Water Analysis Meters & Electrodes

Ingeniously Practical

Content

Instrument Selector Guide

	Bench Meters								Portable Meters					
	AquaSearcher AB33M1	Starter 5000	AquaSearcher AB41PH	AquaSearcher AB33PH	AquaSearcher AB23PH	Starter 2200	AquaSearcher AB33EC	AquaSearcher AB23EC	Starter 400M	Starter 400	Starter 300	Starter 300C	Starter 400D	Starter 300D
Measurement Range	-2.00 to 20.00 pH; 0.01 µS/cm to 500.0 mS/cm;-5.0 to 110°C	-2.000 to 20.000 pH; -30°C to 130 °C	-2.000 to 20.000 pH; -10.0 to 125.0 °C	-2.00 to 16.00 pH; -5.0 to 110°C	0.00 to 14.00 pH; 0.0 to 100.0 °C	0.00 to 14.00 pH; 0.0 to 100.0 °C	0.001 µS/cm to 1000.0 mS/cm; -5.0 to 110°C	0.01 µS/cm to 199.9 µS/cm; 0.0 to 100.0 °C	2.00to16.00 pH; -5 °Cto110 °C	2.00to16.00 pH -5 °Cto110 °C	0.00 to 14.00 pH 0 °C to 100 °C	0.0 µS/cm to 199.9 mS/cm 0 °C to 100 °C	0.0 to 200.0% 0 °C to 50 °C	0.0 to 199.9%; 200 to 400% 0 °C to 50 °C
pH	●	●	●	●	●	●			●	●	●			
ORP	●	●	●	●	●	●			●	●	●			
Conductivity	●						●	●	●			●		
TDS	●						●	●	●			●		
Salinity	●						●	●	●			●		
Resistivity	●						●		●					
DO													●	●
Temperature	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Input	BNC Mini-Din	BNC	BNC	BNC	BNC	BNC	Mini-Din	Mini-Din	BNC	BNC	BNC	Mini-Din	BNC	BNC
Automatic Temp. Compensation	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Manual Temp. Compensation	●	●	●	●	●	●	●	●	●	●	●			●
Battery Power									●	●	●	●	●	●
1 Pt. Calibration	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2 Pt. Calibration	●	●	●	●	●	●	●	●	●	●	●		●	●
≥3 Pt. Calibration	●	●	●						●	●	●			
Memory	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Backlit LCD	●	●	●	●	●	●	●	●	●	●			●	
LCD					●	●		●	●	●	●	●	●	●
Touchscreen	●	●	●	●			●							
Mechanical Keys					●	●		●	●	●	●	●	●	●
USB	●		●	●			●	●	●					
RS232	●	●	●	●			●							
USB Host		●												
GLP / Time / Date	●	●	●	●			●							
Multi Languages	●	●	●	●			●		●	●				
IP Protection	IP53		IP53	IP53	IP53		IP53	IP53	IP67	IP67	IP54	IP54	IP54	IP54
Stand-alone Electrode Holder	●	●	●	●	●	●	●	●						
Quick Guide	●	●	●	●	●	●	●	●						
In-Use Cover & Rubber Cover		●							o	o				
Hold Function									●	●	●	●	●	●
Auto Shut Off	●		●	●			●		●	●	●	●	●	●
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*on specific models
☼ Rubber Cover

Instrument Selector Guide

	Starter Series Pen Meters													
	pH meters		ORP meters		Conductivity meters		DO meters	Salinity meters		TDS meters		Multi meters	
	ST10	ST20	ST10R	ST20R	ST10C	ST20C	ST20D	ST10S	ST20S	ST10T	ST20T	ST20M-B	ST20M-C
Measurement Range	0.00 to 14.00 pH*		-1000mV to 1000mV		0.0 to 199.9 µs/cm*		0.0 to 19.9 mg/L	0.0 to 80.0 ppt*		0 to 1000 mg/L*		0.00 to 14.00 pH, 0-1999 µS/cm, 0-19.99 mS/cm, 0-1000 mg/L, 0.0-10.0 ppt	
Automatic Temp. Compensation	●*		●*		●*		●*	●*		●*		●	
Battery Power	●		●		●		●	●		●		●	
1 Pt. Calibration	●*		●*		●*		●*	●*		●*		●	
2 Pt. Calibration	●*												
≥3 Pt. Calibration	●*												
LCD	●		●		●		●	●		●		●	
Mechanical Keys	●		●		●		●	●		●		●	
IP Protection	IP67		IP67		IP67		IP67	IP67		IP67		IP67	
Hold Function	●*		●		●		●	●		●		●	
Auto Shut Off	●		●		●		●	●		●		●	
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AQUASEARCHER *AB33M1 Bench*

Easy-to-Use and Accurate Multi-Parameter Benchtop Meter

- Capable of measuring up to seven parameters including pH, ORP, conductivity, TDS, salinity, resistivity and temperature, the AB33M1 utilizes two independent measuring channels which can work simultaneously.
- With multifunctional touch keypads, AB33M1 makes measurement simple and fast. The intelligent i-Steward monitors the condition of electrodes, ensuring the accuracy of the results.
- A 1000-item memory for measurement and calibration allows for efficient data documentation. Records are kept with date/time for traceability. RS232 and USB enable connection to external devices.

Parameters	pH, oxidation-reduction potential (ORP), Conductivity, Total Dissolved Solids (TDS), Salinity and Resistivity with Temperature Measurements
Communication	RS232, USB Device (included)
Operation	AC adapter (included)
Design Features	i-Steward, two independent channels, calibration due alarm, 1,000 measurement memory

Construction and Display

Standalone Electrode Holder

Touch Backlit Display

Dual Channel Display

Connectivity

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
a-AB33M1-B	N/A	pH: -2.00 to 20.00 pH ; ORP: ± 2000.0 mV Conductivity: 0.01 µS/cm to 19.99 µS/cm 20 µS/cm to 199.9 µS/cm; 200 µS/cm to 1999 µS/cm; 2.00 mS/cm to 19.99 mS/cm ; 20.0 mS/cm to 500.0 mS/cm TDS: 0.1mg/L to 199.9 g/L ; Resistivity: 2 to 100 MΩ-cm Salinity: 0 to 100 psu ; Temperature: -5.0 to 110.0°C, 23.0°F to 230.0°F	pH: 0.01 pH ; ORP: 0.1mV Conductivity: 0.01µS/cm minimum; auto ranging TDS: 0.01 mg/L minimum, auto ranging ; Resistivity: 0.01 Ω-cm auto ranging ; Salinity: 0.01 psu minimum, auto ranging Temperature: 0.1 °C, 0.1 °F	30589824
a-AB33M1-F	ST310 pH STCON3			30589825

Parameters and Features

Multi-Parameter Meters

AQUASEARCHER *AB33M1 Bench*

Applications and Industries

Academia

Critical for most academic research labs to monitor pH during titrations.

Universities

Used in university labs to teach students why measuring pH is essential in science.

Chemistry Institutes

Many chemical and biochemical processes are pH dependent.

Municipalities

Monitor water quality parameters to assure safe drinking water.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

Pharmaceutical

Analyze pH and conductivity to monitor quality and safety of drugs during development.

Chemical Industries

Control pH to help with process control and ensure product quality.

Marine

Accurately measure salinity, conductivity and TDS to monitor water quality for marine life.

STARTER 400M *Portable*

Durable, Waterproof Battery-Operated Multi-Parameter Meters Ideal for Field Testing

- Built with IP67 waterproof housing as well as a rubber cover and IP67 electrodes, the ST400 is ideal for prolonged use in any field environment.
- Rechargeable Lithium battery provides 40 hours of uninterrupted use and more than 300 charge cycles—eliminating the need to change out batteries often.
- The ST400M features intuitive software which guides the user through operation. All necessary information to run tests successfully such as electrode condition is displayed clearly on the large LCD.

Parameters	pH, Conductivity, TDS, Salinity and Resistivity testing
Communication	Built-in micro-USB port
Operation	Rechargeable Lithium battery
Design Features	Data storage of up to 1000 items

Construction and Display

IP67 Waterproof Housing


IP67 Electrodes


Rubber Cover

Backlit Liquid Crystal Display (LCD)

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST400M-B	N/A	pH -2 to 16.00 pH ORP -1999 to 1999 mV Conductivity 0.0 µS/cm to 199.9 mS/cm TDS 0.1 mg/l to 199.9 g/l Salinity 0.0 to 99.9 psu Resistivity 0 to 20MΩ•cm Temperature -5 °C to 110 °C	pH 0.01 pH ORP 1 mV Conductivity 0.1 µS/cm, Auto-range TDS 0.01 mg/l, Auto-range Salinity 0.01 psu, Auto-range Resistivity 0.01 Ω•cm, Auto-range Temperature 0.1 °C	30468990
ST400M-F	ST320 IP67 3m and STCON3 IP67 3m electrodes			30468991
ST400M-G*				30468992

*Portable bag included

Parameters and Features

STARTER 400M *Portable*

Applications and Industries


Surface Water

Test water in rivers, lakes etc. to maintain a stable environment for aquatic life.


Municipalities

Monitor water quality parameters to assure safe drinking water.


Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.


Academia

Critical for most academic research labs to monitor pH during titrations.


Marine

Accurately measure salinity, conductivity and TDS to monitor water quality for marine life.


Aquaculture

Maintain stable pH values to encourage healthy environment for aquatic organisms.


Agriculture

Regulate plant nutrient availability by closely monitoring soil pH.

STARTER 5000 pH *Bench*

High Performance Bench Meter for Universal pH Applications

- A 1000-item library allows for easy recall from data storage. Flexible pH analysis from 10 sensors for calibration storage, one self-defined and eight pre-defined buffer groups, three endpoint modes and GLP mode.
- A user-friendly bench meter with an innovative design, including an adjustable standalone electrode holder and large touch-screen, backlit LCD display.
- Featuring a USB port, IP54 housing and in-use-cover, this flexible and smooth-operating bench meter is built to last.

Parameters	pH, oxidation-reduction potential (ORP) measurement
Communication	RS232 and USB (included), GLP/GMP data output with real-time clock
Operation	AC adapter (included)
Design Features	3 endpoint modes, continuous measurement mode, up to 9 point calibration, 1,000 measurement memory

Construction and Display

ABS Housing

Standalone Electrode Holder

Replaceable In-Use Cover

Backlit Liquid Crystal Display (LCD), Touchscreen

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST5000-B	N/A	pH –2.000 to 20.000 ORP –2000.00 to +2000.00 mV Temperature -30 °C to 130 °C	pH 0.1/0.01/0.001 ORP 1/0.1/0.01 mV Temperature 0.1 °C	30129895
ST5000-F	ST350			30129896

Parameter and Features

STARTER 5000 pH *Bench*

Applications and Industries

Universities

Used in university labs to teach students why measuring pH is essential in science.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

Pharmaceutical

Analyze pH and conductivity to monitor quality and safety of drugs during development.

Chemical Industries

Control pH to help with process control and ensure product quality.

AQUASEARCHER *AB41pH Bench*

An Advanced, Research-Grade Benchtop pH Meter Offering Accurate, Repeatable Results

- With selectable resolution from 0.1 to 0.001 and an intelligent i-Steward system, AB41PH is an excellent pH bench meter with high resolution and consistent accuracy.
- Equipped with a 6.5-inch large LCD display and a touch keypad, AB41PH offers a simple and precise control experience.
- The AB41PH features a 1000-item memory and password management for GLP documentation. Provides connectivity and data output capabilities with RS232 and USB interface

Parameters	pH, Oxidation-Reduction Potential (ORP) with Temperature Measurements
Communication	RS232 and USB (included), GLP/GMP data output with real-time clock
Operation	AC adapter (included)
Design Features	i-Steward, 3 endpoint modes, calibration due alarm, 1,000 measurement memory, ten most recent calibrations, password management

Construction and Display

Standalone Electrode Holder

Touch Backlit Display

Compact Sitrrer

Connectivity

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
a-AB41PH-B	N/A	pH: -2.000 to 20.000 pH ORP: ± 2000.0 mV Temperature: -10.0 to 125.0 °C, 14°F to 257°F	pH: 0.1/0.01/0.001 pH ORP: 0.1 mV Temperature: 0.1 °C, 0.1 °F	30589830
a-AB41PH-F	ST410 pH STTEMP			30589831

Parameter and Features

pH pH Measure-ment · ORP Oxidation Reduction Potential · Temper-ature · i-Steward · Auto Standby · Multi-Language · Touch Screen

AQUASEARCHER *AB41pH Bench*

Applications and Industries

Chemical Industries

Control pH to help with process control and ensure product quality.

Universities

Used in university labs to teach students why measuring pH is essential in science.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

Pharmaceutical

Analyze pH and conductivity to monitor quality and safety of drugs during development.

AQUASEARCHER *AB33PH Bench*

Highly Reliable and User-Friendly pH Benchtop Meter for Standard Laboratory Applications

- With multifunctional touch keypads, AB33PH makes measurement simple and fast within three steps. The intelligent i-Steward monitors the condition of electrodes, ensuring the accuracy of the results.
- Auto endpoint mode and auto buffer recognition makes calibration easy. A 1000-item memory for pH measurements and calibration trail makes for efficient data documentation.
- A user-friendly bench meter with an innovative design, including 6.5 inch large LCD display and adjustable stand-alone electrode holder. Multiple connectivity capabilities include RS232 and USB interface.

Parameters	pH, Oxidation-Reduction Potential (ORP) with Temperature Measurements
Communication	RS232 and USB interface
Operation	AC adapter (included)
Design Features	A 1000-item memory, automatic and manual endpoint functions, automatic and manual temperature compensation

Construction and Display

Standalone Electrode Holder

Touch Backlit Display

Connectivity

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
a-AB33PH-B	N/A	pH: -2.00 to 16.00 pH ORP: ± 2000.0 mV Temperature: -5.0 to 110.0°C, 23.0°F to 230.0°F	pH: 0.1/0.01 pH ORP: 1 mV Temperature: 0.1 °C, 0.1 °F	30589826
a-AB33PH-F	ST310 pH			30589827

Parameters and Features

pH & ORP Meters

AQUASEARCHER *AB33PH Bench*

Applications and Industries

Academia

Critical for most academic research labs to monitor pH during titrations.

Universities

Used in university labs to teach students why measuring pH is essential in science.

Chemistry Institutes

Many chemical and biochemical processes are pH dependent.

Municipalities

Monitor water quality parameters to assure safe drinking water.

Recirculating Systems

Closely monitor water quality to assure suitable habitat for fish.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

Chemical Industries

Control pH to help with process control and ensure product quality.

AQUASEARCHER *AB23PH Bench*

Simple-to-Use Benchtop Meter Designed for Easy Sample Measurement

- With six instructional menu buttons, auto buffer recognition or auto temperature compensation, AB23 series is an easy and straightforward meter for measurement.
- Large 5-inch bright LCD display with complete measurement information simplifies operation and allows you to monitor the results from a distance.
- Featuring a compact stand-alone electrode holder, AB23 series increases the flexibility of experiments and fits ideally in any lab.

Parameters	pH, oxidation-reduction potential (ORP) measurement
Operation	AC adapter (included)
Design Features	Up to 3 point calibration, 5 inch segment LCD with backlight

Construction and Display

Standalone Electrode Holder

Backlit Display

Compact Design

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
a-AB23PH-B	N/A	pH: 0.00 to 14.00 pH ORP: ± 1999 mV Temperature: 0.0 to 100.0 °C, 32.0 °F to 212.0 °F	pH: 0.01 pH ORP: 1 mV Temperature: 0.1 °C, 0.1 °F	30589820
a-AB23PH-F	ST320 pH			30589821

Parameters and Features

pH — pH Measurement

ORP — Oxidation Reduction Potential

Temperature

AQUASEARCHER *AB23PH Bench*

Applications and Industries

Academia

Critical for most academic research labs to monitor pH during titrations.

Chemistry Institutes

Many chemical and biochemical processes are pH dependent.

Learning Centers

Students learn the theory and practice of pH measurement.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

Aquaculture

Maintain stable pH values to encourage healthy environment for aquatic organisms.

Agriculture

Regulate plant nutrient availability by closely monitoring soil pH.

Municipalities

Monitor water quality parameters to assure safe drinking water.

STARTER 2200 *Bench*

Affordable Benchtop pH Meter for Basic Laboratory Applications

- A user-friendly bench meter which clearly displays critical information and the five distinctly marked keys allows users to operate the instrument with minimal training.
- Auto buffer recognition and auto-endpoint mode make calibration and measurement simple and ideal for routine pH measurement.
- The built-in electrode holder provides straightforward and convenient all-in-one operation, while the attached quick guide clearly explains the operating steps.

Parameters	pH, Oxidation-Reduction Potential (ORP) with Temperature Measurements
Operation	AC adapter (included)
Design Features	Auto buffer recognition, 1 to 3 point calibration, electrode condition icon

Construction and Display

Built-in Electrode Holder

Compact Design

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST2200-B	N/A	pH: 0.00 to 14.00 pH ORP: ± 1999 mV Temperature: 0.0 to 100.0 °C, 32.0 °F to 212.0 °F	pH: 0.01 pH ORP: 1 mV Temperature: 0.1 °C, 0.1 °F	30656033
ST2200-F	ST320 pH			30655944

Parameters and Features

pH pH Measure-ment

ORP Oxidation Reduction Potential

Temper-ature

STARTER 2200 *Bench*

Applications and Industries

Municipalities

Monitor water quality parameters to assure safe drinking water.

Chemistry Institutes

Many chemical and biochemical processes are pH dependent.

Learning Centers

Students learn the theory and practice of pH measurement.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

Aquaculture

Maintain stable pH values to encourage healthy environment for aquatic organisms.

Agriculture

Regulate plant nutrient availability by closely monitoring soil pH.

STARTER 400 pH *Portable*

Durable, Waterproof Battery-Operated pH Meters Ideal for Field Testing

- Built with IP67 waterproof housing as well as a rubber cover and IP67 electrodes, the ST400 is ideal for prolonged use in any field environment.
- Rechargeable lithium battery provides 40 hours of uninterrupted use and more than 300 charge cycles—eliminating the need to change out batteries often.
- The ST400 features intuitive software which guides the user through operation. All necessary information to run tests successfully such as electrode condition is displayed clearly on the large LCD.

Parameters	pH, Oxidation-Reduction Potential (ORP) measurement
Communication	Built-in micro-USB port
Operation	Rechargeable lithium battery
Design Features	Data storage of up to 1000 items

Construction and Display

IP67 Waterproof Housing


IP67 Electrodes


Rubber Cover

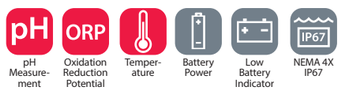
Backlit Liquid Crystal Display (LCD)

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST400-B	N/A	pH -2 to 16.00 pH ORP -1999 to 1999 mV Temperature -5 °C to 110 °C	pH 0.01 pH ORP 1 mV Temperature 0.1 °C	30468964
ST400-F	ST320 IP67 3m Electrode			30468965
ST400-G*				30468966

*Portable bag included

Parameters and Features



pH & ORP Meters

STARTER 400 pH *Portable*

Applications and Industries


Learning Centers

Students learn the theory and practice of pH measurement.


Surface Water

Test water in rivers, lakes etc. to maintain a stable environment for aquatic life.


Municipalities

Monitor water quality parameters to assure safe drinking water.


Wastewater treatment

Test for contaminants in wastewater or sewage before it is converted into an effluent.


Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.


Marine

Accurately measure pH and ORP to monitor water quality for marine life.


Aquaculture

Maintain stable pH values to encourage healthy environment for aquatic organisms.

STARTER 300 pH *Portable*

Convenient Portable pH Meter for Wherever Your Work Takes You

- Auto buffer recognition with four different buffer groups makes it easy to avoid errors during the calibration process.
- Easy-to-use and accurate with a simple calibration process, automatic temperature compensation and fast results. Ideal for secure field use with a meter stand, wrist strap and durable IP54 housing.
- The 30-measurement library stores data for future reference and allows the user to easily recall the last calibration data with one quick touch.

Parameters	pH, oxidation-reduction potential (ORP) measurement
Operation	4 AAA batteries (included)
Design Features	30 measurement memory, automatic and manual endpoint functions, automatic and manual temperature compensation

Construction and Display

ABS Housing

Field Kit

Liquid Crystal Display (LCD)

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST300-B	N/A	pH 0.00 to 14.00 ORP -1999 to 1999 mV Temperature 0 to 100 °C	pH 0.01 pH ORP 1 mV Temperature 0.1 °C	83033962
ST300	ST320			83033961
ST300-G*				30219114

*Portable bag included

Parameters and Features

STARTER 300 pH *Portable*

Applications and Industries

Surface Water

Test water in rivers, lakes etc. to maintain a stable environment for aquatic life.

Municipalities

Monitor water quality parameters such as Dissolved Oxygen to assure safe drinking water.

Wastewater treatment

Test for contaminants in wastewater or sewage before it is converted into an effluent.

Aquaculture

Maintain stable pH values to encourage healthy environment for aquatic organisms.

Agriculture

Regulate plant nutrient availability by closely monitoring soil pH.

AQUASEARCHER *AB33EC Bench*

Highly Reliable Conductivity/TDS/Salinity/ Resistivity Benchtop Meter for Standard Laboratory Applications

- Selectable reading reference temperatures of 20ºC or 25ºC with linear curve options and automatic temperature compensation ensure accurate results.
- Features such as auto-stop, auto temperature compensation, adjustable TDS factor, 2- or 4-cell conductivity probe compatibility make AB33EC well-suited for universal laboratory applications.
- A 1000-item memory for conductivity measurements and calibration trail allows for efficient data documentation. Standard RS232 and USB interface allow connection to external devices.

Parameters	Conductivity, Total Dissolved Solids (TDS), Salinity and Resistivity with Temperature Measurements
Communication	RS232, USB Device (included)
Operation	AC adapter (included)
Design Features	i-Steward, Calibration due alarm, 1,000 measurement memory

Construction and Display

Standalone Electrode Holder

Touch Backlit Display

Connectivity

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
a-AB33EC-B	N/A	Conductivity: 0.001µS/cm to 19.99 µS/cm 20 µS/cm to 199.9 µS/cm ; 200 µS/cm to 1999 µS/cm ; 2.00 mS/cm to 19.99 mS/cm ; 20.0 mS/cm to 1000 mS/cm TDS: 0.1 mg/L to 200 g/L ; Resistivity: 1 to 100 MΩ-cm Salinity: 0 to 100 psu ; Temperature: -5.0 to 110.0°C, 23.0°F to 230.0°F	Conductivity: 0.001 µS/cm minimum; auto ranging TDS: 0.01 mg/L minimum, auto-range Resistivity: 0.01 Ω-cm auto ranging Salinity: 0.01 psu minimum, auto ranging ; Temperature: 0.1 °C, 0.1 °F	30589828
a-AB33EC-F	STCON7			30589829

Parameters and Features

AQUASEARCHER *AB33EC Bench*

Applications and Industries

Academia

Critical for most academic research labs to monitor conductivity of water during their workflow.

Chemistry Institutes

Use conductivity measurements to determine the amount of dissolved ions present in a water sample.

Municipalities

Monitor water quality parameters to assure safe drinking water.

Wastewater treatment

Test for contaminants in wastewater or sewage before it is converted into an effluent.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

Chemical Industries

Determine concentration of ions in water to help with process control and ensure product quality.

Universities

Used in university labs to teach students why measuring pH is essential in science.

Pharmaceutical

Analyze pH and conductivity to monitor quality and safety of drugs during development.

Agriculture

Regulate plant nutrient availability by closely monitoring soil pH.

Wastewater treatment

Test for contaminants in wastewater or sewage before it is converted into an effluent.

AQUASEARCHER *AB23EC Bench*

Simple-to-Use Benchtop Meter Designed to Easily Measure Conductivity, TDS and Salinity

- With six instructional menu buttons and auto temperature compensation, the AB23EC is an easy and straightforward meter for measurement.
- A large 5-inch backlit LCD display with complete measurement information simplifies operation and allows you to monitor the results from a distance.
- Featuring a compact stand-alone electrode holder, the AB23EC increases the flexibility of the experiment and fits ideally in any lab.

Parameters	Conductivity, Total Dissolved Solids (TDS), Salinity with Temperature Measurements
Operation	AC adapter (included)
Design Features	99 measurement memory, automatic and manual endpoint functions, automatic and manual temperature compensation

Construction and Display

Standalone Electrode Holder

Backlit Display

Compact Design

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
a-AB23EC-B	N/A	Conductivity: 0.01 µS/cm to 19.99 µS/cm 20 µS/cm to 199.9 µS/cm ; 200 µS/cm to 1999 µS/cm ; 2.00 mS/cm to 19.99 mS/cm 20.0 mS/cm to 199.9 mS/cm TDS: 0.1 mg/L to 199.9 g/L Salinity: 0 to 99.9 psu Temperature: 0.0 to 100.0 °C, 32.0 °F to 212.0 °F	Conductivity: 0.01 µS/cm minimum; auto ranging TDS: 0.01 mg/L minimum, auto ranging Salinity: 0.01 psu minimum, auto ranging Temperature: 0.1 °C, 0.1 °F	30589822
a-AB23EC-F	STCON3			30589823

Parameters and Features

Conduct-ivity · Total Dissolved Solids · Salinity · Temper-ature

AQUASEARCHER *AB23EC Bench*

Applications and Industries

Academia

Critical for most academic research labs to monitor conductivity of water during their workflow.

Learning Centers

Students learn the theory and practice of pH measurement.

Municipalities

Monitor water quality parameters to assure safe drinking water.

Cooling Water

Measuring and controlling conductivity allows accurate calculation of blowdown quantities and timing.

Food & Beverage

Effectively monitor process water to enhance productivity and quality of final product.

STARTER 300C *Portable*

Convenient Portable Conductivity Meter for Wherever Your Work Takes You

- Four-pole linear electrode with temperature sensor safeguards the unit from polarization and pollution effects to ensure accurate readings.
- Easy-to-use and accurate with a simple calibration process, automatic temperature compensation and fast results.
- The 30-measurement library stores data for future reference and allows the user to easily recall the last calibration data with one quick touch.

Parameters	Conductivity, total dissolved solids (TDS) measurement
Operation	4 AAA batteries (included)
Design Features	Automatic temperature compensation, adjustable temperature coefficient

Construction and Display

ABS Housing

Wrist Strap

Liquid Crystal Display (LCD)

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST300C-B	N/A	Conductivity 00.0 µS/cm to 199.9 mS/cm; TDS 0.1 mg/L to 199.9 g/L Temperature 0 to 100 °C	Conductivity 0.01 µS/cm TDS 0.1 mg/L Temperature 0.1 °C	30092000
ST300C	STCON3			83033964
ST300C- G*				30219115

*Portable bag included

Parameters and Features

Conduct-ivity | Total Dissolved Solids | Temper-ature | Battery Power | Low Battery Indicator

STARTER 300C *Portable*

Applications and Industries

Municipalities

Monitor water quality parameters to assure safe drinking water.

Wastewater treatment

Test for contaminants in wastewater or sewage before it is converted into an effluent.

Recirculating Systems

Closely monitor water quality to assure suitable habitat for fish.

Cooling Water

Measuring and controlling conductivity allows accurate calculation of blowdown quantities and timing.

Marine

Accurately measure salinity, conductivity and TDS to monitor water quality for marine life.

Agriculture

Regulate plant nutrient availability by closely monitoring soil electrical conductivity (EC).

STARTER 400D *Portable*

Dissolved Oxygen (DO) Meter with Optical Technology

- Optical DO electrode requires minimal maintenance and offers immediate measurement readings. No warm up or sample preparation needed.
- Large backlit LCD screen provides easy to read results—even in low light environments. Ideal for secure field use with a meter stand, wrist strap and durable IP54 housing.
- The 99-measurement library stores data for future reference and allows for easy one-touch recall of the last calibration data.

Parameter	Dissolved Oxygen (DO) measurement
Operation	4 AAA batteries (included)
Design Features	99 measurement memory, last calibration data recall, auto barometric pressure measurement, auto temperature compensation with manual salinity compensation

Construction and Display

Optical Electrode

Field Kit

Liquid Crystal Display (LCD)

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST400D-B	–	DO 0.00 to 20.0 mg/L(ppm) Temperature 0 to 50 °C	DO 0.01 mg/L; 0.1% Temperature 0.1 °C	30378541
ST400D-G	STDO21			30378542
ST400D				30378543

Parameter and Features

Dissolved Oxygen · Temperature · Battery Power · Low Battery Indicator

Dissolved Oxygen Meters

STARTER 400D *Portable*

Applications and Industries

Academia

Critical for most academic research labs to monitor pH during titrations.

Surface Water

Test water in rivers, lakes etc. to maintain a stable environment for aquatic life.

Municipalities

Monitor water quality parameters such as Dissolved Oxygen to assure safe drinking water.

Wastewater treatment

Test for contaminants in wastewater or sewage before it is converted into an effluent.

Food & Beverage

Analyzing Dissolved Oxygen concentration is a critical control point during fermentation.

Marine

Accurately measure Dissolved Oxygen to monitor water quality for marine life.

Aquaculture

Maintain stable Dissolved Oxygen values to encourage healthy environment for aquatic organisms.

STARTER 300D *Portable*

Convenient Portable Dissolved Oxygen Meter for Wherever Your Work Takes You

- The galvanic electrode can be used immediately after being powered on without the typical wait time associated with dissolved oxygen meters.
- Easy-to-use and accurate with a simple calibration process, automatic temperature compensation and fast results.
- The 30-measurement library stores data for future reference and allows the user to easily recall the last calibration data with one quick touch.

Parameter	Dissolved Oxygen (DO) measurement
Operation	4 AAA batteries (included)
Design Features	30 measurement memory

Construction and Display

Galvanic Electrode

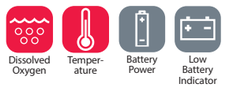
Wrist Strap

Liquid Crystal Display (LCD)

Models

Model	Included Electrode	Measurement Range	Measurement Resolution	Item No.
ST300D-B	N/A	DO 0.0 to 199.9%; 200 to 400% Temperature 0 to 50 °C	DO 0.1%; 1% Temperature 0.1 °C	30031656
ST300D	STDO11 STTEMP30			30031655
ST300D-G				30219116

Parameter and Features



STARTER 300D *Portable*

Applications and Industries

Municipalities

Monitor water quality parameters such as Dissolved Oxygen to assure safe drinking water.

Wastewater treatment

Test for contaminants in wastewater or sewage before it is converted into an effluent.

Food & Beverage

Analyzing Dissolved Oxygen concentration is a critical control point during fermentation.

Aquaculture

Monitor Dissolved Oxygen values to encourage healthy environment for aquatic organisms.

Agriculture

Regulate plant nutrient availability by closely monitoring Dissolved Oxygen levels of saturated soil.

STARTER PEN *Meters*

Accurate Electrochemistry Measurement At Your Fingertips

- Small, economical pen meters offer simple, fast, and straightforward operation.
- With durable IP67 waterproof ABS housing, protective sensor cap, and an automatic shutdown feature that preserves battery life, OHAUS pen meters can endure consistent use in rough, wet environments.
- Equipped with a wrist strap to prevent accidental drop and damage.

Parameters	pH, ORP, conductivity, TDS, salinity, DO
Operation	4 1.5V batteries (included)
Design Features	Easily replaceable electrodes, automatic shut off feature

Construction and Display

IP67 ABS Housing

Backlit Liquid Crystal Display (LCD)

Wrist Strap

Models

Model	Meter Type	Measurement Range	Measurement Resolution	Temperature Display	Item No.
ST10	pH	0.00 to 14 pH	0.1 pH	Not Available	30073970
ST20		0.00 to 14 pH ; 0.0 to 99.0 °C	0.01 pH	Yes	30073971
ST20M-B	Multi	pH 0 to14 Conductivity 0 to 1999 µS/cm TDS 0 to 1000 mg/L Temperature 0-99.0 °C	pH 0.01 pH Conductivity 1µS/cm TDS 1 mg/L NA Temperature 0.1 °C	Yes	30393199
ST20M-C		pH 0-14 Conductivity 0 to 19.99 mS/cm Salinity 0.0 to 10.0 ppt Temperature 0 to 99.0°C	pH 0.01pH Conductivity 0.01mS/cm Salinity 0.1 ppt Temperature 0.1°C	Yes	30393200

Parameters and Features

pH pH Measurement
ORP Oxidation Reduction Potential
Conductivity
Total Dissolved Solids
NaCl Salinity
Dissolved Oxygen
Temperature
Auto Shut-Off
Battery Power
IP67 NEMA 4X IP67

STARTER PEN *Meters*

Models

Model	Meter Type	Measurement Range	Measurement Resolution	Temperature Display	Item No.
ST10C-A	Conductivity	0.00 – 199.9 µs/cm	0.1 µs/cm	Not Available	30073972
ST10C-B		0 – 1999 µs/cm	1µs/cm		30073973
ST10C-C		0.00 – 19.99 ms/cm	10 µs/cm		30073974
ST20C-A		0.00 – 199.9 µs/cm ; 0.0 – 99.0 °C	0.1 µs/cm	Yes	30073975
ST20C-B		0 – 1999 µs/cm; 0.0 – 99.0 °C	1µs/cm		30073976
ST20C-C		0.00 – 19.99 ms/cm ; 0.0 – 99.0 °C	10 µs/cm		30073977
ST10T-A	TDS	0.0 – 100.0 mg/L	0.1 mg/L	Not Available	30073978
ST10T-B		0.0 – 1000 mg/L	1 mg/L		30073979
ST20T-A		0.0 – 100.0 mg/L; 0.0 – 99.0 °C	0.1 mg/L	Yes	30073980
ST20T-B		0.0 – 1000 mg/L; 0.0 – 99.0 °C	1 mg/L		30073981
ST10S	Salinity	0.0 – 10.0 ppt	0.1 ppt	Not Available	30073982
ST20S		0.0 – 80.0 ppt; 0.0 – 99.0 °C		Yes	30073983
ST10R	ORP	-1000 – 1000 mV	1 mV	Not Available	30073984
ST20R		-1000 – 1000 mV; 0.0 – 99.0 °C		Yes	30073985
ST20D	Dissolved Oxygen	0.0 – 80.0 ppt	0.1 mg/L	Yes	30073986

Applications and Industries

Universities

Used in university labs to teach students why measuring pH is essential in science.

Chemistry Institutes

Many chemical and biochemical processes are pH dependent.

Learning Centers

Students learn the theory and practice of pH measurement.

Municipalities

Monitor water quality parameters such as Dissolved Oxygen to assure safe drinking water.

Chemical Industries

Control pH to help with process control and ensure product quality.

Aquaculture

Maintain stable pH values to encourage healthy environment for aquatic organisms.

Agriculture

Regulate plant nutrient availability by closely monitoring soil pH.

MULTI-PARAMETER ACCESSORIES

Accessories	Item No.
Electrode holder AB33/41	30661423
Stirrer Compact AS20 w/o Power Supply	30661425
Holder, Stand Alone, Electrode	30058733
Printer, Impact, SF40A, AM	30064203
RS232 Kit, STX SPX ST3100M	30268982
USB Kit, Device, STX SPX ST3100M	30268984
pH Electrolyte	30059255
pH Electrode Protection	30059256
In-Use-Cover, STARTER	30058734
Portable Bag, STARTER	30031635
Zero Oxygen Chemicals, STARTER	30059257
Seal Kit, STARTER portables	83032962

Accessories	Item No.
Buffer pH 4.01 250 mL	30100425
Buffer pH 6.86 250 mL	30100426
Buffer pH 7.00 250 mL	30100427
Buffer pH 9.18 250 mL	30100428
Buffer pH 10.01 250 mL	30100429
Buffer pH 12.45 250 mL	30100440
Buffer pH 1.68 250 mL	30100424
Buffer Powder pH 4.01; 7.00; 10.01	83033971
Standard Conduct 10µs/cm 250 mL	30100441
Standard Conduct 84µs/cm 250 mL	30100442
Standard Conduct 1413µs/cm 250 mL	30100443
Standard Conduct 12.88mS/cm 250 mL	30100444
Standard Conduct 500µs/cm 250mL	30393269

pH & ORP ACCESSORIES

Accessories	Item No.
Electrode holder AB33/41	30661423
Electrode holder AB23	30661424
Stirrer Compact AS20 w/o Power Supply	30661425
ECS Special Accessory	30658042
Holder, Stand Alone, Electrode	30058733
Adapter, 9 Pin-9 Pin, PC-SF40A	30059316
Printer, Impact, SF40A, AM	30064203
pH Electrolyte	30059255
pH Electrode Protection	30059256
In-Use Cover, ST5000	30129897
In-Use-Cover, STARTER	30058734
Portable Bag, STARTER	30031635
Seal Kit, STARTER portables	83032962
Zero Oxygen Chemicals, STARTER	30059257

Accessories	Item No.
Standard Conduct 84µs/cm 250 mL	30100442
Standard Conduct 1413µs/cm 250 mL	30100443
Standard Conduct 12.88mS/cm 250 mL	30100444
Membrane Kit Replaceable, ST20D	30222084
Buffer pH 1.68 250 mL	30100424
Buffer pH 4.01 250 mL	30100425
Buffer pH 6.86 250 mL	30100426
Buffer pH 7.00 250 mL	30100427
Buffer pH 9.18 250 mL	30100428
Buffer pH 10.01 250 mL	30100429
Buffer pH 12.45 250 mL	30100440
Buffer Powder pH 4.01; 7.00; 10.01	83033971

CONDUCTIVITY ACCESSORIES

Accessories	Item No.
Holder, Stand Alone, Electrode	30058733
In-Use-Cover, STARTER	30058734
Printer, Impact, SF40A, AM	30064203
Standard Conduct 10µs/cm 250 mL	30100441
Standard Conduct 84µs/cm 250 mL	30100442
Standard Conduct 1413µs/cm 250 mL	30100443
Standard Conduct 12.88mS/cm 250 mL	30100444
Standard Conduct 500µs/cm 250mL	30393269
Portable Bag, STARTER	30031635
Seal Kit, STARTER portables	83032962

DISSOLVED OXYGEN ACCESSORIES

Accessories	Item No.
Seal kit, STARTER portables	83032962
Zero Oxygen Chemicals, STARTER	30059257
DO Electrode Cap, STD021	30253566
Portable Bag, STARTER	30031635

PEN METER ACCESSORIES

Accessories	Item No.
Zero Oxygen Chemicals, STARTER	30059257
Buffer pH 4.01 250 mL	30100425
Buffer pH 7.00 250 mL	30100427
Buffer pH 10.01	30100429
Standard Conduct 84µs/cm 250 mL	30100442
Standard Conduct 1413µs/cm 250 mL	30100443
Standard Conduct 12.88mS/cm 250 mL	30100444
Membrane Kit Replaceable, ST20D	30222084

Accessories	Item No.
Pen Meter Electrode pH10 ST	30087992
Pen Meter Electrode pH20 ST	30087993
Pen Meter Electrode ST20M-B	30393203
Pen Meter Electrode ST20M-C	30393204
Pen Meter Electrode CT10A ST	30087994
Pen Meter Electrode CT10B ST	30087995
Pen Meter Electrode CS10C ST	30087996
Pen Meter Electrode CT20A ST	30087997
Pen Meter Electrode CT20B ST	30087998
Pen Meter Electrode CS20C ST	30087999
Pen Meter Electrode R10 ST	30088020
Pen Meter Electrode R20 ST	30088021
Pen Meter Electrode ST20D	30222083

STARTER ELECTRODES SELECTOR GUIDE

pH Electrodes							
Application	**Sample Type**	**Recommendations**	**Double Junction**	**Standard**	**Economy/ Basic**	**IP Rated**	**Micro**
Education	Student Use	Epoxy body for added durability	ST260	–	ST210 / ST310	–	N/A
General Purpose	Most sample types	Suitable for general purpose measurements	ST260	ST350	ST310	–	N/A
Emulsions	Foods, cosmetics, oils	Open junction to prevent clogging	–	ST350	ST230	–	N/A
Flat Surfaces	Paper, cheese, meat, agar	Flat surface tip and double junction Ag/AgCl reference (no sample contact with silver)	–	STSURF	–	–	N/A
Biological/ Pharmaceutical	TRIS buffer, proteins, enzymes	Double junction Ag/AgCl reference (no sample contact with silver)	ST260 / ST420	–	–	–	N/A
Low Ionic Strength	Treated effluent, deionized water, distilled water	Refillable for better contact and stable measurements	ST420	STPURE	–	–	N/A
Small Sample Size	Microtiter plates, test tubes, small flasks and beakers as small as 0.2 mL	Small diameter to fit into narrow sample containers	N/A	N/A	N/A	–	STMICRO8
Small Sample Size	TRIS buffer, proteins, sulfides, fits 96 microwell plates	Small diameter to fit into narrow sample containers	N/A	N/A	N/A	–	STMICRO5
Viscous Liquids	Slurries, suspended solids, sludges	Open junction to prevent the electrode from clogging	–	ST350	ST230 / ST280	–	N/A
Waters	Acid rain, boiler feed water, distilled water, rain water,	Double junction Ag/AgCl reference and refillable for better contact	ST260	–	–	–	N/A
Waters	Drinking water, tap water	Epoxy body for added durability	–	ST350	ST310	–	N/A
Waters	Wastewater, seawater	Double junction Ag/AgCl reference and epoxy body for added durability	–	ST270 / ST272	ST230	–	N/A
Harsh Environments	Field or plant use, rugged use	Epoxy body for added durability and polymer or gel filled for easy maintenance	–	ST322	ST320	ST320 IP67	N/A
High Ionic Strength	Acids, bases, brines, pH > 12 or pH < 2	Open junction for better contact and stable measurements	–	–	ST230	–	N/A
Soft Samples	Piercing fruits, cheese and meats	Spear tip for piercing samples	–	ST270	–	–	N/A

STARTER ELECTRODES SELECTOR GUIDE

			ORP Electrodes		Conductivity Electrodes		Dissolved Oxygen Electrodes	
Application	**Sample Type**	**Recommendations**						
Education	Student use	Epoxy body for added durability	–	STORP1	STCON3	–	STDO11	–
General Purpose	Most sample types	Suitable for general purpose measurements	–	STORP1	STCON3	–	STDO11	–
Emulsions	Foods, cosmetics, oils	Open junction to prevent clogging	–	N/A	–	N/A	–	STDO21
Flat Surfaces	Paper, cheese, meat, agar	Flat surface tip and double junction Ag/AgCl reference (no sample contact with silver)	–	N/A	–	STCON7	–	STDO21
Biological/ Pharmaceutical	TRIS buffer, proteins, enzymes	Double junction Ag/AgCl reference (no sample contact with silver)	–	N/A	–	STCON7	–	N/A
Low Ionic Strength	Treated effluent, deionized water, distilled water	Refillable for better contact and stable measurements	–	N/A	STCON3	STCON8	–	STDO21
Small Sample Size	Microtiter plates, test tubes, small flasks and beakers as small as 0.2 mL	Small diameter to fit into narrow sample containers	–	N/A	–	N/A	–	N/A
Small Sample Size	TRIS buffer, proteins, sulfides, fits 96 mi-crowell plates	Small diameter to fit into narrow sample containers	–	N/A	–	N/A	–	N/A
Viscous Liquids	Slurries, suspended solids, sludges	Open junction to prevent the electrode from clogging	–	N/A	–	N/A	–	STDO21
Waters	Acid rain, boiler feed water, distilled water, rain water,	Double junction Ag/AgCl reference and refillable for better contact	–	STORP1	STCON3	–	STDO11	–
Waters	Drinking water, tap water	Epoxy body for added durability	–	STORP1	STCON3	–	–	STDO21
Waters	Wastewater, seawater	Double junction Ag/AgCl reference and epoxy body for added durability	STORP2	–	–	STCON7	–	STDO21
Harsh Environments	Field or plant use, rugged use	Epoxy body for added durability and polymer or gel filled for easy maintenance	–	–	–	STCON7	–	STDO21
High Ionic Strength	Acids, bases, brines, pH > 12 or pH < 2	Open junction for better contact and stable measurements	–	–	–	–	–	–
Soft Samples	Piercing fruits, cheese and meats	Spear tip for piercing samples	–	–	–	–	–	–

STARTER ELECTRODES

OHAUS Precision Powers the Starter Electrodes

- All sturdy and durable electrodes are constructed of either plastic or glass shafts and built to withstand daily use.
- Options available for electrodes with temperature sensing, which powers automatic temperature compensation and ensures accurate measurements.
- All electrodes fit perfectly in the electrode holders on OHAUS bench meters and electrode clips on all OHAUS portable meters.

Parameters	pH, reference, oxidation-reduction potential (ORP), conductivity, dissolved oxygen (DO), temperature measurement
Construction	Glass, plastic or metal
Design Features	Can be used in conjunction with all Starter bench and portable meters

Construction

Glass

Plastic

Metal

Parameters

pH Measure-ment | Conduct-ivity | Total Dissolved Solids | Salinity | Oxidation Reduction Potential | Dissolved Oxygen | Temper-ature

STARTER ELECTRODES

Models

	Model	ST5000, AB41PH, AB33PH, AB23PH, ST2200, ST300	AB33M1	AB33EC, AB23EC, ST300C	ST300D	ST400M	ST400	ST400D	Temperature	Shaft Material	Item No.
pH Electrode	ST210	●	●							Plastic	83033966
	ST230	●	●							Glass	83033968
	ST260	●	●							Glass	30129357
	ST270	●	●							Glass	30240974
	ST272	●	●							Plastic	30393265
	ST280	●	●							Glass	30681114
	STMICRO5	●	●							Glass	30087566
	STMICRO8	●	●							Glass	30087569
	STPURE	●	●							Glass	83033969
	STSURF	●	●							Plastic	30129470
	ST310	●	●						●	Plastic	83033965
	ST320	●	●						●	Plastic	83033967
	ST320 IP67					●	●		●	Plastic	30468960
	ST322	●	●						●	Plastic	30681113
	ST350	●	●						●	Glass	30129354
	ST410	●	●							Glass	30656037
	ST420	●	●							Glass	30681115
Reference Electrode	STREF1	●	●							Glass	30059253
Orp Electrode	STORP1	●	●							Plastic	30038555
	STORP2	●	●							Glass	30038553
Conductivity Probe	STCON3		●	●						Plastic	83033972
	STCON3 IP67					●				Plastic	30468962
	STCON5		●	●						Glass	30681116
	STCON7		●	●						Steel	30080693
	STCON8		●	●						Glass	30681117
	STCON8 w/glass chamber		●	●						Glass	30681235
Dissolved Oxygen Sensor	STDO11				●					Plastic	30031639
	STDO21, 1m							●	●	Plastic	30378544
	STDO21, 5m							●	●	Plastic	30378545
Temperature Sensor	STTEMP30	●	●		●				●	S.Steel	83033970

Starter electrodes

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 precise weight determination that is essential to laboratory applications, OHAUS is proud to also offer our expertise in measurement in a line of electrochemistry products.

The Starter Series includes pH, reference, oxidation-reduction potential (ORP) electrodes, as well as conductivity, dissolved oxygen (DO) and temperature electrodes that can be used in conjunction with our bench and portable meters. In this section, you will find essential information regarding OHAUS' portfolio of Starter sensors, including product specifications and sample types they were designed to measure. In addition to the sensors, information regarding accessories such as conductivity and pH solutions used for calibration, are included.

Basic Theory of pH

pH is a one of the most commonly measured parameters in chemical and life science research, as well as is many different industries, including water and wastewater treatment, food technology, environmental protection, production and agriculture.

pH is defined as the negative logarithm of the hydrogen ions concentration in the sample:

pH = -log [H+]

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

pH electrodes produce different mV values in solutions with different pH. Ideally, at 25°C, a pH electrode should produce a slope of 59.16mV per 1 pH unit.

Electrodes for pH Measurement

pH measurement is usually conducted using a combination electrode that consists of a pH-sensitive glass electrode that is sensitive to hydrogen ions present in the sample as well as a reference electrode that has a constant potential value.

A potential is developed on the membrane surface when a pH electrode comes into contact with a sample.

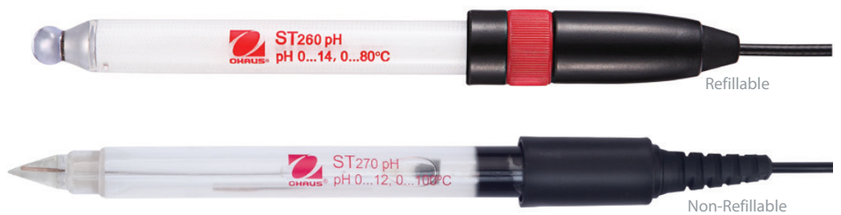
pH meters measure variations in the potential and convert it directly to a corrsponding pH value, according to the Nernst equation:

E = E0 + (2.303RT/nF)log[H+]

pH measurement is sensitive to temperature changes. However, at a pH of 7, temperature will not have an effect on the potential of the system.This is known as the isopotential point. OHAUS' 3-in-1 electrodes are convenient tools that contain a built-in temperature electrode that can be used together with a meter to compensate temperature changes without the need for an external temperature electrode.

pH electrodes structure

Shaft Body Material	Characteristic	Advantage
Glass Shaft	Can withstand high temperatures and is resistant to corrosive materials and organic solvents.	Ideal for laboratory use, easy to clean
Plastic Shaft	Not recommended for usage at temperatures above 80 ˚C. Moderate resistance to highly corrosive materials and organic solvents.	Durable and sturdy



Fill Type	Characteristic	Advantage
Refillable	Reference electroytes can be replenished when necessary.	Reusable
Non-Refillable	The electrode must be replaced when contaminated.	No maintenance is required

Reference Junction Type	Characteristic	Advantage
Ceramic Junction	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, Ideal for muddy samples

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.

	ST410	ST420	ST350	ST322	ST320	ST320 IP67	ST310	ST272	ST270
pH Range	0 to 14	2 to 12	0 to 14	0 to 14	0 to 14	0 to 14	0 to 14	2 to 12	0 to 14
Tempture	5 to 90°	5 to 90°	0 to 100°	5 to 60°	0 to 80°	0 to 80°	0 to 80°	0 to 50°	0 to 100°
Type of junction	Ceramic	Ceramic	Annular Ceramic	Fiber Pin	Fiber Pin	Fiber Pin	Ceramic	Annular Ceramic	Annular Ceramic
Shaft Material	Glass	Glass	Glass Body	Plastic	Epoxy Body	Epoxy Body	Epoxy Body	Epoxy Body	Glass Body
Connector	BNC	BNC	BNC&Cinch	BNC & Cinch	BNC & Cinch	BNC & Cinch	BNC & Cinch	BNC	BNC
Sensor Type	Combined Electrode	Combined Electrode	3 in1	3 in1	3 in1	3 in1	3 in1	Combined Electrode	Combined Electrode
Reference System	Ag/AgCl Double Junction	Ag/AgCl Double Junction	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Reference electrolyte	3.3 M KCl	3.3 M KCl	3.3 M KCl	Polymer Gel	Gel Filled	Gel Filled	3.3 M KCl	Gel Filled	Gel Filled
Cable	1 m	1 m	1 m	1 m	1 m	3 m	1 m	1 m	1 m
Fill Type	Refillable	Refillable	Refillable	Non-Fillable	Non-refillable	Non-refillable	Refillable	Non-refillable	Non-refillable
Description	Double Junction combination pH electrode	Double Junction combination pH electrode	pH/ATC with glass body	3-in-1 pH/ATC electrode with low maintenance	pH/ATC with epoxy body, low maintenance	pH/ATC with epoxy body, low maintenance gel	pH/ATC with epoxy body, refillable	Combination pH electrode with stainless steel cutting blade	Combination pH electrode, glass body, spear tip
Application	Strong Acid/ Alkali Solution	Low ionic strength solutions. TRIS, protein, sulfide, or any other samples that react chemically with the Ag/AgCl reference element.	Top performance for QC and research	Laboratory general purpose, routine or research applications	General purpose, high performance	High performance ph analysis in the field	General purpose for everyday use	For meat, cheese and sludge where glass alone may break	For meat, cheese and fruit samples
Feature	Chemical resistant glass body	Chemical resistant glass body	Chemical resistant glass body	Low maintenance	Epoxy body for ruggedness	Epoxy body and built-in ATC	Long-lasting	Annular junction prevents clogging	Annular junction prevents clogging

PH ELECTRODES

OHAUS Starter series electrochemistry instruments include electrodes that support advanced pH analysis, including a glass shaft 3-in-1 electrode, micro sample, double salt-bridge, and flat surface pH electrodes.

OHAUS launched several pH electrodes, include glass shaft 3-in-1 ST350, micro sample pH electrode STMICRO5 and STMICRO8; double-salt bridge pH electrode ST260 which is fit for tris-buffer solution pH measurement, flat surface pH electrode STSURF and puncture electrodes ST270 and ST272.

	ST280	ST260	ST230	ST210	STMICRO8	STMICRO5	STPURE	STSURF
pH Range	0 to 14	0 to 14	0 to 14	0 to 14	0 to 14	0 to 14	2 to 12	0 to 14
Tempture	5 to 60°	0 to 100°	0 to 100°	0 to 80°	0 to 100°	0 to 100°	0 to 80°	0 to 100°
Type of junction	Open Junction	Ceramic	Annular Ceramic	Ceramic	Annular Ceramic	Annular Ceramic	Ground Glass	Ground Glass
Shaft Material	Glass	Glass Body	Glass Body	Epoxy Body	Glass Body	Glass Body	Glass Body	Epoxy Body
Connector	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC
Sensor Type	Combined Electrode	Combined Electrode	Combined Electrode	Combined Electrode	Combined Electrode	Combined Electrode	Combined Electrode	Combined Electrode
Reference System	Ag/AgCl	Ag/AgCl Double Junction	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Reference electrolyte	Polymer gel	3.3 M KCl	3.3 M KCl	3.3 M KCl	3.3 M KCl	3.3 M KCl	3.3 M KCl	3.3 M KCl
Cable	1 m	1 m	1 m	1 m	1 m	1 m	1 m	1 m
Fill Type	Non-Fillable	Refillable	Refillable	Refillable	Refillable	Refillable	Refillable	Refillable
Description	Open junction combination pH electrode	Double junction refillable combination pH electrode	Combination pH electrode with rugged bulb	Combination pH electrode with epoxy body	Combination pH electrode with glass body, long length	Combination pH electrode with glass body, semi-micro tip	Combination pH electrode	Combination pH electrode with epoxy body, flat surface
Application	Highly suspended, dirty samples	Use in dirty water or TRIS, sulfide and protein samples	For soil, sludge, colloids, viscous material	For routine applications	For routine or research applications	For samples with size constraints For samples with size limitations	For samples with low ionic strength	Measure moist surfaces such as agar gel lates, meats and cheese
Feature	Toughened bulb for rugged lab use	Long-lasting	Toughened bulb for rugged lab use	Economical	Measure samples as small as 0.5 mL in tube	Measure samples as small as 0.2 mL in 96 well plates	Economical	A flat pH bulb and refillable designs

REFERENCE ELECTRODES

Basic Principle of Reference Electrodes

Reference eletrodes have a stable and well defined electrochemical potential. A measured potential in an electrochemical cell is determined against a defined potential value of a reference electrode.

STREF1 is Silver/Silver Chloride (Ag/AgCl in Saturated KCl), which represents another type of reference electrode.

Storage and Maintenance

Maintenance of reference electrodes can help avoid stability problems and keep them in proper working condition.

Check that the reference electrode compartments are filled with electrolyte solution and the junction is not blocked.

Model	STREF1
Item Number	30059253
Description	Silver/Silver Chloride (Ag/AgCl)
E vs. SHE (Standard Hydrogen Electrode) (V)	0.198
Connector	2mm Banana
Dimensions (Shaft)	110 x 12 mm
Cable Length	1 m

ORP ELECTRODES

Basic Principle of ORP

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.
ORP is expressed in millivolts (mV). -1000 mV to 1000mV is a common range for ORP tests. The pH value influences the ORP value significantly.

Storage and Maintenance

To ensure accurate measurements, it is important to keep the electrode clean. Contamination can cause inaccurate results and slow response times.

Model	STORP2	STORP1
Item Number	30038553	30038555
Shaft Material	Glass	Plastic
Temperature Range	0-100 ˚C	0-80 ˚C
Internal Reference Type	Ag/AgCl	Ag/AgCl
Refillable/Non-refillable	Refillable	Non-refillable, Gel
Reference Junction Type	Annular Ceramic	Ceramic Pin
Refilling Reference Electrolyte	3M KCl Solution	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 ELECTRODES

Basic Theory of Conductivity

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

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

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

Calibration

Cell constants at time of manufacture are listed on many conductivity cells. It is recommended that you always determine the exact cell constant by using a calibration standard. Calibration is essential since the cell constant can vary by 10% or more from the nominal value and they do change over time. Once calibrated, they do not change quickly and do not require frequent calibration like a pH electrode. It is important to calibrate 25 ºC or know the value of your calibration standard at different temperatures. The cell constant changes only if the surface of the electrode changes, for example through fingerprints, deposits, scratches or enclosed air bubbles.

Benefits of 4-Electrode Cells

- All have durable plastic bodies
- No error from cable resistance, allowing for longer cable lengths
- Minimum effect on accuracy from electrode polarization and contamination
- Wide measurement range
- Unaffected by deposits on cell surface

Model	STCON3	STCON3 IP67
Item Number	83033972	83033972
Measuring range	2 µS/cm - 200mS/cm	2 µS/cm - 200mS/cm
Temperature range	0 °C – 50°C	0 °C – 50°C
Cable Length	1 m	3m
Connector Type	Mini-DIN	CTW
Cell Material	4 rings stainless steel	4 rings stainless steel
Cell Constant	1.5 - 2.0 cm^{-1}	1.5 - 2.0 cm^{-1}
Shaft Material	Plastic	Plastic
Shaft Length	130 mm	130 mm
Shaft Diameter	14 mm	14 mm
Temperature probe	NTC 30 kΩ	NTC 30 kΩ
Description	Widest conductivity range	Widest conductivity range
Application	For lab and field applications	For lab and field applications
Feature	Removable guard	Removable guard

CONDUCTIVITY ELECTRODES

Storage and Maintenance

The conductivity electrode should be stored in a clean and dry environment. They can be stored in deionized water in-between measurements. For storage overnight or longer, conductivity cells should be rinsed thoroughly in deionized water and stored dry.

If they become contaminated they should be cleaned. Refer to user guides for specific instructions for different electrode materials.

Precautions and Limitations

Do not expose the shaft to organic solvents when cleaning or when taking measurements.

1. Do not use the electrode outside the recommended temperature range.

2. Calibrate the electrode with standard solution for an accurate measurement.

Benefits of 2-Electrode Cells

- Available in glass, allows use in most samples
- best for ultra-pure water measurements
- Multiple cell materials available, platinum or stainless steel
- Different cells designed to measure multiple specific ranges
- Option for flow cell or flow-thru design

Model	STCON5	STCON7	STCON8 w chamber
Item Number	30681116	30080693	30681235
Measuring range	50 µS/cm-2 mS/cm	0.02 µS/cm - 200µS/cm	0.055-300µS/cm
Temperature range	0 °C – 80°C	0 °C – 60°C	0 °C – 80 °C
Cable Length	1 m	1 m	1m
Connector Type	Mini-DIN	Mini-DIN	Mini-DIN
Cell Material	2 Ring platinum	2 Ring 316L	2 Ring platinum
Cell Constant	1 cm^{-1} ± 0.2	0.1 cm^{-1} ±0.02	0.1 cm^{-1} ±0.02
Shaft Material	Glass	Steel	Glass
Shaft Length	155 mm	95 mm	155mm
Shaft Diameter	12 mm	12 mm	12 mm
Temperature probe	NTC 30 kΩ	NTC 30 kΩ	NTC 30 kΩ
Description	Standard conductivity range	Low conductivity range	Low ionic strength solutions, deionized water, and ultra pure water.
Application	For lab applications	For Boiler feed water, ultra-pure water	For ultra pure water applications
Feature	Chemical resistant glass body	Rugged Steel	Platinized glass/platinum
Other	N/A	N/A	Includes detachable glass chamber

DISSOLVED OXYGEN ELECTRODES

Basic Principle of Dissolved Oxygen (DO) Electrodes

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

STDO11 is a galvanic DO electrode and the simplest among the three electrodes. 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.

Galvanic sensors are active at all times and will degrade in storage as well as during use. They do not need to polarize (warm up) before calibration or measurement while polarographic electrodes take 15 minutes to several hours to warm up.

The STDO21 optical dissolved oxygen sensors measure the interaction between oxygen and certain luminescent dyes. These sensors are ideal for long-term monitoring applications due to their minimal maintenance requirements. STDO21 also does not require any warm-up time or stirring when taking a measurement. Over a long period of time, the dye degrades and the sensing element and membrane will need to be replaced, but this replacement is very infrequent compared to electrochemical sensor membrane replacement.

Storage 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.

Model	STDO11	STDO21-1	STDO21-5
Item Number	30031639	30378544	30378545
Connection	BNC	Mini-DIN	Mini-DIN
Cable Length	1.1 m	1 m	5 m
Shaft Length	120 mm	120 mm	120 mm
Shaft Diameter	12 mm	16 mm	16 mm
Shaft Material	Plastic	Plastic	Plastic
Temperature Range	0-50 ˚C	0 °C – 60 °C	0 °C – 60 °C
Measurement Range	0-200%	0.00 – 20.0 mg/L(ppm)	0.00 – 20.0 mg/L(ppm)

TEMPERATURE ELECTRODES & SOLUTIONS

Temperature Compensation

Temperature variations can affect measurement values.
OHAUS offers a standalone temperature electrode, STTEMP30.
It can be used in conjunction with Bench and Portable meters.

Model	STTEMP30
Item Number	83033970
Shaft Material	Stainless Steel
Shaft Length	120 mm
Temperature Range	0-100 ˚C
Cable Length	1 m
Connection	Cinch

Standard Solutions

pH Buffer Solutions
1.68, 4.01, 6.86, 7.00, 9.18, 10.01, and 12.45 buffer solutions are available in 250ml bottles.

Conductivity standards
Four conductivity standard solutions for calibration include:
10µS/cm, 84µS/cm, 1413µS/cm and 12.88 mS/cm.

Reference Refilling Electrolyte
3M KCl saturated with AgCl reference fill solution for Ag/AgCl single junction electrodes.

Electrode Protection Solutions
After cleaning or when the electrode is not in use, always keep it in storage solution. To ensure proper conditions for pH electrodes, we offer pH electrode protection solution (3M KCl, 125ml).

ESSENTIALS OF PH MEASUREMENT

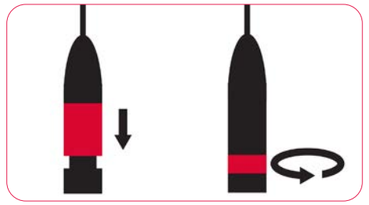
Electrode calibration is necessary in order to establish the slope and zero point of the electrode. Since both of these can change over time, frequent calibration is necessary. The frequency of calibration depends on the application, with some applications requiring daily calibration while others may require only weekly or monthly calibration. More frequent calibration is recommended when measuring in heavily contaminated, low-ion, strongly acidic, and high temperature solutions.
The following is a general procedure for preparing most pH electrodes.

Perform Routine Maintenance

- On a weekly basis, inspect the pH electrode for scratches, cracks, salt crystal build-up, or membrane/junction deposits.
- Keeping an electrode clean can help eliminate calibration issues. Clean any salt deposits from the electrode exterior by rinsing it with distilled water before use. Always check the meter and electrode manuals for calibration and routine maintenance information.
- Place the electrode for 10 minutes in 0.1 M HCl or 0.1 M NaOH. If the buildup is not removed, the solution should be cautiously heated up to 45 ˚C - 55 ˚C for 10 minutes before the acid or alkaline concentration is increased.

Open the Refill Slider/Ring

- For pH electrodes featuring a refillable reference, the first step to calibrating and/or taking a measurement is to open the refill opening. Depending on the model, the refill opening is either a slider (left image) or a ring (right image). The refilling opening must always be open during calibration and measurement.



Check the Electrolyte Level

- For refillable electrodes, ensure the fill level of the electrolyte is at least 2 cm above the level of the measurement solution. Replace the electrolyte if it has become contaminated.

Check the Selected Buffer Set

- The pH values of buffer solutions are temperature dependent and the response can vary from manufacturer to manufacturer. Also, the pH values of buffers in a buffer set can vary from one set to another. Modern pH meters automatically adjust for the respective temperature profile once the buffer set used has been correctly set.

Use Fresh, Unused, Unexpired Buffers

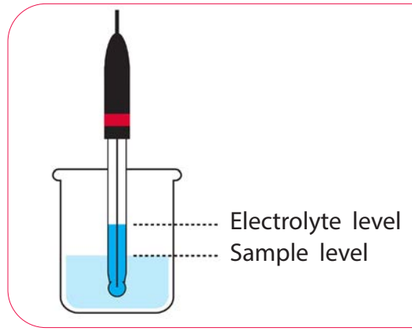
- Once buffers are used for calibration, they are assumed contaminated and should not be used again. Reusing buffers can lead to slow pH electrode response or the inability to calibrate. The cause of calibration failure is difficult to determine if the pH buffers have already been used. Used buffer solutions can be kept for rinsing the calibration container and the electrode between calibration points.
- Expired buffer solutions should not be used and buffer bottles should not be left open. Carbon dioxide in the air can change the pH of basic buffer solutions, so basic buffer bottles should only briefly be opened. Use opened containers of buffer as soon as possible.

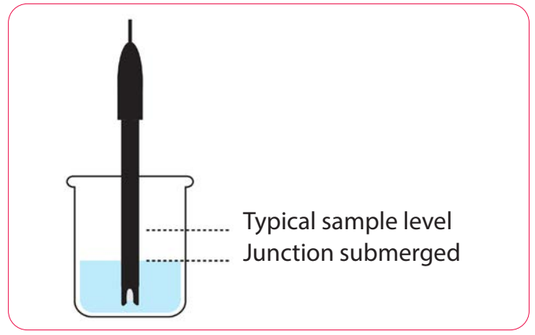
Expiration dates are printed on the label of the buffer bottle, and according to the LOT code
visit ohaus.com/Lot-Certificates

ESSENTIALS OF PH MEASUREMENT

The Reference Junction Should be Immersed

- The reference junction must be completely submerged in solution. The temperature sensor must also be in solution in order to accurately compensate pH for temperature.
- The sample solution level must be above the pH electrode reference junction when the electrode is immersed in the sample.





Perform at Least a 2-Point Calibration

- It is best to perform at least a 2-point calibration and pH 7 buffer must be one of those points.
- The pH buffers used should differ by at least two pH units and should bracket the expected in situ pH conditions. Calibration points need to bracket your sample range. Unless the sample is expected to be above pH 7, basic buffers should not be used, as their pH value quickly changes by absorbing CO^2.
- When measurements are performed over a large range of pH values, it is recommended that one takes at least 3 calibration points. A 1-point calibration will only determine the zero point, not the electrode slope. The range of use of 1-point calibrations is limited and should only be completed with pH 7 buffer. The pH value obtained can be used to compare to previous results, but is not an absolute value.
- Between buffers, rinse the electrode with distilled water and then with the next buffer. To reduce the chance of error due to polarization, avoid rubbing or wiping the electrode bulb. Use a lint-free tissue and gently blot the bulb.
- The first calibration point should be pH 7. Although it is not always required, it is best to begin calibration with pH 7 buffer.

PH MEASUREMENT OF DIFFERENT SAMPLE TYPES

pH measurements of flat samples and very small samples

- Some samples are too small even for a micro sensor to measure accurately. In such cases, a surface sensor is the optimal configuration. The sample must be moist enough for the pH-sensing bulb and the reference junction to make adequate contact with the sample. If necessary, add a drop of distilled water or potassium chloride to wet the surface before placing the electrode on the sample. For the best reproducibility, all samples should have the same amount of liquid added before measurement.
- Surface pH sensors prevent sample contamination: Direct contact of the pH sensor with the sample during measurement can be a critical source of contamination. Reference electrolyte may flow into the sample; in addition, there is a risk of carryover from the rinsing solution, and residues may be present on the sensor. Pipetting at least 100 µL of sample onto a flat, clean surface and measuring with a flat membrane sensor can prevent such problems.

pH measurements in solid samples

- Solid and semi-solid samples include cheese, meat, powders, paper and agar gels. Standard pH electrodes are generally not able to withstand the pressure of being pushed into a solid sample; therefore one needs a special electrode which is able to penetrate the sample in order to measure the pH. There are many methods available for measuring the pH of solid and semi-solid samples that include using a flat surface pH electrode, using a spear tip pH electrode, and mixing or blending a fixed amount of sample with distilled water. The Ohaus electrodes most suitable for these kinds of applications are the ST272 pH electrode. While their spear shaped point enables them to pierce the sample, the membrane shape ensures accurate measurements. This electrode is typically used for quality control or checking production processes of cheese and meat.

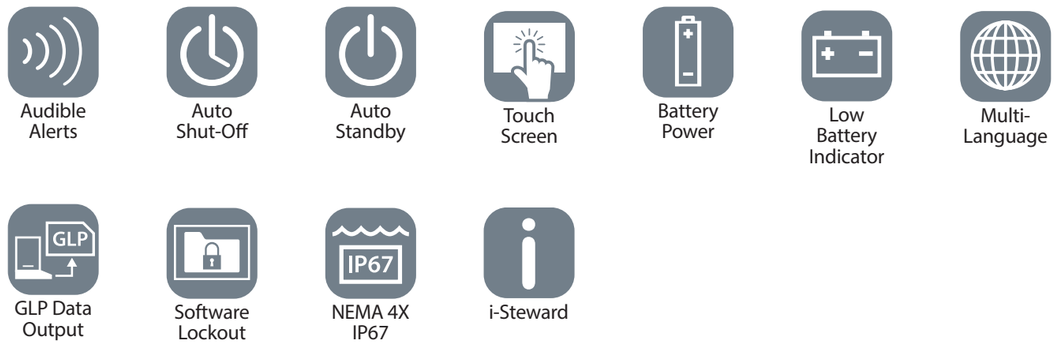
pH measurements in dirty samples

- Measuring the pH of dirty samples can be somewhat tricky, since the dirt in the sample can hinder correct measurements. Sludge, suspension, colloid, slurry and viscous samples include wastewater, mud, paper pulp and corn syrup. The risk of blockages with such samples would be very high if one were to use a pH electrode with a ceramic junction. These samples clog the electrode junction and coat the pH-sensing bulb, resulting in slow electrode response, measurement drift and pH measurement errors.

ICON LEGEND

Applications

Features



OHAUS Corporation

Headquartered in Parsippany, NJ, OHAUS Corporation manufactures an extensive line of balances and scales, lab equipment and lab instruments that meet the weighing, sample processing and measurement needs of multiple industries. We are a global leader in the laboratory, industrial and education markets, as well as a host of specialty markets, including the food preparation, pharmacy and jewelry industries. An ISO 9001:2008 manufacturer, OHAUS produces lab balances, industrial scales, lab equipment and lab instruments that are precise, reliable and affordable, and backed by industry-leading customer support.

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