuring samples in slender tubes (e.g., NMR test tube). |

| Model | pH Range | Operating Temperature Range (°C) | Liquid Junction | Application |
|---|---|---|---|---|
| **Flat Electrode**<br>**6261-10C**<br>  <br>3014081807<br>Overall length: 150 mm<br>Diameter of probe: 12 mm<br>Connector: BNC | 0-12 | 0-50 | Sleeve | The sensor is located on the flat surface of the tip.<br>• Measurement can be made from minute amount of moisture on solid sample surface<br>• Pure water can be applied for samples with no moisture<br>• Waterproof<br><br>Perfect for measuring samples in shallow containers (e.g., petri dishes) and gelatinous materials (e.g., nutrient agar). For surface measurement of meat, paper, skin, and cloth. |

# 3-in-1 pH Glass Body Electrodes[2]

HORIBA pH Combination electrodes with an integrated thermistor offer higher accuracy as these electrodes measure temperature concurrently with pH. The pH meter is able to continuously monitor and compensate for temperature effects automatically.

[2] Only compatible with HORIBA pH meters

| Model | pH Range | Operating Temperature Range (°C) | Liquid Junction | Application |
|---|---|---|---|---|
| **ToupH Standard Electrode**<br>**9615S-10D** General laboratory application<br>  <br>3200585428<br>Overall length: 151 mm<br>Diameter of probe: 12 mm<br>Connectors: BNC & phono jack | 0-14 | 0-100 | Ceramic | The electrode offers quick stability and drift reduction.<br>• Constructed with responsive glass that is 10x stronger than JIS standards<br>• The one-touch refilling port slider allows one-hand operation<br>• Waterproof, Pb-free glass<br><br>Perfect for preparing pH buffers and other aqueous test solutions. |
| **ToupH Sleeve Electrode**<br>**9681S-10D** High viscosity application<br>  <br>3200585463<br>Overall length: 151 mm<br>Diameter of probe: 12 mm<br>Connectors: BNC & phono jack | 0-14 | 0-60 | Movable sleeve | The electrode gives stable readings in highly viscous samples.<br>• The liquid junction is designed with a movable sleeve that can be cleaned easily and prevents clogging<br>• Waterproof, Pb-free glass<br><br>For measurement of highly viscous samples and samples containing non-aqueous solvents (e.g. cosmetics, paints). |
| **ToupH Micro Electrode**<br>**9618S-10D** Precious trace amount sample<br>  <br>3200585447<br>Overall length: 151.5 mm<br>Diameter of probe: 3 mm<br>Connectors: BNC & phono jack | 0-14 | 0-60 | Ceramic | The electrode can measure samples as small as 50µL.<br>• Compatible with extremely small containers (e.g. micro tubes)<br>• Temperature sensor is placed next to the bulb for quick response<br>• Waterproof<br><br>Suitable for low-volume samples and a wide range of aqueous solutions. |
| **ToupH Long Electrode**<br>**9680S-10D** For large containers and long test tubes<br>  <br>3200585428<br>Overall length: 251 mm<br>Diameter of probe: 8 mm<br>Connectors: BNC & phono jack | 0-14 | 0-100 | Ceramic | The long, thin body of the electrode is perfect for large containers and test tubes.<br>• 283mm length, 8mm diameter<br>• Constructed with responsive glass that is 10x stronger than JIS standards<br>• Waterproof, Pb-free glass<br><br>For measuring samples (e.g. microbial culture fluids) in test tubes and tall beakers. |
| **Needle Electrode**<br>**6252-10D** For food application<br>  <br>3014080850<br>Overall length: 150 mm<br>Diameter of probe: 12 mm<br>Connectors: BNC & phono jack | 0-12 | 0-60 | Ceramic | Needle electrode allows measurement of food samples and aqueous solutions. |

| Model | pH Range | Operating Temperature Range (°C) | Liquid Junction | Application |
|---|---|---|---|---|
| **Standard Sleeve Electrode**<br>**6367-10D**<br>  <br>3014079136<br>Overall length: 150 mm<br>Diameter of probe: 12 mm<br>Connectors: BNC & phono jack | 0-14 | 0-60 | Sleeve | Uses a sleeve at the liquid junction for improved stability and repeatability. For measuring pH at high accuracy. |

## 3-in-1 pH Plastic Body Electrodes[2]

[2] Only compatible with HORIBA pH meters

| Model | pH Range | Operating Temperature Range (°C) | Liquid Junction | Applications |
|---|---|---|---|---|
| **Gel-filled pH Electrode**<br>**9651-10D** For Field<br>  <br>3200642020<br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack | 0-14 | 0-80 | Porous sintered polyethylene | The plastic body of the electrode is filled with gel electrolyte. Less maintenance is needed as refilling is not required.<br>• Can be submerged up to 1m depth of water for 30mins.<br>• Waterproof, Pb-free glass<br><br>Recommended for field use. |
| **Gel-filled pH Electrode**<br>**9652-10D; 9652-20D** For Field<br>  <br>3200786359; 3200786361<br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack | 0-14 | 0-80 | Porous sintered polyethylene | The plastic body of the electrode is filled with gel electrolyte. Less maintenance is needed as refilling is not required.<br>• Can be submerged up to 1m depth of water for 30mins.<br>• Waterproof, Pb-free glass<br><br>Recommended for field use. |
| **Standard Plastic Electrode**<br>**9625-10D; 9625-20D; 9625-30D** For Field<br>  <br>3200360505; 3200393025; 3200393026<br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack | 0-14 | 0-100 | Ceramic | The electrode has a plastic body which is ideal for field measurement.<br>• Can be submerged up to 1m depth of water for 30mins. (with refilling port closed)<br>• Waterproof, Pb-free glass<br><br>Recommended for field use. For measurement of tap water and drinking water. |
| **Hydrofluoric Acid Resistant Electrode**<br>**9631-10D**<br>  <br>3200524119<br>Overall length: 155 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack | 2-12 | 0-60 | Ceramic | The electrode can measure 1% hydrofluoric acid solution (at 25°C, immersed at 1min.) for about 1000 times.<br>• Rolled glass design for long-term reliable measurement and easy maintenance<br>• Compliant with Japan's Measurement Act Certification<br>• Waterproof, Pb-free glass<br><br>Suitable for drain water measurement after etching process. |
| **Strong Alkali Resistant Electrode**<br>**9632-10D**<br>  <br>3200524120<br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack | 0-14 | 0-100 | Ceramic | The alkali-resistant glass membrane has higher resistance and longer stability (about 5X in 0.1mol/L sodium at 60°C, pH 13) than conventional electrodes.<br>• Waterproof, Pb-free glass<br><br>Suitable for strong alkali samples such as plating solutions. |
| **Standard Plastic Electrode**<br>**9630-10D** For tap water<br>  <br>3200528726<br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack | 0-14 | 0-100 | Ceramic | The electrode can measure samples with low conductivity or buffering capacity.<br>• Made of high purity multicomponent lithium series glass<br>• Waterproof, Pb-free glass<br><br>Suitable for tap water measurement and quality control in water purification plant. Recommended to use with cleaning solution 230. |

# 3-in-1 ORP Electrodes

HORIBA ORP electrodes have flat platinum tip that allows measurement of low-volume samples and thermistor that ensures accurate temperature reading during ORP measurement.

| Model | Operating Temperature Range (°C) | Electrode Material | Liquid Junction | Applications |
|---|---|---|---|---|
| **Standard ORP Electrode**<br>**9300-10D** For Laboratory<br>  <br>Overall length: 150 mm<br>Diameter of probe: 12 mm<br>Connectors: BNC & phono jack<br>3014046710 | 0-60 | Pt / Glass | Ceramic | Waterproof & refillable with 3.33M KCl; Suitable for lab use. |
| **Gel-filled ORP Electrode**<br>**9301-10D** For Field<br>  <br>Overall length: 110 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack<br>3200922105 | 0-80 | Pt / Plastic | Porous sintered polyethylene | Waterproof & maintenance-free; Suitable for field use. |

# Dissolved Oxygen (DO) Electrodes & Tips

HORIBA Dissolved Oxygen (DO) electrodes are galvanic probes with integrated temperature sensors. With galvanic DO probes, calibration can be performed immediately and in air. The HORIBA DO probes use unique and innovative tips which are replaceable. No need to replace membranes or refill electrolytes.

Three models are available: 9520 that can be used for lab BOD measurements, and 9551 / 9552 housed in a rugged casing available in 2m, 5m, and 10m cable configurations for field use. The 9520 model is fitted with a rotor as well as an adaptor to facilitate BOD measurements.

## DO Electrodes

| Model | Measurement Range | Response Time | Temperature Range (°C) | Features |
|---|---|---|---|---|
| **9521-10D** For laboratories<br>  <br>Overall length: 183 mm<br>Diameter of probe: 15.6 mm<br>Connectors: BNC & phono jack<br>3200891722 | 0-20.00mg/L DO | 20 seconds (90% response time at constant temperature) | 0-50 | Waterproof; Comes with replaceable DO tip 7544. |
| **9551-20D; 9551-100D** For field<br>  <br>Overall length: 165 mm<br>Diameter of probe: 32 mm<br>Connectors: BNC & phono jack<br>3014047090; 3014047091 | 0-19.99mg/L DO | 30 seconds (90% response time at constant temperature) | 0-40 | Waterproof; Comes with replaceable DO tip 5401. |
| **9552-20D; 9552-50D** For field<br>  <br>Overall length: 165 mm<br>Diameter of probe: 30 mm<br>Connectors: BNC & phono jack<br>3200780939; 3200780941 | 0-20.00 mg/L DO | 30 seconds (90% response time at constant temperature) | 0-50 | Waterproof; Comes with replaceable DO tip 5402. |

## DO Electrode Tips

| Model | Description |
|---|---|
| **7541**<br>  <br>Overall length: 26.5 mm<br>Diameter: 15 mm<br>3014074145 | Replacement DO electrode tip for 9520-10D |
| **7544**<br>  <br>Overall length: 43 mm<br>Diameter: 15 mm<br>3200891724 | Replacement DO electrode tip for 9521-10D |
| **5401**<br>  <br>3014072770 | Replacement DO electrode tip for 9551-20D and 9551-100D |
| **5402**<br>  <br>Overall length: 19 mm<br>Diameter: 21 mm<br>3200781553 | Replacement DO electrode tip for 9552-20D and 9552-50D |

# **Conductivity** Electrode Cells

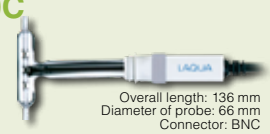
HORIBA Conductivity cells are available as Submersible type and Flow type, as well as in a variety of cell constants ranging from 0.1 to 10.0.

The HORIBA Conductivity cells are integrated with temperature sensor (except for 3573 & 3574) and the wetted material is either **Stainless Steel or Platinum / Titanium coated with Platinum black**. Rugged Titanium allows cell to be used in a wide range of applications, including highly corrosive samples such as concentrated acids and sea water. Maintenance is simple – soak in deionized/demineralized water or with the conditioning solution. The 9371-10D stainless steel conductivity cell is compatible with the glass flow cell.

## Conductivity Cells (Submersible Type)

| Model | Cell Constant | Measurement Range | Temp. Range (°C) | Cell Material | Thermistor | Minimum Sample Volume (ml) | Application |
|---|---|---|---|---|---|---|---|
| **3551-10D**<br>  <br>Overall length: 175 mm<br>Diameter of probe: 23 mm<br>Connectors: BNC & phono jack<br>3014081712 | 0.1 $cm^{-1}$ | 0.1 µS/cm - 10 mS/cm | 0 - 60 | Pt-Pt black / Glass | Built-in | 50 | Low conductivity water (e.g., deionized, distilled) |
| | 10 $m^{-1}$ | 10 µS/m - 1 S/m | | | | | |
| **3552-10D**<br>  <br>Overall length: 150 mm<br>Diameter of probe: 12 mm<br>Connectors: BNC & phono jack<br>3014081545 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | 0 - 100 | Pt-Pt black / Glass | Built-in | 15 | General purpose use |
| | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | | | | | |
| **3553-10D**<br>  <br>Overall length: 175 mm<br>Width of probe: 28 mm<br>Connectors: BNC & phono jack<br>3014081714 | 10 $cm^{-1}$ | 10 µS/cm - 1 S/cm | 0 - 60 | Pt-Pt black / Glass | Built-in | 50 | High conductivity water |
| | 1000 $m^{-1}$ | 1 mS/m - 100 S/m | | | | | |
| **9371-10D**<br>  <br>Overall length: 180 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack<br>3200878882 | 0.1 $cm^{-1}$ | 0.01 µS/cm - 500 µS/cm | 0 - 100 | Stainless Steel | Built-in | 20-30 | Low conductivity water and ultra-pure water |
| | 10 $m^{-1}$ | 1 µS/m - 50 mS/m | | | | | |
| **9382-10D**<br>  <br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack<br>3014046709 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | 0 - 80 | Ti-Pt black / Plastic | Built-in | 20-30 | General purpose use; Waterproof |
| | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | | | | | |
| **9383-10D**<br>  <br>Overall length: 150 mm<br>Diameter of probe: 16 mm<br>Connectors: BNC & phono jack<br>3200780927 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | 0 - 80 | Ti-Pt black / Plastic | Built-in | 20-30 | General purpose use; Waterproof |
| | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | | | | | |

## Conductivity Cells (Flow Type)

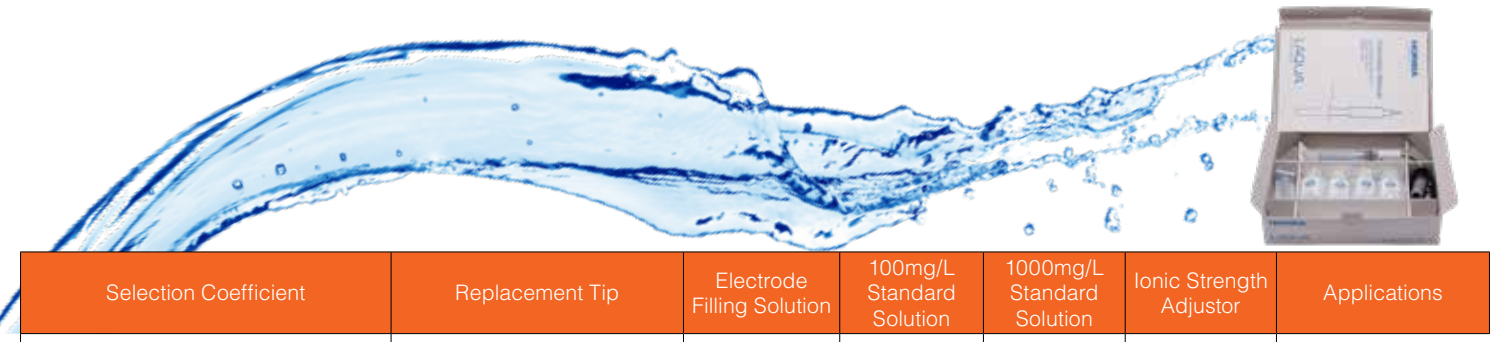
| Model | Cell Constant | Measurement Range | Temp. Range (°C) | Cell Material | Thermistor | Minimum Sample Volume (ml) | Application |
|---|---|---|---|---|---|---|---|
| **3561-10D**<br>  <br>Overall length: 143 mm<br>Diameter of probe: 18 mm<br>Connectors: BNC & phono jack<br>3014082350 | 0.1 $cm^{-1}$ | 0.1 µS/cm - 10 mS/cm | 0 - 60 | Pt-Pt black / Glass | Built-in | 10 | Low conductivity water (e.g., deionized, distilled) |
| | 10 $m^{-1}$ | 10 µS/m - 1 S/m | | | | | |
| **3562-10D**<br>  <br>Overall length: 205 mm<br>Diameter of probe: 18 mm<br>Connectors: BNC & phono jack<br>3014082350 | 1 $cm^{-1}$ | 1 µS/cm - 100 mS/cm | 0 - 60 | Pt-Pt black / Glass | Built-in | 16 | General purpose use |
| | 100 $m^{-1}$ | 0.1 mS/m - 10 S/m | | | | | |
| **3573-10C**<br>  <br>Overall length: 222 mm<br>Diameter of probe: 18 mm<br>Connector: BNC<br>3014082590 | 10 $cm^{-1}$ | 10 µS/cm - 1 S/cm | 0 - 60 | Pt-Pt black / Glass | — | 4 | High conductivity water |
| | 1000 $m^{-1}$ | 1 mS/m - 100 S/m | | | | | |
| **3574-10C**<br>  <br>Overall length: 136 mm<br>Diameter of probe: 66 mm<br>Connector: BNC<br>3014082592 | 10 $cm^{-1}$ | 10 µS/cm - 100 mS/cm | 0 - 60 | Pt-Pt black / Glass | — | 0.25 | Small volume sample (e.g., column chromatography) |
| | 1000 $m^{-1}$ | 1 mS/m - 10 S/m | | | | | |

# Combination ISE

Ion-selective electrodes are responsive to concentration of particular ions in the test liquid and are variable-potential electrodes. They are used in conjunction with reference electrodes to measure the concentration of particular ions. HORIBA's years of experience and know-how in this field are behind the wide range of ion electrodes we offer.

When measurements are made using an ion meter, calibrating it with various standard solutions will give direct readings of the ion concentration. Note that since volume-detection level changes with temperature, measurements must be taken at a fixed temperature.

| Model | Accessories Included | Temp. Range (°C) | Measurement Range | pH Range |
|---|---|---|---|---|
|  **Ammonia ($NH_3$) electrode** **5002S-10C** 3200698386 Overall length: 150 mm Diameter of probe: 15 mm Connector: BNC | • membrane cap, 3pcs • 1000mg/L ammonium ion standard solution, 50ml • 100mg/L ammonium ion standard solution, 50ml • ammonia electrode filling solution, 50ml • syringe • dropper • protective pipe • manual | 0 - 50 | 0.01 - 18,000 mg/L $NH_4^+$ ($5 \times 10^{-7}$ to 1 mol/L $NH_4^+$) | pH 12 or more |
|  **Calcium ion ($Ca^{2+}$) electrode** **6583S-10C** 3200697410 Overall length: 150 mm Diameter of probe: 16 mm Connector: BNC | • calcium electrode tip, 2pcs • 1000mg/L calcium ion standard solution, 50ml • 100mg/L calcium ion standard solution, 50ml • calcium electrode filling solution, 50ml • calcium ionic strength adjustor, 50ml • syringe • dropper • protective pipe • manual | 0 - 50 | 0.4 - 40,080 mg/L $Ca^{2+}$ ($10^{-5}$ to 1 mol/L $Ca^{2+}$) | 4.0 mg/L ($10^{-4}$ mol/L) $Ca^{2+}$, pH 5 to 11 |
|  **Chloride ion ($Cl^-$) electrode** **6560S-10C** 3200697407 Overall length: 150 mm Diameter of probe: 16 mm Connector: BNC | • chloride electrode tip • 1000mg/L chloride ion standard solution, 50ml • 100mg/L chloride ion standard solution, 50ml • syringe • dropper • protective pipe • water-resistant abrasive sheet • manual | 0 - 50 | 0.35 - 35,000 mg/L $Cl^-$ ($10^{-5}$ to 1 mol/L $Cl^-$) | 350 mg/L ($10^{-2}$ mol/L) $Cl^-$, pH 3 to 11 |
|  **Fluoride ion ($F^-$) electrode** **6561S-10C** 3200693774 Overall length: 150 mm Diameter of probe: 16 mm Connector: BNC | • fluoride electrode tip • 1000mg/L fluoride ion standard solution, 50ml • 100mg/L fluoride ion standard solution, 50ml • fluoride electrode filling solution, 50ml • fluoride ionic strength adjustor, 50ml • dropper • protective pipe • manual | 0 - 50 | 0.02 - 19,000 mg/L $F^-$ ($10^{-6}$ to 1 mol/L $F^-$) | 0.1 to 1,000 mg/L $F^-$, pH 5 to 8 |
|  **Nitrate ion ($NO_3^-$) electrode** **6581S-10C** 3200697408 Overall length: 150 mm Diameter of probe: 16 mm Connector: BNC | • nitrate electrode tip, 2pcs • 1000mg/L nitrate ion standard solution, 50ml • 100mg/L nitrate ion standard solution, 50ml • nitrate electrode filling solution, 50ml • nitrate ionic strength adjustor, 50ml • syringe • dropper • protective pipe • manual | 0 - 50 | 0.62 - 62,000 mg/L $NO_3^-$ ($10^{-5}$ to 1 mol/L $NO_3^-$) | 62 mg/L ($10^{-3}$ mol/L) $NO_3^-$, pH 3 to 7 |
|  **Potassium ion ($K^+$) electrode** **6582S-10C** 3200697409 Overall length: 150 mm Diameter of probe: 16 mm Connector: BNC | • potassium electrode tip, 2pcs • 1000mg/L potassium ion standard solution, 50ml • 100mg/L potassium ion standard solution, 50ml • potassium electrode filling solution, 50ml • potassium ionic strength adjustor, 50ml • syringe • dropper • protective pipe • manual | 0 - 50 | 0.39 - 39,000 mg/L $K^+$ ($10^{-5}$ to 1 mol/L $K^+$) | 3.9 mg/L ($10^{-4}$ mol/L) $K^+$, pH 5 to 11 |



| Selection Coefficient | Replacement Tip | Electrode Filling Solution | 100mg/L Standard Solution | 1000mg/L Standard Solution | Ionic Strength Adjustor | Applications |
|---|---|---|---|---|---|---|
| — |  **$NH_3$ electrode membrane caps** 3200705774 | 500-NH3-IFS 3200697173 | 500-NH4-SL 3200697172 | 500-NH4-SH 3200697171 | 500-NH3-ISA 3200697174  | Agriculture, Soil, Power Station Water, Fish Tanks, Sea Water, Waste Water, Plating Baths, Air / Stack Gases and Biological Cultures or Samples |
| $Fe^{3+}$ = 0.1, $Fe^{2+}$, $Zn^{2+}$ = 1, $Sr^{2+}$ = 50<br>$Ni^{2+}$, $Cu^{2+}$ = 70, $Co^{2+}$ = 350<br>$Mn^{2+}$ = 500, $Mg^{2+}$ = 1,000<br>$Na^+$, $K^+$, $Ba^{2+}$, $NH_4^+$ = over 1,000 |  **7683S** 3200697414 | 500-CA-IFS 3200697177 | 500-CA-SL 3200697176 | 500-CA-SH 3200697175 | 500-CA-ISA 3200697178 | Agriculture / Plant Tissue, Soil, Water Softening Systems, Boiler Feed Water, Drinking / Mineral Water, Biological Cultures, Dental / Clinical Analysis and Dairy / Food / Beverages Applications |
| $S_2O_3^{2-}$, $S^{2-}$, $I^-$, $Ag^+$, $Hg^{2+}$ = Not acceptable<br>$SCN^-$= 0.3, $MnO_4^-$= 0.1<br>$Br^-$= 0.03<br>$NO_3^-$, $F^-$, $HCO_3^-$, $SO_4^{2-}$, $PO_4^{2-}$= 1,000 |  **7660S** 3200697411 | 500-CL-IFS 3200697169 | 500-CL-SL 3200697168 | 500-CL-SH 3200697167 | 500-CL-ISA 3200697170 | Agriculture, River / Tap Water, Plant Tissue, Soils, Boiler Feed Water, Clinical Analysis, Sweat, Urine, Cement, Plating Baths and Dairy / Food / Beverages Samples |
| Possible interference when multiply-charged ion (ex. $Al^{3+}$, $Fe^{3+}$) coexisted and foamed the complex. |  **7661S** 3200693606 | 500-F-IFS 3200697165 | 500-F-SL 3200697164 | 500-F-SH 3200697163 | 500-F-TISAB 3200697166 | Dental / Toothpaste / Mouth Wash, Drinking / Seawater, Wastewater, Air / Stack Gases, Acids, Soils, Food, Biological Fluids, Plant Tissue, Coal, Carbonated Beverages and Bone |
| $ClO_4^-$, $I^-$ = Not acceptable, $Br^-$= 2<br>$NO_2^-$= 3, $Cl^-$ = 300<br>$HCO_3^-$, $H_2PO_4^-$, $SO_4^{2-}$=over 1000 |  **7681S** 3200697412 | 500-NO3-IFS 3200697181 | 500-NO3-SL 3200697180 | 500-NO3-SH 3200697179 | 500-NO3-ISA 3200697182 | Agriculture / Plant Tissue / Fertilizers, Surface / Seawater / Drinking Water, Sewage Effluent, Soils, Meats, Vegetables, Foods / Beverages |
| $Rb^+$ = 0.4, $Cs^+$ = 3, $NH_4^+$ = 70<br>$Li^+$, $Na^+$, $Mg^{2+}$, $Ca^{2+}$, $Sr^{2+}$, $Ba^{2+}$ = over 1,000 |  **7682S** 3200697413 | 500-K-IFS 3200697185 | 500-K-SL 3200697184 | 500-K-SH 3200697183 | 500-K-ISA 3200697186 | Agriculture / Plant Tissue, Soils, Wastewater, River / Tap Water, Clinical Analysis, Saliva, Serum, Fertilizers, Soils and Wines, Dairy / Foods / Beverages |

Note: Detailed information on standard solutions, ISAs, and filling solutions can be found on page 16

# **LAQUA WQ-300 Series** Smart Digital Sensors

# HORIBA's Smart digital sensor technology

All sensor heads are offered in 2-m and 5-m cable versions. A 10-m extension cable is also available.

## Maintenance-free, gel-filled pH sensor

### No electrolyte refilling required

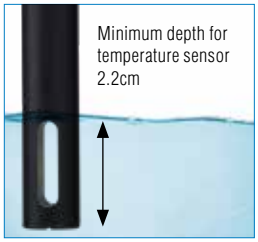
- KCl gel electrolyte
- Double junction reference
- Porous sintered polyethylene junction
- Built-in temperature sensor
- Rugged polycarbonate body
- Replaceable pH sensor cartridge

pH

## 2-Cell & 4-Cell conductivity sensors

### Wide range of conductivity measurements possible

- 2-Cell conductivity sensor with flow cell is designed for ultra-pure water applications
- From clean water to industrial wastewater, the 4-cell type can measure a variety of samples with different conductivities
- Built-in temperature sensor
- Stainless steel 2-cell cartridge
- Durable epoxy / carbon body 4-cell cartridge
- Replaceable conductivity sensor cartridge



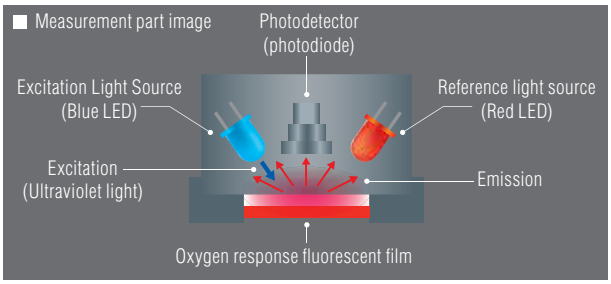

Detachable glass flow cell

COND

## Optical dissolved oxygen (DO) sensor

### Longer usable life with excellent performance

- Easy to handle – not affected with sample flow velocity, not sensitive to hydrogen sulfide, DO sensor cap replacement after 1-2 years*
- Built-in temperature sensor
- Comes with replaceable DO sensor cap, air calibration bottle and Stainless Steel DO Sensor Protective Guard



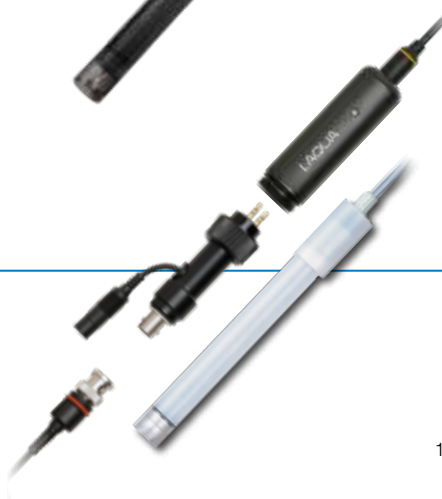

DO

ORP

## Maintenance-free, gel-filled ORP sensor

### No electrolyte refilling required

- Platinum tip attached to glass
- KCl gel electrolyte
- Porous sintered polyethylene junction
- Built-in temperature sensor
- Rugged polycarbonate body
- Replaceable ORP sensor cartridge



Ion

## Ion sensor head

### Compatible with conventional ion selective electrodes

- Accepts all combination ion selective electrodes with BNC connector
- Requires sensor head adapter

*Depending on application, handling, and maintenance

# **LAQUA WQ-300 Series** Sensor Specifications

| **pH Sensor Head** pH / mV / Temp (°C/°F) | | |
|---|---|---|
| Model | **300PH-2** | **300PH-5** |
| Part No. | 3200812206 | 3200812207 |
| pH Range | -2.00 to 20.00 pH<br>-2.000 to 20.000 pH | |
| Resolution | -2.00 to 20.00: 0.01 pH<br>-2.000 to 20.000: 0.001 pH | |
| Accuracy | -2.00 to 20.00: ±0.01<br>-2.000 to 20.000: ±0.005 | |
| Calibration Points | Up to 6 | |
| pH Buffer Groups | USA, DIN, NIST, NIST10, Custom | |
| mV Range | ±1000.0 mV | |
| Resolution | 0.1 mV | |
| Accuracy | ±0.1 mV | |
| Temperature Range | -30.0 to 130.0 °C<br>-22.0 to 266.0 °F | |
| Resolution | 0.1 °C / °F | |
| Accuracy | ±0.5 °C / ±0.9 °F | |
| Calibration Option | Yes | |
| Body Material | ABS / Polycarbonate | |
| Length and Diameter | 85 x 30 mm | |
| Connector | Push-pull | |
| Cable Length | 2 m | 5 m |

| **pH Sensor Cartridge** pH/mV/Temp (°C/°F) | |
|---|---|
| Model | **300-P-C** |
| Part No. | 3200786363 |
| pH Range | -2.00 to 20.00 pH<br>-2.000 to 20.000 pH |
| Temperature Range | 0 to 80 °C<br>-32.0 to 176.0 °F |
| Junction Material | Porous sintered polyethylene |
| Double Junction | Yes |
| Temperature Sensor | Built-in |
| Length and Diameter | 110 x 16 mm |
| Body Material | Polycarbonate, glass bulb |

| **Dissolved Oxygen Sensor** DO (mg/L, %) / $O_2$ / Temp (°C/°F) | | |
|---|---|---|
| Model | **300-D-2** | **300-D-5** |
| Part No. | 3200780940 | 3200780942 |
| Dissolved Oxygen (DO) Range | 0.00 to 20.00 mg/L<br>0.0 to 200.0 % | |
| Resolution | 0.01 mg/L, 0.1% | |
| Accuracy | ±0.2 mg/L, ±2 % | |
| Salinity Compensation | Auto: by conductivity sensor / Manual: 0.0 to 40.0 ppt | |
| Barometric Pressure Compensation | Auto: by built-in barometer / Manual: 10.0 to 199.9 kPa | |
| Calibration Points | Up to 2 | |
| Oxygen Range | 0.0 to 50.0% | |
| Resolution | 0.1% | |
| Accuracy | ±0.5% | |
| Temperature Range | -30.0 to 130.0 °C<br>-22.0 to 266.0 °F | |
| Resolution | 0.1 °C / °F | |
| Accuracy | ±0.5 °C / ±0.9 °F | |
| Calibration Option | Yes | |
| Body Material | ABS / Polycarbonate | |
| Length and Diameter | 200 x 16 mm | |
| Connector | Push-pull | |
| Cable Length | 2 m | 5 m |
| Sensor cap included | 1 | |

| **Dissolved Oxygen Sensor Cap** | |
|---|---|
| Model | **300-D-M** |
| Part No. | 3200781554 |
| DO Range | 0.00 to 20.00 mg/L<br>0.0 to 200.0 % |
| Temperature Range | 0 to 50.0 °C<br>32.0 to 122.0 °F |
| Length and Diameter | 10 x 16 mm |
| Body Material | PVC, PMMA |

| **Conductivity Sensor Head** EC / Sal / TDS / Res / Temp (°C/°F) | | |
|---|---|---|
| Model | **300-C-2** | **300-C-5** |
| Part No. | 3200784468 | 3200812202 |
| Conductivity Range | µS/cm<br>0.000 to 0.199<br>0.200 to 1.999<br>2.00 to 19.99<br>20.0 to 199.9<br>200 to 1999<br>mS/cm<br>2.00 to 19.99<br>20.0 to 199.9<br>200 to 2000 | µS/m<br>0.0 to 19.9<br>20.0 to 199.9<br>200 to 1999<br>mS/m<br>2.00 to 19.99<br>20.0 to 199.9<br>200 to 1999<br>S/m<br>2.00 to 19.99<br>20.0 to 200.0 |
| Resolution | Auto ranging, up to 4 significant digits | |
| Accuracy | ± 0.5% full scale of each range<br>> 200 mS/cm (20.0 S/m): ± 1.5% full scale | |
| Reference Temperature | 15 to 30°C | |
| Temperature Coefficient | 0.00 to 10.00 %/°C | |
| Calibration Points | Up to 4 (Auto) / Up to 5 (Manual) | |
| Units | S/cm, S/m | |
| Salinity Range | 0.00 to 80.00 ppt<br>0.000 to 8.000 % | |
| Resolution | 0.01 ppt, 0.001 % | |
| Accuracy | ± 0.5% of reading or ± 0.01 ppt, whichever is greater | |
| Salinity Curves | NaCl, Seawater (UNESCO 1978) | |
| Calibration Option | Yes | |
| Total Dissolved Solids (TDS) Range | 0.01 mg/L to 200,000 mg/L | |
| Resolution | 0.01 minimum, 4 significant digits | |
| Accuracy | ± 0.5% of reading or ± 0.1 mg/L, whichever is greater | |
| TDS Curves | Linear (0.40 to 1.00), EN27888, 442, NaCl | |
| Resistivity Range | Ω•cm<br>0.1 to 199.9<br>200 to 1999<br>kΩ•cm<br>2.00 to 19.99<br>20.0 to 199.9<br>200 to 1999<br>MΩ•cm<br>2.00 to 19.99<br>20.0 to 200.0 | Ω•m<br>0.001 to 1.999<br>2.00 to 19.99<br>20.0 to 199.9<br>200 to 1999<br>kΩ•m<br>2.00 to 19.99<br>20.0 to 199.9<br>200 to 2000 |
| Resolution | Auto ranging, up to 4 significant digits | |
| Accuracy | ± 0.5% full scale of each range<br>> 200 mS/cm (20.0 S/m): ± 1.5% full scale | |
| Temperature Range | -30.0 to 130.0 °C<br>-22.0 to 266.0 °F | |
| Resolution | 0.1 °C / °F | |
| Accuracy | ±0.5 °C / ±0.9 °F | |
| Calibration Option | Yes | |
| Body Material | ABS / Polycarbonate | |
| Length and Diameter | 85 x 30 mm | |
| Connector | Push-pull | |
| Cable Length | 2 m | 5 m |

| **4-Cell Conductivity Sensor Cartridge** | |
|---|---|
| Model | **300-4C-C** |
| Part No. | 3200780928 |
| Cell Constant | 0.172 $cm^{-1}$ |
| Conductivity Range | 10 µS/cm to 2000 mS/cm |
| Operating Temperature Range | 0 to 100 °C<br>32.0 to 212.0 °F |
| Temperature Sensor | Built-in |
| Length and Diameter | 110 x 16 mm |
| Body Material | Epoxy, carbon |

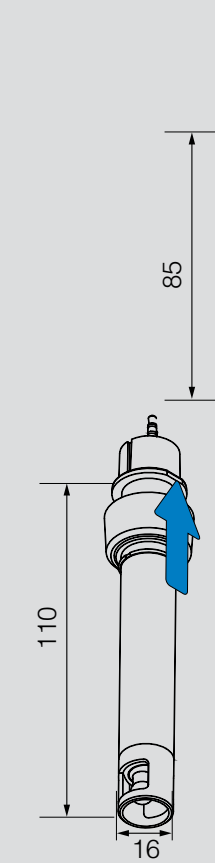
| **2-Cell Conductivity Sensor Cartridge** | |
|---|---|
| Model | **300-2C-C** |
| Part No. | 3200820579 |
| Cell Constant | 0.1 $cm^{-1}$ |
| Conductivity Range | 0.01 µS/cm to 500 µS/cm |
| Temperature Range | 0 to 100 °C<br>32.0 to 212.0 °F |
| Temperature Sensor | Built-in |
| Length and Diameter | 110 x 16 mm |
| Body Material | Stainless steel |

| **Ion Sensor Head** Ion / mV / Temp (°C/°F) | | |
|---|---|---|
| Model | **300-I-2** | **300-I-5** |
| Part No. | 3200812203 | 3200923560 |
| Ion Range | (mg/L, mmol/L)<br>0.000 to 0.999, 1.00 to 9.99, 10.0 to 99.9, 100 to 999, 1000 to 9990, 10000 to 99900 | |
| Resolution | 0.001 minimum, 3 significant digits | |
| Accuracy | ±0.3% full scale | |
| Calibration Points | Up to 5 | |
| mV Range | ±1000.0 mV | |
| Resolution | 0.1 mV | |
| Accuracy | ±0.1 mV | |
| Temperature Range | -30.0 to 130.0 °C<br>-22.0 to 266.0 °F | |
| Resolution | 0.1 °C / °F | |
| Accuracy | ±0.5 °C / ±0.9 °F | |
| Calibration Option | Yes | |
| Body Material | ABS / Polycarbonate | |
| Length and Diameter | 85 x 30 mm | |
| Connector | Push-pull | |
| Cable Length | 2 m | 5 m |

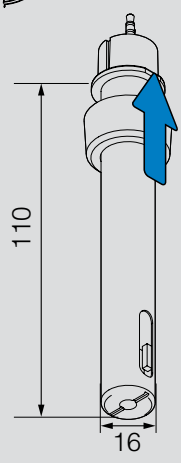
| **ORP Sensor Head** ORP / Temp (°C/°F) | | |
|---|---|---|
| Model | **300-O-2** | **300-O-5** |
| Part No. | 3200812204 | 3200923561 |
| ORP Range | -2000 to +2000 mV | |
| Resolution | < ±1000.0 mV: 0.1mV<br>≥ 1000.0 mV: 1 mV | |
| Accuracy | < ±1000.0 mV: ±0.1 mV<br>≥ 1000.0 mV: ±1 mV | |
| Calibration Option | Yes | |
| Temperature Range | -30.0 to 130.0 °C<br>-22.0 to 266.0 °F | |
| Resolution | 0.1 °C / °F | |
| Accuracy | ±0.5 °C / ±0.9 °F | |
| Calibration Option | Yes | |
| Body Material | ABS / Polycarbonate | |
| Length and Diameter | 85 x 30 mm | |
| Connector | Push-pull | |
| Cable Length | 2 m | 5 m |

| **ORP Sensor Cartridge** ORP / Temp (°C/°F) | |
|---|---|
| Model | **300-O-C** |
| Part No. | 3200922104 |
| ORP Range | -2000 to +2000 mV |
| Temperature Range | 0 to 80 °C<br>-32.0 to 176.0 °F |
| Junction Material | Porous sintered polyethylene |
| Double Junction | Yes |
| Temperature Sensor | Buit-in |
| Length and Diameter | 110 x 16 mm |
| Body Material | Polycarbonate, platinum/glass |

## pH / ORP / Conductivity Sensor Head

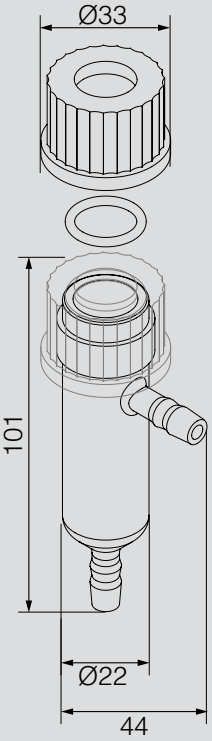



pH / ORP sensor cartridge

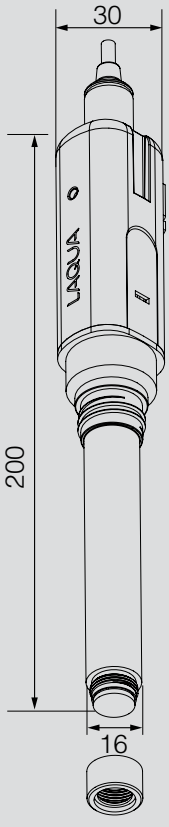



4-cell / 2-cell Conductivity sensor cartridge

## Flow Cell

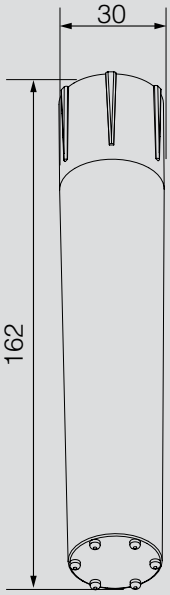



## Optical DO Sensor

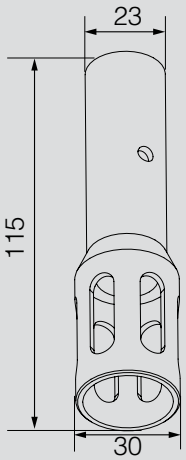



DO sensor cap

## DO Calibration bottle




## Stainless Steel DO Sensor Protective Guard



501-S NIST pH Buffer Solution Kit

502-S USA pH Buffer Solution Kit

503-S Conductivity Standard Solution Kit

160-51 & 160-22 ORP Powders

500-225 ORP Standard Solution 225 mV

220 250

230

Cleaning Solutions

## pH Buffer Solution Kits

| Model | Part No. | Description | Volume |
|---|---|---|---|
| 501-S | 3999960015 | NIST pH Buffer Solution Kit (pH 4.01, 6.86, 9.18 buffers & 3.33M KCl) | 250ml each |
| 502-S | 3999960016 | USA pH Buffer Solution Kit (pH 4.01, 7.00, 10.01 buffers & 3.33M KCl ) | 250ml each |

## pH Buffer Solutions

| Model | Part No. | Description | Volume |
|---|---|---|---|
| 500-2 | 3999960028 | pH 1.68 Buffer Solution at 25°C | 500ml |
| 500-4 | 3999960029 | pH 4.01 Buffer Solution at 25°C | 500ml |
| 500-686 | 3999960030 | pH 6.86 Buffer Solution at 25°C | 500ml |
| 500-7 | 3999960031 | pH 7.00 Buffer Solution at 25°C | 500ml |
| 500-9 | 3999960032 | pH 9.18 Buffer Solution at 25°C | 500ml |
| 500-10 | 3999960033 | pH 10.01 Buffer Solution at 25°C | 500ml |
| 500-12 | 3999960034 | pH 12.46 Buffer Solution at 25°C | 500ml |

## Conductivity Standard Solution Kit

| Model | Part No. | Description | Volume |
|---|---|---|---|
| 503-S | 3999960017 | Conductivity Standard Solution Kit (84µS/cm, 1413µS/cm, 12.88mS/cm & 111.8mS/cm) | 250ml each |

## Conductivity Standard Solutions

| Model | Part No. | Description | Volume |
|---|---|---|---|
| 500-21 | 3999960035 | 84 µS/cm Conductivity Standard Solution | 500ml |
| 500-22 | 3999960036 | 1413 µS/cm Conductivity Standard Solution | 500ml |
| 500-23 | 3999960037 | 12.88 mS/cm Conductivity Standard Solution | 500ml |
| 500-24 | 3999960038 | 111.8 mS/cm Conductivity Standard Solution | 500ml |

## ORP Standard Solution & Powders

| Model | Part No. | Description | Volume |
|---|---|---|---|
| 500-225 | 4000047848 | ORP Standard Solution 225 mV at 25°C | 500ml |
| 160-51 | 3200043618 | ORP Powder 89 mV at 25°C (for 250ml solution) | 10 sachets/pack |
| 160-22 | 3200043617 | ORP Powder 258 mV at 25°C (for 250ml solution) | 10 sachets/pack |

## pH/ORP Electrode Filling Solutions

| Model | Part No. | Description | Volume |
|---|---|---|---|
| 525-3 | 3999960023 | 3.33M KCl | 250ml |
| 300 | 3200043640 | 3.33M KCl | 250ml |

## pH Electrode Cleaning Solutions

| Model | Part No. | Description | Volume |
|---|---|---|---|
| 220 | 3014028653 | For removing inorganic residues from glass membrane and liquid junction | 2 x 50ml |
| 230 | 3200530494 | For removing inorganic and organic residues from glass membrane (30ml Solution A & 100ml Solution B) | 30ml & 100ml |
| 250 | 3200366771 | For removing protein residues from glass membrane and liquid junction | 400ml |

Calcium Ion Electrode Solutions

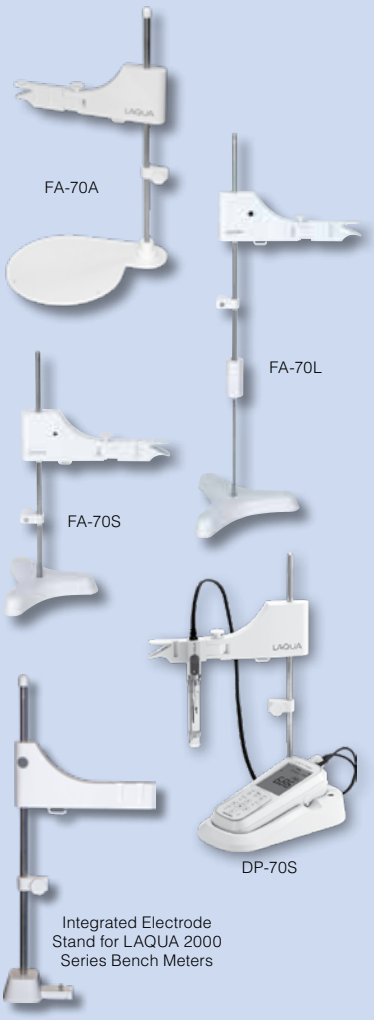
Chloride Ion Electrode Solutions

Fluoride Ion Electrode Solutions

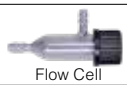
Potassium Ion Electrode Solutions

Ammonia Ion Electrode Solutions

Nitrate Ion Electrode Solutions




| Ion Standard Solutions | | | |
|---|---|---|---|
| Model | Part No. | Description | Volume |
| 500-NH4-SH | 3200697171 | 1000 mg/L Ammonium Ion Standard Solution | 500ml |
| 500-NH4-SL | 3200697172 | 100 mg/L Ammonium Ion Standard Solution | 500ml |
| 500-CA-SH | 3200697175 | 1000 mg/L Calcium Ion Standard Solution | 500ml |
| 500-CA-SL | 3200697176 | 100 mg/L Calcium Ion Standard Solution | 500ml |
| 500-CL-SH | 3200697167 | 1000 mg/L Chloride Ion Standard Solution | 500ml |
| 500-CL-SL | 3200697168 | 100 mg/L Chloride Ion Standard Solution | 500ml |
| 500-F-SH | 3200697163 | 1000 mg/L Fluoride Ion Standard Solution | 500ml |
| 500-F-SL | 3200697164 | 100 mg/L Fluoride Ion Standard Solution | 500ml |
| 500-NO3-SH | 3200697179 | 1000 mg/L Nitrate Ion Standard Solution | 500ml |
| 500-NO3-SL | 3200697180 | 100 mg/L Nitrate Ion Standard Solution | 500ml |
| 500-K-SH | 3200697183 | 1000 mg/L Potassium Ion Standard Solution | 500ml |
| 500-K-SL | 3200697184 | 100 mg/L Potassium Ion Standard Solution | 500ml |
| **Ionic Strength Adjustors** | | | |
| Model | Part No. | Description | Volume |
| 500-NH3-ISA | 3200697174 | Ammonia Ionic Strength Adjustor | 500ml |
| 500-CA-ISA | 3200697178 | Calcium Ionic Strength Adjustor | 500ml |
| 500-CL-ISA | 3200697170 | Chloride Ionic Strength Adjustor | 500ml |
| 500-F-TISAB | 3200697166 | Fluoride Ionic Strength Adjustor | 500ml |
| 500-NO3-ISA | 3200697182 | Nitrate Ionic Strength Adjustor | 500ml |
| 500-K-ISA | 3200697186 | Potassium Ionic Strength Adjustor | 500ml |
| **Ion Selective Electrode Filling Solutions** | | | |
| Model | Part No. | Description | Volume |
| 500-NH3-IFS | 3200697173 | Ammonia Electrode Filling Solution | 500ml |
| 500-CA-IFS | 3200697177 | Calcium Electrode Filling solution | 500ml |
| 500-CL-IFS | 3200697169 | Chloride Electrode Filling Solution | 500ml |
| 500-F-IFS | 3200697165 | Fluoride Electrode Filling Solution | 500ml |
| 500-NO3-IFS | 3200697181 | Nitrate Electrode Filling Solution | 500ml |
| 500-K-IFS | 3200697185 | Potassium Electrode Filling Solution | 500ml |

| Accessories | | |
|---|---|---|
| Model | Part No. | Description |
| | 3200861022 | Integrated Electrode Stand (Height: 383mm) for 2000 Series |
| FA-70A | 3200644455 | Integrated Electrode Stand (Height: 338mm) for 1000 Series |
| FA-70S | 3200382557 | Adjustable, free-standing electrode stand (Height: 384 mm) |
| FA-70L | 3200382560 | Long, free-standing electrode stand (Height: 450-650mm) |
| DP-70S | 3200528474 | Electrode stand for 100 Series and D-70, ES-70, OM-70 Series handheld meters (Height: 400mm) |
|  | 3200373991 | Arm for electrode stand FA-70A, FA-70S, & FA-70L |
|  | 3200373961 | Electrode holders, 2pcs/pack (for mounting electrode with round cap on electrode stand arm) |
|  | 3200382482 | Electrode protection caps, 5pcs/pack |
|  | 3200382482 | Electrode protection cap for long electrode (for 9680S-10D, 9480-10C pH Electrode) |
|  | 3200044409 | Clear pH sensor tip guard (for plastic pH electrodes 9651/9652, 9625, 9630 etc.), 5pcs/pack |
|  | 3200828646 | Black pH sensor tip guard (for 200 series, 300 series), 3pcs/pack |
|  Stirrer set | 3200897227 | Stirrer set for 9521-10D |
|  | 3200779640 | Electrode adapter |
|  300-BNC | 3200821465 | Sensor head adapter (for WQ-300 pH/ORP/Ion sensor heads) |
|  Flow Cell | 3200844642 | Glass flow cell (for 300-2C-C and 9371-10D) |
|  300-EXT-10 | 3200921588 | 10-m sensor head extension cable |

# pH Electrode Care and Maintenance Procedures

Your pH electrode will eventually reach the end of its useful life as its performance naturally degrades over time. To maximize the performance of your pH electrode and extend its life span, proper care and regular maintenance are equally required.

- Part no. 3014028653 Cleaning Solution 220 - contains 10% thiourea and 1% hydrochloric acid (HCl) for removing inorganic residues on glass membrane and junction

- Part no. 3200366771 Cleaning Solution 250 - contains less than 0.5% enzyme protease, less than 0.1% sodium azide, and other ingredients (See SDS) for removing protein residues on glass membrane and junction

- Part no. 3999960023 525-3 3.33M KCl pH electrode filling solution (for liquid-filled electrodes)

- Part no. 3999960031 500-7 pH 7.00 buffer

- Part no. 3999960029 500-4 pH 4.00 buffer

- Clean water (e.g., tap, distilled or deionized water) in a squirt bottle

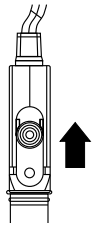
- Mild detergent

- Soft lint-free tissue

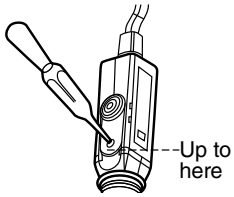
Refer to the safety data sheet (SDS) of the chemical solution to be used in cleaning and wear the appropriate personal protective equipment for safe handling. Download the SDSs of HORIBA solutions at www.horiba-laqua.com.

## Refilling

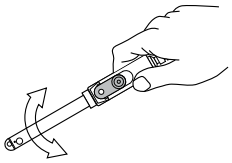
The pH electrode may be filled with either an ionic liquid solution (refillable or liquid-filled pH electrode) or ionic gel solution (sealed or gel-filled pH electrode). Gel-filled pH electrodes do not require routine refilling and typically require less maintenance than liquid-filled electrodes. Liquid-filled pH electrodes are constructed with refilling port, which is securely covered with a slider. The refilling port allows you to fill or empty the reference chamber.



- To top up or re-fill the reference chamber of liquid-filled pH electrode, push the slider upward to uncover the refilling port and insert a dropper containing fresh 3.33M potassium chloride (KCl) solution. The filling solution should reach the bottom of the refilling port.

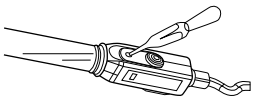



- The filling solution level must be maintained just below the refilling port and higher than the pH buffer or sample level during calibration and measurement. This creates a positive head pressure forcing the filling solution to leak into pH buffer or sample through the junction and preventing the reverse.



- Bubbles may form and get trapped within the solution of the sensing tip or reference chamber during transportation. This can affect the operation of your pH electrode. To dislodge the bubbles, gently shake the electrode body.

- If the filling solution inside the reference chamber gets contaminated with sample or microbial growth or the reading is drifting, change the filling solution. Tilt the pH electrode, uncover the refilling port, and draw out the old solution using a dropper before refilling it with fresh 3.33M KCl solution.



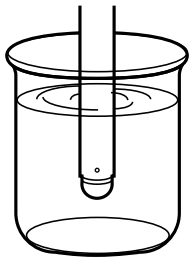
## Conditioning

Nowadays, combination and 3-in-1 pH electrodes are commonly available. Both types of pH electrodes consist of glass electrode and reference electrode built in one body, but the latter is integrated with temperature sensor for detecting the temperature of the solution being measured.

The glass electrode has a silver-based electrical wire suspended in a neutral solution with KCl contained inside a special glass. The surface of the glass bulb or membrane at the tip of the electrode must be hydrated to function properly. This can be accomplished by immersing the glass membrane in an aqueous solution, where a hydrated layer that is responsible for the pH response of the glass, is developed.

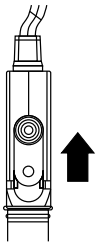
Another component of the pH electrode that must remain hydrated is the junction of the reference electrode. The junction is made of porous material such as ceramic or sintered polyethylene, which allows filling solution of the electrode to leak into the solution being measured. Keeping the reference junction hydrated will prevent precipitation of KCl from the filling solution which may clog it and cause erratic or slow electrode response.

- All pH electrodes come with white protective cap. A sponge wet with pure water is positioned at the bottom of the cap to keep the glass membrane and junction moist. If you find KCl salts formed on the junction or refilling port of your pH electrode, simply rinse off using clean water. This KCl creep from the filling solution is normal.

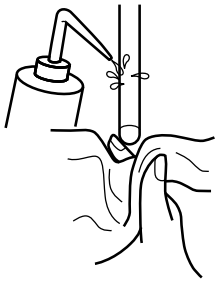


- A dry pH electrode will give inaccurate reading in pH measurement. Condition a dry pH electrode by soaking the glass membrane and junction in pH 7.00, 4.01 buffer, or tap water for at least 1 hour to regenerate the hydrated layer. Note: High salt solutions such as 3.33M KCl and the like are not recommended for conditioning our pH electrodes. After conditioning, rinse the pH electrode with clean water and proceed with calibration.
- Never touch the glass membrane with fingers as oil or dirt may coat the glass and interfere with measurement.

## Calibration and Measurement

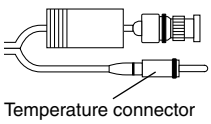


- If a liquid-filled pH electrode is in use, the refilling port must be uncovered and the filling solution level must be higher than the pH buffer or sample level. These conditions will ensure smooth outward flow of filling solution through the junction during calibration and measurement.

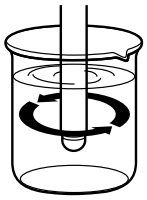


- Before and after measurement, rinse the pH electrode with clean water and/or with a portion of the next solution to be measured and blot with soft lint-free tissue to remove excess water or solution. Rinsing between measurements prevents contamination by carry-over on the electrodes. Avoid wiping or rubbing as this can scratch the glass membrane, remove the hydrated layer, and cause static charge, resulting in inaccurate pH readings.


- Calibrate frequently using at least two fresh pH buffers that bracket the expected sample pH value. Make sure that the glass membrane and junction of pH electrode are both immersed in pH buffer or sample.



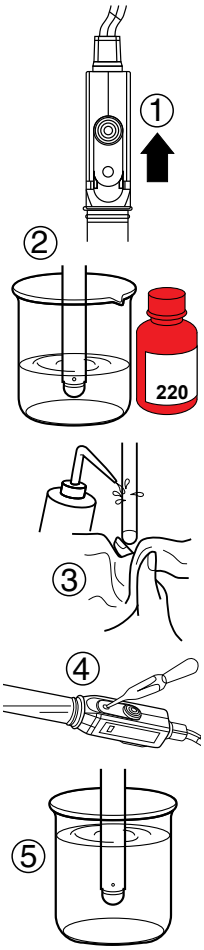

- To compensate for temperate effect on pH, use either 3-in-1 pH electrode or combination pH electrode and temperature probe. If temperature probe is not available, check the solution temperature using a calibrated thermometer and input the reading into the meter.



- Stir pH buffers and sample at same rate. Stirring provides representative pH value of a solution and faster electrode response. If stirring is not possible due to measurement noise, limited sample volume or other reasons, it may be abandoned in both calibration and measurement.
- There is a wide selection of pH electrodes and each model is designed to suit specific applications. Choose the best pH electrode suitable for your sample.

## Cleaning

A clean, hydrated glass membrane and free-flowing junction are necessary in performing an accurate measurement of pH. The choice of cleaning solution should effectively remove all contaminants based on sample tested without damaging your pH electrode.

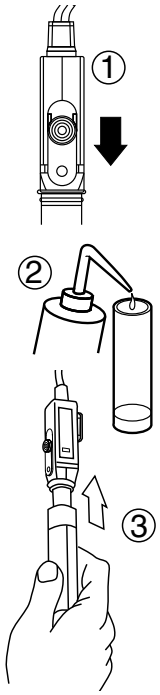



1. If the pH electrode is liquid-filled, uncover the refilling port.
2. Clean the tip of your pH electrode using the appropriate cleaning solution. Make sure that the glass membrane and junction are both immersed in cleaning solution.
   - General samples – Soak the pH electrode in diluted detergent solution for 5 to 10 minutes, while moderately stirring the solution. A strong cleaning solution is needed for clogged junction, stains, and electrodes exhibiting slow response. Soak the pH electrode in cleaning solution 220 or 0.1M HCl for at least 1 hour.
   - Oily samples – Soak the pH electrode in warm, diluted detergent solution for 5 to 10 minutes, while moderately stirring the solution. Alternatively, rinse the pH electrode with methanol or ethanol. Note: Alcohol is only applicable for glass-body electrodes. Never use organic solvents such as alcohol, acetone etc. to clean any plastic-body electrode as they may damage the body and shorten the life span. Use of organic solvents will void the electrode warranty.
   - Protein-containing samples – soak the pH electrode in cleaning solution 250 for at least 1 hour.
3. Rinse the pH electrode with clean water.
4. If the pH electrode is liquid-filled, draw out the old filling solution from the reference chamber and refill it with fresh 3.33M KCl (See Refilling).
5. Condition the pH electrode (See Conditioning).

If calibration with fresh pH buffers failed repeatedly and cleaning failed to restore the performance, replace the pH electrode with a new one.

## Storage

pH electrodes must be clean before they are stored for any length of time.




1. If the pH electrode is liquid-filled, cover the refilling port with the slider to prevent evaporation of filling solution.
2. Wash the protective cap with clean water to wet the sponge and remove KCl salts.
3. Insert the pH electrode into the protective cap with wet sponge. The water will not dissipate easily as the cap fit snugly on the electrode body. This environment is enough to keep the glass membrane and junction moist. It is not necessary to fill the cap with clean water and soak the pH electrode tip.

**Short-term storage:**

Between measurements, the pH electrode can be soaked in pH 7.00 buffer or clean water (e.g., tap, distilled or deionized).

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## Water Quality Analyzers

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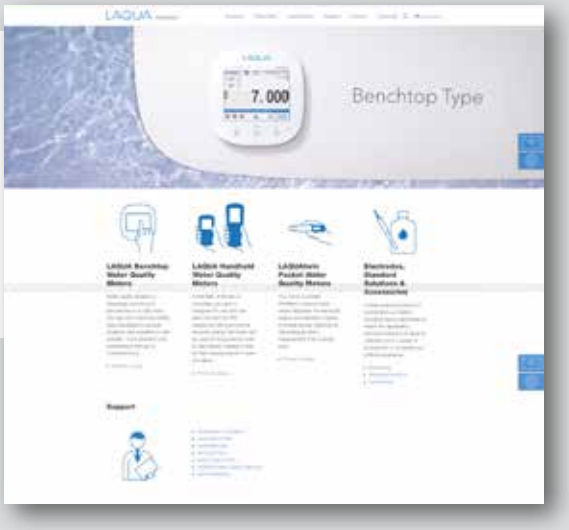



### Benchtop Meters

Developed using extensive feedback from users, our new LAQUA meters deliver the best solution for water quality analysis. Our LAQUA website features an online 'Selection Guide' to enable you to find the perfect LAQUA meter and electrode for your need.


### Handheld Meters

In the lab, in the field or anywhere you need it. LAQUA Handheld meters are designed for use with one hand and with an IP67 waterproof rating and shock-resistant casing. Meters can be used for long periods, even in dark places, making it ideal for field measurements in rivers and lakes.


### Pocket Meters

Analyzing water quality is simplified when using our LAQUAtwin range of meters. Designed to produce accurate and reliable results. Anyone, anywhere, at any time can measure samples easily with a LAQUAtwin meter. See just how good they are at our website.

### Application Notes

LAQUAtwin pocket meters offer quick and convenient alternative to analyze important parameters with high accuracy. Several application notes are available at (http://goo.gl/znwE6j) detailing the use of LAQUAtwin and the results achieved for the respective applications. Additional application notes will be added when available.

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