



## **ELECTRODES & ACCESSORIES**

●pH ●mV(ORP) ●ION ●Conductivity ●Dissolved Oxygen



http://www.horiba-water.com/

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PH ELECTRODES

METALLIC ELECTRODES

ION ELECTRODES

CONDUCTIVITY ELECTRODE CELLS

DO ELECTRODES

ACCESSORIES

Benchtop pH/Water Quality Analyzer	F-70 Series, F-50 Series, F-20/F-20
Portable pH Meter	D-70 Series, D-50 Series, D-20 Series, D-10 Series
Compact pH Meter	B-211/212/213/711/712/713
Benchtop Conductivity Meter	DS-70 Series, DS-50 Series, DS-10 Series
Portable Conductivity Meter	ES-71, ES-51, ES-10 Series
Compact Conductivity Meter	B-173/771
Compact lon Meter	B-341/342/343/721/722/731/ 741/742/743/751, C-121/122/131/141
Portable DO Meter	OM-71, OM-51, OM-10 Series
Portable Water Quality	U-50, U-20XD, U-10 Series

■ Applicable Product Models

**Monitoring System** 

#### pH METER and ELECTRODE COMBINATION TABLE

	pH ORP ION										Discolated
	3-in-1 Electrode	Combination Electrode	ISFET Electrode	Single Electrode*1	Reference Electrode	3-in-1 Combination Electrode	Combination Electrode	Sin Electr	gle ode <sup>*1</sup>	Conductivity Electrode Cells	Dissolved Oxygen Electrode
	9615S-10D	6069-10C	0030-10D	1066A-10C	2060A-10T	9300-10D	6560-10C	8001-10C	8011-10C	9382-10D	9520-10D
	9625-10D	6261-10C	0040-10D	1076A-10C	2565A-10T		6561-10C	8002-10C	1512A-10C	3551-10D	9551-20D
	9618S-10D						5002A-10C	8003-10C	8201-10C	3552-10D	9551-100D
	9681S-10D						6581-10C	8004-10C	8202-10C	3553-10D	
	9680S-10D						6582-10C	8005-10C	8203-10C	3561-10D	
	6367-10D						6583-10C	8006-10C		3562-10D	
	6377-10D							8007-10C		3573-10C	
	6252-10D							8008-10C		3574-10C	
	9631-10D							8009-10C			
	9632-10D							8010-10C			
Туре	9630-10D										
F-71, F-51 · 52	0	0	0	0	0	0	×	>	×	×	×
F-72 · 73, F-53	0	0	0	0	0	0	0	(	)	×	×
F-54	0	0	0	0	0	0	×	>	×	0	×
F-74 · 74BW, F-55	0	0	0	0	0	0	0	(	)	0	×
D-71, D-51, D-21	0	0	0	×	×	×	×	>	×	×	×
D-72, D-52, D-22	0	0	0	×	×	0	×	>	×	×	×
D-73, D-53, D-23	0	0	0	×	×	0	0	>	×	×	×
D-74, D-54, D-24	0	0	0	×	×	0	×	>	×	0	×
D-75, D-55, D-25	0	0	0	×	×	0	×	>	×	×	0
F-21 · 22 · 21 II · 22 II	0	0	0	0	0	0	×	>	×	×	×
F-22C · 22 II C	0	0	0	0	0	0	×	>	×	×	×
F-23 · 24 · 23 II · 24 II	0	0	0	0	0	0	0		)	×	×
F-23C · 24C · 23 II C · 24 II C	0	0	0	0	0	0	0	(	)	×	×
M-11, F-11 · 12	0	○*2	0	○*2	○*2	×	×	>	×	×	×
M-12 · 13, F-13 · 14 · 15 · 16	0	0	0	0	0	0	×	>	×	×	×
D-11·12	0	○*2	0	×	×	×	×	>	×	×	×
D-13 · 14	0	○*2	0	×	×	0	×	,	×	×	×

<sup>:</sup> Applicable X: Not Applicable \*1: Reference electrode required for measurement \*2: Temperature compensation electrode (4163-10T) required for measurement

#### 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.

Only D type connector can be used for the D-20, D-50, D-70 series. C, T, D type connectors can be used for all of the F series and M-series.

#### <Reference>

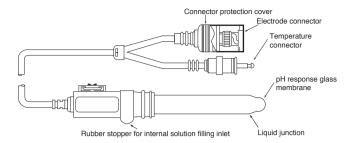
The liquid junction is the section where the liquid inside the reference electrode comes in contact with the sample liquid. Several junction types are available (ceramic, sleeve, etc.), to meet the requirements of specific samples or applications.

Liquid junction type	Features
Ceramic	A broad range of pH measurements. (Please note that samples of high viscosity may cause clogging.)
Movable sleeve	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.
Fixed sleeve	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.
Double junction	Combination of the ceramic type and the movable sleeve type overcomes the disadvantages of using either separately. When the outflow of the KCI in the internal solution presents a problem, placing the sample or other salt solution in the external tube will ensure stable measurements.

## 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 ELECTRODES ToupH

<ToupH> electrode: HORIBA's glass membrane molding technology achieves strengths more than 10 times the Japanese Industrial Standards (strength tests). New dome-shaped construction (9615-10D) boosts strength in all directions.

Туре	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
9615S-10D General laboratory application  ToupH Standard ToupH electrode  Standard ToupH electrode	0-100	0-14	Ceramic	#300 (KCI)	Quick stability, and reduction of drift. No more worries about the timing of your measurement value readings.  Ouses responsive glass that is 10 times stronger than JIS standards. The domed shape provides strength in all directions, greatly reducing damage concerns. Constructed with smooth surfaces for easy wiping and cleaning. One touch slide port enable easy one hand operation.  Waterproof Pb free (Recommended) Perfect for preparing buffers. Can be used on a wide range of aqueous test solutions. (Post 9615-10D, 9611-10D, 6366-10D)
9618S-10D Precious trace amount sample ToupH Micro ToupH electrode    Solution   Solutio	0-60	0-14	Ceramic	#300 (KCI)	This pH electrode with temperature compensation sensor can take measurements from samples as small as 50 μL.  Compatible with extremely small containers such as micro tubes etc.  Waterproof The temperature sensor is placed next to the response section for high-speed temperature response.  (Recommended)  Can be used for a wide range of aqueous solutions, including those that cannot be obtained in large quantities.  We recommend using our specialized cleaning solution after measuring samples that contain proteins.  (Post 9618-10D, 9669-10D)
9680S-10D For large containers and long test tubes  ToupH Long ToupH electrode  187±5 251±5 3200585455	0-100	0-14	Ceramic	#300 (KCI)	251 mm length & 8 mm diameter. The long, thin design makes this electrode perfect for measuring in large containers and test tubes.  Uses responsive glass that is 10 times stronger than JIS standards.  Constructed with smooth surfaces for easy wiping and cleaning.  Waterproof Pb free (Recommended) For measuring samples such as microbe culture fluids in test tubes. We recommend that it be used with the long type electrode stand (FA-70L). (Post 9680-10D, 9678-10D, 6378-10D)
9681S-10D High viscosity application  ToupH Sleeve ToupH electrode  26 87±3 151±5  3200585463	0-60	0-14	Movable sleeve	#300 (KCI)	Stable measurement can also be achieved for highly viscous samples.  The liquid junction section is constructed with a moveable sleeve that can be rinsed clean, preventing highly viscous samples from clogging the liquid junction, and maintaining stable measurement performance.  Waterproof  Pb free (Recommended) For highly viscous samples and solutions, and samples that contain non-aqueous solvents (such as cosmetics or paints).  We recommend that you take measurements while using the graph display function to confirm stable responses. (Post 9681-10D, 9677-10D)

## 3-in-1 ELECTRODES Plastic Body

Adopting plastic for the body material and covering the electrode tip with a protective tube, this electrode series is ideally suited to measurements in the field and harsh environments. This plastic body lineup consists of the electrodes equipped with high purity glass for tap water measurements, and those with special resistive glasses for hydrofluoric acid and strong alkali sample measurements.

Туре	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
9625-10D Standard type	0-100	0-14	Ceramic	#300 (KCI)	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)  Waterproof Pb free (Recommended)  Suitable for measurements for tap water, drinking water, field measurements. (Post 9621-10D model)
9630-10D For tap water	0-100	0-14	Ceramic	#300 (KCI)	Can measure samples with low conductivity or buffering capacity such as tap water, by adopting high purity multicomponent lithium series glass to its body. Optimal for quality control in Water purification plant.  Waterproof Pb free  * Recommended to use along with the dedicated wash solution (model: 230)
9631-10D Hydrofluoric acid resistant model   20 20 464 3200524119	0-60	2-12	Ceramic	#300 (KCI)	Long life capable of measuring about 1000 times*. Rolled glass architecture achieves easy maintenance and long-term reliable measurement. Compliant with the Measurement Act Certification(Japan).  Optimal for drain water control after etching process etc.  Waterproof Pb free  * When a measurement is conducted for 1 minute with 1% hydrofluoric acid solution (at 25°C)
9632-10D Strong alkali resistant model	0-100	0-14	Ceramic	#300 (KCI)	An alkali resistant glass membrane achieves higher resistance and about five times* longer stability than our conventional products. Suitable for strong alkali samples such as plating solutions.  Waterproof Pb free  * With 0.1 mol/L sodium (about pH 13) (at 60°C)

## 3-in-1 ELECTRODES Glass Body

	Туре	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
3014079136 (9003011800)	Standard type (sleeve)	0-60	0-14	Sleeve	#300 (KCI)	Uses a sleeve for the liquid junction, improving the stability and repeatability. For measuring pH at high accuracy. (Standard accessory for model F-24II.)
3014093085 (9003014100)	For measurement of low-conductivity water and non-aqueous solvents	0-60	0-14	Movable sleeve	#300 (KCI)	Uses a glass membrane highly sensitive to low-conductivity water and non-aqueous solvents. Movable sleeve used at the liquid junction.
6252-10D 3014080850 (9003013800)	For food application (needle type)	0-60	0-12	Ceramic	#300 (KCI)	Needle electrode allows measurement of aqueous solutions too.

## pH ELECTRODES (ISFET (Semiconductor electrode))

ISFET is the abbreviation of Ion Sensitive Field Effect Transistor.

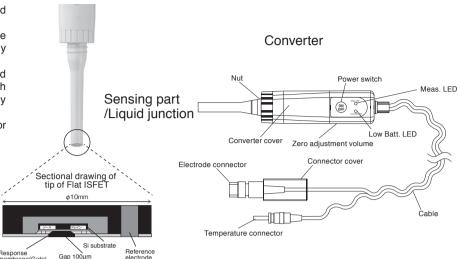
Since ISFET is robust and will not crack like the conventional glass electrodes, it can be easily handled and maintained.

The response part is equipped with a flat and miniature semiconductor-based sensor, which makes the measurement even on extremely small samples possible.

Combination of HORIBA's unique semiconductor

device structure and improvement of the electrostatic protection circuit enables to reduce greatly the static electricity effect that had been the weak point of the semiconductor sensor.

Now the measurement has become more comfortable and reliable.



#### ISFET ELECTRODES ISFET

Туре	Applicable temperature range(°C)	pH range	Liquid junction	Feature
O040-10D Surface of solid samples Flat ISFET pH electrode 0040-10D  8  0141 Replacement sensor for 0040-10D 3200367925	0-60	0-14	Porous sintered polyethylene	The sensor is located on the flat surface of the tip, with less than a 100 µm difference from the housing.  ● Measurements can be made from a minute amount of moisture on the solid sample surface. ● Use of a semiconductor sensor means there are no concerns that the electrode will be damaged.  ● Also perfect for measuring samples in shallow containers such as Petri dishes. ● Waterproof ● Repalceable Sensor (Recommended) For surface measurement of gelatinous materials such as nutrient agar, and foodstuffs such as meat.  Evaluation of sheet materials such as cloth or paper.If the sample only has a small amount of moisture, pure water etc. is required.
0030-10D Inside solid samples Needle ISFET electrode  131 Replacement sensor for 0030-10D 3014028323 (9096002100)	0-60	0-14	ABS,epoxy, polyethylene, Ta <sub>2</sub> O <sub>5</sub> , platinum	The sharp tip can pierce solid samples to take measurements.  Use of a semiconductor sensor means there are no concerns that the electrode will be damaged. Waterproof (Recommended)  For measuring inside foodstuffs, such as fruits, vegetables and bread.

#### REPLACEMENT SENSOR for ISFET ELECTRODES

Туре	Fearute
141 Flat ISFET (0040-10D) sensor part (for replacement)	Replaceable sensor tip for flat ISFET electrode (0040-10D)
131 Needle ISFET (0030-10D) sensor part (for replacement)	Replaceable sensor tip for needle ISFET electrode (0030-10D)

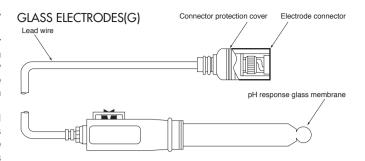
## ph electrodes (glass electrodes(g), reference electrodes(r))

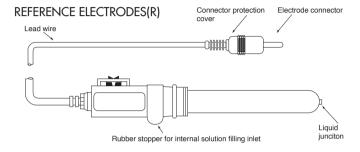
Glass electrodes measure the pH value in the sample solution by detection of electromotive force, i.e., voltage.

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.

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.





## Glass Electrodes(G)

Туре	Usage	Applicable temperature range(°C)	pH range	Applicable reference electrode	Feature
1066A-10C Standard type  No. 150  LAQUA  150  150	Glass electrode 1066A-10C	0-100	0-14	2060A 2565A	Very durable minimum alkali errors. Most widely used for general pH measurements.
1076A-10C For measurement of low-conductivity water and non-aqueous solvents.  HORIBA LAQUA  150  150	Glass electrode 1076A-10C	0-100	0-14	2060A 2565A	Uses a glass membrane highly sensitive to low-conductivity water and non-aqueous solvents. Can also be used for ordinary pH measurement.

## Reference Electrodes(R)

Туре	Applicable temperature range(°C)	Liquid junction	Internal solution	Applicable glass electrode	Feature
2060A-10T Standard type			#300	40004	
3014080434 (9003012500)	0-100	Ceramic	#300 (KCI)	1066A 1076A	Suitable for a wide range of pH measurements since the resistance of the liquid junciton is small.
2565A-10T Double-junciton type	0-100	Intermediate: Ceramic External: Sleeve	#300 (KCI)	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.

# pH ELECTRODES (COMBINATION), Temperature Compensation Electrode, METALLIC ELECTRODES (FOR ORP MEASUREMENT)

### **Combination Electrodes**

Туре	Applicable temperature range(°C)	pH range	Liquid junction	Internal solution	Feature
8069-10C For very slender test tubes 180 291 (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.
6261-10C Flat type  3014081807 (9003013700)	0-50	0-12	Sleeve	#300 (KCI)	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.

## **Temperature Compensation Electrode**

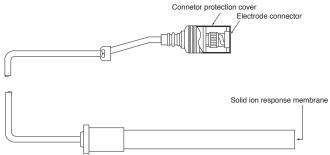
Туре	Applicable temperature range(°C)	Applicable	Temperature compensation element	Feature
4163-10T		Temperature		Used to automatically compensate the changes in
3014080375 (9003013000) 150	0-100	compensation and measurement	Thermistor	the electromotive force of the pH electrode due to temperatures and also to measure temperatures.

## **Metallic Electrode (For ORP Measurement)**

Туре	Applicable temperature range(°C)	Electrode material	Applicable reference electrode	Internal solution	Feature
9300-10D Waterproof platinum combination type  3014046710 (9096000400)	0-60	Pt		#300 (KCI)	Waterpoof. Uses a flat type metallic electrode, which allows a small amount of sample to be measured.

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 temperture.



Туре	①: Measuring range ②: pH range ③: Ap  Measuring range	Applicable reference electrode	ture range @: Response time (90%)  Selection coefficient
Cyanide ion electrode 8001-10C	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	$S^{2^{-}}$ , MnO <sub>4</sub> <sup>-</sup> = Not acceptable I <sup>-</sup> = 0.1 $S_2O_3^{2^{-}}$ = 1
Chloride ion electrode (combination) 6560-10C  ©	①: 0.35 to 35,000 mg/L Cl - (10 <sup>-5</sup> to 1 mol/L Cl -) ②: 350 mg/L (10 <sup>-2</sup> mol/L) Cl - 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
Chloride ion electrode 8002-10C	10:0.35 to 35,000 mg/L Cl <sup>-1</sup> (10 <sup>-5</sup> to 1 mol/L Cl <sup>-1</sup> ) 20:350 mg/L (10 <sup>-2</sup> mol/L) Cl <sup>-1</sup> pH 3 to 11 30:0 to 50°C 40: 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
Sulfide ion electrode 8003-10C 2 3014094395 (9003015700)	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> , CI <sup>-</sup> , PO <sub>4</sub> <sup>2</sup> -, SO <sub>4</sub> <sup>2</sup> = 1,000
lodide ion electrode 8004-10C 2 3014094396 (9003015800)	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
Bromide ion electrode 8005-10C	10:0.8 to 80,000 mg/L Br (10 <sup>-5</sup> to 1 mol/L Br ) 20:800 mg/L (10 <sup>-2</sup> mol/L) Br pH 1.5 to 11.5 30:0 to 50°C 40: Within 10 seconds	2565A	$S_2O_3^{2^-}$ , $I^-$ , $S^{2^-}$ , $CN^-$ = Not acceptable MnO <sub>4</sub> <sup>-</sup> = 1 CI <sup>-</sup> , PO <sub>4</sub> <sup>2^-</sup> = 100 F <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , $SO_4^{2^-}$ = 1,000
Copper ion electrode 8006-10C No. 100 Processor 100 Proce	10:0.06 to 6,350 mg/L Cu <sup>2+</sup> (10 <sup>-6</sup> to 10 <sup>-1</sup> mol/L Cu <sup>2+</sup> ) 20:6.35 mg/L (10 <sup>-4</sup> mol/L) Cu <sup>2+</sup> pH 2 to 6 30:0 to 50°C 40: Within 10 seconds	2565A	Fe <sup>2+</sup> = 0.1 Ni <sup>2+</sup> , Na <sup>+</sup> = 1,000
Cadmium ion electrode 8007-10C	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	$Cu^{2+}$ , $Hg^{2+}$ , $Ag^+ = Not$ acceptable $Pb^{2+} = 0.1$ $Fe^{3+} = 1$ $Cr^{3+}$ , $Fe^{2+} = 100$ $Ni^{2+} = 1,000$

Туре	Measuring range	Applicable reference electrode	Selection coefficient
Lead ion electrode 8008-10C	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	$Cu^{2+}$ , $Hg^{2+}$ , $S^{2-}$ , $Ag^+$ = Not acceptable $Fe^{3+}$ = 0.01 $Cr^{3+}$ = 1 $Cd^{2+}$ = 10 $Ni^{2+}$ , $Mg^{2+}$ , $Zn^{2+}$ = 100 $NH_4^+$ , $K^+$ = 1,000
Thiocyanate ion electrode 8009-10C	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	$CN^{-}$ , $I^{-}$ , $S^{2^{-}}$ , $S_{2}O_{3}^{2^{-}}$ = Not acceptable $Br^{-}$ = 1 $CI^{-}$ = 100
Fluoride ion electrode (combination) 6561-10C  9	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.
Fluoride ion electrode 8010-10C  20 20 3014093439 (9003016400)  135	10:0.02 to 19,000 mg/L F <sup>-</sup> (10 <sup>-6</sup> to 1 mol/L F <sup>-</sup> ) 20:20 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.
Silver ion electrode 8011-10C No. 100 100 100 100 100 100 100 100 100 10	0:0.01 to 110,000 mg/L Ag+ (10 <sup>-7</sup> to 1 mol/L Ag+) 2:1 mg/L (10 <sup>-5</sup> mol/L) Ag+ 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
Ammonia ion electrode (combination) 5002A-10C  3014093560 (9003016600)  161	O: 0.1 to 1,000 mg/L NH3 Adjust more than pH 12 O: 0 to 50°C  Within 30 seconds when substituting low concentration to high concentration Within 2 minutes when substituting high concentration to low concentration		
Sodium ion electrode 1512A-10C	©: 2.3 to 230,000 mg/L Na <sup>+</sup> (10 <sup>-4</sup> to 10 mol/L Na <sup>+</sup> ) ©: 230 mg/L (10 <sup>-2</sup> mol/L) Na <sup>+</sup> Over pH 4.5 ©: 0 to 60°C @: Within 30 seconds *1	2565A	K <sup>+</sup> , Li <sup>+</sup> = 10 NH <sub>4</sub> <sup>+</sup> = 20 Ca <sup>2+</sup> = 500
Nitrate ion electrode (combination) 6581-10C 3014093432 (9003014700)	0: 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		CIO <sub>4</sub> <sup>-</sup> = 0.03 I <sup>-</sup> = 0.1 Br <sup>-</sup> = 2 NO <sub>2</sub> <sup>-</sup> = 3 CI <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
Nitrate ion electrode 8201-10C	10: 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> ) 20: 62 mg/L (10 <sup>-3</sup> mol/L) NO <sub>3</sub> <sup>-</sup> pH 3 to 7 30: 0 to 50°C 30: Within 15 seconds *2	2565A	CIO <sub>4</sub> <sup>-</sup> = 0.03 I <sup>-</sup> = 0.1 Br <sup>-</sup> = 2 NO <sub>2</sub> <sup>-</sup> = 3 CI <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
Potassium ion electrode (combination) 6582-10C	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

Туре	Measuring range	Applicable reference electrode	Selection coefficient			
Potassium ion electrode 8202-10C No. 100 Position of the control	①: 0.04 to 39,000 mg/L K+ (10 <sup>-6</sup> to 1 mol/L K+) ②: 3.9 mg/L (10 <sup>-4</sup> mol/L) K+ pH 5 to 11 ③: 0 to 50°C ④: Within 15 seconds *3	2565A	Rb+ = 0.4 Cs+ = 3 NH <sub>4</sub> + = 70 Li+, Na+, Mg <sup>2+</sup> , Ca <sup>2+</sup> , Sr <sup>2+</sup> , Ba <sup>2+</sup> = over 1,000			
Calcium ion electrode (combination) 6583-10C	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		$Fe^{3+} = 0.1  Fe^{2+}, Zn^{2+} = 1  Sr^{2+} = 50$ $Ni^{2+}, Cu^{2+} = 70  Co^{2+} = 350$ $Mn^{2+} = 500  Mg^{2+} = 1,000$ $Na^{+}, K^{+}, Ba^{2+}, NH_{4}^{+} = over 1,000$			
Calcium ion electrode 8203-10C	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	$Fe^{3+} = 0.1  Fe^{2+}, Zn^{2+} = 1  Sr^{2+} = 50$ $Ni^{2+}, Cu^{2+} = 70  Co^{2+} = 350$ $Mn^{2+} = 500  Mg^{2+} = 1,000$ $Na^{+}, K^{+}, Ba^{2+}, NH_{4}^{+} = over 1,000$			

<sup>•</sup>Sensor holder is necessary for ion electrode except of combination type to attach to electrode stand.

## Cartridges for Ion Sensor

Type		Feature				
7660	Chloride ion cartridge	Replacement electrode tip for				
3014093436(9003015000)		combination ion electrodes				
7661	Fluoride ion cartridge					
3014093438(9003015100)						
7681	Nitrate ion cartridge					
3014068364(9003015200)		Replacement electrode tip for combination or				
7682	Potassium ion cartridge	single electrodes				
3014069795(9003015300)						
7683	Calcium ion cartridge					
3014068795(9003015400)						
Membrane(NH <sub>3</sub> )		Membrane set (6 pcs) for NH3 electrodes				
3014067083(9012001000)		Wiembrane set (o pes) for 14 is electrodes				
370	Internal solution for	Contains 250 mL				
3014067184(9012000900)	NH <sub>3</sub> electrodes	Oontains 200 mil				
O-ring		Neoprene ring set (10 pcs)				
3200043723(9012001100)		for NH <sub>3</sub> electrodes (JIS B 2401-P7)				

<sup>•</sup>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.

<sup>\*1:90%</sup> responce when ion concentration is changed to  $10^{-6}$  mol/L  $\sim 10^{-2}$  mol/L

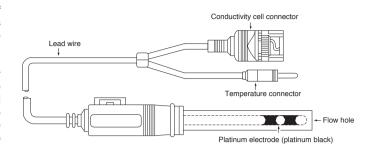
 $<sup>\</sup>pm 2 \colon 95\%$  responce when ion concentration is changed to  $10^{\text{-}3} \; \text{mol/L} \sim 10^{\text{-}1} \; \text{mol/L}$ 

<sup>\*3:95%</sup> responce when ion concentration is changed to  $10^{-4}$  mol/L  $\sim 10^{-2}$  mol/L \*4:95% responce when ion concentration is changed to  $10^{-4}$  mol/L  $\sim 10^{-1}$  mol/L  $\sim 10^{-1}$  mol/L  $\sim 10^{-1}$  mol/L

<sup>•</sup>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.

## CONDUCTIVITY ELECTRODE CELLS

Conductivity is calculated as the inverse of the resistance R(in ohms) of the sample solution as  $\mbox{S/m} = \mbox{V/m}$  between two parallel electrode plates with a surface area of  $\mbox{1m}^2$  separated by a distance of  $\mbox{1m}$ . Since conductivity changes depending on temperature of the sample solution, values are shown at the standard temperature equivalent of  $25^{\circ}\mbox{C}$ . 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 25C, when used in conjunction with the conductivity meter. Since the conductivity gives valuable information about the ion composition of the sample solution, it is expect 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 10% of the values shown.

Туре	Cell constant (cm <sup>-1</sup> )	Measuring range	Sample amount required (mL)	Temperature compensation element Applicable temperature range(°C)		Remarks
3551-10D 3014081712 (9056000800)	0.1	10 μS/m to 1 S/m (0.1 μS/cm ~10 mS/cm)	50	Incorporated	0-60	For low conductivity water (deionized water or other)
3552-10D  3014081545 (9056000900)	1	0.1 mS/m to 10 S/m (1 µS/cm ~100 mS/cm)	15	Incorporated	0-100	For general purposes (provided as a standard accessory for the DS-10 series)
3553-10D  3014081714 (9056001000)	10	1 mS/m to 100 S/m (10 μS/cm ~1 S/cm)	50	Incorporated	0-60	For high conductivity water
9382-10D  3014046709 (9096000300)	1	0.1 mS/m to 10 S/m (1 µS/cm ~100 mS/cm)	20-30	Incorporated	0-80	Waterproof. For general purposes.

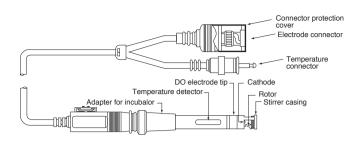
## **Conductivity Cells (Flow Type)**

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

Туре	Cell constant (cm <sup>-1</sup> )	Measuring range	Sample amount required (mL)	Temperature compensation element Applicable temperature range(°C)		Remarks
3561-10D 3014082350 (9056001100)	0.1	10 mS/m to 1 S/m (0.1 μS/cm ~10 mS/cm)	10	Incorporated	0-60	For low conductivity water (pure water or other)
3562-10D © 1 © 1	1	0.1 mS/m to 10 S/m (1 µS/cm ~100 mS/cm)	16	Incorporated	0-60	For general purposes
3573-10C \$\times_{\text{3014082590}} \text{222} \text{1.00A} \text{18}	10	1 mS/m to 100 S/m (10 µS/cm ~1 S/cm)	4	Not provided	0-60	For high conductivity water
3014082592 (9056001400)	10	1 mS/m to 10 S/m (10 μS/cm ~100 mS/cm)	0.25	Not provided	0-80	For column chromatography using a very small amount of sample

## **DISSOLVED OXYGEN(DO) ELECTRODE & TIPS**

Dissolved Oxygen(DO) electrode 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.



## **Dissolved Oxygen Electrodes**

Туре	Applicable temperature range(°C)	Measuring range	Response time	Feature
9520-10D For laboratories  100 1 184  184	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.
9551-20D For field immersible type (2 m cable)  3014047090 (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.
9551-100D For field immersible type (10 m cable)	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.

## **Dissolved Oxygen Electrode Tips**

•A commercially available stirrer should be used.

Туре	Remarks
5401 3014072770 (9033010000)	A DO electrode chip for replacement. (For the above-mentioned 9551-20D, 9551-100D, 9550-20D, 9550-100D, 5450-20D and 5450-100D)
7541 3014074145 (9074000200)	A DO electrode chip for replacement. (For the above-mentioned 5410-10C, 9520-10D)
DIFFUSION SET  3200043567 (9074000400)	Stirrer casing set for model 7541

## **ACCESSORIES**

#### For Electrode

Model		Part No.	Remarks	Applicable electrodes
Sensor holder	7	3200373961	For attaching an ion electrode or the like with a round electrode cap to the stand arm 2 pcs/pack	9615-10D/9618-10D/9681-10D/9680-10D/9600-10D/5002A-10C/8001-10C/8002-1 0C/8003-10C/8004-10C/8005-10C/8006-10C/8007-10C/8008-10C/8009-10C/8010- 10C/8011-10C/1512A-10C/8201-10C/8202-10C/8203-10C
Electrode protector tube	No.s.	3200044409 (9003012000)	Protects the tip of the electrode 5 pcs/pack	9621-10D/9625-10D/9630-10D/9632-10D
Electrode protector cap	-	3200043508 (9003012100)	5 pcs/pack	9621-10D/9625-10D/9615S-10D/9618S-10D/9681S-10D/6367-10D/6377-10D /6252-10D/9630-10D/9631-10D/9632-10D/6261-10C/1066A-10C/1076A-10C/ 2060A-10T/9300-10D/3552-10D
Electrode protector cap		3200382477	3 pcs/pack	9615-10D/9618-10D/9681-10D/9600-10D
Electrode protector cap for long electrode		3200382482	1 pcs/pack	9680-10D/9680S-10D
Plug for internal solution filler port	G.	3200382468	3 pcs/pack	9615-10D/9618-10D/9681-10D/9680-10D

### Meter Accessories Meter and Accessories table

	Madal	Don't No.					Me	eter				
	Model	Part No.	F-50	F-70	DS-50	DS-70	D-50	D-70	ES-50	ES-70	OM-50	OM-70
	Printer (for GLP/GMP compliance)	_	0	0	0	0	O*1	○*1	0	0	0	0
Drintor	Printer cable	3014030148	0	0	0	0	○*1	○*1	0	0	0	0
Printer	Printer paper	3014030149	0	0	0	0	○*1	O*1	0	0	0	0
	Ink ribbon	3014030150	0	0	0	0	O*1	O*1	0	0	0	0
For Inspection	Digital simulator X-51	_	0	0	_	_	0	0	_	_	0	0
For inspection	Digital simulator X-52	_	O*2	○*2	0	0	O*2	○*2	0	0	_	_
l	USB cable	3200373941	_	0	_	0	_	_	_	_	_	-
	Serial cable	3014030151	0	0	0	0	O*1	O*1	0	0	0	0
Communication and Output	Analog (alarm) output cable	3014030152	○*3	○*3	○*3	○*3	_	_	_	-	_	-
and Output	COMPACTFLASH® memory card	3014030160	○*4	_	_	_	_	_	_	_	_	_
	Data Collection Software *5	_	0	0	0	0	○*1	○*1	0	0	0	0
Power	AC adapter and cable set	_	0	0	0	0	0	0	0	0	0	0
	LCD protection sheet	3200382462	_	0	_	0	ı	_	_	_	_	_
Meter Accessories	Protection cover	3200382441	_	0	_	0	_	_	_	_	_	_
Accessories	Electrode hook	3200528475	_	_	_	_	_	0	_	0	_	0
	Electrode stand for F-50/DS-50	3014028342	0	_	0	_	_	_	_	_	_	_
Flacture de	FA-70S Electrode stand (adjustable type)	3200382557	0	0	0	0	0	0	0	0	0	0
Electrode stand	FA-70L Electrode stand (long type)	3200382560	0	0	0	0	0	0	0	0	0	0
J Stario	DP-50S Electrode stand	3014028590	_	_	_	_	0	_	0	_	0	_
	DP-70S Electrode stand	3200528474	-	-	-	_	_	0	_	0	_	0

<sup>\*1</sup> Except D-51/D-71 \*2 Conductivity measuement model: F-54/F-55/F-74/F-74BW/D-54/D-74 \*3 Except F-51/F-71/F-74BW/DS-51/DS-71 \*4 Only F-53/F-54/F-55 \*5 Data collection software is available as a free download for registered users. http://www.horiba.co.jp/register

#### **Printer-related**

Printer (for GLP/GMP compliance)	Printer cable	Printer paper	Ink ribbon
CBM-910-24RJ100-A	3014030148 (9096003800)	3014030149 (9096003900)	3014030150 (9096004000)
There are printers for 100V, 120V and 230V power supplies. Please consult our sales staff when ordering 120V and 230V models.  The model numbers for 120V and 230V are listed below. 120V: CBM-910-24RJ-120-A (3014030146) 230V: CBM-910-24RJ-230-A (3014030147)	Cable to connect Printer with 50 series and 70 series.	20 rolls	5 pcs/set

#### For Inspection

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)		

#### Communication/output

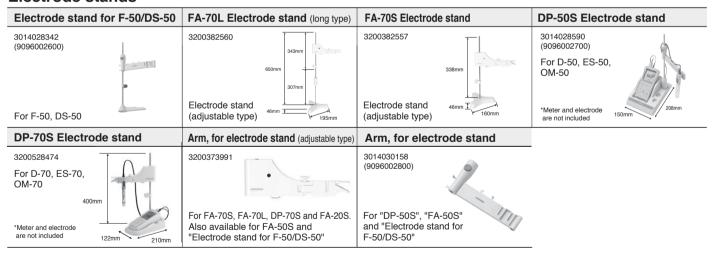
USB cable	Serial cable	COMPACTFLASH® memory card	Analog (alarm) output cable
Cable to connect a meter and PC.	Cable to connect a meter and PC (Serial, 9 pins)	3014030160 (9096003000) For F-53, 54, 55	3014030152 (9096004900) For F-52, 53, 54, 55 and DS-52, F-72, F-73, F-74, DS-72

\*COMPACTFLASH is a trademark of San Disk Corporation

## Power supply and Meter accessories

AC adapter cable set.	LCD protection sheet (2 pcs/pack)	Protection cover	Electrode hook
AC adaptor 1.8m cable 1m	3200382462	3200382441	3200528475 For D-70, ES-70, OM-70
120V: 3014031951 230V: 3014031952	For F-70, DS-70 series	Protects the meter for F-70, DS-70 series	With electrode cable winding function  *Meter and electrode are not included

#### **Electrode stands**



#### **Maintenance Parts for Obsolete Models**

Output cord	AC-10 AC adapter	Printer paper (10 rolls)	Dual electrode holder				
3200044408 (9078000200)	3200044196 (9078000100)	3200043956 (9079000400)	3200043613 (9096001100)				
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, F-10 ES-10, OM-10, D-10 and DS-10 series	Applicable models: F-15, 16, DS-15, and F-20 series	Applicable model: D-20 series Adaptor for fitting two electrodes				

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

#### pH Standard Solution SET (accuracy: ±0.02 pH)

45.9	Type		Name	pH value(25°C)	Volume(mL)	Remarks	
	101 6			Phosphate standard equimolal solution	6.86	500	
		3200043642	Phthalate standard solution	4.01	250	Use undiluted. The set contains standard and internal	
0101		(9003003500)	Borate standard solution	9.18	250	solutions, as shown.	
			Internal Solution for Reference Electrode (300)		250		

#### pH Standard Solution (accuracy: ±0.02 pH)

	Туре		Name	pH value(25°C)	Volume(mL)	Remarks
75454	100-2	3200043639 (9003001500)	Oxalate standard solution	1.68	500	
0 1 0 1 0	100-4	3200043638 (9003001600)	Phthalate standard solution	4.01	500	The original solution should be used as it is. For general use as standard solution
	100-7	3200043637 (9003001700)	Phosphate standard equimolal solution	6.86	500	sets, 101-S (100-4.7.9 and #310 internal
6 1 6 1	100-9	3200043636 (9003001800)	Borate standard solution	9.18	500	solution) are also available.
	100-10	3200043635 (9003001900)	Carbonate standard solution	10.02	500	

#### Condensed pH Standard Solution (accuracy: ±0.02 pH)

	Type		Name	pH value(25°C)	Volume(mL)	Remarks
444	110-4	3200043626 (9003002300)	Condensed phthalate standard solution	4.01	500	Should be diluted when used. The pH
110-7 (90)	(3003002400)	Condensed phosphate standard equimolal solution	6.86	500	values shown are those obtained when the original solution is diluted with pure water	
	110-10	3200043624 (9003002500)	Condensed carbonate standard solution	10.02	500	at a volume ratio of 1 to 4. For general use.

#### Powder for pH Standard Solution (accuracy: ±0.05 pH)

Туре		Name	pH value(25°C)	Remarks
150-4	3200043619 (9003002700)	Powder for phthalate standard solution	4.01	The pH value shown are those obtained when one packet
150-7	3200043620 (9003002800)	Powder for neutral phosphate standard solution	6.86	is dissolved in 500 ml of pure water. One packet contains powder for 500 mL.
150-9	3200043621 (9003002900)	Powder for borate standard solution	9.18	For use in field at factories (10 packets per set)

#### Powder for ORP Standard Solution (accuracy: ±15 mV)

	Type	Name	ORP value(25°C)	Remarks
restate la constitución de secución	<b>160-51</b> (9003003100)	Powder for ORP standard solution	89 mV (vs, 3.33 mol/L KCI-AgCI)	
and supply solution	<b>160-22</b> 3200043617 (9003003000)	Powder for ORP standard solution	258 mV (vs, 3.33 mol/L KCI-AgCI)	standard solution should be used immediately after conditioning and can-not be used for 2 hours or more. (10 packets per set)

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**

	Туре		Name	Concentration	Volume(mL)	Remarks
	300	3200043640 (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
9	310	3200043622 (9003003300)	For H-7 and old type pH meter electrodes	3.33 mol/L KCI (AgCl, saturation in normal temp.)	250	also available for a large amount of internal solution. (The powder is used by dissolving it in pure water.)

#### Powder for Internal Solution for Reference Electrode

	Туре		Remarks
350	350	3200043623 (9003003400)	500g. Dissolve in 2L of pure water.

#### **Electrode Cleaning Solution**

		Туре		Name	Volume(mL)	Remarks
_ ^ _		220	3014028653 (9096002500)	Electrode cleaning solution		For removing inorganic sample residues from glass electrodes, and for cleaning liquid junctions
	6	230	3200530494	Electrode cleaning solution	Solution A 30mL(1 bottle) Solution B 100mL(1 bottle)	For 9630-10D (pH electrode for tap water or low conductivity sample)
		250	3200366771	Electrode cleaning solution	400	For removing protein containing sample residues from glass electrodes, and for cleaning liquid junctions.

# ACCESSORIES for U-50, U-20XD, U-10, W-20XD SERIES & INTERNAL SOLUTION for REFERENCE ELECTRODE

#### **U-50 Series Accessories**

pH sensor ToupH 7113	ORP sensor 7313	DO sensor 7543	Reference sensor 7210
3200170923	3200170920	3200170924	3200043582 (90370050000)
Turbidity sensor 7800 for U-52/U-52G	Turbidity sensor 7801 for U-53/U-53G	Turbidity sensor 7802 for U-54/U-54G	DO membrane cap for U-50 series
3200172803	3200172800	3200318188	3200170194
	3200170923 <b>Turbidity sensor 7800</b> for U-52/U-52G	3200170923 3200170920 <b>Turbidity sensor 7800</b> for U-52/U-52G <b>Turbidity sensor 7801</b> for U-53/U-53G	3200170923 3200170920 3200170924 <b>Turbidity sensor 7800</b> for U-52/U-52G Turbidity sensor 7801 for U-53/U-53G for U-54/U-54G

DO inner fluid 306

3200170938

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



**Ammonia sensor 5012** for W-23 3014050864 (9037006200)

Nitrate ion sensor \* 6531 for W-23 3014050863 (9037005900) **pH/ORP sensor 6280** for U-22, W-22/23 3014050850 (9037005700)

Chloride ion sensor \* 6522 for W-23 3014050860 (9037006000)

Potassium ion sensor \* 6532 for W-23 3014050862 (9037006400)

Dissolved oxygen sensor 5460

for U-21/22/23, W-22/23 3014001152 (9037005800)



Fluoride ion sensor \* 6530 for W-23 3014050859 (9037006300)

Calcium ion sensor \* 6533 for W-23 3014050861 (9037006100)

\* Ion selective electridge cartridge included.

**#5460 membrane replace kit** (50 times) 3014050853 (9037007400)

#5012 membrane replace kit (6 units/set)

3014001155 (9037007000)

#### **U-10 Electrode Tips**

PH Electrode Tip 7112  74 57 3014057312 (9037004800)	Reference Electrode Tip 7210  3200043582 (9037005000)  69
Reference electrode internal solution 330 3200043641 (9037005200) 3.33 mol/L KCL Gel type 250 mL	<b>Liquid junction</b> 3200043587 (9037005100) For 7210 2 units/set
Do Tip 7542  9 29 40  3014057313 (9037004900)	
<b>Calibration beaker</b> 3200043588 (9037005300)	

#### Internal Solution for Reference Electrode

300	301	302	303
3200043640 (9003003200)	3014001271 (9037006700)	3014001273 (9037006600)	3014001272 (9037006900)
Reference electrode internal solution for nitrate ion (250 mL)	Reference electrode internal solution for chloride (50 mL)	Reference electrode internal solution for calcium/fluoride (50 mL)	Reference internal solution for potassium (50 mL)
370	Calibration beaker		
3014067184 (9012000900)	3014001156 (9037007300)		
Reference internal solution for ammonia (250 mL)	U-20 For automatic calibration		

## **ELECTRODES & ACCESSORIES for TWIN/CARDY**

#### SENSOR and ACCESSORIES for LAQUAtwin/TWIN/CARDY

Туре		Sample amount required	Measuring temperature	Applicable model	Remarks		
S010 LAQUAtwin/TWIN pH sensor 3200459834	pH LAQUAMA	Approx. 0.1 mL	5 to 40°C	B-211/B-212 B-213/B-711 B-712/B-713	Liquid junction: Porous macromolecule Glass electrode and reference electrode integrated on a 1mm-thick substrate. Replacement flat type pH sensor.		
S021 LAQUAtwin Salt sensor	Salt	Approx. 0.3 mL	5 to 40°C	B-721	Liquid junction: Porous macromolecule Replacement flat type salt sensor. This sensor respond to sodium ion.		
S022 LAQUAtwin Sodium ion sensor 3200459867	Na" LAQUANIA	Approx. 0.3 mL	5 to 40°C	B-722	Liquid junction: Porous macromolecule Replacement flat type Sodium ion sensor.		
S030 LAQUAtwin Potassium ion sensor 3200459868	K* LAQUAWA	Approx. 0.3 mL	5 to 40°C	B-731	Liquid junction: Porous macromolecule Replacement flat type Potassium ion sensor.		
S040 LAQUAtwin Nitrate ion sensor 3200459870	NO <sub>0</sub>	Approx. 0.3 mL	5 to 40°C	B-341/B-342 B-343/B-741 B-742/B-743	Liquid junction: Porous macromolecule Replacement flat type Nitrate ion sensor.		
S050 LAQUAtwin Calcium ion sensor 3200459869	Ca <sup>2+</sup>	Approx. 0.3 mL	5 to 40°C	B-751	Liquid junction: Porous macromolecule Replacement flat type Calcium ion sensor.		
S070 LAQUAtwin Conductivity sensor 3200459672	COND	Approx. 0.12 mL	5 to 40°C	B-771	Replacement flat type Conductivity sensor.		

#### **Exclusively for TWIN Conductivity Cell**

Туре	)	Measuring range	Cell capacity	Cell capacity Measuring temperature c		Remarks	
<b>0413</b> (for B-173)	Twin Cond	0 to 19.9mS/cm	Approx. 0.1 mL	5 to 35°C	Incorporated	For B-173 (conductivity meter) only. Cannot be applied for B-771.	
3014088578 (9088000400)							

#### Exclusively for CARDY Ion Electrode

Туре	Measuring range	Sample amount required	Measuring temperature	Liquid junction	Remarks	
Sodium ion electrode 0221 (for C-121 and C-122) 3014081704 (9076003000)	0.1% (w/w) to 10% (w/w) NaCl	Approx. 0.1 mL	5 to 35°C	Porous macromolecule	For C-121, C-122 (Salt, Sodium ion meter) only. Cannot be applied for B-721, B-722.	
Potassium ion electrode 0231 (for C-131) 3014083433 (9076007200)	39 to 3,900 mg/L	Approx. 0.1 mL	5 to 35°C	Porous macromolecule	For C-131 (Potassium ion meter) only. Cannot be applied for B-731.	
Nitrate ion electrode 0241 (for C-141) 3014083435 (9076007600)	62 to 6,200 mg/L	Approx. 0.1 mL	5 to 35°C	Porous macromolecule	For C-141 (Nitrate ion meter) only. Cannot be applied for B-340 series & B-740 series.	

#### **Accessories**

Туре	specification	Remarks
Y047 Sampling sheet holder 3200053995	For B-342 (for soil)/replacement sensor (0243) *Cannot be applied for LAQUAtwin B-700 series and their replacement sensors (S010/S021/S022/S030/S040/S050)	For a sample that contain particulate such as soils, suspension. To be used with "Sampling sheet B (model Y046)"
Y048 Sampling sheet holder 3200459736	For LAQUAtwin B-700 series and their replacement sensors (S010/S021/S022/S030/S040/S050) *Cannot be applied for B-342 (for soil)/replacement sensor (0243)	For a sample that contain particulate such as soils, suspension. To be used with "Sampling sheet B (model Y046)"
Y046 Sampling sheet B	100 sheets For LAQUAtwin/TWIN series	For trace measurement(0.05 mL), wiping measurement. If a sample that contain particulate, please use *Y047: twin series/Y048: LAQUAtwin series
Y011A Sampling sheet C 3014053435	11 mm × 6 mm × 5 rolls For CARDY series	For trace measurement (0.05 mL), wiping measurement.
Y049 Crop sample press 3200469679	For squeezing a sample such as crop	Standard accessory for B-341, B-741

### Standard solution

Туре		Value	Volume	Applicable model	Remarks
Y017 Standard solution (pH 6.86) 3200457725	mm	pH 6.86	14 mL 6 bottles	B-711/B-712 B-211/B-212	Replacing model of Y031 (discontinued)
Y014 Standard solution (pH 4.01)		pH 4.01	14 mL 6 bottles	B-712/B-212	Replacing model of Y032 (discontinued)
3200457726	NONONONONO N				
Y021H Standard solution (NaCl 5.0%)		NaCl 5.0%	14 mL 6 bottles	B-721/C-121	Replacing model of Y022 (discontinued) *To be used with Y021L for two-point calibration
Y021L Standard solution (NaCl 0.5%)		NaCl 0.5%	14 mL 6 bottles	B-721/C-121	Replacing model of Y022 (discontinued) *To be used with Y021H for two-point calibration
Y022H Standard solution (Sodium Ion 2000ppm)	Title	Sodium Ion 2000ppm	14 mL 6 bottles	B-722/C-122	Replacing model of Y024 (discontinued) *To be used with Y022L for two-point calibration
Y022L Standard solution (Sodium Ion 150ppm)		Sodium Ion 150ppm	14 mL 6 bottles	B-722/C-122	Replacing model of Y024 (discontinued) *To be used with Y022H for two-point calibration
Y031H Standard solution (Potassium Ion 2000ppm)	mm	Potassium Ion 2000ppm	14 mL 6 bottles	B-731/C-131	Replacing model of Y025 (discontinued) *To be used with Y031L for two-point calibration
Y031L Standard solution (Potassium Ion 150ppm)		Potassium Ion 150ppm	14 mL 6 bottles	B-731/C-131	Replacing model of Y025 (discontinued) *To be used with Y031H for two-point calibration
3200457720  Y041  Standard solution (Nitrate Ion 5000ppm) 3200053433		Nitrate Ion 5000ppm	14 mL 6 bottles	B-741/B-341	
Y042 Standard solution (Nitrate Ion 300ppm) 3200053514		Nitrate Ion 300ppm	14 mL 6 bottles	B-741/B-742 B-341/B-342	
Y043 Standard solution (Nitrate Ion 2000ppm) 3200053532	mm	Nitrate Ion 2000ppm	14 mL 6 bottles	B-743/B-343 C-141	Replacing model of Y026 (discontinued) *To be used with Y045 for two-point calibration
Y044 Standard solution (Nitrate Ion 30ppm)		Nitrate Ion 30ppm	14 mL 6 bottles	B-742/B-342	
Y045 Standard solution (Nitrate Ion 150ppm) 3200053536	mm	Nitrate Ion 150ppm	14 mL 6 bottles	B-743/B-343 C-141	Replacing model of Y026 (discontinued) *To be used with Y043 for two-point calibration
Y051H Standard solution (Calcium Ion 2000ppm)		Calcium Ion 2000ppm	14 mL 6 bottles	B-751	
Y051L Standard solution (Calcium Ion 150ppm)		Calcium Ion 150ppm	14 mL 6 bottles	B-751	
Y071H Standard solution (Conductivity 12.9mS/cm) 3200457718		Conductivity 12.9mS/cm	14 mL 6 bottles	B-771	
Y071L Standard solution (Conductivity 1.41mS/cm)		Conductivity 1.41mS/cm	14 mL 6 bottles	B-771/B-173	Replacing model of Y023 (discontinued) *To be used with Y071H for two-point calibration (Only B-771)

pH Electrode Selection Guide

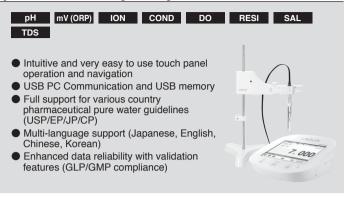
pH Electi	ode Se	election Guide								
							ODES (Toupl	<del>-</del> 1)		
			PLASTIC	STANDARD	LONG ToupH	MICRO ToupH	SLEEVE ToupH	For TAP WATER	HF- PROOF	
			9625-10D	ToupH 9615S-10D	9680S-10D	9618S-10D	9681S-10D	9630-10D	9631-10D	
	Annlicable te	mperature range (°C)	0-100	0-100	0-100	0-60	0-60	0-100		
	Diameter (mr		16	12	8	3	12	16		
Specification	,	,	15	13	21	6		15		
		quid junction (approx.mm)					26			
	Length (mm)		150	151	251	151	151	150	155	
pH-Sample Co	onditions	I								
		Normal (over 100 mS/m)	•	•	•	•	•	•	•	
	Conductivity	Low (approx.10~100 mS/m)					0	0		
		Very low (approx.5~10 mS/m) High (approx. 5 S/m)	0	0	0		•	0	0	
Aqueous	Strong alkalin		+		0			0	0	
Solution		(pH 0-2) * Except HF sample		•						
00.00.0		nange (within 50°C)	•					•		
		(approx. 5 Pa·S)					•			
		on-aqueous solvent		0	0	0	0			
	Suspension  Inside Surface  PH-Sample Conditions  Microtube/plate (> 50 µL)			0	0	0	•			
Solid/Somissild	· ·									
JUIIU/Semisolid	Surface									
_										
pH-Sample Co	onditions									
		te (> 50 µL)	×	×	×	•	×	×	×	
	NMR tube	φ5 mm ID > φ4 mm	×	×	×	×	×	×	×	
	Ampule	> φ4 mm				•				
Sample	Micro contain	er (> 2 mL)			0	•				
Containers	Tube	ID:13 mm, L:100 ~ 150 mm			•					
Containore	Beaker	10 mL∼ 1 L	•	•	0	0	0	•	-	
	Large contain	ier (> 1 L)	0	0	•			0	0	
	Petri dish									
	Droplet		×	X	×	×	×	X	X	
pH-Typical Sa						1	1			
		nange water (approx. 0.1 mS/m)								
		r (approx. 0.5 mS/m)		0						
Water		water (approx. 10 mS/m)	0	0			0	•		
	Surface wate			0			0	•		
	Pharmaceutic		0	0			0			
		water/acid rain	+	0			_	0		
	Hydrofluoric	g acid (Except HF sample)		•			0			
	Organic solve		×					×		
Chemical	KCI-reactive		×	×	×	×	×	×		
reagent/solvent	Surfactant			0			•			
	Water-based	paint		0			•			
	Dye/coloring	-					•			
	Protein-conta			0		0	•			
	Medicinal pre	paration				0	0			
Pharmaceutical/	Enzyme solut	•			0	•				
biology sample	Tris buffer			•		0	0			
	Suspension			0			•			
	Agar medium									
	Jam			0			•			
	Meat/fish									
	Fruit/vegetab	le							0-60 16 20 155	
Food	Dough									
	Honey									
	Cheese/butte	r	1				_			
	Yogurt		0	0			0	0		
Dever/	Beer		0	0			•	0		
Beverage/	Milk			0			•			
seasoning		drink/juice/sauce/soy sauce		0			•			
	Mayonnaise/			0			•			
Coometic	Beauty cream			0			•			
Cosmetic/ lotion	Gel/soap/sha	•		0			•			
.50011	Hairdye lotion Emulsified liq			0			0			
	L - maisineu ilq	uiu	1		1	I.				I

	ISFET ELF	ECTRODES		n-1 ELECTRO		COMBINATION				REFERENCE I	
ALKALI-	NEEDLE	FLAT		NON-							
PROOF	ISFET	ISFET	SLEEVE	AQUEOUS	NEEDLE	SLENDER TEST TUBE	FLAT	STANDARD	AGOLOGO	STANDARD	DOUBLE
9632-10D	0030-10D	0040-10D	6367-10D	6377-10D	6252-10D	6069-10C	6261-10C	1066A-10C	1076A-10C	2060A-10T	2565A-10T
0-100	0-60	0-60	0-60	0-60	0-60	0-60	0-50	0-100	0-100	0-100	0-100
16	15	10	12	12	12	3	12	12	12	12	15
15	11	0.1	10	23	13	8	-	_	_	_	_
150	190	190	150	150	150	291	150	150	150	150	150
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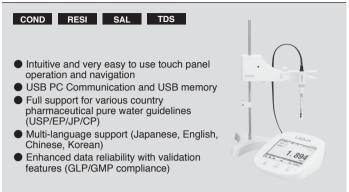
## HORIBA WATER QUALITY ANALYZER LINEUP

#### Benchtop LAQUA

#### pH/Water Quality Analyzer F-70 series



#### **DS-70** series

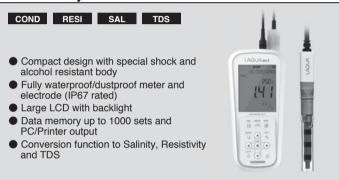


#### Portable LAQUAact

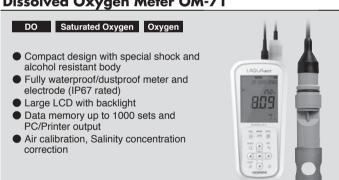
#### pH/Water Quality Meter D-70 Series

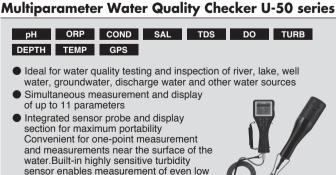


#### **Conductivity Meter ES-71**

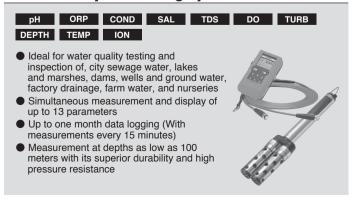


#### **Dissolved Oxygen Meter OM-71**





#### Water Quality Monitoring System W-20XD Series



turbidity water

#### Compact LAQUAtwin

#### pH METER B-711/B-712/B-713

- Flat sensor technology realizes a reliable and direct measurement of a drop of the sample from 0.1 mL
- Select measurement method depending on your situation and sample. (Drops, Immersion, Scoop, Wipe, Solid samples, Powders, Paper, textiles)
- IP67 waterproof and dustproof
- Temperature compensation/Auto hold

B-711 (One-point calibration)

B-712 (Two-point calibration)

B-713 (US only) (Two-point calibration)



#### **Conductivity METER B-771**

#### COND Salt TDS

- Flat sensor technology realizes a reliable and direct measurement of a drop of the sample from 0.12 mL
- Conductivity readings can be converted into Salt and TDS
- IP67 waterproof and dustproof
- Temperature compensation/Auto hold/Auto range change



#### **Sodium Ion METER B-722**

#### ION

- Only compact meter for a quick measurement of sodium ion using ion selective membrane
- Flat sensor technology realizes a reliable and direct measurement of a drop of the sample from 0.3 mL
- IP67 waterproof and dustproof
- Temperature compensation/Auto hold/Auto range change



#### Potassium Ion METER B-731

#### ION

- Only compact meter for a quick measurement of potassium Ion using ion selective membrane
- Flat sensor technology realizes a reliable and direct measurement of a drop of the sample from 0.3 mL
- IP67 waterproof and dustproof
- Temperature compensation/Auto hold/Auto range change



#### Nitrate Ion METER B-741/B-742/B-743

#### ION

- Only compact meter for a quick measurement of Nitrate ion using ion selective membrane
- Flat sensor technology realizes a reliable and direct measurement of a drop of the sample from 0.3 mL
- IP67 waterproof and dustproof
- Temperature compensation/Auto hold/Auto range change
- Special application packages for crop and soil

B-741 (for crops) B-742 (for soil)

B-743 (for general use)



#### Calcium Ion METER B-751

- Only compact meter for a quick measurement of Calcium ion using ion selective membrane
- Flat sensor technology realizes a reliable and direct measurement of a drop of the sample from 0.3 mL
- IP67 waterproof and dustproof
- Temperature compensation/Auto hold/Auto range change



#### Salt METER B-721

#### ION

- Only compact meter to measure sodium ion to calculate into NaCl based salt concentration unlike the conductivity converted meters
- Flat sensor technology realizes a reliable and direct measurement of a drop of the sample from 0.3 mL
- IP67 waterproof and dustproof
- Temperature compensation/Auto hold/Auto range change



#### Water Quality Analyzers www.horiba-water.com

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#### Benchtop Meter (LAQUA) www.horiba.com/laqua

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





#### Compact Meter (LAQUAtwin) www.horiba.com/laquatwin

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









Please read the operation manual before using this product to assure safe and proper handling of the product.

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