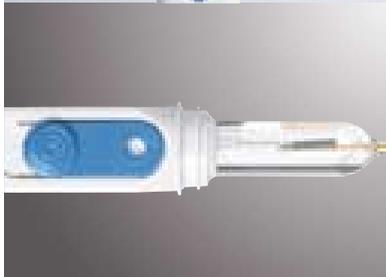
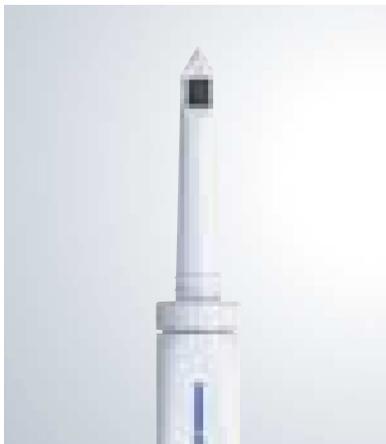


# HORIBA

Explore the future

## ELECTRODES & ACCESSORIES

●pH(ORP) ●ION ●CONDUCTIVITY ●DO



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# pH ELECTRODES METALLIC ELECTRODES ION ELECTRODES CONDUCTIVITY ELECTRODES DO ELECTRODES ACCESSORIES

## ■ Applicable Product Models

**pH Meter** F-50 Series, F-20 II Series, F-20 Series, F-10 Series, M-10 Series

**Portable pH Meter** D-50 Series, D-20 Series, D-10 Series

**Compact pH Meter** B-111/112, B-211/212

**Conductivity Meter** DS-10 Series, DS-50 Series

**Portable Conductivity Meter** ES-10 Series, ES-51

**Compact Conductivity Meter** B-173

**Compact Ion Meter** C-121, C-122, C-131, C-141

**Portable DO Meter** OM-10 Series, OM-51

**Water Quality Monitoring System** U-20XD/W-20XD Series

# ELECTRODE SELECTION GUIDE

		Combination Electrodes with Temperature Compensation Sensors								Combination Electrodes without Temperature Compensation Sensors				Discrete pH Glass Electrodes			Reference Electrodes for Discrete Electrodes			
		9621-10D pHast	9611-10D ToppH	9669-10D Micro	9677-10D High viscosity	6367-10D High accuracy	6377-10D Non-aqueous	6378-10D Test tubes	6252-10D For Food Applications	6066-10C Standard	6069-10C Slender test tubes	6251-10C Needle	6261-10C Flat	1066A-10C Standard	1076A-10C Non-aqueous	6961-15C Distribution	2565A-10T Double	2461A-15T Distribution	2060A-10T Standard	2660A-10T Sleeve
By Application	For school use		○																	
	For outdoor use	○																		
By Shape	Flask	○	○											○	○				○	○
	Test tube			○										○						
	NMR tube	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	
	Trace sample			○										○						
	Beaker	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Solid (surface measurement)	×	×	×	×	×	×	×	×	×	×	○	×	×	×	×	×	×	×	
	Flow-through	×	×	×	×	×	×	×	×	×	×	×	×	×	○	×	○	×	×	
By Condition	Strong alkalinity (pH12-10)														○					
	Strong acidity (pH0-2)		○																	
	High temperature (60-100°C)	○																		
	Drastic thermal change	○																○	○	
	Low ionic strength	○																	○	
	Non-aqueous solution																		○	
	High viscosity					○													○	
	KCl-reactive solution																		○	
Food Sample	Beer					○														
	Milk	○	○			○														
	Yogurt					○														
	Fruit juice		○			○														
	Konjak (Devil's tongue)									○										
	Meat, fish									○										
	Emulsion																			
	Honey																			
	Bread																			
Chemicals	Oil	×																		
	Surfactant		○																	
	Suspension																			
	Paint	×																		
	Photo developer	×	×	×	×	×	×	×	×	×	×	×								
	Organic solvent	×																		
	Liquid fertilizer																			
Bio-chemical	Dialysis						×													
	TRIS buffer																			
	Skin	×	×	×	×	×	×	×	×	×	○									
Environmental	Swimming pool	○	○																	
	Sea water	○	○																	
	Acid rain	○																		
	Soil																			
	Tap water	○																		
	Ion-exchanged water	○																		

○: Recommended X: Prohibited or risk of damage

## pH METER and ELECTRODE COMBINATION TABLE

	pH					ORP		ION		Conductivity Electrode Cells	DO Electrode
	3-in-1 Electrode	Combination Electrode	Cordless Electrode	Single Electrode*1	Reference Electrode	3-in-1 Combination Electrode	Single Electrode*1	Combination Electrode	Single Electrode*1		
	9611-10D	6066-10C	6330	1066A-10C	2060A-10T	9300-10D	3060-10C	6560-10C	8001-10C	9382-10D	9520-10D
	9621-10D	6069-10C	6336	1076A-10C	2660A-10T			6561-10C	8002-10C		9551-20D
	9669-10D	6069MP-10C		6961-10C	2565A-10T	6861-10C		5002A-10C	8003-10C	3551-10D	9551-100D
	9667-10D	6251-10C			2461A-10T			6581-10C	8004-10C	3552-10D	9550-20D
		6261-10C						6582-10C	8005-10C	3553-10D	9550-100D
	6366-10D							6583-10C	8006-10C	3561-10D	
	6367-10D								8007-10C	3562-10D	
	6377-10D								8008-10C	3573-10D	
	6378-10D								8009-10C	3574-10D	
	6252-10D								8010-10C		
									8011-10C		
									1512A-10C		
									8201-10C		
									8202-10C		
									8203-10C		
Type											
F-51 • 52	○	○	×	○	○	○	○	×	×	×	×
F-53	○	○	×	○	○	○	○	○	○	×	×
F-54	○	○	×	○	○	○	○	×	×	○	×
F-55	○	○	×	○	○	○	○	○	○	○	×
D-51, D-21	○	○	×	×	×	×	×	×	×	×	×
D-52, D-22	○	○	×	×	×	○	×	×	×	×	×
D-53, D-23	○	○	×	×	×	○	×	○	×	×	×
D-54, D-24	○	○	×	×	×	○	×	×	×	○	×
D-55, D-25	○	○	×	×	×	○	×	×	×	×	○
F-21 • 22 • 21 II • 22 II	○	○	×	○	○	○	○	×	×	×	×
F-22C • 22 II C	○	○	○	○	○	○	○	×	×	×	×
F-23 • 24 • 23 II • 24 II	○	○	×	○	○	○	○	○	○	×	×
F-23C • 24C • 23 II C • 24 II C	○	○	○	○	○	○	○	○	○	×	×
M-11, F-11 • 12	○	○*2	×	○*2	○*2	×	×	×	×	×	×
M-12 • 13, F-13 • 14 • 15 • 16	○	○	×	○	○	○	○	×	×	×	×
D-11 • 12	○	○*2	×	×	×	×	×	×	×	×	×
D-13 • 14	○	○*2	×	×	×	○	×	×	×	×	×

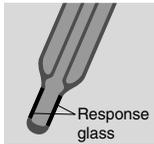
○: Applicable X: Not applicable

\*1: Reference electrode required for measurement \*2: Temperature compensation electrode (4163-10T) required for measurement

# NEW ELECTRODES (pH ELECTRODES)

## “ToupH Electrode” More impact-resistant and unbreakable

The response glass in conventional electrodes had to be thin to keep electric resistance low and sensitivity high. The new ToupH electrode uses glass of lower electric resistance, resulting in a relatively thicker and substantially tougher response glass — especially at the tip — while improving sensitivity and response.

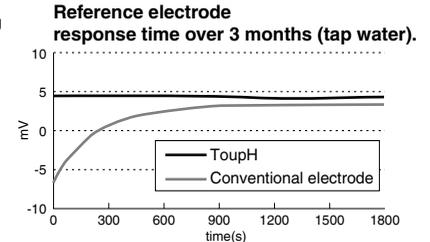
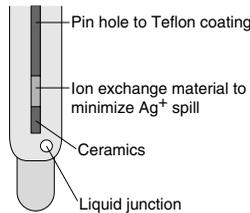


Tougher  
glass electrode  
“ToupH”



## “Silver Ion Trap” Clogging-resistant liquid junction and faster response time

The silver/silver chloride internal electrode in the reference electrode is known to cause silver clogging at the liquid junction and to react with the sample, which can affect the reproducibility and response time. The silver ion trap in the new electrode suppresses the outflow of silver ions, thereby minimizing clogging at the liquid junction and ensuring more stable measurement. The new design also minimizes sample deterioration by silver.



## 3-in-1 Electrode (Waterproof, Silver Ion Trap Construction)

Type	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
<b>9611-10D</b> Thick membrane electrode <b>ToupH</b>  9096001800	0-80	0-14	Ceramic	#300 (KCl)	More impact-resistant and easier to clean, the thick glass membrane realizes rapid response while minimizing clogging at the liquid junction and ensuring stable measurements. For all lab needs. (Post-9610-10D model)
<b>9621-10D</b> Plastic-body electrode  9096001700	0-100 (Submerged measurements: 0-50)	0-14	Ceramic	#300 (KCl)	Cased in a plastic body to enable field measurements. The slide-type internal solution filler permits submerged measurements in depths up to 1m (for up to 30 minutes). The glass membrane, which offers excellent response to low-conductivity water, and the clog-resistant liquid junction design make this model ideal for both tap water and pure water measurements. (Post-9620-10D model)
<b>9677-10D</b> Sleeve electrode for slurry samples <b>ToupH</b>  9096002000	0-60	0-14	Movable sleeve	#300 (KCl)	More break-resistant thick glass membrane. The movable sleeve allows easy cleaning of the liquid junction and replacement of the internal solution. Ideal for measuring samples of high viscosity.
<b>9669-10D</b> Micro electrode for trace amount samples <b>ToupH</b>  9096001900	0-60	0-14	Ceramic	#300 (KCl)	Micro-electrode with a built-in temperature sensor for trace sample measurements (0.3mL). The highly responsive temperature sensor and the clog-resistant liquid junction design assure stable measurements.

### <Reference>

The liquid junction is the section where the liquid inside the reference electrode comes in contact with the sample liquid. Several junction types are available (ceramic, sleeve, etc.), to meet the requirements of specific samples or applications.

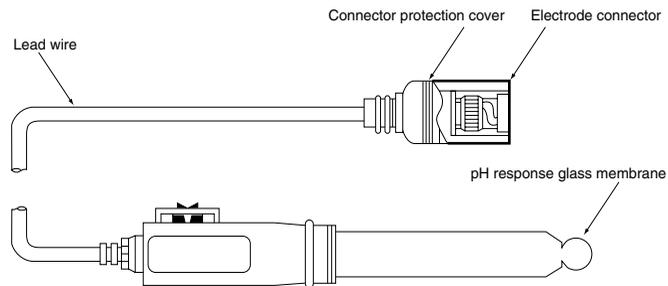
Liquid junction type	Features
<b>Ceramic</b>	A broad range of pH measurements. (Please note that samples of high viscosity may cause clogging.)
<b>Movable sleeve</b>	The larger liquid junction area is ideal for samples of high liquid junction potential, such as those with (1) high viscosity, (2) high salt concentration, or (3) low ionic strength. The liquid junction is easy to clean. High internal solution outflow volume.
<b>Fixed sleeve</b>	The large liquid junction area makes this type somewhat similar to the movable sleeve type. Not recommended for samples of high viscosity, as the sleeve cannot be cleaned.
<b>Double junction</b>	Combination of the ceramic type and the movable sleeve type overcomes the disadvantages of using either separately. When the outflow of the KCl in the internal solution presents a problem, placing the sample or other salt solution in the external tube will ensure stable measurements.

# pH ELECTRODES (GLASS ELECTRODES)

Glass electrodes measure the pH value in the sample solution by detection of electromotive force, i.e., voltage.

HORIBA's superior glass electrodes have all the qualities required for accurate measurement and testing: they are responsive to changes in electromotive force, sensitive to very slight alkaline differences, have a low internal resistance, and are extremely durable. HORIBA's electrodes are perfect not only for laboratory pH measurement conditions, but are in widespread general use for pH measurement.

Our series of electrodes for use with HORIBA's F, M, & D Series of pH meters incorporate a composite lithium glass for the pH-responsive glass membrane. This gives them extremely high sensitivity. They connect to the industry-standard universal BNC connectors. The holder portion has a squared-off design to prevent the electrode from rolling, protecting it from damage.



## Glass Electrodes

Type	Usage	Applicable temperature range(°C)	pH range	Applicable reference electrode	Feature
<b>1066A-10C</b> Standard type  9003012200	 Glass electrode 1066A-10C Reference electrode 2060A-10T or other	0-100	0-14	2060A 2660A 2565A	Very durable minimum alkali errors. Most widely used for general pH measurements.
<b>1076A-10C</b> For measurement of low-conductivity water and non-aqueous solvents.  9003014200	 Glass electrode 1076A-10C Reference electrode 2060A-10T or other	0-100	0-14	2060A 2660A 2565A	Uses a glass membrane highly sensitive to low-conductivity water and non-aqueous solvents. Can also be used for ordinary pH measurement.
<b>6961-15C</b> Small sample amount flow type  9003012400	 Reference electrode 2461A-15T Glass electrode 6961-15C	0-50	0-12	2461A	A glass electrode with a pH response membrane like a slender tube. Becomes a combination pH electrode of small sample amount flow type when combined with the reference electrode 2461A-15T by providing a pinhole liquid junction in the slender tube. (Allows a small amount of sample to be measured while it is distributed.)

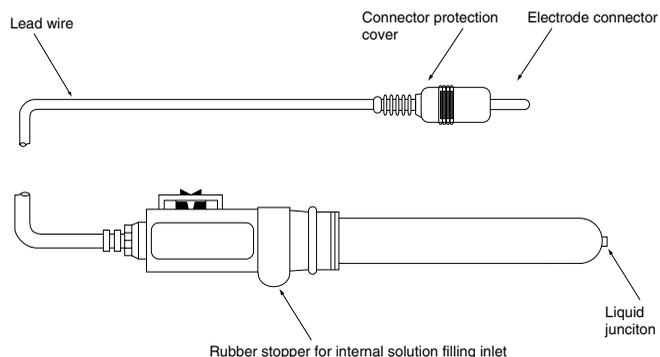
### Electrode connector and lead wire length:

10 of -10C, -10T, or -10D in the last part of each type shows that the lead wire length is 1.0m. C, T, and D denote connector types for the main unit. The connector type suited for the main unit should be selected.

Can be connected to the D connector on the D series or to the C, T, or D connector on the standard F series and M series of popular HORIBA pH meters.

# pH ELECTRODES (REFERENCE ELECTRODES) & TEMPERATURE COMPENSATION ELECTRODES

Reference electrodes constitute part of the detection portion of pH meters; they are used together with a glass electrode to isolate the electromotive force generated in the glass electrode. HORIBA's reference electrodes use a top-quality internal reference electrode and a liquid junction with numerous special features; this gives them an incredible stable indication of electrical potential, making them particularly suitable as reference electrodes in all types of pH and electrical potential measurement. These electrodes have a double-junction configuration, incorporating two types of liquid junction, using capillary tubes, a sleeve with large surface area, and an easy-to-use ceramic filter.



## Reference Electrodes

Type	Applicable temperature range(°C)	Liquid junction	Internal solution	Applicable glass electrode	Feature
<b>2060A-10T</b> Standard type  9003012500	0-100	Ceramic	#300 (KCl)	1066A 1076A	Suitable for a wide range of pH measurements since the resistance of the liquid junction is small.
<b>2660A-10T</b> Sleeve type  9003012600	0-100	Sleeve	#300 (KCl)	1066A 1076A	Particularly suitable for measurements of suspensions, emulsions, paste, and non-aqueous solutions since the resistance of the liquid junction is small. The cleaning of the liquid junction and the replacement of the internal solution can be carried out easily.
<b>2565A-10T</b> Double-junction type  9003012700	0-100	Intermediate: Ceramic External: Sleeve	#300 (KCl)	1066A 1076A	Suitable for measurements of liquid other than normal aqueous solutions, such as suspensions, emulsions, paste, and non-aqueous solutions. When the potassium chloride solution of the internal solution reacts with the sample, measurements can be stably carried out by filling the sample or any other chloride solution in the external jacket. The replacement of the internal solution and the cleaning of the liquid junction can be carried out easily.
<b>2461A-15T</b> For small sample amount flow Salt bridge  9003012800	0-50	Salt Bridge	#300 (KCl)	6961	Connected to the electrode 6961-15C for very small sample amounts when used.

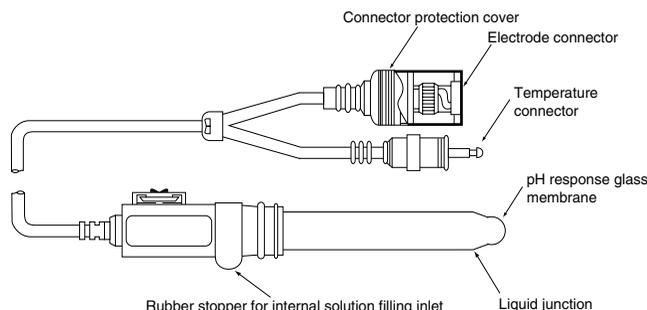
## Temperature Compensation Electrode

Type	Applicable temperature range(°C)	Applicable	Temperature compensation element	Feature
<b>4163-10T</b>  9003013000	0-100	Temperature compensation and measurement	Thermistor	Used to automatically compensate the changes in the electromotive force of the pH electrode due to temperatures and also to measure temperatures.

# pH ELECTRODES (3-in-1 ELECTRODES)

Combination electrodes are a glass electrode and a reference electrode incorporated into one unit. 3-in-1 electrodes incorporate a glass electrode and a reference electrode-plus a temperature compensation electrode-into a single unit.

These electrodes are compact and easy to use; they give superb results in pH measurements over a broad range of sample liquids and test conditions. Also, since the glass membrane and the liquid junction are adjacent, only a small amount of sample fluid is required and they are extremely simple to clean. The internal reference electrode uses a solution of 3.33 mol/L KCl.



## 3-in-1 Electrode

Type	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
<b>6366-10D</b> Standard type (ceramic)  9003011700	0-100	0-14	Ceramic	#300 (KCl)	The most standard pH electrode. (Standard accessory M series and models F-21II, F-22II, F-23II.)
<b>6367-10D</b> Standard type (sleeve)  9003011800	0-60	0-14	Sleeve	#300 (KCl)	Uses a sleeve for the liquid junction, improving the stability and repeatability. For measuring pH at high accuracy. (Standard accessory for model F-24II.)
<b>6377-10D</b> For measurement of low-conductivity water and non-aqueous solvents  9003014100	0-60	0-14	Movable sleeve	#300 (KCl)	Uses a glass membrane highly sensitive to low-conductivity water and non-aqueous solvents. Movable sleeve used at the liquid junction.
<b>6378-10D</b> For test tubes  9003011900	0-60	0-14	Ceramic	#300 (KCl)	Can be used not only for general purposes, but also for measuring pH of a small amount of sample in a long, slender container such as a test tube.
<b>6252-10D</b> For food application (needle type)  9003013800	0-60	0-12	Ceramic	#300 (KCl)	Needle electrode allows measurement of aqueous solutions too.

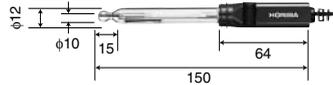
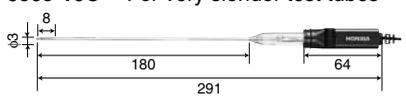
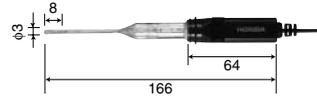
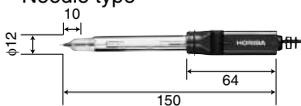
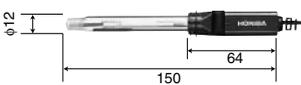
## 3-in-1 Electrode (Cordless Electrode\*)

\* Marketed only for Japanese and U.S. market.

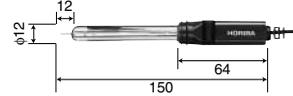
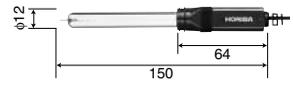
Type	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
<b>6330</b> Plastic body type  9003014300	0-80	0-14	Ceramic	#300 (KCl)	Cordless electrode with plastic body(standard accessory for models F-22IIC, F-23IIC, F-24IIC).
<b>6336</b> Standard type  9003014400	0-80	0-14	Ceramic	#300 (KCl)	Special cordless electrode with glass body.

# pH ELECTRODES (COMBINATION), METALLIC ELECTRODES (FOR ORP MEASUREMENT) & ISFET ELECTRODES

## Combination Electrodes

Type	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
<b>6066-10C</b> Standard type  9003013400	0-100	0-14	Ceramic	#300 (KCl)	A combination electrode incorporating a glass electrode and a reference electrode into single unit, which allows pH values to be measured easily.
<b>6069-10C</b> For very slender test tubes  9003013500	0-60	0-14	Ceramic	#310 (KCl with AgCl)	For measuring pH of a small amount of sample in a slender tube (more than 3.5 mm dia.) such as a NMR test tube.
<b>6069MP-10C</b>  9003017900	0-60	0-14	Ceramic	#300 (KCl)	This slim electrode $\phi$ 3mm is suitable for biological or pharmaceutical applications, allowing the measurement for the trace amount sample, such as 0.3ml, in a micro tube.
<b>6251-10C</b> Needle type  9003013600	0-50	0-12	Sleeve	#300 (KCl)	Since its tip is very sharp, this electrode can be directly thrustured into solid samples such as meat, fruits, and animal tissues to measure their pH values.
<b>6261-10C</b> Flat type  9003013700	0-50	0-12	Sleeve	#300 (KCl)	Since the pH response membrane and the liquid junction are located on the same surface, pH values on the surfaces of skin, leather, paper, and leaves can be measured.

## Metallic Electrodes (For ORP Measurement)

Type	Applicable temperature range(°C)	Electrode material	Applicable reference electrode	Internal solution	Feature
<b>6861-10C</b> Platinum combination type  9003013100	0-60	Pt	—	#300 (KCl)	A combination electrode for measuring oxidation reduction potentials (ORP), which incorporates a metallic electrode and a reference electrode into a single unit. It is the most standard electrode.
<b>3060-10C</b> Platinum single polarity type  9003013300	0-60	Pt	2060A 2660A 2565A	—	Used for an indication electrode in measurements of oxidation-reduction potentials.
<b>9300-10D</b> Waterproof platinum combination type  9096000400	0-60	Pt	—	#300 (KCl)	Waterproof. Uses a flat type metallic electrode, which allows a small amount of sample to be measured.

## ISFET Electrode

Type	Applicable temperature range(°C)	pH range	Liquid junction material	Feature
<b>0030-10D</b> Needle type  9096002100	0-60	0-14	ABS, epoxy, polyethylene, Ta <sub>2</sub> O <sub>5</sub> , platinum	Ideal for food processing and other applications where glass is prohibited, and as well as for penetration measurements in soil.

# STANDARD SOLUTIONS, INTERNAL SOLUTION for REFERENCE ELECTRODE & CLEANING SOLUTIONS

## pH Standard Solution SET (accuracy: $\pm 0.02$ pH)

Type	Name	pH value(25°C)	Volume(mL)	Remarks
101-S 9003003500	Phosphate standard equimolal solution	6.86	500	Use undiluted. The set contains standard and internal solutions, as shown.
	Phthalate standard solution	4.01	250	
	Borate standard solution	9.18	250	
	Internal Solution for Reference Electrode (300)	—	250	

## pH Standard Solution (accuracy: $\pm 0.02$ pH)



Type	Name	pH value(25°C)	Volume(mL)	Remarks
100-2 9003001500	Oxalate standard solution	1.68	500	The original solution should be used as it is. For general use as standard solution sets, 101-S (100-4, 7.9 and #310 internal solution) are also available.
100-4 9003001600	Phthalate standard solution	4.01	500	
100-7 9003001700	Phosphate standard equimolal solution	6.86	500	
100-9 9003001800	Borate standard solution	9.18	500	
100-10 9003001900	Carbonate standard solution	10.02	500	

## Condensed pH Standard Solution (accuracy: $\pm 0.02$ pH)



Type	Name	pH value(25°C)	Volume(mL)	Remarks
110-4 9003002300	Condensed phthalate standard solution	4.01	500	Should be diluted when used. The pH values shown are those obtained when the original solution is diluted with pure water at a volume ratio of 1 to 4. For general use.
110-7 9003002400	Condensed phosphate standard equimolal solution	6.86	500	
110-10 9003002500	Condensed carbonate standard solution	10.02	500	

## Standard Solution for Accurate Measurements (N.B.S., accuracy: $\pm 0.003$ pH)



Type	Name	pH value		Volume(mL)	Remarks
		25°C	37°C		
100-B4 9003002000	Phthalate standard solution	4.008	4.030	500	The original solution should be used as it is. This standard solution is for very accurate measurements based on N.B.S. The pH values shown do not necessarily match with those shown in JIS.
100-B7 9003002100	Phosphate standard solution	7.413	7.383	500	
100-B9 9003002200	Borate standard solution	9.180	9.082	500	

## Powder for pH Standard Solution (accuracy: $\pm 0.05$ pH)



Type	Name	pH value(25°C)	Remarks
150-4 9003002700	Powder for phthalate standard solution	4.01	The pH value shown are those obtained when one packet is dissolved in 500 ml of pure water. One packet contains powder for 500 mL. For use in field at factories (10 packets per set)
150-7 9003002800	Powder for neutral phosphate standard solution	6.86	
150-9 9003002900	Powder for borate standard solution	9.18	

## Powder for ORP Standard Solution (accuracy: $\pm 15$ mV)



Type	Name	ORP value(25°C)	Remarks
160-51 9003003100	Powder for ORP standard solution	89 mV (vs, 3.33 mol/L KCl-AgCl)	The ORP values shown are those obtained when one packet is dissolved in 250 mL of pure water. This standard solution should be used immediately after conditioning and can-not be used for 2 hours or more. (10 packets per set)
160-22 9003003000	Powder for ORP standard solution	258 mV (vs, 3.33 mol/L KCl-AgCl)	

Note: The pH standard solution by a reliable manufacturer should be selected because they are used as reference for pH measurements. It is recommended for safety not to use the standard liquid which was allowed to stand for long hours after opening its bottle or which was once used.

## Internal Solution for Reference Electrode



Type	Name	Concentration	Volume(mL)	Remarks
300 9003003200	For 6327, 6328, F, M, and D-10 series electrodes	3.33 mol/L KCl	250	The original solution should be used as it is. Powder for internal solution (350) is also available for a large amount of internal solution. (The powder is used by dissolving it in pure water.)
310 9003003300	For H-7 and old type pH meter electrodes	3.33 mol/L KCl (AgCl, saturation in normal temp.)	250	

## Powder for Internal Solution for Reference Electrode

Type	Remarks
350 9003003400	500g. Dissolve in 2L of pure water.

## Electrode Cleaning Solution

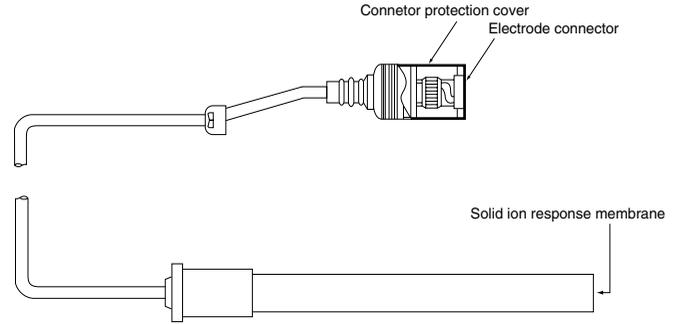
Type	Name	Volume(mL)	Composition	Remarks
220 9096002500	Electrode cleaning solution	50 x 2 pcs	Hydrochloric acid 1% Thiourea 10%	For removing inorganic sample residues from glass electrodes, and for cleaning liquid junctions

# ION ELECTRODES

See P5 for information about reference electrodes.

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. HORIBAs years of experience and know-how in this field are behind the wide range of ion electrodes we offer.

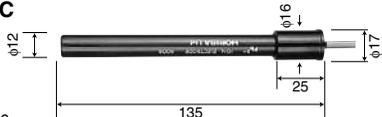
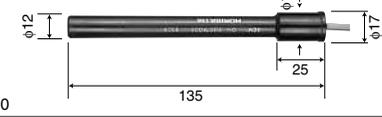
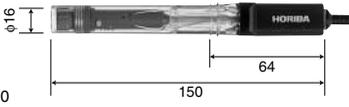
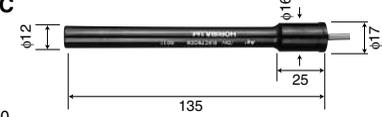
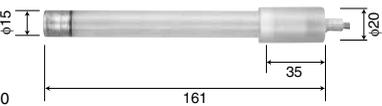
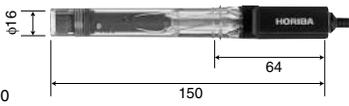
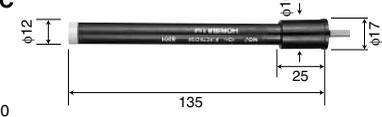
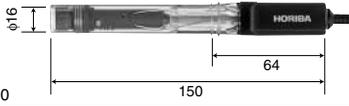
When measurements are made using an ion meter, by calibrating with various standard solutions, direct readings of the concentration of the ion in question can be taken. Note that since volume-detection level changes with temperature, measurements must be taken at a fixed temperature.

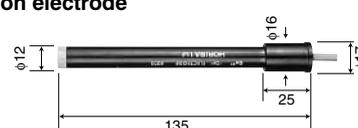


①: Measuring range ②: pH range ③: Applicable temperature range ④: Response time (90%)

Type	Measuring range	Applicable reference electrode	Selection coefficient
<b>Cyanide ion electrode</b> <b>8001-10C</b> 	①: 0.03 to 2,600 mg/L CN <sup>-</sup> (10 <sup>-6</sup> to 10 <sup>-1</sup> mol/L CN <sup>-</sup> ) ②: 2.6 mg/L (10 <sup>-4</sup> mol/L) CN <sup>-</sup> pH 12 to 13 ③: 0 to 50°C ④: Within 10 seconds	2060A, 2565A	S <sup>2-</sup> , MnO <sub>4</sub> <sup>-</sup> = Not acceptable I <sup>-</sup> = 0.1 S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> = 1
<b>Chloride ion electrode (combination)</b> <b>6560-10C</b> 	①: 0.35 to 35,000 mg/L Cl <sup>-</sup> (10 <sup>-5</sup> to 1 mol/L Cl <sup>-</sup> ) ②: 350 mg/L (10 <sup>-2</sup> mol/L) Cl <sup>-</sup> pH 3 to 11 ③: 0 to 50°C ④: Within 5 seconds	—	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> , S <sup>2-</sup> , I <sup>-</sup> , Ag <sup>+</sup> , Hg <sup>2+</sup> = Not acceptable SCN <sup>-</sup> = 0.3 MnO <sub>4</sub> <sup>-</sup> = 0.1 Br <sup>-</sup> = 0.03 NO <sub>3</sub> <sup>-</sup> , F <sup>-</sup> , HCO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , PO <sub>4</sub> <sup>2-</sup> = 1,000
<b>Chloride ion electrode</b> <b>8002-10C</b> 	①: 0.35 to 35,000 mg/L Cl <sup>-</sup> (10 <sup>-5</sup> to 1 mol/L Cl <sup>-</sup> ) ②: 350 mg/L (10 <sup>-2</sup> mol/L) Cl <sup>-</sup> pH 3 to 11 ③: 0 to 50°C ④: Within 5 seconds	2565A	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> , S <sup>2-</sup> , I <sup>-</sup> , Ag <sup>+</sup> , Hg <sup>2+</sup> = Not acceptable SCN <sup>-</sup> = 0.3 MnO <sub>4</sub> <sup>-</sup> = 0.1 Br <sup>-</sup> = 0.03 NO <sub>3</sub> <sup>-</sup> , F <sup>-</sup> , HCO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , PO <sub>4</sub> <sup>2-</sup> = 1,000
<b>Sulfide ion electrode</b> <b>8003-10C</b> 	①: 0.32 to 32,000 mg/L S <sup>2-</sup> (10 <sup>-5</sup> to 1 mol/L S <sup>2-</sup> ) ②: 3.2 mg/L (10 <sup>-4</sup> mol/L) S <sup>2-</sup> pH 12 to 14 ③: 0 to 50°C ④: Within 10 seconds	2060A, 2565A	CN <sup>-</sup> = Not acceptable S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> = 10 I <sup>-</sup> , F <sup>-</sup> , Cl <sup>-</sup> , PO <sub>4</sub> <sup>2-</sup> , SO <sub>4</sub> <sup>2-</sup> = 1,000
<b>Iodide ion electrode</b> <b>8004-10C</b> 	①: 0.0127 to 12,700 mg/L I <sup>-</sup> (10 <sup>-7</sup> to 10 <sup>-1</sup> mol/L I <sup>-</sup> ) ②: 1,270 mg/L (10 <sup>-2</sup> mol/L) I <sup>-</sup> pH 2 to 11 ③: 0 to 50°C ④: Within 10 seconds	2060A, 2565A	MnO <sub>4</sub> <sup>-</sup> , S <sup>2-</sup> , CN <sup>-</sup> = Not acceptable S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> = 10 NO <sub>3</sub> <sup>-</sup> = 100 Br <sup>-</sup> = 1,000
<b>Bromide ion electrode</b> <b>8005-10C</b> 	①: 0.8 to 80,000 mg/L Br <sup>-</sup> (10 <sup>-5</sup> to 1 mol/L Br <sup>-</sup> ) ②: 800 mg/L (10 <sup>-2</sup> mol/L) Br <sup>-</sup> pH 1.5 to 11.5 ③: 0 to 50°C ④: Within 5 seconds	2565A	S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> , I <sup>-</sup> , S <sup>2-</sup> , CN <sup>-</sup> = Not acceptable MnO <sub>4</sub> <sup>-</sup> = 1 Cl <sup>-</sup> , PO <sub>4</sub> <sup>2-</sup> = 100 F <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> = 1,000
<b>Copper ion electrode</b> <b>8006-10C</b> 	①: 0.06 to 6,350 mg/L Cu <sup>2+</sup> (10 <sup>-6</sup> to 10 <sup>-1</sup> mol/L Cu <sup>2+</sup> ) ②: 6.35 mg/L (10 <sup>-4</sup> mol/L) Cu <sup>2+</sup> pH 2 to 6 ③: 0 to 50°C ④: Within 10 seconds	2565A	Fe <sup>2+</sup> = 0.1 Ni <sup>2+</sup> , Na <sup>+</sup> = 1,000
<b>Cadmium ion electrode</b> <b>8007-10C</b> 	①: 0.1 to 11,240 mg/L Cd <sup>2+</sup> (10 <sup>-6</sup> to 10 <sup>-1</sup> mol/L Cd <sup>2+</sup> ) ②: 11 mg/L (10 <sup>-4</sup> mol/L) Cd <sup>2+</sup> pH 3 to 8 ③: 0 to 50°C ④: Within 10 seconds	2060A, 2565A	Cu <sup>2+</sup> , Hg <sup>2+</sup> , Ag <sup>+</sup> = Not acceptable Pb <sup>2+</sup> = 0.1 Fe <sup>3+</sup> = 1 Cr <sup>3+</sup> , Fe <sup>2+</sup> = 100 Ni <sup>2+</sup> = 1,000

# ION ELECTRODES

Type	Measuring range	Applicable reference electrode	Selection coefficient
<b>Lead ion electrode</b> <b>8008-10C</b>  <p>9003016200</p>	①: 2 to 20,000 mg/L Pb <sup>2+</sup> (10 <sup>-5</sup> to 10 <sup>-1</sup> mol/L Pb <sup>2+</sup> ) ②: 20 mg/L (10 <sup>-4</sup> mol/L) Pb <sup>2+</sup> pH 4.5 to 6.5 ③: 0 to 50°C ④: Within 10 seconds	2565A	Cu <sup>2+</sup> , Hg <sup>2+</sup> , S <sup>2-</sup> , Ag <sup>+</sup> = Not acceptable Fe <sup>3+</sup> = 0.01 Cr <sup>3+</sup> = 1 Cd <sup>2+</sup> = 10 Ni <sup>2+</sup> , Mg <sup>2+</sup> , Zn <sup>2+</sup> = 100 NH <sub>4</sub> <sup>+</sup> , K <sup>+</sup> = 1,000
<b>Thiocyanate ion electrode</b> <b>8009-10C</b>  <p>9003016300</p>	①: 0.6 to 5,800 mg/L SCN <sup>-</sup> (10 <sup>-5</sup> to 10 <sup>-1</sup> mol/L SCN <sup>-</sup> ) ②: 5.8 mg/L (10 <sup>-4</sup> mol/L) SCN <sup>-</sup> pH 2 to 12 ③: 0 to 50°C ④: Within 30 seconds	2565A	CN <sup>-</sup> , I <sup>-</sup> , S <sup>2-</sup> , S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> = Not acceptable Br <sup>-</sup> = 1 Cl <sup>-</sup> = 100
<b>Fluoride ion electrode (combination)</b> <b>6561-10C</b>  <p>9003014600</p>	①: 0.02 to 19,000 mg/L F <sup>-</sup> (10 <sup>-6</sup> to 1 mol/L F <sup>-</sup> ) ②: 20 mg/L (10 <sup>-3</sup> mol/L) F <sup>-</sup> pH 4 to 10 ③: 0 to 50°C ④: Within 5 seconds	—	Possible interference when multiply-charged ion (ex. Al <sup>3+</sup> , Fe <sup>3+</sup> ) coexisted and foamed the complex.
<b>Fluoride ion electrode</b> <b>8010-10C</b>  <p>9003016400</p>	①: 0.02 to 19,000 mg/L F <sup>-</sup> (10 <sup>-6</sup> to 1 mol/L F <sup>-</sup> ) ②: 20 mg/L (10 <sup>-3</sup> mol/L) F <sup>-</sup> pH 4 to 10 ③: 0 to 50°C ④: Within 5 seconds *1	2060A, 2565A	Possible interference when multiply-charged ion (ex. Al <sup>3+</sup> , Fe <sup>3+</sup> ) coexisted and foamed the complex.
<b>Silver ion electrode</b> <b>8011-10C</b>  <p>9003016500</p>	①: 0.01 to 110,000 mg/L Ag <sup>+</sup> (10 <sup>-7</sup> to 1 mol/L Ag <sup>+</sup> ) ②: 1 mg/L (10 <sup>-5</sup> mol/L) Ag <sup>+</sup> pH 2 to 10 ③: 0 to 50°C ④: Within 10 seconds	2565A	Hg <sup>2+</sup> = Not acceptable Cu <sup>2+</sup> , Cd <sup>2+</sup> , Pb <sup>2+</sup> , Zn <sup>2+</sup> , Mg <sup>2+</sup> , Ca <sup>2+</sup> , Na <sup>2+</sup> , K <sup>+</sup> = over 1,000
<b>Ammonia ion electrode (combination)</b> <b>5002A-10C</b>  <p>9003016600</p>	①: 0.1 to 1,000 mg/L NH <sub>3</sub> ②: Adjust more than pH 12 ③: 0 to 50°C ④: Within 30 seconds when substituting low concentration to high concentration Within 2 minutes when substituting high concentration to low concentration	—	—
<b>Sodium ion electrode</b> <b>1512A-10C</b>  <p>9003016700</p>	①: 2.3 to 230,000 mg/L Na <sup>+</sup> (10 <sup>-4</sup> to 10 mol/L Na <sup>+</sup> ) ②: 230 mg/L (10 <sup>-2</sup> mol/L) Na <sup>+</sup> Over pH 4.5 ③: 0 to 60°C ④: Within 30 seconds *1	2565A	K <sup>+</sup> , Li <sup>+</sup> = 10 NH <sub>4</sub> <sup>+</sup> = 20 Ca <sup>2+</sup> = 500
<b>Nitrate ion electrode (combination)</b> <b>6581-10C</b>  <p>9003014700</p>	①: 0.62 to 62,000 mg/L NO <sub>3</sub> <sup>-</sup> (10 <sup>-5</sup> to 1 mol/L NO <sub>3</sub> <sup>-</sup> ) ②: 62 mg/L (10 <sup>-3</sup> mol/L) NO <sub>3</sub> <sup>-</sup> pH 3 to 7 ③: 0 to 50°C ④: Within 15 seconds *2	—	ClO <sub>4</sub> <sup>-</sup> = 0.03 I <sup>-</sup> = 0.1 Br <sup>-</sup> = 2 NO <sub>2</sub> <sup>-</sup> = 3 Cl <sup>-</sup> = 40 F <sup>-</sup> = 200 CH <sub>3</sub> COO <sup>-</sup> = 300 SO <sub>4</sub> <sup>2-</sup> = over 1,000
<b>Nitrate ion electrode</b> <b>8201-10C</b>  <p>9003016800</p>	①: 0.62 to 62,000 mg/L NO <sub>3</sub> <sup>-</sup> (10 <sup>-5</sup> to 1 mol/L NO <sub>3</sub> <sup>-</sup> ) ②: 62 mg/L (10 <sup>-3</sup> mol/L) NO <sub>3</sub> <sup>-</sup> pH 3 to 7 ③: 0 to 50°C ④: Within 15 seconds *2	2565A	ClO <sub>4</sub> <sup>-</sup> = 0.03 I <sup>-</sup> = 0.1 Br <sup>-</sup> = 2 NO <sub>2</sub> <sup>-</sup> = 3 Cl <sup>-</sup> = 40 F <sup>-</sup> = 200 CH <sub>3</sub> COO <sup>-</sup> = 300 SO <sub>4</sub> <sup>2-</sup> = over 1,000
<b>Potassium ion electrode (combination)</b> <b>6582-10C</b>  <p>9003014800</p>	①: 0.04 to 39,000 mg/L K <sup>+</sup> (10 <sup>-6</sup> to 1 mol/L K <sup>+</sup> ) ②: 3.9 mg/L (10 <sup>-4</sup> mol/L) K <sup>+</sup> pH 5 to 11 ③: 0 to 50°C ④: Within 15 seconds *3	—	Rb <sup>+</sup> = 0.4 Cs <sup>+</sup> = 3 NH <sub>4</sub> <sup>+</sup> = 70 Li <sup>+</sup> , Na <sup>+</sup> , Mg <sup>2+</sup> , Ca <sup>2+</sup> , Sr <sup>2+</sup> , Ba <sup>2+</sup> = over 1,000

Type	Measuring range	Applicable reference electrode	Selection coefficient
<b>Potassium ion electrode</b> <b>8202-10C</b>  9003016900	①: 0.04 to 39,000 mg/L K <sup>+</sup> (10 <sup>-6</sup> to 1 mol/L K <sup>+</sup> ) ②: 3.9 mg/L (10 <sup>-4</sup> mol/L) K <sup>+</sup> pH 5 to 11 ③: 0 to 50°C ④: Within 15 seconds *3	2565A	Rb <sup>+</sup> = 0.4 Cs <sup>+</sup> = 3 NH <sub>4</sub> <sup>+</sup> = 70 Li <sup>+</sup> , Na <sup>+</sup> , Mg <sup>2+</sup> , Ca <sup>2+</sup> , Sr <sup>2+</sup> , Ba <sup>2+</sup> = over 1,000
<b>Calcium ion electrode (combination)</b> <b>6583-10C</b>  9003014900	①: 0.4 to 40,080 mg/L Ca <sup>2+</sup> (10 <sup>-5</sup> to 1 mol/L Ca <sup>2+</sup> ) ②: 4.0 mg/L (10 <sup>-4</sup> mol/L) Ca <sup>2+</sup> pH 5 to 11 ③: 0 to 50°C ④: Within 15 seconds *4	—	Fe <sup>3+</sup> = 0.1 Fe <sup>2+</sup> , Zn <sup>2+</sup> = 1 Sr <sup>2+</sup> = 50 Ni <sup>2+</sup> , Cu <sup>2+</sup> = 70 Co <sup>2+</sup> = 350 Mn <sup>2+</sup> = 500 Mg <sup>2+</sup> = 1,000 Na <sup>+</sup> , K <sup>+</sup> , Ba <sup>2+</sup> , NH <sub>4</sub> <sup>+</sup> = over 1,000
<b>Calcium ion electrode</b> <b>8203-10C</b>  9003017000	①: 0.4 to 40,080 mg/L Ca <sup>2+</sup> (10 <sup>-5</sup> to 1 mol/L Ca <sup>2+</sup> ) ②: 4.0 mg/L (10 <sup>-4</sup> mol/L) Ca <sup>2+</sup> pH 5 to 11 ③: 0 to 50°C ④: Within 15 seconds *4	2060A, 2565A	Fe <sup>3+</sup> = 0.1 Fe <sup>2+</sup> , Zn <sup>2+</sup> = 1 Sr <sup>2+</sup> = 50 Ni <sup>2+</sup> , Cu <sup>2+</sup> = 70 Co <sup>2+</sup> = 350 Mn <sup>2+</sup> = 500 Mg <sup>2+</sup> = 1,000 Na <sup>+</sup> , K <sup>+</sup> , Ba <sup>2+</sup> , NH <sub>4</sub> <sup>+</sup> = over 1,000

- The response time is the time which is required to reach 90% response when the ion concentration is gradually changed from 10<sup>-4</sup> mol/L to 10<sup>-2</sup> mol/L with the solution stirred.  
 Exception:  
 \*1: 90% response when ion concentration is changed to 10<sup>-6</sup> mol/L ~ 10<sup>-2</sup> mol/L  
 \*2: 95% response when ion concentration is changed to 10<sup>-3</sup> mol/L ~ 10<sup>-1</sup> mol/L  
 \*3: 95% response when ion concentration is changed to 10<sup>-4</sup> mol/L ~ 10<sup>-2</sup> mol/L  
 \*4: 95% response when ion concentration is changed to 10<sup>-4</sup> mol/L ~ 10<sup>-1</sup> mol/L

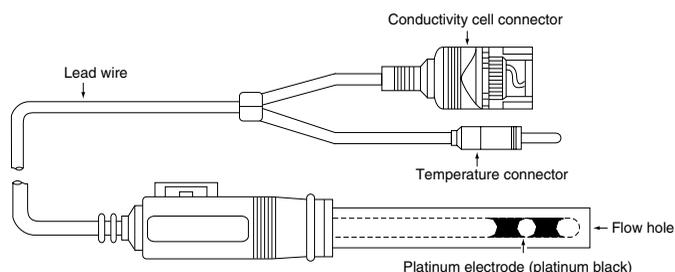
•The selection coefficient is a ratio of the limit concentration of coexisting ions (mol/L) to the ion concentration to be measured (mol/L); The value of 1000 means that the coexisting ions can be permitted up to 1000 times the ion measured and "not acceptable" means that chemical change occurs in the solid response membrane.

## Cartridges for Ion Sensor Replacement

Type	Feature
<b>7660 Chloride ion cartridge</b> 9003015000	Replacement electrode tip for combination ion electrodes
<b>7661 Fluoride ion cartridge</b> 9003015100	
<b>7681 Nitrate ion cartridge</b> 9003015200	
<b>7682 Potassium ion cartridge</b> 9003015300	
<b>7683 Calcium ion cartridge</b> 9003015400	
<b>Membrane(NH<sub>3</sub>)</b> 9012001000	Membrane set (6 pcs) for NH <sub>3</sub> electrodes
<b>370 Internal solution for NH<sub>3</sub> electrodes</b> 9012000900	Contains 250 mL
<b>O-ring</b> 9012001100	Neoprene ring set (10 pcs) for NH <sub>3</sub> electrodes (JIS B 2401-P7)

# CONDUCTIVITY ELECTRODE CELLS

Conductivity is calculated as the inverse of the resistance R(in ohms) of the sample solution as  $S/m = V/m$  between two parallel electrode plates with a surface area of  $1m^2$  separated by a distance of 1m. Since conductivity changes depending on temperature of the sample solution, values are shown at the standard temperature equivalent of 25°C. HORIBA's conductivity electrodes also have a built-in thermistor for temperature measurement, making them perfect for temperature measurement and for obtaining values equivalent to those at the standard 25°C, when used in conjunction with the conductivity meter. Since the conductivity gives valuable information about the ion composition of the sample solution, it is expected that these useful electrodes will continue to find a wide range of applications in the future.



## Conductivity Cells (Submersible Type)

(\*1) The cell constants are within  $\pm 10\%$  of the values shown.

Type	Cell constant (cm <sup>-1</sup> )	Measuring range	Sample amount required (mL)	Temperature compensation element	Applicable temperature range(°C)	Remarks
<b>3551-10D</b> 	0.1	0.1 $\mu$ S/cm to 10mS/cm	50	Incorporated	0-60	For low conductivity water (deionized water or other)
<b>3552-10D</b> 	1	1 $\mu$ S/cm to 100 mS/cm	15	Incorporated	0-100	For general purposes (provided as a standard accessory for the DS-10 series)
<b>3553-10D</b> 	10	10 $\mu$ S/cm to 1 S/cm	50	Incorporated	0-60	For high conductivity water
<b>9382-10D</b> 	1	1 $\mu$ S/cm to 100 mS/cm	20-30	Incorporated	0-80	Waterproof. For general purposes.

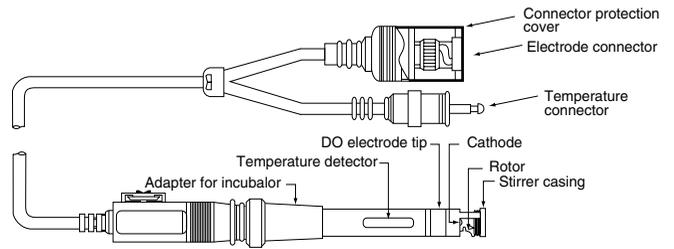
## Conductivity Cells (Flow Type)

(\*1) The cell constants are within  $\pm 10\%$  of the values shown.

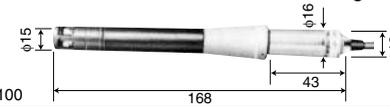
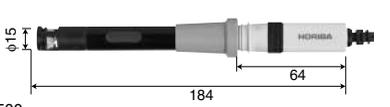
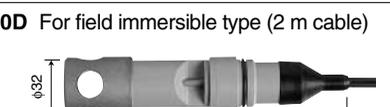
Type	Cell constant (cm <sup>-1</sup> )	Measuring range	Sample amount required (mL)	Temperature compensation element	Applicable temperature range(°C)	Remarks
<b>3561-10D</b> 	0.1	0.1 $\mu$ S/cm to 10 mS/cm	10	Incorporated	0-60	For low conductivity water (pure water or other)
<b>3562-10D</b> 	1	1 $\mu$ S/cm to 100 mS/cm	16	Incorporated	0-60	For general purposes
<b>3573-10C</b> 	10	10 $\mu$ S/cm to 1 S/cm	4	Not provided	0-60	For high conductivity water
<b>3574-10C</b> 	10	10 $\mu$ S/cm to 100 mS/cm	0.25	Not provided	0-80	For column chromatography using a very small amount of sample

# DO ELECTRODES & DO ELECTRODE TIPS

DO Electrodes detect oxygen that diffuses through the oxygen-permeable membrane to determine the amount of dissolved oxygen. The method for measuring dissolved oxygen based on this principle is referred to as the diaphragm electrode method. DO measurement can be carried out much more simply than chemical analysis, which requires complex preparatory procedures to eliminate the effects of deoxidized and oxidized substances. HORIBA's DO electrodes use innovative disposable probe tips. This eliminates the troublesome replacement of membranes and fluid that plagued conventional methods. Each disposable tip comes with its own rotor, so it is not necessary to prepare a separate rotor for each sample. In addition, the electrode has an adaptor for easy use with an incubator in BOD measurement.



## DO Electrodes

Type	Applicable temperature range(°C)	Measuring range	Response time	Feature
<b>5410-10C</b> (For DO-8F) Adapter for incubator, rotor, and stirrer casing  9074000100	0-45	DO: 0-19.99mg/L O <sub>2</sub> : 0-50% Temperature: 0-45°C (When used with dissolved oxygen meter DO-8F)	20 seconds (90% response time at constant temperature)	A DO electrode exclusively for DO-8F. This is a disposable chip type electrode (7541), which uses a detachable stirrer and a precision platinum resistance bulb for its temperature measuring element.
<b>9520-10D</b> For laboratories  9096000500	0-45	DO: 0-19.99mg/L Temperature: 0-40°C (When used with dissolved D-25)	20 seconds (90% response time at constant temperature)	Waterproof. Uses a thermistor with a disposable ship-type electrode 7541 as the thermometric element.
<b>9551-20D</b> For field immersible type (2 m cable)  9096002300	0-40	DO: 0-19.99mg/L Temperature: 0-40°C (When used with dissolved D-55, OM-51)	30 seconds (90% response time at constant temperature)	Waterproof. Uses a thermistor with a disposable ship-type electrode 5401 as the thermometric element.
<b>9551-100D</b> For field immersible type (10 m cable)  9096002400	0-40	DO: 0-19.99mg/L Temperature: 0-40°C (When used with dissolved D-55, OM-51)	30 seconds (90% response time at constant temperature)	Waterproof. Uses a thermistor with a disposable ship-type electrode 5401 as the thermometric element.
<b>9550-20D</b> For field immersible type (2 m cable)  9096000600	0-40	DO: 0-19.99mg/L Temperature: 0-40°C (When used with dissolved D-25, OM-10 series)	30 seconds (90% response time at constant temperature)	Waterproof. Uses a thermistor with a disposable ship-type electrode 5401 as the thermometric element.
<b>9550-100D</b> For field immersible type (10 m cable)  9096000700	0-40	DO: 0-19.99mg/L Temperature: 0-40°C (When used with dissolved D-25, OM-10 series)	30 seconds (90% response time at constant temperature)	Waterproof. Uses a thermistor with a disposable ship-type electrode 5401 as the thermometric element.

## DO Electrode Tips

•A commercially available stirrer should be used.

Type	Remarks
<b>5401</b>  9033010000	A DO electrode chip for replacement. (For the above-mentioned 9551-20D, 9551-100D, 9550-20D, 9550-100D, 5450-20D and 5450-100D)
<b>7541</b>  9074000200	A DO electrode chip for replacement. (For the above-mentioned 5410-10C, 9520-10D)

# ACCESSORIES

## For Electrode

Sensor holder	9621 Electrode protector tube (5 units/pack)	Electrode protector cap (5 units/pack)
9003017100  For attaching an ion electrode or the like with a round electrode cap to the stand arm.	9003012000  Protects the tip of the 9621-10D electrode. Because the electrode is already encased in a plastic sheath, just slip this protective tube over the tip and your pH meter is ready to for work in the field.	9003012100 Protects electrodes during storage or transportation.

## For 50, 20, 10 Series

Digital simulator X-51	Digital simulator X-52
 pH, mV, ION, DO simulator (for periodic inspection of the electrode)	 Conductivity simulator (for periodic inspection of the electrode)

## For 50 Series (D-50, F-50, DS-50, ES-50, OM-50 Series)

Printer (for GLP/GMP compliance)	Printer cable	Printer paper	Ink ribbon
9096003500  CBM-910-24RJ100-A	9096003800 Cable to connect a plain paper printer and a 50-series electrode	9096003900 20 rolls (for 50-series electrode plain paper printers)	9096004000 5 pcs/set
AC adapter	AC adapter cable	Serial cable	Stand arm
9096003100 AC adaptor cable is also recommended with the purchase of a new AC adaptor.	9096003200	9096004800 Cable to connect an electrode and a personal computer (serial, 9 pins)	9096002800 

## For F-50, DS-50 Series

Electrode stand	Compact flash memory card 16MB	Analog (alarm) output cable
9096002600 	9096003000  For F-53, 54, 55	9096004900 For F-52, 53, 54, 55 and DS-52

## For D-50, ES-50, OM-50 Series

Electrode stand	Connector cap	Strap	Soft case
9096002700 	9096002900 	9096005200 	9096005100 

## Maintenance Parts for Earlier Models

Output cord	AC-10 AC adapter	Printer paper (10 rolls)	Electrode holder for dual channel
9078000200 Connect a recorder to make easy work of data analysis after measurement. Applicable models: D-20, 10, OM-10 and D-10 series	Applicable models: D-20, F-20, ES-10, OM-10, D-10 and DS-10 series	9079000400 Applicable models: F-15, 16, DS-15, and F-20 series	9096001100 Applicable model: D-20 series Adaptor for fitting two electrodes

# ELECTRODES & ACCESSORIES for TWIN/CARDY

## Exclusively for TWIN pH Electrode (Combination Electrode)

Type	Measuring range	Sample amount required	Measuring temperature	Liquid junction	Remarks
<b>0112</b> (For the B-111, B-112, B-113) 9076001000 	pH 2 to 12	Approx. 0.1 mL	5 to 40°C	Porous macromolecule	Glass electrode and reference electrode integrated on a 1mm-thick substrate.
<b>0113</b> (For the B-211, B-212, B-213) 9088000500 	pH 2 to 12	Approx. 0.1 mL	5 to 40°C	Porous macromolecule	Glass electrode and reference electrode integrated on a 1mm-thick substrate. Waterproof construction protects the instrument.

## Exclusively for TWIN Conductivity Cell

Type	Measuring range	Cell capacity	Temperature compensation element	Measuring temperature	Remarks
<b>0413</b> (For the B-173) 9088000400 	0 to 19.9mS/cm	Approx. 0.1 mL	Incorporated	5 to 35°C	Ideal for measuring trace samples, such as acid rain.

## Exclusively for CARDY Ion Electrode

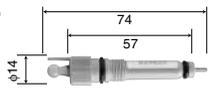
Type	Measuring range	Sample amount required	Measuring temperature	Liquid junction	Remarks
<b>Sodium ion electrode 0221</b> (For the C-121 and C-122) 9076003000 	0.1% (w/w) to 10% (w/w) NaCl	Approx. 0.1 mL	5 to 35°C	Porous macromolecule	Flat electrode for sodium ion which is so selective that pH or other ions do not affect it.
<b>Potassium ion electrode 0231</b> (For the C-131) 9076007200 	39 to 3,900 mg/L	Approx. 0.1 mL	5 to 35°C	Porous macromolecule	Flat electrode for potassium ion.
<b>Nitrate ion electrode 0241</b> (For the C-141) 9076007600 	62 to 6,200 mg/L	Approx. 0.1 mL	5 to 35°C	Porous macromolecule	Flat electrode for nitric acid ion.

## Accessories for TWIN/CARDY

<p>■ <b>B-211, B-212</b> Standard solution set <b>Y031</b> pH7 14 mL× 6 <b>Y032</b> pH4 14 mL× 6</p>	<p>■ <b>C-121</b> Standard solution set <b>Y022</b> NaCl 0.5% 4 mL× 2 NaCl 5.0% 4 mL× 2 De-ionized water 14 mL× 4</p>	<p>■ <b>B-173</b> Standard solution set <b>Y023</b> 0.01 mol/LKCl 4 mL× 4 De-ionized water 14 mL× 4</p>	<p>■ <b>C-122 Na<sup>+</sup></b> Standard solution set <b>Y024</b> Na<sup>+</sup> 2000 mg/L 4 mL× 2 Na<sup>+</sup> 150 mg/L 4 mL× 2 De-ionized water 14 mL× 4</p>	<p>■ <b>C-131 K<sup>+</sup></b> Standard solution set <b>Y025</b> K<sup>+</sup> 2000 mg/L 4 mL× 2 K<sup>+</sup> 150 mg/L 4 mL× 2 De-ionized water 14 mL× 4</p>	<p>■ <b>C-141 NO<sub>3</sub><sup>-</sup></b> Standard solution set <b>Y026</b> NO<sub>3</sub><sup>-</sup> 2000 mg/L 4 mL× 2 NO<sub>3</sub><sup>-</sup> 150 mg/L 4 mL× 2 De-ionized water 14 mL× 4</p>
<p>■ <b>Soft case</b> (tiny laboratory) <b>Y091</b> </p>	<p>■ <b>Sampling sheet Y011A</b> 11 mm×6 m×5 rolls </p>	<p>■ <b>B-111, B-112, B-211, B-212</b> Twin accessories kit <b>Y092</b> </p>			

# ACCESSORIES for U-10, U-20XD/W-20XD SERIES & INTERNAL SOLUTION for REFERENCE ELECTRODE

## U-10 Electrode Tips

<b>pH Electrode Tip 7112</b> 9037004800 	<b>Reference Electrode Tip 7210</b> 9037005000 	<b>Do Tip 7542</b> 9037004900 
<b>Reference electrode internal solution 330</b> 9037005200 3.3 mol/L KCL Gel type 250 mL	<b>Liquid junction</b> 9037005100 For 7210 2 units/set	<b>Calibration beaker</b> 9037005300

## U-20XD/W-20XD Series Sensors

<b>pH sensor 6230</b> for U-21/22/23 9037005600 	<b>Dissolved oxygen sensor 5460</b> for U-21/22/23 9037005800 	<b>Chloride ion sensor * 6522</b> for U-23 9037006000 	<b>Fluoride ion sensor * 6530</b> for U-23 9037006300 	<b>Ammonia sensor 5012</b> for U-23 9037006200 
<b>pH/ORP sensor 6280</b> for U-22/23 9037005700 	<b>Nitrate ion sensor * 6531</b> for U-23 9037005900 	<b>Calcium ion sensor * 6533</b> for U-23 9037006100 	<b>Potassium ion sensor * 6532</b> for U-23 9037006400 	* Ion selective electrode cartridge included.

## Internal Solution for Reference Electrode

● <b>Reference electrode internal solution for nitrate ion (50mL)</b> <b>302</b> Part No.9037006600	● <b>Reference electrode internal solution for chloride (50mL)</b> <b>301</b> Part No.9037006700	● <b>Reference electrode internal solution for calcium/fluoride (250 mL)</b> <b>300</b> Part No.9003003200	● <b>Reference internal solution for potassium (50 mL)</b> <b>303</b> Part No.9037006900	● <b>Reference internal solution for ammonia (250 mL)</b> <b>370</b> Part No.9012000900	● <b>Calibration beaker</b> Part No.9037007300 U-20 For automatic calibration
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# Earlier models pH ELECTRODES METALLIC ELECTRODES CONDUCTIVITY ELECTRODES ACCESSORIES

## EARLIER MODELS pH ELECTRODES, METALLIC ELECTRODES

### 3-in-1 Electrodes

Type	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Applicable models
<b>6328-10C</b> For accurate measurements 9003010400	0-80	0-14	Ceramic	#300(KCl)	7, 8 Series (Detail: A)
<b>6327-10C</b> For very accurate measurements 9003009900	0-60	0-14	Sleeve	#300(KCl)	7, 8 Series (Detail: A)
<b>6300</b> Standard type exclusively for L-7LC 9055000100	0-50	0-14	Plastic fiber	#310 (KCl with AgCl)	L-7LC Series

### Reference Electrodes

Type	Applicable temperature range(°C)	Internal solution	Liquid junction	Applicable models
<b>2080A-06T</b> Ceramic type standard 9003004400	0-60°C	#310 (KCl with AgCl)	Ceramic	7, 8 Series (Detail: B)

### Temperature Compensation Electrodes

Type	Applicable temperature range(°C)	Feature	Applicable models
<b>4143-06T</b> 9003009100	0-100	Temperature compensation electrode	7, 8 Series

### Metallic Electrodes (For ORP Measurement)

Type	Applicable temperature range(°C)	Material of electrode trip	Internal solution	Applicable models
<b>6811-06C</b> Platinum combination type 9003009000	0-50	Pt	#310 (KCl with AgCl)	7, 8 Series (Detail: A)
<b>3010-06T</b> Platinum single polarity type 9003007300	0-60	Pt	—	7, 8 Series (Detail: B)
<b>3211-06T</b> Silver single 9003007400	0-60	Ag	—	7, 8 Series (Detail: B)

#### ● Applicable models

A: H-7 Series, M-7E<sub>II</sub>, F-7LC, M-7<sub>II</sub>, F-7<sub>II</sub>, F-7SS<sub>II</sub>, F-7AD, M-8E, F-8E, M-8L, M-8, M-8S, M-8AD, F-8L, F-8, F-8DP, F-8AT, N-8F, N-7ION<sub>II</sub>  
(use CB-7 with M-7E, M-7, F-7, F-7SS or F-7DE)

B: M-7E, M-7, F-7, F-7SS, F-7DE, M-7E<sub>II</sub>, F-7LC, M-7<sub>II</sub>, F-7<sub>II</sub>, F-7SS<sub>II</sub>, F-7AD, M-8L, M-8, M-8S, M-8AD, F-8L, F-8, F-8DP, F-8AT, N-8F, N-7ION<sub>II</sub>  
(use CB-7 with H-7 Series, M-8E or F-8E)

## EARLIER MODELS CONDUCTIVITY ELECTRODES

### Conductivity Cell (Submersible Type)

Type	Cell constant (*1) ( $\text{cm}^{-1}$ )	Measuring range	Sample amount required	Temperature compensation element	Applicable temperature range
<b>3451-06C</b> For low conductivity water 9056000100	0.1	0.1 $\mu\text{S}/\text{cm}$ to 10 $\text{mS}/\text{cm}$	50 mL	Incorporated	0-50°C
<b>3452-06C</b> For general-purpose 9056000200	1	1 $\mu\text{S}/\text{cm}$ to 100 $\text{mS}/\text{cm}$	30 mL	Incorporated	0-50°C
<b>3453-06C</b> For high conductivity water 9056000300	10	10 $\mu\text{S}/\text{cm}$ to 1 $\text{S}/\text{cm}$	100 mL	Incorporated	0-50°C

(\*1) The cell constants are within  $\pm 10\%$  of the values shown.

## EARLIER MODELS ACCESSORIES

Type	Remarks
<b>Electrode relay box</b> (for single type electrode) <b>CB-7</b> 9003010400	Used when a 3-in-1 type electrode is connected to the old type M-7, M-7E, F-7, F-7ss, M-8E, or F-8E pH meter.
<b>Electrode guard L</b> (5 pcs/set) 9044001200	Protects electrode end. For 6326-06C, 6327-10C, 6328-10C, and 6811-06C.
<b>Electrode guard S</b> (5 pcs/set) 9044001100	Protects electrode end. For 6326-06C, 6327-10C, 6328-10C, and 6811-06C.
<b>Printer paper</b> 9063000300	For M-8AD, F-8DP, F-8AT
<b>BNC/G Ion electrode connector</b> 9003017800	The BNC/G conversion adapter enable the BNC connector electrode to be connected to G connector type meter.
<b>pH Checker X-5D</b> 9003017800	In addition to generating an electromotive force equivalent to the glass pH electrode for pH meter check, it contains a potentiometer for generating millivolts to check the ORP meter. It is ideal as a portable inspection instrument where many pH or ORP meters are used on a day-to-day basis in factories and laboratories.

## pH METER F-50 Series

- Color display and navigation function for enhanced user-friendliness.
- Enhanced data reliability with validation feature. (GLP/GMP compliance)
- Benchtop multi-parameter meter allows measurement of up to 4 parameters.
- Electronic record, audit trail and electronic signatures are security function features. (FDA 21CFR Part11 compliance)



pH  
ORP  
ION  
COND  
RESI  
SALT

## CONDUCTIVITY METER DS-50 Series

- Color display and navigation function for enhanced user-friendliness.
- Electronic record, audit trail and electronic signatures are security function features. (FDA 21CFR Part11 compliance)
- Automatic data-logging function.
- Self diagnostic function assures reliable measurement.



COND  
RESI  
SALT

## Portable pH METER D-50 Series

- Revolutionary waterproof meter and electrodes enhance care-free operation in the lab or field.
- Quick connection to PC allows easy and fast data evaluation.
- Portable multi-parameter meter allows measurement of up to 4 parameters.
- Automatic data-logging function.
- Self diagnostic function assures reliable measurement.



pH  
ORP  
ION  
COND  
DO

## Portable CONDUCTIVITY METER ES-51

- Revolutionary waterproof meter and electrodes enhance care-free operation in the lab or field.
- Quick connection to PC allows easy and fast data evaluation.
- Automatic data-logging function.
- Self diagnostic function assures reliable measurement.



COND  
RESI  
SALT

## Compact pH METER Twin pH B-211/212

- Immersion, scoop, and flat measurement
- Waterproof construction protects the instrument
- Automatic calibration



pH

## Compact CONDUCTIVITY METER Twin COND B-173

- Two measurement methods: drop the sample on the sensor or immerse the sensor in the sample
- Waterproof flat sensor
- Auto-hold and to-calibration functions



COND

Cardy Series

[Compact] SALT METER C-121

[Compact] ION METERS C-122(Na<sup>+</sup>)/C-131(K<sup>+</sup>)/C-141(NO<sub>3</sub><sup>-</sup>)

## Portable DO METER OM-51

- Revolutionary waterproof meter and electrodes enhance care-free operation in the lab or field.
- Quick connection to PC allows easy and fast data evaluation.
- Automatic data-logging function.
- Self diagnostic function assures reliable measurement.



DO  
Oxygen  
Saturation  
Oxygen

*Horiba continues contributing to the preservation of the global environment through analysis and measuring technology.*



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