HORIBA
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ciencia e innovación

LAQUA

pH	ORP	Ion	Conductivity
Resistivity	Total Dissolved Solids	Dissolved Oxygen	Salinity

ELECTRODES

6 MONTHS WARRANTY

MADE IN JAPAN

www.horiba-laqua.com

LAQUA Electrode Technology

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

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

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

pH Electrode Selection Guide

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

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

◉ Recommended ○ Can be measured

Expertise in Manufacturing

Sophisticated processing technology

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

Thick membrane technology

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

Miniaturization

Invention Award (Japan)

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

Fast response & highly accurate

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

Double-junction electrodes

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

Convenient slider

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

Built-in clip for hooking onto electrode stand arm

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

ORP Electrode

Model	Part No.	Material	Temp. Range (°C)	Application
9300-10D	3014046710	Pt / Glass	0 - 60	Waterproof; Platinum on the flat tip allows measurement of small volume samples

Ion Selective Electrodes (ISEs)

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

Conductivity Cells

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

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

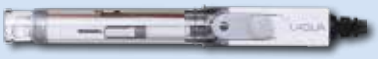
Dissolved Oxygen Probes

Type	Model	Part No.	Temp. Range (°C)	Measurement Range	Replacement Tip	Part No.
Field	9551-20D / 9551-100D	3014047090 / 3014047091	0 - 40	0 - 19.99 mg/L DO	5401	3014072770
	9552-20D / 9552-50D	3200780939 / 3200780941	0 - 50	0 - 20.00 mg/L DO	5402	3200781553
Lab	9520-10D	3014046711	0 - 45	0 - 19.99 mg/L DO	7541	3014074145

pH Combination Electrodes

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

[1] pH meters must have BNC connector

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

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

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

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

[2] Only compatible with HORIBA pH meters

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

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

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

[2] Only compatible with HORIBA pH meters

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

Metallic Electrode (For ORP Measurement)

Model	Operating Temperature Range (°C)	Electrode Material	Internal Solution	Applications
ORP Electrode **9300-10D** Waterproof platinum 3-in-1 type 3014046710 Overall length: 150 mm Diameter of probe: 12 mm Connectors: BNC & phono jack	0-60	Pt / Glass	#300 (KCl)	Waterproof; Platinum on the flat tip allows measurement of small volume samples

Dissolved Oxygen (DO) Electrode & Tips

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

Two models are available: a Laboratory model (9520) that can be used for BOD measurements, and a Field immersible model (9551) housed in a rugged casing available in 2m and 10m cable configurations. The Laboratory 9520 DO probe is fitted with a rotor as well as an adaptor to facilitate BOD measurements.

Dissolved Oxygen Electrodes

Model	Measurement Range	Response Time	Temperature Range (°C)	Features
9520-10D For laboratories 3014046711 Overall length: 184 mm Diameter of probe: 15 mm Connectors: BNC & phono jack	0-19.99mg/L DO	20 seconds (90% response time at constant temperature)	0-45	Waterproof; It operates with the built-in temperature sensor and replaceable DO tip 7541.
9551-20D; 9551-100D For field immersible type 3014047090; 3014047091 Overall length: 165 mm Diameter of probe: 32 mm Connectors: BNC & phono jack	0-19.99mg/L DO	30 seconds (90% response time at constant temperature)	0-40	Waterproof; It operates with the built-in temperature sensor and replaceable DO tip 5401.
9552-20D; 9552-50D For field immersible type 3200780939; 3200780941 Overall length: 165 mm Diameter of probe: 30 mm Connectors: BNC & phono jack	0-20.00 mg/L DO	30 seconds (90% response time at constant temperature)	0-50	Waterproof; It operates with the built-in temperature sensor and replaceable DO tip 5402.

Dissolved Oxygen Electrode Tips

Model	Description
7541 3014074145 Overall length: 26.5 mm Diameter: 15 mm	Replacement DO tip for 9520-10D
5401 3014072770	Replacement DO tip for 9551-20D and 9551-100D
5402 3200781553	Replacement DO tip for 9552-20D and 9552-50D

Conductivity Electrode Cells

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

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

Conductivity Cells (Submersible Type)

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

Conductivity Cells (Flow Type)

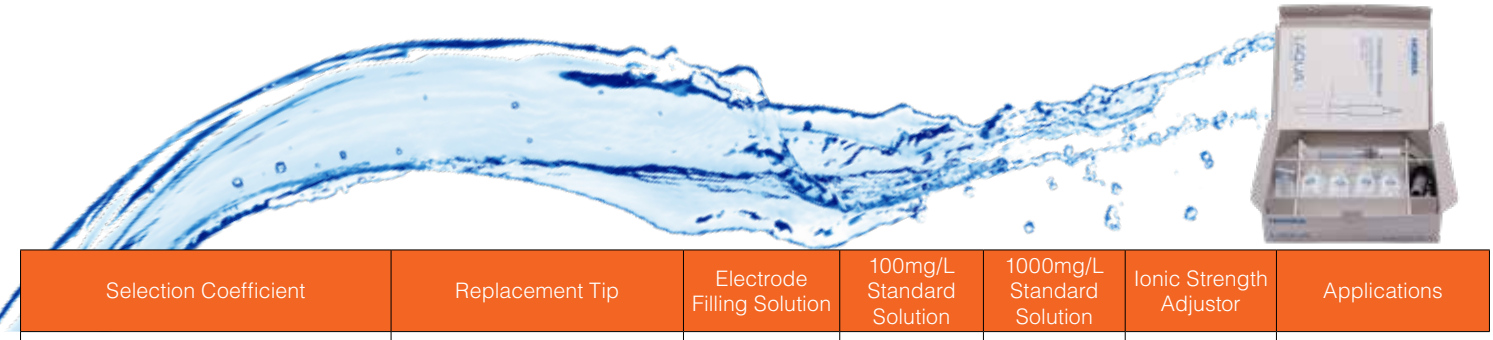
Model	Cell Constant	Measurement Range	Temp. Range (°C)	Cell Material	Thermistor	Minimum Sample Volume (ml)	Application
3561-10D 3014082350 Overall length: 143 mm Diameter of probe: 18 mm Connectors: BNC & phono jack	0.1 cm^{-1}	0.1 µS/cm - 10 mS/cm	0 - 60	Pt-Pt black / Glass	Built-in	10	Low conductivity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

Combination ISE

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

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

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



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

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

LAQUA WQ-300 Series Sensor Heads & Cartridges

Smart Digital Sensor

Maintenance-free, gel-filled pH sensor

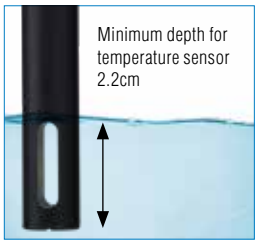
No electrolyte refilling required

- KCl gel electrolyte
- Double junction reference
- Porous sintered polyethylene junction
- Built-in temperature sensor
- Rugged polycarbonate body
- Replaceable pH sensor cartridge
- pH sensor heads with 2m and 5m cables are available

2-Cell & 4-Cell conductivity sensors

Wide range of conductivity measurements possible

- 2-Cell conductivity sensor with flow cell is designed for ultra-pure water applications
- From clean water to industrial wastewater, the 4-cell type can measure a variety of samples with different conductivities
- Built-in temperature sensor
- Stainless steel 2-cell cartridge
- Durable epoxy / carbon body 4-cell cartridge
- Replaceable conductivity sensor cartridge
- Conductivity sensor heads with 2m and 5m cables are available

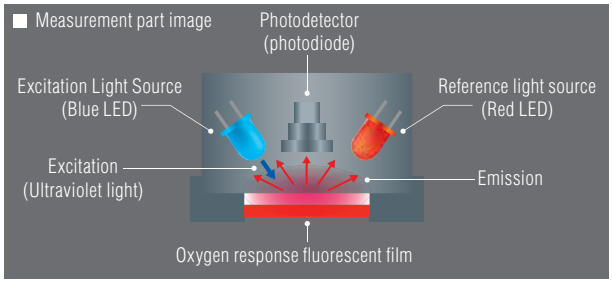


Detachable glass flow cell

Optical dissolved oxygen (DO) sensor

Longer usable life with excellent performance

- Easy to handle – not affected with sample flow velocity, not sensitive to hydrogen sulfide, DO sensor cap replacement after 1-2 years*
- Built-in temperature sensor
- Comes with replaceable DO sensor cap, air calibration bottle and Stainless Steel DO Sensor Protective Guard
- DO sensor heads with 2m and 5m cables are available



Ion sensor head

Compatible with conventional ion selective electrodes

- Accepts all combination ion selective electrodes with BNC connector
- Requires sensor head adapter
- Comes with 2m cable

ORP sensor head

Compatible with conventional ORP electrodes

- Accepts 9300-10D and other combination ORP electrodes with BNC connector
- Requires sensor head adapter
- Comes with 2m cable

*Depending on application, handling, and maintenance

LAQUA WQ-300 Series Sensor Specifications

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

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

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

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

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

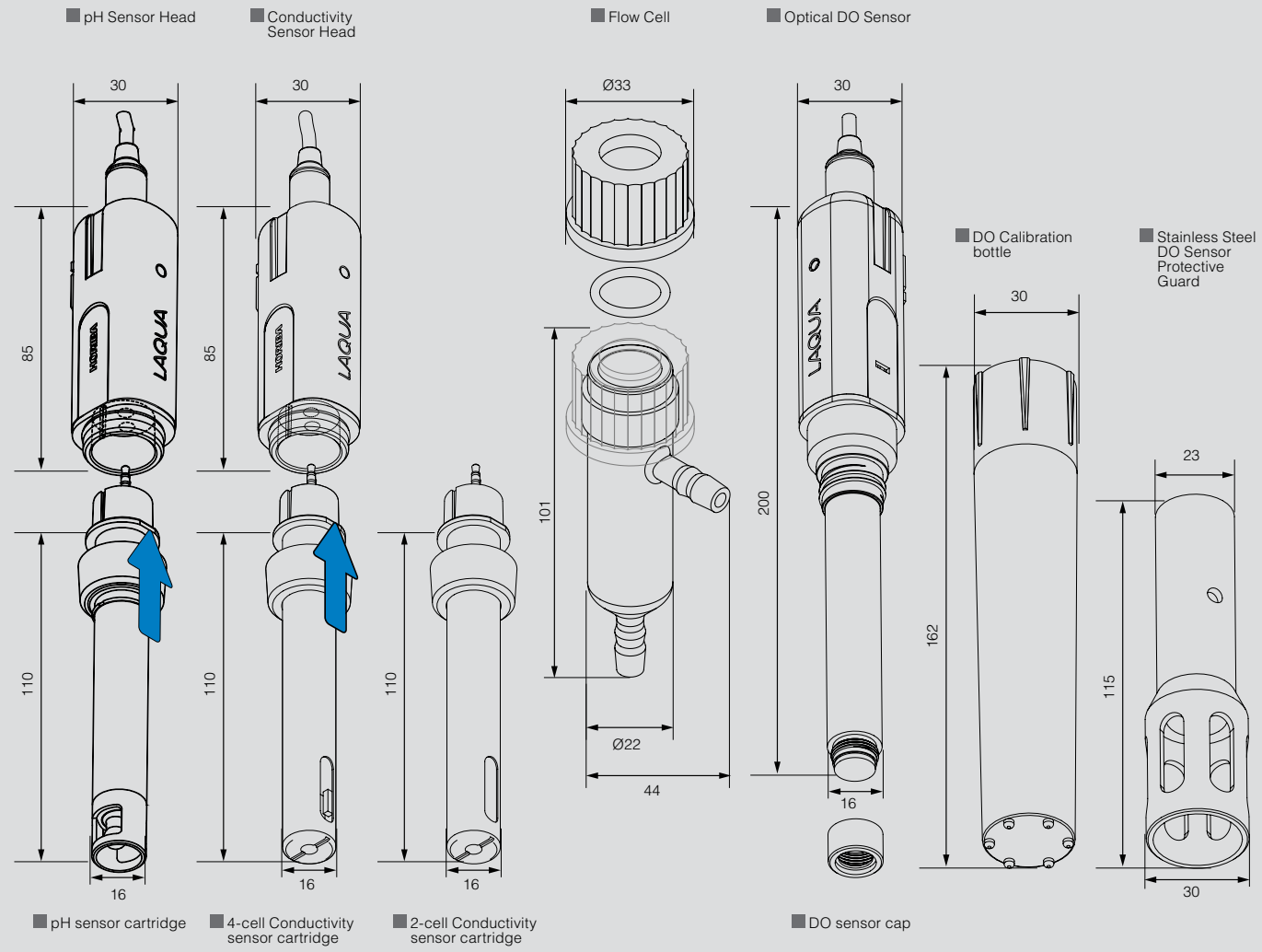
4-Cell Conductivity Sensor Cartridge	
Model	**300-4C-C**
Part No.	3200780928
Cell Constant	0.172 cm^{-1}
Conductivity Range	10 µS/cm to 2000 mS/cm
Operating Temperature Range	0 to 100 °C 32.0 to 212.0 °F
Temperature Sensor	Built-in
Length and Diameter	110 x 16 mm
Body Material	Epoxy, carbon

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

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

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

Dimensions (Unit: mm)



501-S NIST pH Buffer Solution Kit

502-S USA pH Buffer Solution Kit

503-S Conductivity Standard Solution Kit

ORP Powders

220 250

230

Cleaning Solutions

pH Buffer Solution Kits

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

pH Buffer Solutions

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

Conductivity Standard Solution Kit

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

Conductivity Standard Solutions

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

ORP Powders

Code	Part No.	Description	Volume
160-51	3200043618	89 mV at 25°C (for 250ml solution)	10 sachets/pack
160-22	3200043617	258 mV at 25°C (for 250ml solution)	10 sachets/pack

pH/ORP Electrode Filling Solutions

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

pH Electrode Cleaning Solutions

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

Calcium Ion Electrode Solutions

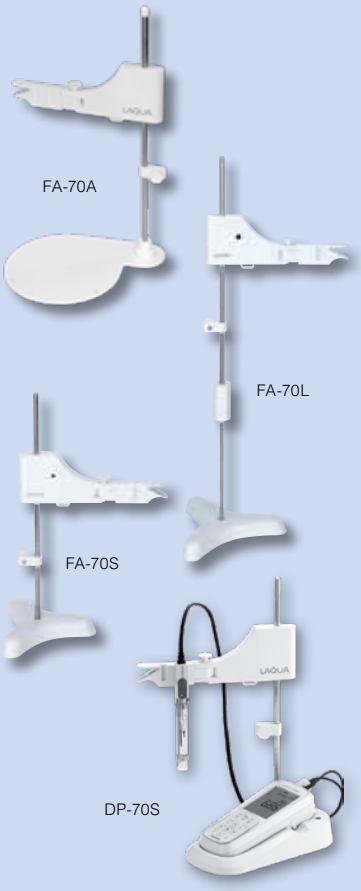
Chloride Ion Electrode Solutions

Fluoride Ion Electrode Solutions

Potassium Ion Electrode Solutions

Ammonia Ion Electrode Solutions

Nitrate Ion Electrode Solutions



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

Accessories		
Code	Part No.	Description
FA-70A	3200644455	Integrated Electrode Stand (Height: 338mm) for bench meter
FA-70S	3200382557	Adjustable, free-standing electrode stand (Height: 384 mm)
FA-70L	3200382560	Long, free-standing electrode stand (Height: 450-650mm)
DP-70S	3200528474	Electrode stand for 100 Series and D-70, ES-70, OM-70 Series handheld meters (Height: 400mm)
	3200373991	Arm for electrode stand FA-70A, FA-70S, & FA-70L
	3200373961	Electrode holders, 2pcs/pack (for mounting electrode with round cap on electrode stand arm)
	3200382477	Electrode protection caps, 3pcs/pack (for 9615S-10D, 9618S-10D, 9681S-10D pH electrode)
	3200043508	Electrode protection caps, 5pcs/pack (for plastic pH electrodes)
	3200382482	Electrode protection cap for long electrode (for 9680S-10D, 9480-10C pH Electrode)
	3200044409	Clear pH sensor tip guard (for plastic pH electrodes 9651/9652, 9625, 9630 etc.), 5pcs/pack
	3200828646	Black pH sensor tip guard (for 200 series, 300 series), 3pcs/pack
	3200779640	Electrode adapter
300-BNC	3200821465	Sensor head adapter (for WQ-300 Series sensor heads)
Flow Cell	3200844642	Flow Cell (for 300-2C-C)

pH Electrode Care and Maintenance Procedures

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

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

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

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

- Part no. 3999960031 500-7 pH 7.00 buffer

- Part no. 3999960029 500-4 pH 4.00 buffer

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

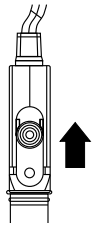
- Mild detergent

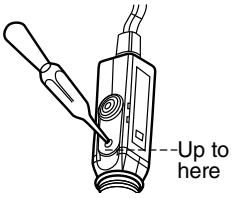
- Soft lint-free tissue

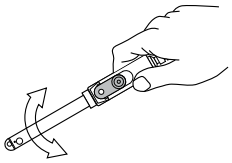
Refer to the safety data sheet (SDS) of the chemical solution to be used in cleaning and wear the appropriate personal protective equipment for safe handling. Download the SDSs of HORIBA solutions at www.horiba-laqua.com.

Refilling

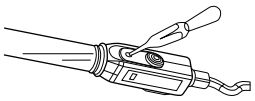
The pH electrode may be filled with either an ionic liquid solution (refillable or liquid-filled pH electrode) or ionic gel solution (sealed or gel-filled pH electrode). Gel-filled pH electrodes do not require routine refilling and typically require less maintenance than liquid-filled electrodes. Liquid-filled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







- To top up or re-fill the reference chamber of liquid-filled pH electrode, push the slider upward to uncover the refilling port and insert a dropper containing fresh 3.33M potassium chloride (KCl) solution. The filling solution should reach the bottom of the refilling port.
- The filling solution level must be maintained just below the refilling port and higher than the pH buffer or sample level during calibration and measurement. This creates a positive head pressure forcing the filling solution to leak into pH buffer or sample through the junction and preventing the reverse.
- Bubbles may form and get trapped within the solution of the sensing tip or reference chamber during transportation. This can affect the operation of your pH electrode. To dislodge the bubbles, gently shake the electrode body.
- If the filling solution inside the reference chamber gets contaminated with sample or microbial growth or the reading is drifting, change the filling solution. Tilt the pH electrode, uncover the refilling port, and draw out the old solution using a dropper before refilling it with fresh 3.33M KCl solution.



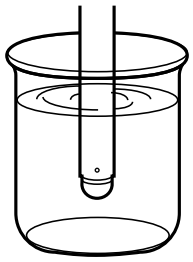
Conditioning

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

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

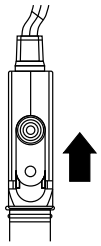
Another component of the pH electrode that must remain hydrated is the junction of the reference electrode. The junction is made of porous material such as ceramic or sintered polyethylene, which allows filling solution of the electrode to leak into the solution being measured. Keeping the reference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

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

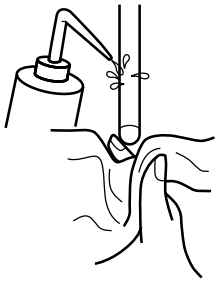


- A dry pH electrode will give inaccurate reading in pH measurement. Condition a dry pH electrode by soaking the glass membrane and junction in pH 7.00, 4.01 buffer, or tap water for at least 1 hour to regenerate the hydrated layer. Note: High salt solutions such as 3.33M KCl and the like are not recommended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

Calibration and Measurement

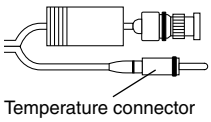


- If a liquid-filled pH electrode is in use, the refilling port must be uncovered and the filling solution level must be higher than the pH buffer or sample level. These conditions will ensure smooth outward flow of filling solution through the junction during calibration and measurement.

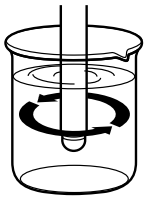


- Before and after measurement, rinse the pH electrode with clean water and/or with a portion of the next solution to be measured and blot with soft lint-free tissue to remove excess water or solution. Rinsing between measurements prevents contamination by carry-over on the electrodes. Avoid wiping or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

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



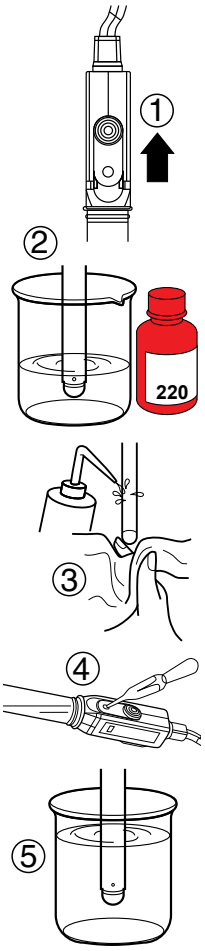
- To compensate for temperate effect on pH, use either 3-in-1 pH electrode or combination pH electrode and temperature probe. If temperature probe is not available, check the solution temperature using a calibrated thermometer and input the reading into the meter.



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

Cleaning

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

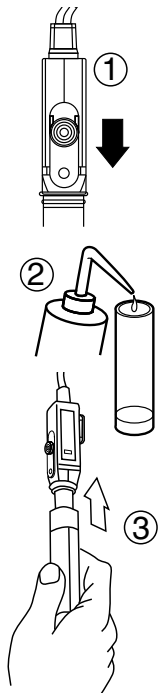


1. If the pH electrode is liquid-filled, uncover the refilling port.
2. Clean the tip of your pH electrode using the appropriate cleaning solution. Make sure that the glass membrane and junction are both immersed in cleaning solution.
   - General samples – Soak the pH electrode in diluted detergent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

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

Storage

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



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

Short-term storage:

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

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