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PRODUCTS

Starter Series Electrodes and Meters



Ingeniously Practical

Electrodes and Meters for pH, ORP, Conductivity, DO and Temperature



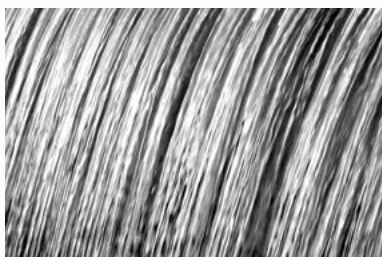
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About the Starter Series

Accurate and precise measurement has been our main focus since our inception in 1907. After more than a century of developing balances that have provided the reliable and repeatable weight determination that is essential to laboratory applications, OHAUS is proud to now offer our expertise in measurement in a line of electrochemistry products.

The Starter Series of electrodes includes pH, reference, oxidation-reduction potential (ORP), conductivity, dissolved oxygen (DO) and temperature electrodes that can be used in conjunction with our bench and portable meters. This catalog contains background information on each electrochemistry substance, information about our electrodes that measure these substances, as well as buffers and solutions.



OHAUS®

Starter Series

pH / ORP Benchtop Meters

Starter ST5000 pH / ORP Bench Meter

Cost-effective High Performance Bench Meter for universal applications

Applications

- Academia
- General Laboratory Use
- Pharmacy
- Water Analysis

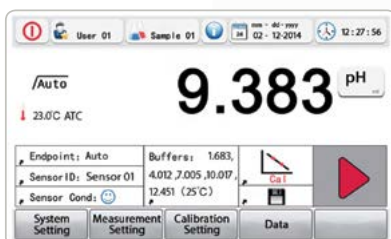


ST5000-F [Shop](#)



The Starter 5000 provides accurate pH and ORP measurement for high-level experiments and research. Enhanced features, advanced technology, and high performance have been combined to support complex laboratory tasks requiring pH measurement.

- The Starter 5000's performance is propelled by a 1000 item library, 10 sensors for calibration storage, 8 predefined and 1 self-defined buffer groups, 3 endpoint modes and GLP mode.
- Advanced Software and Technology Support Complex Applications and Intuitive Operation. Starter 5000 has a user-friendly interface, similar to other smart devices used daily. With a large LCD touchscreen display, users will find themselves intuitively navigating through all applications.
- Enhanced Features Offer Protection & Simple Use of this Advanced Meter — Starter 5000 also has many features that promote ease of use, convenience, as well as protection, including a standalone electrode arm, IP54 housing and in-use cover.



- High resolution Screen display for easy monitoring and operation



- IP54 housing protects the meter from damage by water and dust particles



- 4.3" high-resolution color touchscreen has large digits and well-arranged icons to facilitate simple operation

- Built-in USB host port to export data or RS232 to connect a printer

Starter ST5000 pH / ORP Bench Meter

| Model | ST5000 |
|--------------------------|---|
| Package | ST5000-F |
| Part Number | 30129896 Shop |
| Measurement Range | -2.000...20.000 pH, -2000.00...+2000.00 mV, -30°C...130 °C |
| Resolution | 0.1/0.01/0.001pH, 1/0.1/0.01mV, 0.1 °C |
| Error Limits | ± 0.002 pH, ± 0.03% FS mV, ± 0.1 °C |
| Calibration | 1 Point, 4 Predefined Standards |
| Buffer Group | 8 predefined groups, 1 self define group |
| pH Calibration | 1-9 points |
| Memory | 1000 sets, with 10*10 calibration data |
| Power Supply | 110-240V/50-60Hz, 9V DC |
| Size/Weight | 220 W × 175 D × 78 H mm / 0.55 kg |
| Display | Color Touch-Screen LCD |
| Input | BNC, impedance >3*10e+12 Ω, Cinch, NTC 30 kΩ |
| Output | USB & RS232 for easy data export |
| Temperature Compensation | ATC and MTC |
| Housing | ABS |
| ST5000-F Kit | ST5000 Meter, stand alone electrode holder, ST5000 in-use-cover, 4G USB-driver + ST350, pH buffer powder sachet |
| Compatible Electrodes | ST210, ST230, ST310, ST320, ST350, STMICRO5, STPURE, STORP1, STORP2, STREF1, STREF2, STTEMP30 |

Additionally

- 3 end-point modes: manual, auto and time
- Calibration reminder
- Screen Cover



Starter Series

pH / Conductivity / ORP Benchtop Meters

Whether it is a basic or advanced model that you are looking for, you can rely on Starter Series bench meters to meet your water analysis needs.

Applications • Academic • General Laboratory Use • Food & Beverage • Water Analysis

Starter 2100 pH

Cost-effective and reliable pH Meter for Laboratory Applications

- With the attached quick guide, five clearly marked keys and user-friendly software, novices can operate the meter with minimal training.
- The built-in electrode holder provides uncomplicated and convenient all-in-one operation while the large LCD display screen clearly displays results.
- Auto buffer recognition, electrode condition icon, automatic temperature compensation and reference input, all work together to ensure accurate results.



ST2100-F [Shop](#)

Best Seller



ST3100-F [Shop](#)

Starter 3100 pH/ORP

Starter 3100 offers premium features at a cost-effective price point for reliable and convenient pH and ORP measurements

- Starter 3100's intuitive software includes three point calibration, three buffer groups, automatic and manual endpoint functions, as well as a 99 item library.
- Adjustable stand-alone electrode holder + large backlit LCD display.
- Simple documenting measurement data thanks to the RS232 which can be used to connect peripheral devices such as printers or computers to the meter.

Starter 3100C Conductivity

With plenty of advanced intuitive features, Starter 3100C is the ideal meter for standard testing of conductivity, total dissolved solids (TDS) and salinity.



ST3100C-F [Shop](#)

- Starter 3100C's intuitive software includes 1 point calibration, 4 pre-defined standards, automatic and manual endpoint functions, and one touch conversion between measurement modes.
- Among Starter 3100C's user-friendly features that support ease-of-use are an adjustable stand-alone electrode holder and large backlit LCD display.
- Documenting measurement data is made simple through the RS232 which can be used to connect peripheral devices such as printers or computers to the meter.

pH / Conductivity / ORP Benchtop Meters

| Model | ST2100 | | ST3100 | ST3100C |
|---|---|----------|---|--|
| Package | ST2100-E | ST2100-F | ST3100-F | ST3100C-F |
| Part Number | 30057495 | 3005496 | 30058489 | 30058731 |
| Measurement Range | 0.00...14.00 pH -1999...1999 mV 0 °C...100 °C | | -2.00...16.00 pH -1999...1999 mV -5 °C...110 °C | 00.0 μS/cm...199.9 mS/cm 0.1 mg/l...199.9 g/l (TDS) 0.00 ... 19.99 psu (Salinity) 0 °C...100 °C |
| Resolution | 0.01 pH 1 mV 0.1 °C | | | Automatic Range 0.1 °C |
| Error Limits | ± 0.01 pH ± 1 mV ± 0.5 °C | | | ± 0.5 % of the Measured Value ± 0.3 °C |
| Calibration | 1 or 2 Points 1 Predefined Buffer Group (1.68, 4.01, 7.00, 10.01) | | Up to 3 Points 3 Predefined Buffer Groups | 1 Point 4 Predefined Standards |
| Memory | Last Calibration Data | | 99 Measurements Last Calibration Data | |
| Power Supply | 110-240V/50Hz, DC 12V | | | |
| Size/Weight | Approximately 220 W × 175 D × 78 H mm / 0.75 kg | | | |
| Display | Liquid Crystal | | Liquid Crystal Backlight | |
| Input | BNC, impedance > 10e+12 Ω Cinch, NTC 30 kΩ 2 mm | | | Mini-DIN |
| Temperature Compensation | ATC & MTC | | | Linear: 0.00 %/°C...10.00 %/°C Reference Temperature: 20 & 25 °C |
| Housing | ABS | | | |
| ST2100-E Kit | ST2100-B (2100 Meter With Built-In Electrode Holder) + ST210 Electrode, pH Buffer Powder Set (4.01, 7.00, 10.01) | | | |
| ST2100-F Kit | ST2100-B (2100 Meter With Built-In Electrode Holder) + ST210 Electrode, STTEMP30 Temperature Probe, pH Buffer Powder Set (4.01, 7.00, 10.01) | | | |
| ST3100-F Kit | ST3100-B (3100 Meter With Stand-alone Electrode Holder) + ST310 Electrode, pH Buffer Powder Set (4.01, 7.00, 10.01), In-use Cover | | | |
| ST3100C-F Kit | ST3100C-B (3100C Meter, Stand-Alone Electrode Holder, Conductivity Standards 1413 μS/cm and 12.88 mS/cm (20 mL Bottles) + STCON3 Conductivity Probe (Range 70 μS/cm – 200 mS/cm), In-use Cover | | | |
| Compatible Electrodes (Find the complete range on page 26) | ST210, ST230, ST310, ST320, ST350, STMICRO5, STPURE, STORP1, STORP2, STREF1, STREF2, STTEMP30 | | | |



ST3100

Starter Series

pH, DO & Conductivity Portable Meters



Low-cost Portable Meters packed with productive features

- Lightweight design ideal for field testing
- Compact and ergonomic design offers a user friendly experience
- Clear, well-organized LCD screen
- Reliable calibration results in accurate measurement screen

Applications

- Academic • General Laboratory Use
- Food & Beverage
- Field Use • Water Analysis

Developed with versatility in mind, these meters can be operated in the lab with the support of the built-in stands or in the field thanks to their lightweight design. The portable Starter Series also boasts IP54 protection which shields the meter from damage by water and dust particles and it also offers an integrated labeling area which can be customized for quick identification. Each meter can store 30 sets of data memory and has the ability to quickly recall calibration data and stored information with one quick touch.

Starter 400D Dissolved Oxygen Meter

ST400D is a practical, affordable, low-maintenance DO portable meter equipped with optical technology - ideal for applications that require simple yet accurate DO measurements.

- The optical probe requires minimal maintenance –frequent membrane replacement not needed. Also, warm up and stirring of samples when taking measurements is not required.
- Equipped with a color LCD display, the ST400D is designed to fit comfortably in the palm of your hands. The automatic/manual endpoints enable easy recall of last calibration data and stored information with one touch.
- Simple calibration process offers quick delivery of measurements, and automatic temperature and barometric pressure compensation ensure accurate results.



ST400D-G

[Shop](#)

Starter 300 pH Meter

Starter 300 marries portability with precise pH measurement. An ORP or temperature electrode can also be easily connected to provide additional functionality.

- Auto buffer recognition stores calibration data and helps to avoid errors during the calibration process.
- Automatic and manual temperature compensation helps ensure accurate readings.



ST300-G

[Shop](#)

pH, DO & Conductivity Portable Meters

Starter 300C Conductivity Meter

Starter 300C is the reliable and accurate choice for measurement of the conductivity and TDS levels of liquids. With a variety of features that protect the meter from more extreme elements, Starter 300C can be used for a wide variety of applications.

- The 30 item library allows the user to store measurements data, and stored information and calibration data can be easily recalled with one touch.
- Auto temperature compensation with adjustable temperature co-efficient for accurate measurements, and 4-pole and 2-pole conductivity probes which offer a large conductivity range that safeguards them from effects of polarization and pollution.
- With a simple calibration process and quick delivery of measurement results, Starter 300C is efficient and easy-to-use.



ST300C-G [Shop](#)

* Portable Meters are available in different packages:

ST300-G includes ST300-B, ST320 3-in-1 Plastic Gel pH Electrode, pH Buffer Powder Sachet (4.01, 7.00, 10.01), Portable Bag

Starter 300D Dissolved Oxygen Meter

Starter 300D provides accurate and reliable DO measurement, critical to aquatic life and water quality.

- With a simple calibration process, quick delivery of measurements and automatic temperature compensation, Starter 300D is both easy-to-use and accurate.
- The automatic or manual endpoints allow the user to easily recall the last calibration data and stored information with one quick touch.
- The galvanic electrode can be used immediately after being powered on without the wait time typically associated with dissolved oxygen meters.



ST300D-G [Shop](#)

pH, DO & Conductivity Portable Meters

| Model | ST400D-G | ST300-G | ST300C-G | ST300D-G |
|--------------------------|---|---|--|---|
| Part Number | 30208726 Shop | 30219114 Shop | 30219115 Shop | 30219116 Shop |
| Measurement Range | 0.0 to 200.0% 0.00 to 20.0 mg/L(ppm) 0 to 50 °C | 0.00...14.00 pH -1999...1999 mV 0 °C...100 °C | 0.0 µS/cm...199.9 mS/cm 0.1 mg/l...199.9 g/l (TDS) 0 °C...100 °C | 0.0 to 199.9%; 200 to 400% 0.00 to 19.99; 20.0 to 45.0 mg/L 0.00 to 19.99; 20.0 to 45.0 ppm 0 to 50 °C |
| Measurement Resolution | 0.1% 0.01 mg/L(ppm) 0.1 °C | 0.01 pH 1 mV 0.1 °C | Automatic Range 0.1 °C | 0.1%; 1% 0.1 mg/L; 1mg/L 0.01 ppm; 0.1 ppm 0.1 °C |
| Barometric Range | 50.0 to 115.0 kPa | NA | | 375 to 825 mmHg 500 to 1100 mbar 500 to 1100 hPa |
| Barometric Resolution | 0.1 kPa | NA | | 1 mmHg, 1 mbar, 1 hPa |
| Error Limits | ± 0.2 mg/L (<8 mg/L), ± 0.3 mg/L (8 to 20 mg/L); ± 0.3 °C ± 1.5 kPa | ± 0.01 pH, ± 1 mV, ± 0.5 °C | ± 0.5 % of the Measured Value ± 0.3 °C | ± 1%; ± 0.3 °C |
| Calibration | 1 or 2 points | 3 Points, 1 Predefined Buffer Group | 1 Point, 3 Predefined Standards | 1 or 2 Points, 100% and 0% |
| Memory | 99 Measurements Last Calibration Data | 30 Measurements, Last Calibration Data | | |
| Power Supply | 4 x AAA (LR03) Batteries, 12 hrs | 4 AAA > 500 Operating Hrs | 4 AAA > 250 Operating Hours | |
| Size/Weight | Approx. 90 W × 150 D × 35 H mm / 0.16 kg (Without Batteries) | Approx. 90 W × 150 D x 35 H mm / 0.18 kg (Without Batteries) | Approx. 90 W × 150 D x 35 H mm / 0.16 kg (Without Batteries) | Approx. 90 W × 150 D x 35 H mm / 0.18 kg (Without Batteries) |
| Display | Liquid Crystal | | | |
| Input | Mini-DIN | BNC, Impedance > 10e+12 Ω Cinch, NTC 30 kΩ | Mini-Din | BNC, Cinch, NTC 30 kΩ |
| Temperature Compensation | ATC | ATC & MTC | ATC, Linear: 0.00 %/°C. 10.00 %/°C Ref. Temperature: 20 & 25 °C | ATC & MTC |
| Salinity Compensation | 0.0 to 40.0 ppt | NA | | 0.0 to 50.0 ppt |
| IP Protection | IP54 | | | |
| Housing | ABS | | | |
| Kit Content | ST400D-B with STDO21 Optical DO Probe, Portable Bag | ST300-B*, ST320 3-in-1 Plastic Gel pH Electrode, pH Buffer Powder Sachet (4.01, 7.00, 10.01), Portable Bag | ST300C-B*, STCON3 4-Pole Conductivity Probe (70 µS/cm - 200 mS/cm), Portable Bag | ST300D-B* with STDO11 Galvanic DO Probe, STTEMP30 Temperature Probe, Portable Bag |
| Compatible Electrodes | STDO21 | ST210, ST230, ST310, ST320, STPURE, STTEMP30, STORP1, STROP2 | STCON3 | STTEMP30, STDO11 |

* Meter comes with with IP54 Sets, electrode clip, wrist strap and 4 AAA batteries

Reference Electrodes

Reference Electrodes have a stable and well defined electrochemical potential (at constant temperature) against which the applied or measured potentials in an electrochemical cell are referred. Therefore, a good reference electrode is non-polarizable, or will remain stable upon passage of a small current.

STREF2 is a saturated calomel electrode (SCE)(Hg/Hg₂Cl₂ in saturated KCl) which traditionally was the most widely used electrode. The disadvantage is it cannot be used above 50 due to instability of the Hg₂Cl₂.

STREF1 is a Silver/Silver Chloride (Ag/AgCl in Saturated KCl) electrode which has become the most widely used reference electrode since the SCE became less popular.

Maintenance of the reference electrode can help avoid stability problems and keep it in good working order:

1. Make sure that the reference electrode compartments are filled with electrolyte solution.
2. Make sure the junction is not blocked.



| Model | STREF2 | STREF1 |
|---|-------------------------------|-----------------------------------|
| Part Number | 30059254 Shop | 30059253 Shop |
| Description | Saturated Calomel (SCE) | Silver/Silver Chloride (Ag/AgCl) |
| E vs. SHE (Standard Hydrogen Electrode) (V) | 0.241 | 0.198 |
| Connector | 2mm banana | 2mm banana |
| Dimensions (Shaft) | 120 x 12 mm | 110 x 12 mm |
| Cable Length | 1 m | 1 m |

pH Electrodes

Basic Theory of pH

pH is one of the most common parameters measured in a wide variety of industries such as water and wastewater treatment, food and beverage, agriculture, research and production, environmental monitoring, chemical and life sciences research, electronics production as well as other industrial applications.

pH is defined as the negative logarithm of the molar concentration of the active hydrogen ions $\text{pH} = -\log [\text{H}^+]$.

pH provides a convenient way to compare the relative acidity or alkalinity of a sample at a given temperature.

A pH electrode produces different mV in different solutions.

A perfect pH electrode, at 25°C, produces a slope of 59.16mV per 1.00 pH unit and has a value that ranges between 50 and 58 mV.

Slope = mV /pH unit

Use of Electrodes for pH Measurement

Measurement is usually done with a combination electrode. The combination electrode is an electrode system formed by a glass electrode and a reference electrode.

A potential develops on the membrane surface when a pH electrode comes into contact with a sample and its value varies with the pH of the sample.

This variation in potential is measured in mV by a meter and is converted to direct pH values through Nernst Equation.

$$E = E_0 + (2.303RT/nF) \log a_{\text{H}^+}$$

pH Electrode Structure

Shaft Body Material

| | Characteristic | Advantage |
|---------------|--|--|
| Glass Shaft | Can withstand high temperatures and is resistant to corrosive materials and solvents. | Ideal for laboratory use and is easy to clean. |
| Plastic Shaft | Not recommended for usage at temperatures above 80 °C. Moderate resistance to highly corrosive materials and solvents. | Is durable and not easily broken. |

Refillable vs. Gel

| | Characteristic | Advantage |
|------------|---|------------------------------|
| Refillable | Reference electrolytes can be replenished when necessary. | Can be used many times over. |
| Gel | The reference electrolyte gel is not refillable and the electrode must be replaced when contaminated. | No maintenance is required. |

Reference Junctions Types

| | Characteristic | Advantage |
|------------------|---|---|
| Ceramic | This standard junction consists of a porous piece of ceramic which allows the electrolyte to slowly flow out of the electrode. | Stable and simple to use. |
| Annular Junction | Formulated with a special ceramic which encircles the glass bulb. Numerous pores in the ceramic provide lower resistance and more stable pH readings. | Not easily blocked and ideal for muddy samples. |



| Model | STMICRO5 | STMICRO8 | STSURF |
|-------------------------|---|---|---|
| Part Number | 30087566 | 30087569 | 30129470 |
| pH Range | 0 to 14pH | 0 to 14pH | 2 to 12pH |
| Meas. Range | 0 to 100 °C | 0 to 100 °C | 0 to 80 °C |
| Shaft Material | Glass | Glass | Plastic |
| Internal Ref. Type | Ag/AgCl | Ag/AgCl | Ag/AgCl |
| Refill Type | Refillable | Refillable | Refillable |
| Reference Junction Type | Annular ceramic | Annular ceramic | Ground glass |
| Reference Electrolyte | 3M KCl Solution | 3M KCl Solution | 3M KCl Solution |
| Dimensions (Shaft) | 80 x 5 mm | 150 x 8 mm | 120 x 12 mm |
| Cable Length | 1 m | 1 m | 1 m |
| Temp. Sensor | No | No | No |
| Connector | BNC | BNC | BNC |
| Description | 2-in-1 80mm length. For MicroSamples in tube or MicroCentrifuge tube | 2-in-1 150mm length. For MicroSamples in tube or MicroCentrifuge tube | 2-in-1 refillable pH electrode. For surface, skin, leather, paper, emulsion, etc. |
| Used With | Can be used in conjunction with all Starter bench and portable meters | | |

pH Electrodes

Maintenance and Storage of pH Electrodes

pH electrodes are delicate measuring instruments that require proper care and maintenance to produce accurate and reliable results as well as to ensure a long useful life.

Always keep the pH electrode moist when not in use by using an electrode storage solution (3M KCl). DO NOT store the electrode in distilled or deionized water as this will cause ions to leak out of the glass bulb and reference electrolyte, causing a slow and sluggish response.

Electrodes may be shipped with either protective caps or in electrode soaking bottles to prevent cracking or scratching and to keep the glass bulbs moist. Remove the electrode gently from the storage bottle and rinse it with distilled water before use. For long-term storage, always keep the electrode in the bottle in enough storage solution to cover the bulb. Replenish the bottle as needed.



| Model | ST350 | ST320 | ST310 | STPURE | ST270 | ST272 | ST260 | ST230 | ST210 |
|---------------------------------|---|---|---|--|--|---|--|--|--|
| Part Number | 30129354 | 83033967 | 83033965 | 83033969 | 30240974 | 30393265 | 30129357 | 83033968 | 83033966 |
| pH Range | 0 to 14pH | 0 to 13pH | 0 to 14 pH | 0 to 13 pH | 0 to 14pH | 2 to 12pH | 0 to 14pH | 0 to 14 pH | 0 to 14 pH |
| Temp. Range | 0 to 100 °C | 0 to 80 °C | 0 to 80 °C | 0 to 100 °C | 0 to 100 °C | 0 to 50 °C | 0 to 80 °C | 0 to 100 °C | 0 to 80 °C |
| Shaft Material | Glass | Plastic | Plastic | Glass | Glass | Plastic | Glass | Glass | Plastic |
| Internal Ref. Type | Ag/AgCl | Ag/AgCl | Ag/AgCl | Ag/AgCl | Ag/AgCl | Ag/AgCl | Ag/AgCl | Ag/AgCl | Ag/AgCl |
| Gel/Refillable | Refillable | Non-refillable, Gel | Refillable | Refillable | Non-refillable, Gel | Non-refillable, Gel | Refillable | Refillable | Refillable |
| Reference Junction Type | Annular ceramic | Fiber pin | Ceramic pin | Ground glass | Annular ceramic | Annular fiber | Ceramic pin | Annular ceramic | Ceramic pin |
| Refilling Reference Electrolyte | 3M KCl solution | 3M KCl gel | 3M KCl solution | 3M KCl solution | 3M KCl gel | 3M KCl gel | Double salt-bridge 3M KCl (AgCl)---Pure KCl solution | 3M KCl solution | 3M KCl solution |
| Dimensions (Shaft) | 120 x 12 mm | 120 x 12 mm | 120 x 12 mm | 120 x 12 mm | 120 x 12 mm | 120 x 15 mm | 120 x 12 mm | 110 x 12 mm | 120 x 12 mm |
| Cable Length | 1 m | 1 m | 1 m | 1 m | 1 m | 1 m | 1 m | 1 m | 1 m |
| Temp. Sensor | Yes | Yes | Yes | NO | NO | NO | NO | NO | NO |
| Connector | BNC, Cinch | BNC, Cinch | BNC, Cinch | BNC | BNC | BNC | BNC | BNC | BNC |
| Description | 3-in-1 electrode, with integrated temperature probe. Ideal for high Temp. | 3-in-1 electrode with integrated temperature probe for standard or muddy samples. | General purpose 3-in1 plastic refillable pH electrode suitable for normal samples | Glass-body refillable pH electrode for pure water (distilled water, rain water tap water etc.) | Puncture electrode for semisolid samples such as fruits, meat or cheese. | 2-in-1 plastic shaft puncture pH electrode for semi-solid samples: meat, fruits, cheese. Steel head ensures a stronger and durable structure. | Tris-buffer solution | General purpose glass-body refillable pH electrode for muddy samples (juice, milk, wine, etc.) | General purpose 2-in1 plastic gel refillable pH electrode. Suitable for normal samples |
| Used With | OHAUS pH meters with BNC input connector and Cinch temperature connector | | | | OHAUS pH meters with BNC input connector | | | | |

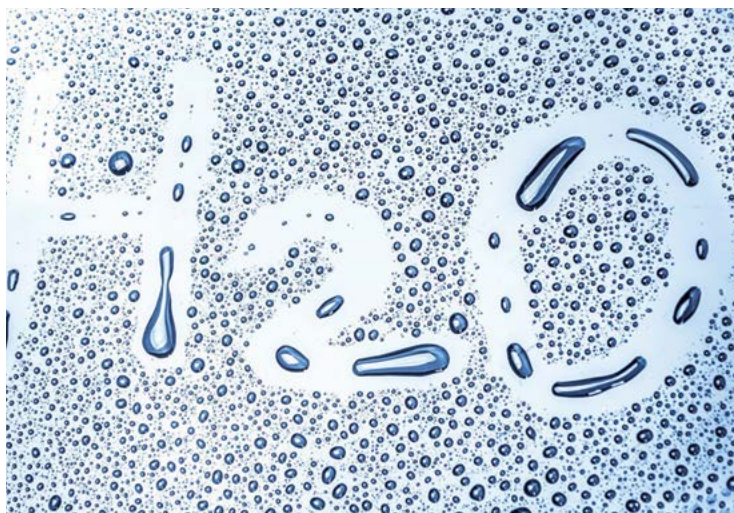
ORP Electrodes

Oxidation-Reduction Potential (ORP) electrodes test for the overall availability of electrons in a medium, specifically the ratio of positive and negative ions in the solution. They are also sometimes referred to as Redox electrodes.

ORP is the only practical method used to electronically monitor sanitizer effectiveness and it is also commonly tested in water, such as swimming pools and aquariums, in order to help oxidize contaminants.

ORP is expressed in millivolts (mV). A range of -1000 mV to 1000mV is common with most ORP tests. The pH value influences the ORP value significantly.

Keeping the electrode clean is very important in order to keep the platinum band or disk from getting contaminated, which can result in slow response time or inaccurate measurement.



| Model | STORP2 | STORP1 |
|---------------------------------|-------------------------------|-------------------------------|
| Part Number | 30038553 Shop | 30038555 Shop |
| Shaft Material | Glass | Plastic |
| Temperature Range | 0-100 °C | 0-80 °C |
| Internal Reference Type | Ag/AgCl | Ag/AgCl |
| Gel/Refillable | Refillable | Non-Refillable, Gel |
| Reference Junction Type | Annular ceramic | Ceramic pin |
| Refilling Reference Electrolyte | 3M KCl gel | 3M KCl gel |
| Dimensions (Shaft) | 120 x 12 mm | 120 x 12 mm |
| Cable Length | 1 m | 1 m |
| Temperature Sensor | NO | NO |
| Connector | BNC | BNC |
| Zero Potential Value | 86mV±15mV | 86mV±15mV |
| Grade Difference | ≥ 165mV | ≥ 165mV |

Conductivity Probes

Basic Theory of Conductivity

Conductivity is measured in a wide range of industries and gives a readout of total ionic concentration within the sample solution. It's a rapid and inexpensive way of determining the ionic strength of a solution.

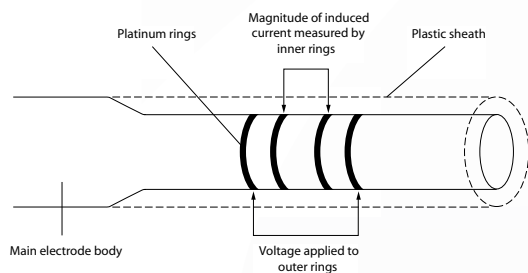
A basic conductivity cell consists of a pair of electrodes between which the sample is situated. The ratio of the distance between the electrodes (D) and their surface area (A) is known as the cell constant: K:

$$K = d/A \text{ [cm}^{-1}\text{]}$$

Every measuring cell has its own particular cell constant. It is recommended that you always determine the cell constant exactly by using a standard to calibrate.

In contrast to a pH electrode, the measuring cell does not change with time, at least if the sensor is used properly. The cell constant changes only if the surface of the electrode changes, for example through fingerprints, deposits, scratches or enclosed air bubbles.

The conductivity electrode should be stored dry.



The **STCON3** utilizes the 4-Ring potentiometric method for measuring conductivity, which incorporates a series of four stainless steel rings formed into the probe shaft. This design completely eliminates polarization, which occurs with the 2-Plates amperometric method.

Furthermore, without polarization the probe can measure a wider range of conductivity values because it does not suffer from electrolysis.



The **STCON3** conductivity electrode has a built-in temperature sensor which is 30K. When using STCON3, please consider the following:

1. Make sure the plastic shield is in place when measuring.
2. Be sure the solution has reached the line on the plastic shield and below the vent hole when measuring.
3. To prevent carry over from high to low conductivity solutions, rinse with distilled water between and after measurements.
4. Make sure the cell chamber is bubble-free when measuring.
5. Allow sufficient time for the sensor to stabilize when measuring samples at different temperatures. Manual end-pointing is advised.



| Model | STCON3 | STCON3 IP67 |
|-------------------|--|--|
| Part Number | 83033972 Shop | 30468962 Shop |
| Connection | Mini-Din | IP67 LTW |
| Cable Length | 1 m | 3 m |
| Shaft Length | 130mm | 130 mm |
| Shaft Diameter | 14mm | 14 mm |
| Temperature Range | 0-50 °C | 0-50 °C |
| Measurement Range | 70 µS/cm - 200mS/cm (0.5% acc.) 2 µS/cm - 70µS/cm (1% to 5% acc.) | 70 µS/cm - 200mS/cm (0.5% acc.) 2 µS/cm - 70µS/cm (1% to 5% acc.) |
| Compatible with | ST300C portable meter | ST400M IP67 waterproof portable meter |

Conductivity Probes

The newest conductivity probe to join the Starter Series is a 2-pole potentiometric probe, **STCON7**. **STCON7** is especially designed for low conductivity measurements in mediums such as pure or distilled water. With a built-in 30K Ω temperature sensor, it performs automatic temperature compensation.

The stainless steel measuring cell chamber can hold 316L.

Operation

For optimal performance, use the same procedure as described for **STCON3** on the previous page. Moreover, when taking measurements, make sure the solution is above the cell chamber and remove any build-up of solids in the chamber. This can be done by dabbing the probe with cotton soaked in detergent solution and then rinsing it in distilled water

Precautions and Limitations

1. Do not expose the shaft to organic solvents when cleaning or when taking measurements.
2. Do not use the probe outside the recommended temperature range.
3. Calibrate the electrode with standard solution for an accurate measurement.



| Model | STCON7 |
|-------------------|---|
| Part Number | 30080693 Shop |
| Connection | Mini-Din |
| Cable Length | 1.0 m |
| Shaft Length | 95mm |
| Shaft Diameter | 12mm |
| Temperature Range | 0-60 °C |
| Measurement Range | 0.02 μ S/cm - 200 μ S/cm (accuracy: 0.02 μ S/cm) |

OHHAUS®

Dissolved Oxygen Probes

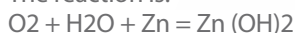
Basic principle of Dissolved Oxygen (DO) Probes

There are 3 types of commonly used oxygen sensors: polarographic, galvanic and optical (luminescence) sensors.

STDO11 is a galvanic DO electrode and the simplest sensor among the 3 sensors. It produces its own electric current.

The cathode is silver and the anode is zinc. Oxygen passes through the membrane and is reduced at the cathode to increase the electrical signal (current) read by the electrode. As oxygen increases, the signal increases.

The reaction is:



Galvanic sensors are active at all times and will degrade in storage as well as during use. The galvanic electrode does not need to polarize (warm up) before calibration or measurement while polarographic electrodes take

15 minutes to several hours to warm up.

Care and maintenance

Carefully remove the protective bottle from the tip of the electrode by unscrewing the lid and removing the bottle. Remove the shorting plug from the connector and store in a safe place. Be careful because the protective bottle lid is tightly fit on the electrode.

STDO11 should be stored in a moist environment to keep the membrane from drying out, but do not store directly in water.

Calibration and Measurement

DO probes should be calibrated before being placed in the sample. Before calibrating a probe, do not forget to remove water droplets from the membrane by gently shaking the sensor.



| Model | STDO11 | STDO21 (1m) | STDO21 (5m) |
|-------------------|-------------------------------|-------------------------------|-------------------------------|
| Part Number | 30031639 Shop | 30378544 Shop | 30378545 Shop |
| Connection | BNC | Min-Din | Min-Din |
| Cable Length | 1.1m | 1m | 5m |
| Shaft Length | 120mm | 125mm | 125mm |
| Shaft Diameter | 12mm | 13mm | 13mm |
| Shaft Material | Plastic | ABS | ABS |
| Temperature Range | 0-50 °C | 0-60 °C | 0-60 °C |
| Measurement Range | 0-200% | 0.02~20 mg/L | 0.02~20 mg/L |
| Storage Solution | 10% NaCl | | |



Temperature Probes

Temperature Compensation

Temperature variations can affect pH measurements. However at pH level 7, temperature will not have an effect on the potential of the system. This is known as the 'isopotential point'.

If automatic compensation is not practical, the following equation can be used to determine error:

Magnitude of error = $0.003 \text{ pH}/^{\circ}\text{C}/\text{pH unit from pH 7}$

Note: The temperature compensation here refers to electrode related temperature variation and not solution related variations.

STTEMP30 is a standalone sensor that can be used in conjunction with Starter 3100, 2100, 300 and 300D meters to check for temperature variations.

pH Buffer Solutions

250 ml pH buffer solutions are available in values of pH 4.01, 7.00, 9.21, 10.01. Select solutions come in color coded bottles with dispenser tops and help with instant recognition. These are available in 250 ml bottles.

Conductivity standards

250 ml Conductivity standard solutions are available in values of $84\mu\text{s}/\text{cm}$, $1413\mu\text{s}/\text{cm}$ and $12.88 \text{ ms}/\text{cm}$.

Reference Refilling Electrolyte

3M KCl saturated (with AgCl) reference fill solutions for Ag/AgCl single junction electrodes is available.






















Electrode Storage Solutions

After cleaning or when the electrode is not in use, always keep pH electrodes in some storage solution to ensure proper working condition.



| Model | STTEMP30 |
|-------------------|-------------------------------|
| Item Number | 83033970 Shop |
| Shaft Material | Stainless steel |
| Shaft Length | 120mm |
| Temperature Range | 0-100 °C |
| Cable Length | 1 m |
| Connection | Cinch |

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| Sensor Type | Model | Description | Shaft Material | Shaft Dim. Cable Length | Measurement Range, Accuracy | Temp. Range | Application Area | Connector |
|------------------|--|--------------------------------|------------------------------|-------------------------|-----------------------------|-------------|---|------------|
| pH |  ST350 | 3-in-1 within temp sensor | glass refillable | 120 × 12mm 1m | 0--14pH | 0 - 100°C | Normal samples with ATC; as well as high temperature, organic etc. | BNC+Cinch |
| |  ST320 | 3-in-1 within temp sensor | plastic non-refillable | 120 × 12mm 1m | 0--13pH | 0 - 80°C | Normal samples with ATC | BNC+Cinch |
| |  ST310 | 3-in-1 within temp sensor | plastic refillable | 120 × 12mm 1m | 0--14pH | 0 - 80°C | Normal samples with ATC | BNC+Cinch |
| |  ST270 | Puncture electrode | glass non-refillable | 120 × 12mm 1m | 0--14pH | 0 - 100°C | Suitable for semisolid samples such as fruits, meat or cheese. | BNC |
| |  ST272 | Puncture electrode | Plastic, Non-refillable, Gel | 120 x 15 mm 1m | 2 - 12pH | 0 to 50°C | Suitable for semisolid samples such as meat, fruits or cheese. | BNC |
| |  ST260 | 2-in-1 | glass refillable | 120 × 12mm 1m | 0--14pH | 0-80°C | Tris-buffer solution | BNC |
| |  ST230 | 2-in-1 | glass refillable | 110 × 12mm 1m | 0--14pH | 0 - 80°C | Muddy samples (milk, juice) | BNC |
| |  ST210 | 2-in-1 | plastic refillable | 120 × 12mm 1m | 0--14pH | 0 - 80°C | Normal samples | BNC |
| |  STPURE | 2-in-1 | glass refillable | 120 × 12mm 1m | 0--13pH | 0 - 100°C | low conductivity samples (pure water, distilled water, rain water) | BNC |
| |  STSURF | 2-in-1 | plastic refillable | 120 × 12mm 1m | 2--12pH | 0 - 80°C | Flat surface such as skin, paper etc. | BNC |
| |  STMICRO5 | 2-in-1 | glass refillable | 80 × 5 mm 1m | 0--14pH | 0 - 100°C | Mico samples in tube or microcentrifuge tube | BNC |
| |  STMICRO8 | 2-in-1 | glass refillable | 150 × 8 mm 1m | 0--14pH | 0 - 100°C | Mico samples in tube or microcentrifuge tube | BNC |
| Reference |  STREF2 | Saturated Calomel (SCE) | glass refillable | 120 × 12mm 1m | NA | 0 - 50°C | E vs sHE is 0.241v | 2mm banana |
| |  STREF1 | Ag AgCl | glass refillable | 110 × 12mm 1m | NA | 0 - 100°C | E vs sHE is 0.198v | 2mm banana |
| ORP |  STORP1 | Pt disk | plastic non-refillable | 120 × 12mm 1m | -1000mv--1000mv 1mv | 0 - 80°C | Normal samples | BNC |
| |  STORP2 | Pt band | glass refillable | 120 × 12mm 1m | -1000mv--1000mv 1mv | 0 - 100°C | Can endure high temperature and organic solvents | BNC |
| Conductivity |  STCON3 | 4-pole sensor with temp sensor | Plastic | 130 × 14mm 1m | 70µs/cm-200ms/cm 0.5% | 0 - 50°C | Normal samples | Mini-Din |
| |  STCON7 | 2-pole sensor with temp sensor | Plastic | 95 × 12mm 1m | 0.02µs/cm-200µs/cm 0.5% | 0 - 50°C | Pure water, not fit for ultrapure water | Mini-Din |
| Dissolved Oxygen |  STDO11 | Galvanic | Plastic | 120 × 12mm 1m | 0-45mg/L | 0 - 50°C | Normal samples, no warm up needed, no maintenance | BNC |
| |  STDO21 | Optical | Plastic | 125 x 13 mm 1m | 0-20 mg/L | 0-60°C | Waste water, environmental monitoring. (lakes, streams, rivers etc.) Aquaculture systems wine and beer. | Mini-Din |
| Temperature |  STTEMP30 | NTC 30KΩ | Steel | 120 × 3mm 1m | 0-100°C 0.5°C | 0-100°C | Can work with ST300, ST300D, ST2100 and ST3100 | Cinch |

Starter Electrodes Selector Guide

| | | pH Electrodes | | | | | | | | | | | |
|--|---|---------------|-------|-------|-------|-------|-------|-------|-------|----------|----------|--------|--------|
| | | ST350 | ST320 | ST310 | ST272 | ST270 | ST260 | ST230 | ST210 | STMICRO8 | STMICRO5 | STPURE | STSURF |
| pH measurements of environmental and laboratory samples | Standard Aqueous samples, general purpose (e.g. pH buffers) | ● | ● | ● | ◐ | ◐ | ◐ | ● | ● | ● | ● | ● | ◐ |
| | Waste water | ● | ◐ | ◐ | | | | ● | ◐ | | | | |
| | River/lake water | ● | ● | ● | | | | ● | ● | | | ● | |
| | Swimming pool | ● | ◐ | ◐ | | | | ● | ◐ | | | ● | |
| | Tap water/drink water | ● | ◐ | ◐ | | | | ● | ◐ | | | ● | |
| | Pharmaceutical industry water | ● | ◐ | ◐ | | | | ● | ◐ | | | ● | |
| | Distilled water/pure water | ◐ | | | | | | ◐ | | | | ● | |
| | Education purpose samples | ◐ | ◐ | ● | | | | ◐ | ● | ◐ | | ◐ | |
| | Strong Acid(not HF)or strong Base | ◐ | | | | | | ◐ | | | | | |
| | Harsh Environmental solution, e.g high temperature or corrosive | ◐ | | | | | | ◐ | | | | | |
| | Drug formulations | ◐ | | | | | | ◐ | | | | | |
| | Tris-buffer solutions | | | | | | ● | | | | | | |
| | Suspensions(e.g. ink, soil in water) | ◐ | | | | | | ◐ | | | | | |
| | Cell culture media | | | | ◐ | ◐ | | | | | | | ◐ |
| | Small container/Tube samples | | | | | | | | | ● | ◐ | | |
| Microtube samples | | | | | | | | | ◐ | ● | | | |
| pH measurements of Food and Beverages etc.. (various liquid or semi-solid samples) | Jam/Yoghurt | ◐ | | | ● | ● | | ◐ | | | | | ◐ |
| | Vegetable and fruit | ◐ | | | ● | ● | | ◐ | | | | | |
| | Honey | ◐ | | | | | | ◐ | | | | | |
| | Cream | ◐ | | | | | | ◐ | | | | | |
| | Fish/Meat/Poultry | | | | ● | ● | | | | | | | |
| | Cheese | | | | ● | ● | | | | | | | |
| | Milk | ● | ◐ | ◐ | | | | ● | ◐ | | | | |
| | Soy sauce | ● | ◐ | ◐ | | | | ● | ◐ | | | | |
| | Beer | ● | ◐ | ◐ | | | | ● | ◐ | | | | |
| | Wine | ◐ | | | | | | ◐ | | | | | |
| | Tea and coffee | ● | ◐ | ◐ | | | | ● | ◐ | | | | |



fit for this application



partially fit for this application

not fit for this application



| | | pH Electrodes | | | | | | | | | | | |
|---|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|----------|----------|--------|--------|
| | | ST350 | ST320 | ST310 | ST272 | ST270 | ST260 | ST230 | ST210 | STMICRO8 | STMICRO5 | STPURE | STSURF |
| Exemplary daily use chemical products pH measurements | Pesticidea solution | ● | | | | | | ● | | | | | |
| | Paint/latex paint | ● | | | | | | ● | | | | | |
| | Water paint | ● | | | | | | ● | | | | | |
| | Cosmetics/emulsion | ● | ● | ● | | | | ● | ● | | | | |
| | Shampoo/Shower creams/liquid soups | ● | ● | ● | | | | ● | ● | | | | |
| pH measurement on surface | Meat/Cheese | | | | | | | | | | | | ● |
| | Paper | | | | | | | | | | | | ● |
| | Skin | | | | | | | | | | | | ● |
| | Agar | | | | | | | | | | | | ● |

| | | Redox(ORP) Electrodes | | Conductivity Probes | |
|---|---|-----------------------|--------|---------------------|--------|
| | | STORP1 | STORP2 | STCON3 | STCON7 |
| pH measurements of environmental and laboratory samples | Standard Aqueous samples, general purpose (e.g. pH buffers) | ● | ● | ● | ● |
| | Waste water | ● | ● | ● | |
| | River/lake water | ● | ● | ● | |
| | Swimming pool | | | | |
| | Tap water/drink water | ● | ● | ● | |
| | Pharmaceutical industry water | | | ● | ● |
| | Distilled water/pure water | | | | ● |
| | Education purpose samples | | | | |
| | Strong Acid(not HF)or strong Base | | | | |
| | Harsh Environmental solution, e.g high temperature or corrosive | | | | |
| | Drug formulations | | | | |
| | Tris-buffer solutions | | | | |
| | Suspensions(e.g. ink, soil in water) | | | | |
| | Cell culture media | | | | |
| | Small container/Tube samples | | | | |
| Microtube samples | | | | | |

- fit for this application
- partially fit for this application
- not fit for this application

Pen Meters, Starter Series

Accurate results anywhere and anytime you need them!

The Pen Meters, Starter Series from OHAUS can be completely operated with just one hand, freeing up the other hand for sample handling.

With several models designed to measure pH, Conductivity, ORP (oxidation-reduction potential), salinity and TDS (Total Dissolved Solids), OHAUS continue providing solutions for users looking for accurate measurement at a very competitive price.



pH Meter

Conductivity

ORP

Salinity

| Model | ST20 | ST20C-C | ST20C-B | ST20C-A | ST20R | ST20S |
|-------------------------------|--------------------------------------|--------------------------------------|-------------------------|-------------------------|-----------------------|-----------------------|
| Part Number | 30073971 | 30073977 | 30073976 | 30073975 | 30073985 | 30073983 |
| Range | 0.00-14.00 | 0.00-19.99 ms/cm | 0-1999 μ s/cm | 0.0-199.9 μ s/cm | -1000mV-1000mV | 0.0-80.0 ppt |
| Resolution | 0.01pH | 10 μ s/cm | 1 μ s/cm | 0.1 μ s/cm | 1mV | 0.1 ppt |
| Accuracy | 0.05pH | \pm 1.5% FS | \pm 1.5% FS | \pm 1.5% FS | 2mV | \pm 1.5% FS |
| Temperature Range | 0.0-99.0 $^{\circ}$ C | ATC - With Temperature Display | | | - | - |
| Temperature Compensation | Yes | - | - | - | 0.0-99.0 $^{\circ}$ C | - |
| Display | Dual | Dual | | | | |
| Calibration | 3 Point | - | - | - | NA | - |
| Buffer Group | 4.01, 7.00, 10.01 | - | - | - | - | - |
| Automatic Shutdown | 6 Minutes of Non-Use | 6 Minutes of Non-Use | | | | |
| Battery | 4 AG13 1.5V Micro Alkaline Batteries | 4 AG13 1.5V Micro Alkaline Batteries | | | | |
| Size / Weight | 185 x 45 x 38 mm / 110g | 185 x 45 x 38 mm / 110g | | | | |
| Other Models available | ST10 - 30073970 | ST10C-C 30073974 | ST10C-B 30073973 | ST10C-A 30073972 | ST10R 30073984 | ST10S 30073982 |

TDS Meters

| | |
|-------------------------------|---|
| Model | ST20T-B |
| Part Number | 30073981 |
| Range | 0-1000 mg/L |
| Resolution | 1 mg/L |
| Accuracy | ±1.5% FS |
| ATC | With Temperature Display |
| Temperature Range | - |
| Temperature Compensation | - |
| Display | Dual |
| Calibration | - |
| Automatic Shutdown | 6 Minutes of Non-Use |
| Battery | 4 AG13 1.5V Micro Alkaline Batteries |
| Size / Weight | 185 x 45 x 38 mm, 110g |
| Other Models available | ST20T-A - 30073980 ST10T-B - 30073979 ST10T-A - 30073978 |



Multiparameter Meters

| | | |
|-------------------|-------------------------|------------------|
| Model | ST20M-B | ST20M-C |
| Part Number | 30393199 | 30393200 |
| Measurement Range | pH | 0 - 14 |
| | Conductivity | 0 ... 1999 µS/cm |
| | TDS | 0 ... 1000 mg/L |
| | Salinity | NA |
| | Temperature | 0 - 99.0 °C |
| Resolution | pH | 0.01 pH |
| | Conductivity | 1 µS/cm |
| | TDS | 1 mg/L |
| | Salinity | NA |
| | Temperature | 0.1 °C |
| Accuracy | pH | ± 0.05pH |
| | Conductivity | ± 2% Full Scale |
| | TDS | ± 2% Full Scale |
| | Salinity | NA |
| | Temperature | ± 0.5 °C |
| ATC | Yes, with temp. display | |
| ATC Range | 0-45 °C | |
| Calibration | pH | 3 point |
| | Conductivity | 1 point |
| | TDS | NA |
| | Salinity | NA |
| Battery | 4 x 1.5V | |
| Battery Life | 100 hrsIP grade | |
| Size / Weight | 185 x 45 x 38 mm, 110g | |
| IP grade | IP67 | |

Solutions and Buffers

| Part Number | Description |
|-------------|---|
| 30100441 | Conductivity Standard 10 µS/cm, 250ml per bottle |
| 30100442 | Conductivity Standard 84 µS/cm, 250ml per bottle |
| 30100443 | Conductivity Standard 1413 µS/cm, 250ml per bottle |
| 30100444 | Conductivity Standard 12.88 µS/cm, 250ml per bottle |
| 83033971 | pH Buffer Powder Sachet (4.01;7.00;10.01) |
| 30100424 | pH1.68, 250ml per bottle |
| 30100425 | pH4.01, 250ml per bottle |
| 30100426 | pH6.86, 250ml per bottle |
| 30100427 | pH7.00, 250ml per bottle |
| 30100428 | pH9.18, 250ml per bottle |
| 30100429 | pH10.01, 250ml per bottle |
| 30100440 | pH12.45, 250ml per bottle |
| 30059255 | pH electrode reference electrolyte |
| 30059256 | pH electrode protection solution |



More Pen Meters also available, click here to see the full range



- Cleaning solutions also available
- Up to 2 years shelf life at the right temperature
- 250ml Bottle packaging
- Certificates also available



About OHAUS Starter Series

After more than a century of perfecting the art of measurement through our durable weighing products, OHAUS precision is now available in a line of benchtop, portable and pen pH, conductivity, dissolved oxygen, salinity, total dissolved solids (TDS), oxidation reduction potential (ORP) meters and electrodes. The Starter Series includes a wide breadth of products from basic level meters that offer high performance at a great value to high performance products that have extended and advanced functionality, as well as a variety of electrodes that can be used in combination with our bench and portable meters.

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