

General Specifications

pH and ORP Electrodes

GS 12B07B02-E

GENERAL

Yokogawa's process pH and ORP meters are highly reliable and feature advanced functions which are useful for a wide variety of applications including water quality management in a broad range of production processes and medium-sized wastewater treatment plants, or for general pH and ORP control systems. Based on Yokogawa's track record and years of experience, a comprehensive range of products has been produced to provide solutions best suited to individual applications.

In addition to the PH8EFP and PH8ERP standard Ryton pH electrodes, our line of pH electrodes has been strengthened by the inclusion of the solid electrolyte pH electrode HA405, pH electrode for chemical processes DPA405, pH electrode and hydrofluoric acid-resistant pH electrode HF405 to cope with applications where standard electrodes cannot be used. For reliable measurement of pH of high purity water in boilers and semiconductor process applications, the pH electrode PH8EHP and holder PH8HH are offered.

Like the pH electrode series, the ORP electrode series is also offered as a complete lineup with the solid electrolyte ORP electrode HA485, ORP electrode for chemical processes DPA485 in addition to the OR8EFG and OR8ERG standard Ryton ORP electrodes.



FEATURES

Ryton pH/ORP Electrodes PH8EFP, PH8ERP, OR8EFG, OR8ERG

- With the body made of Ryton, a strong engineering plastic, which is comparable to Teflon in terms of corrosion resistance and heat resistance, it allows for a wide range of applications.
- A single type of electrode can support all applications regardless of whether a holder or cleaner is used.
- The integrated-electrode design simplifies calibration with standard solutions and maintenance.
- The glass electrode of a pH meter, the platinum or gold electrode, and the junction of an ORP meter can be easily individually replaced.

Solid Electrolyte pH/ORP Electrodes (Xerolyt) : HA405, HA485

- Allows pH measurement under severe conditions, such as where the process fluid is heavily contaminated or contains sulfide.
- With solid polymer used as the inner solution, the liquid junction is large (1.0 to 1.5 mm), which prevents clogging.

pH/ORP Electrodes for Chemical Processes : DPA405, DPA485

- Extremely long life span for pH measurement in electrolytic processes.

- With the pressurized inner solution there is no need for a pressure holder.
- The silver barrier incorporated in the reference electrode inhibits the generation of sulfide around the liquid junction.

Hydrofluoric Acid-Resistant pH Electrode (HF405)

- The special sensing membrane allows measurement of solutions or drainage containing hydrofluoric acid.
- With solid polymer used as the inner solution, the liquid junction for the process fluid is large (1.0 to 1.5 mm), which prevents clogging.

pH Electrode for High Purity Water: PH8EHP

- The dedicated holder provides solutions to problems that arise when measuring high-purity water.
- Combined with PH202G/PH450G, compensates for the effect of fluid temperature.

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SYSTEM CONFIGURATION

For the PH202G/S 2-Wire Type pH/ORP transmitter, see GS 12B07D02-E, and for the PH400G, PH450G 4-Wire Type pH Converter, see GS 12B7C1-E, GS 12B07C05-01E.

For the holders or cleaning devices, see GS 12J5C2-E.

Fig. 1-a System Configuration (General Purpose, Non-Explosionproof Types)

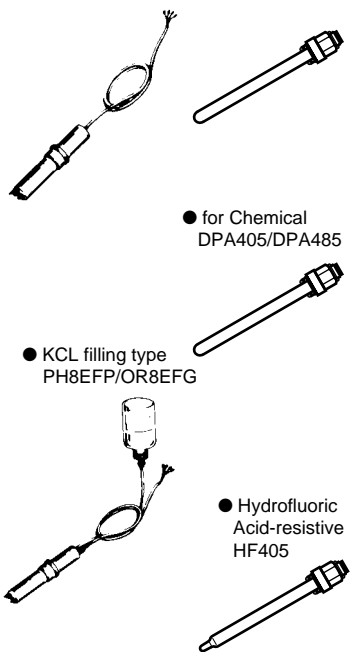
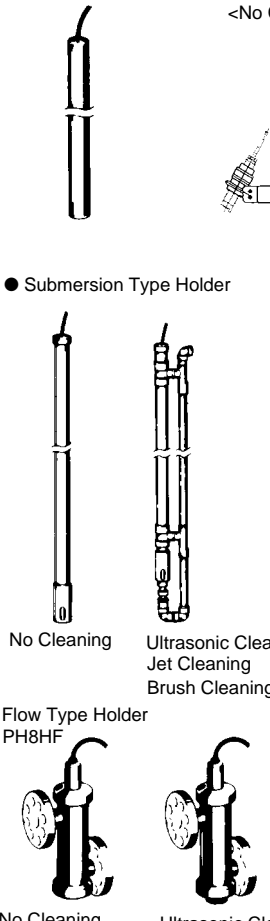
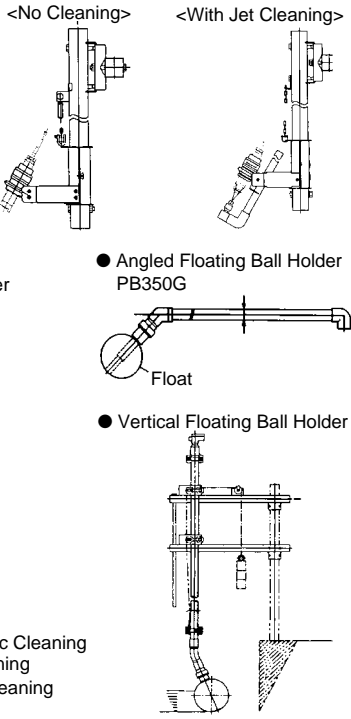
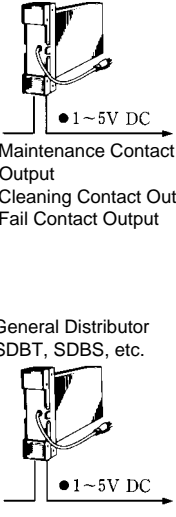
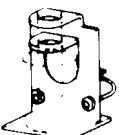
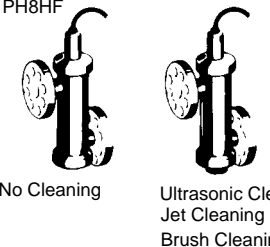
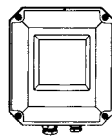
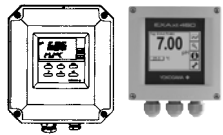


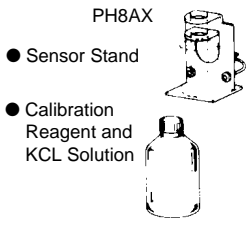
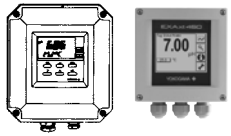
Sensors	Holder, Holder with Cleaning system		Distributors
<ul style="list-style-type: none"> ● KCL refillable type PH8ERP/OR8ERG ● Xerolyt HA405/HA485 ● for Chemical DPA405/DPA485 ● KCL filling type PH8EFP/OR8EFG ● Hydrofluoric Acid-resistant HF405 	<ul style="list-style-type: none"> ● Guide Pipe PH8HG ● Submersion Type Holder ● Flow Type Holder PH8HF 	<ul style="list-style-type: none"> ● Suspension Type Holder HH350G ● Angled Floating Ball Holder PB350G ● Vertical Floating Ball Holder <p><No Cleaning> <With Jet Cleaning></p> 	<ul style="list-style-type: none"> ● EXA PH dedicated Distributor PH201G ● General Distributor SDBT, SDBS, etc.  <p>● 1-5V DC</p> <p>● Maintenance Contact Output</p> <p>● Cleaning Contact Output</p> <p>● Fail Contact Output</p>
<p>Accessories</p> <ul style="list-style-type: none"> ● Sensor Stand 	<ul style="list-style-type: none"> ● No Cleaning ● Ultrasonic Cleaning ● Jet Cleaning ● Brush Cleaning 	<p>Cleaning Devices</p> <ul style="list-style-type: none"> ● Ultrasonic Oscillator PUS400G 	<p>pH/ORP Transmitter</p> <ul style="list-style-type: none"> ● 2-wires pH/ORP Transmitter PH202G, PH450G converter 

Fig. 1-b System Configuration (For Pure Water)

pH sensor	Holder	Accessories	pH Transmitter	Distributors
<ul style="list-style-type: none"> ● For pure water PH8EHP 	<ul style="list-style-type: none"> ● For pure water PH8HH 	<p>PH8AX</p> <ul style="list-style-type: none"> ● Sensor Stand ● Calibration Reagent and KCL Solution 	<ul style="list-style-type: none"> ● 2-wires pH Transmitter PH202G, PH450G converter 	<p>Same as for General Purpose or Non-Explosionproof Types</p>

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SPECIFICATIONS

1. pH Electrode

1-1. Common Specifications

Measured object : Hydrogen ion concentration (pH) in aqueous solution
 Measurement principle : Glass electrode method
 Measuring range : Different by used electrode
 Measurement conditions :
 Process temperature ; See Table 1
 Process pressure ; See Table 2

Table 1. Process Temperature Range

pH Electrode	Holder Type	Holder Material	Cleaner	Adapter Material	pH Range	Temperature (°C)	
PE8ERP	Guide-pipe (PH8HG)	PVC	None	Not used	2 to 12	-5 to 50	
		PP	None			-5 to 80	
	Submersion (PH8HS)	PP	None, Provided			-5 to 80	
		SUS	None, Provided			-5 to 80	
	Flow-through (PH8HF)	SUS	None, Provided			-5 to 80	
	Suspension (HH350G)	SUS	None, Provided			-5 to 80	
PH8EFP	Guide-pipe (PH8HG)	PVC	None		Not used	2 to 12	-5 to 50
		PP	None				-5 to 80
	Submersion (PH8HS)	PP,SUS	None, Provided				-5 to 100
		SUS	None, Provided				-5 to 80
	Flow-through (PH8HF)	PP	None, Provided				-5 to 80
		SUS	None, Provided				-5 to 105
Suspension (HH350G)	SUS	None, Provided	-5 to 80				
	SUS	None, Provided	-5 to 80				
Float (PB350G, PB360G)	PP,SUS	None	-5 to 50				
	PP,SUS	None	-5 to 50				
PH8EHP	High purity water (PH8HH)	Acryl	None	Not used		2 to 12	0 to 50
HA405 DPA405 HF405	Submersion (PH8HS)	PP,SUS	None	PVC		HA405 2 to 14 DPA405 0 to 14 HF405 2 to 11	0 to 50
			Provided	PP,SUS	0 to 100		
			Provided	PVC	0 to 50		
		PP	None, Provided	PP,SUS	0 to 80		
			None, Provided	PVC	0 to 50		
			None, Provided	PP,SUS	0 to 80		
	Flow-through (PH8HF)	SUS	None	PVC	0 to 50		
			None	PP	0 to 80		
			None	SUS	0 to 100		
		SUS	None	PP,SUS	0 to 80		
			None	PP,SUS	0 to 80		
			Provided	PVC	0 to 50		

PV: Rigid Polyvinyl, PP: Polypropylene, SUS: Stainless Steel

(Note 1) SUS holder and SUS adapter should be used in the pH range of 3 or greater.

(Note 2) For flow-through types, refer also to the solution temperature and pressure diagram of Holder GS 12J05C02-E.

(Note 3) Only jet cleaning system can be used for HA405, DPA405 or HF405.

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Table 2. Process Pressure Range

pH Electrode Holder	PH8ERP	PH8EFP	HA405 HF405	DPA405
Submersion	Atmospheric pressure (Submersion depth: Max. 3m)			
Guide-pipe Suspension Float	Atmospheric pressure (Submersion depth: Max. 3m)		Not used	
Flow-through	Atmospheric pressure to 50kPa	Atmospheric pressure to 10kPa (*1) Atmospheric pressure to 500kPa (*2)	Atmospheric pressure to 500kPa	Atmospheric pressure to 250kPa

(Note 1) For flow-through types, refer also to the solution temperature and pressure diagram of Holder GS 12J05C02-E.

(Note 2) Measuring pressure decreases when the inner pressure of DPA405 decreases.

(*1) When general purpose reserve tank used.

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(*2) When medium-pressure reserve tank used.

Table 3. Selection for pH Electrode

pH Electrode Application	PH8ERP PH8EFP	PH8EHP	HA405	DPA405	HF405
General purpose	○	×	—	—	—
High purity water	×	○	×	×	×
Contaminating and sulfide-containing solutions	×	×	○	×	×
Caustic electrolysis solutions	×	×	×	○	×
Solutions containing organic solvents	×	×	×	×	×
Waste water containing hydrofluoric acid *1	×	×	×	×	○

*1 Confirm the specifications of hydrofluoric acid concentration upper limit.

(Note) Consult sales personnel about selection for pH electrode because the table above is just for reference.

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1-2. KCl Refillable Type Electrode (PH8ERP)

Measuring range: pH 2 to 12

Measuring temperature:

-5 to 80 °C (See Table 1 when using holder)

Measuring pressure:

Atmospheric pressure to 50kPa (See Table 2 when using holder)

Temperature compensation sensor: Pt1000

Wetted part materials:

Body; Ryton (PPS resin), glass, titanium or Hastelloy C, ceramics, fluorocarbon rubber or Daielperfrow rubber

Cable; Chlorinated polyethylene rubber (Cable sheath)

Weight: Approx. 0.4kg

1-3. KCl Filling Type Electrode PH8EFP

Measuring range: pH 0 to 14

Measuring temperature:

-5 to 105 °C (-5 to 80 °C when using Guide-pipe holder) (See Table 1 when using holder)

Measuring pressure:

Atmospheric pressure to 10kPa (General purpose or big volume tank 500ml) (See Table 2 when using holder)

Atmospheric pressure to 500kPa (Medium pressure) (See Table 2 when using holder)

- Temperature compensation sensor: Pt1000
 Wetted part materials:
 Body; Ryton (PPS resin), glass, titanium or Hastelloy C, ceramics, fluorocarbon rubber or Daielperfrow rubber
 Cable; Chlorinated polyethylene rubber (Cable sheath)
 KCl tube; Heat-resistant soft PVC (General purpose or big volume tank 500ml), Polyethylene (Medium pressure)
 Weight: Electrode; Approx. 0.4kg
 Tank; Approx. 0.3kg (General purpose), Approx. 1kg ((Medium pressure)
- 1-4. Solid Electrolyte pH Electrode (Xerolyt) HA405
 Measuring range: pH 2 to 14
 Measuring temperature: 0 to 110 °C (See Table 1 when using holder)
 Measuring pressure:
 Atmospheric pressure to 1.6MPa (Temperature 25 °C)
 Atmospheric pressure to 600kPa (Temperature 100 °C)
 (See Table 2 when using holder)
 Internal electrolyte: Solid polymer including KCl (Xerolyt)
 Temperature compensation sensor:
 None (Manual temperature compensation on the converter or transmitter)
 (Use the adapter with temperature sensor SA405 for application where the temperature varies)
 Applicable holder:
 Flow-through holder (PH8HF), Submersion holder (PH8HS)
 (An optional adapter is needed, but not needed when using the adapter with temperature sensor SA405.)
 Ultrasonic cleaning is not available.
 Only jet cleaning is available when cleaning is necessary.
 Wetted part materials:
 Body; Glass
 O-ring; Silicon rubber or Daielperfrow rubber
 Adapter; Stainless steel (SUS316), polypropylene or rigid polyvinyl chloride
- CAUTION ON USE:**
 This electrode cannot be used outdoors and with guide-pipe holder.
 The electrode must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.
 The electrode may not stand a long-term use in solutions containing organic solvents because of the erosion of its internal electrolyte polymer.
- 1-5. pH Electrodes for Chemical Processes (DPA405)
 Measuring range: pH 0 to 14
 Measuring temperature: 0 to 100 °C (See Table 1 when using holder)
 Measuring pressure:
 Atmospheric pressure to 250kPa (Depending on the inner pressure of the electrode)
 (See Table 2 when using holder)
 Internal electrolyte: High-viscosity gel
 Temperature compensation sensor:
 None (Manual temperature compensation on the converter or transmitter)
- (Use adapter with temperature sensor (SA405) for application where the temperature varies)
 Applicable holder:
 Flow-through holder (PH8HF), Submersion holder (PH8HS)
 (An optional adapter is needed, but not needed when using an adapter with temperature sensor SA405.)
 Ultrasonic cleaning is not available.
 Only jet cleaning is available when cleaning is necessary.
 Use O-ring covered by Teflon (K9148MR) when using a special holder for electrolytic processes
 Wetted part materials:
 Body; Glass
 O-ring; Silicon rubber or Daielperfrow rubber
 Adapter; Stainless steel (SUS316), polypropylene, rigid polyvinyl chloride or heat-resistant polyvinyl chloride
- CAUTION ON USE:**
 This electrode cannot be used outdoors and with guide-pipe holder.
 The electrode must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.
- 1-6. Hydrofluoric Acid-Resistant pH Electrode HF405
 Measuring range: pH 2 to 11
 Upper limit of HF concentration:
 Max. 1000 ppm at pH 3 to 4
 Max. 10000 ppm at pH 4 to 5
 No limit at pH 5 or greater
 Measuring temperature: 0 to 80 °C (See Table 1 when using holder)
 Measuring pressure:
 Atmospheric pressure to 1.6MPa (Temperature 25 °C)
 Atmospheric pressure to 600kPa (Temperature 100 °C)
 (See Table 2 when using holder)
 Internal electrolyte: Solid polymer including KCl (Xerolyt)
 Temperature compensation sensor:
 None (Manual temperature compensation on the converter or transmitter)
 (Use adapter with temperature sensor SA405 for application where the temperature varies)
 Applicable holder: Flow-through holder (PH8HF), Submersion holder (PH8HS)
 (An optional adapter is needed, but not needed when using the adapter with temperature sensor SA405.)
 Wetted part materials:
 Body; Glass. silicon rubber or Daielperfrow rubber
 Adapter; Stainless steel (SUS316), polypropylene or rigid polyvinyl chloride
- CAUTION ON USE:**
 This electrode cannot be used outdoors and with guide-pipe holder.
 The electrode must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.
- 1-7. Adapter with Temperature Sensor (SA405)
 Applicable sensors: HA405, DPA405, HF405
 Temperature sensor: Pt1000

Wetted part materials:

Stainless steel (SUS316) (Temperature sensor)- PEEK (Adapter), titanium, Hastelloy C

Applicable holder:

Flow-through holder (PH8HF), Submersion holder (PH8HS)

(Note 1) Use O-ring covered by Teflon (K9148MR) when using a special holder for electrolytic processes.

(Note 2) Use special type terminal box (WTB10-PH2) when using 2-wire type pH transmitter (PH202).

Use special type terminal box (WTB10-PH4) when using 4-wire type pH converter (PH450G).

1-8. pH Electrode for Small Culture Tanks DPAS405

Measuring range: pH 0 to 12

Measuring temperature:

0 to 100 °C (Applicable for autoclave)

Autoclave temperature: max. 130 °C

Measuring pressure:

Atmospheric pressure to 250kPa

Internal electrolyte: High-viscosity gel

Temperature compensation sensor:

None (Manual temperature compensation on the converter or transmitter)

Applicable holder: Silicon bush

(Note) Use silicon bush or socket (DIN Pg 13.5 female) for an insertion length of 120mm and 200mm.

Wetted part materials:

Body; Glass

O-ring; Silicon rubber

CAUTION ON USE:

This electrode cannot be used outdoors and with guide-pipe holder.

The electrode must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.

2. ORP Electrode

2-1. Common Specifications

Measured object:

Oxidation-Reduction potential in aqueous solution

Measurement principle: Metal electrode method

Measuring range: -1500 to 1500 mV

Measurement conditions:

Process temperature: See Table 4

Process pressure: See Table 5

Table 5. Process Pressure Range

ORP Electrode Holder	OR8ERG	OR8EFG	HA485	DPA485
Submersion	Atmospheric pressure (Submersion depth: Max. 3m)			
Guide-pipe Suspension Float	Atmospheric pressure (Submersion depth: Max. 3m)		Not used	
Flow-through	Atmospheric pressure to 50kPa	General purpose Atmospheric pressure to 10kPa	Atmospheric pressure to 500kPa	Atmospheric pressure to 250kPa
		Medium pressure Atmospheric pressure to 500kPa		

(Note 1) For flow-through types, refer also to the solution temperature and pressure diagram of Holder GS 12J05C02-E.

(Note 2) Measuring pressure decreases when the inner pressure of DPA405 decreases.

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Table 4. Process Temperature Range

ORP Electrode	Holder Type	Holder Material	Cleaner	Adapter Material	Temperature (°C)	
OR8ERG	Guide-pipe	PVC	None	Not used	-5 to 50	
		PP	None		-5 to 80	
	Submersion, Flow-through	PP	None, Provided		-5 to 80	
		SUS	None, Provided		-5 to 80	
	Suspension	SUS	None, Provided		-5 to 80	
Float	PP,SUS	None	-5 to 50			
OR8EFG	Guide-pipe	PVC	None		-5 to 50	
		PP	None		-5 to 80	
	Submersion	PP,SUS	None		-5 to 100	
			Provided		-5 to 80	
	Flow-through	PP	None, Provided	-5 to 80		
		SUS	None, Provided	-5 to 105		
	Suspension	SUS	None, Provided	-5 to 80		
	Float	PP,SUS	None	-5 to 50		
HA485 DPA485	Submersion	PP,SUS	None	PVC	0 to 50	
			Provided	PP,SUS	0 to 100	
				PVC	0 to 50	
			PP,SUS	0 to 80		
	Flow-through	PP	None, Provided	PVC	0 to 50	
				PVC	0 to 80	
			SUS	None	PVC	0 to 50
					PP	0 to 80
				Provided	SUS	0 to 100
					PP,SUS	0 to 80
PVC	0 to 50					

PV: Rigid Polyvinyl, PP: Polypropylene, SUS: Stainless Steel

(Note 1) SUS holder and SUS adapter should be used in the pH range of 3 or greater.

(Note 2) For flow-through types, refer also to the solution temperature and pressure diagram of Holder GS 12J05C02-E.

(Note 3) Only jet cleaning system can be used for HA485 or DPA485.

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2-2. KCl Refillable Type Electrode OR8ERG

Measuring range: -1500 to 1500 mV

Measuring temperature:

-5 to 80 °C (See Table 4 when using holder)

Measuring pressure:

Atmospheric pressure to 50kPa

(See Table 5 when using holder)

Wetted part materials:

Body; Ryton (PPS resin), platinum-glass or gold-epoxy resin, titanium, ceramics, fluorocarbon rubber

Cable; Chlorinated polyethylene rubber (Cable sheath)

Weight: Approx. 0.4kg

2-3. KCl Filling Type Electrode OR8EFG

Measuring range: -1500 to 1500 mV

Measuring temperature:

-5 to 105 °C (-5 to 80 °C when using guide-pipe holder)(See Table 4 when using holder)

Measuring pressure:

Atmospheric pressure to 10kPa (General purpose or big volume tank 500ml) (See Table 5 when using holder)

Atmospheric pressure to 500kPa (Medium pressure) (See Table 5 when using holder)
 Wetted part materials:
 Body; Ryton (PPS resin), platinum-glass or gold-epoxy resin, titanium or Hastelloy C, ceramics, fluorocarbon rubber
 Cable; Chlorinated polyethylene rubber (Cable sheath)
 KCl tube; Heat-resistant soft PVC (General purpose), Polyethylene (Medium pressure)
 Weight: Electrode; Approx. 0.4kg
 Tank; Approx. 0.3kg (General purpose), Approx. 1kg ((Medium pressure)

2-4. Solid Electrolyte ORP Electrode (Xerolyt) HA485
 Measuring range: -1500 to 1500 mV
 Process pH range: 2 to 14 pH
 Measuring temperature:
 0 to 110 °C (See Table 4 when using holder)
 Measuring pressure:
 Atmospheric pressure to 1.6MPa (Temperature 25 °C)
 Atmospheric pressure to 600kPa (Temperature 100 °C)
 (See Table 5 when using holder)
 Internal electrolyte: Solid polymer including KCl. (Xerolyt)
 Applicable holder:
 Flow-through holder (PH8HF), Submersion holder (PH8HS)
 (An optional adapter is needed)
 Ultrasonic cleaning is not available.
 Only jet cleaning is available when cleaning is necessary.

Wetted part materials:
 Body; Platinum-glass, silicon rubber
 Adapter; Stainless steel (SUS316), polypropylene or rigid polyvinyl chloride

CAUTION ON USE:
 This electrode cannot be used outdoors and with guide-pipe holder.
 The electrode must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.

2-5. ORP Electrodes for Chemical Processes DPA485
 Measuring range: -1500 to 1500 mV
 Measuring temperature:
 0 to 100 °C (See Table 4 when using holder)
 Measuring pressure:
 Atmospheric pressure to 250kPa
 (See Table 5 when using holder)
 Internal electrolyte: High-viscosity gel
 Applicable holder:
 Flow-through holder (PH8HF), Submersion holder (PH8HS)
 (An optional adapter is needed.)
 Use O-ring covered by Teflon (K9148MR) when using a special holder for electrolytic processes
 Wetted part materials:
 Body; Platinum-glass, silicon rubber
 Adapter; Stainless steel (SUS316), polypropylene, rigid polyvinyl chloride or heat-resistant rigid polyvinyl chloride

CAUTION ON USE:
 This electrode cannot be used outdoors and with guide-pipe holder.

The electrode must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.

2-6. ORP Electrode for Small Culture Tanks DPAS485
 Measuring range: -1500 to 1500mV
 Measuring temperature:
 0 to 100 °C (Applicable for autoclave)
 Autoclave temperature: max. 130 °C
 Measuring pressure: Atmospheric pressure to 250kPa
 Internal electrolyte: High-viscosity gel
 Applicable holder: Silicon bush
 (Note) Use silicon bush or socket (DIN Pg13.5 female) for an insertion length of 120mm and 200mm.

Wetted part materials:
 Body; Platinum-glass, silicon rubber
CAUTION ON USE:
 This electrode cannot be used outdoors and with guide-pipe holder.
 The electrode must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.

3. pH Measuring System for High Purity Water
 Use a holder for high purity water when using pH electrode for high purity water.

3-1. pH Electrode for High Purity Water PH8EHP
 Measuring temperature: 0 to 50 °C
 Measuring pressure: Atmospheric pressure
 Temperature compensation sensor: Pt1000
 Measuring conductivity: See Fig. 2
 Measuring flow rate: See Fig. 2
 Wetted part materials:
 Body; Ryton (PPS resin), glass, titanium or Hastelloy C, ceramics, fluorocarbon rubber
 Cable; Chlorinated polyethylene rubber (Cable sheath)
 KCl tube; Heat-resistant soft PVC
 Weight: Electrode; Approx. 0.4kg
 Tank; Approx. 0.3kg (General purpose)

3-2. Holder for High Purity Water PH8HH
 Material: Acrylic resin, SUS316, chloroprene rubber
 Process connections: Inlet; Rc 1/4 or 1/4NPT (F)
 Outlet; Rc 1/2 or 1/2NPT (F)
 Mounting Method:
 50A(2-inch) vertical or horizontal pipe mounting or wall mounting (Specify mounting bracket)
 Weight: Body; Approx. 1.7kg
 Mounting Bracket; Approx. 0.7kg

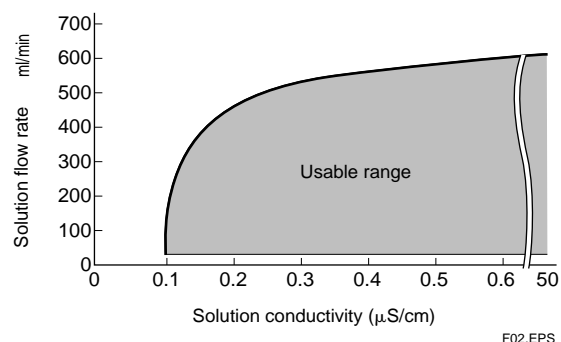


Fig.2 Solution flow rate and solution conductivity of electrode and holder for high purity water

4. Terminal Box

4-1. Terminal Box for General pH/ORP Electrodes
WTB10-PH1, -PH3

Used when pH transmitter or converter is installed remotely from the pH or ORP electrode.

Ambient temperature: -10 to 50 °C
Construction: JIS waterproof
Case material: Fiberglass reinforced polycarbonate resin
Case color: Grayish green (Munsell 2.5GY5.0/1.0)

Electrical connections:
pH electrode side:
 φ21mm hole (With G1/2 plastic gland)
pH Transmitter or Converter side:
 φ13mm hole (With G1/2 plastic gland)
 With Cable (Maximum length 20m)
 Conduit adapter(optional)

4-2. Terminal Box for Special pH/ORP Electrodes
WTB10-PH2, -PH4

Used when using pH transmitter or converter and adapter with temperature sensor SA405.

Ambient temperature: -10 to 50 °C
Construction: JIS waterproof
Case material: Fiberglass reinforced polycarbonate resin
Case color: Grayish green (Munsell 2.5GY5.0/1.0)

Electrical connections:
pH electrode side:
 φ21mm hole (With G1/2 plastic gland)
pH Transmitter or Converter side:
 φ13mm hole (With G1/2 plastic gland)
 With Cable (Maximum length 20m)
 Conduit adapter(optional)
Temperature sensor side: Pg7 plastic gland

5. Accessories (Purchased Separately)

See Model and Suffix Codes.

MODEL AND SUFFIX CODES

1. pH Electrode

● KCl Refillable Type pH Electrode

Model	Suffix Code	Option Code	Specifications
PH8ERP	.....	.....	KCl Refillable Type pH Electrode
Cable Length	-03	.....	3m
	-05	.....	5m
	-07	.....	7m
	-10	.....	10m
	-15	.....	15m
	-20	.....	20m
Solution Ground Tip	-TN	.....	Titanium
	-HC	.....	Hastelloy C
	-N	.....	Always -N
pH Measuring System	-T	.....	For PH200/PH400 (*1)
	-E	.....	For PH202 (*2)
	-B	.....	For PH100 (*3)
	-G	.....	For PH450G,PH202/TB (*5)
Style	*A	.....	Style A
Option	O-ring	/PF	Daielperfrow (*4)

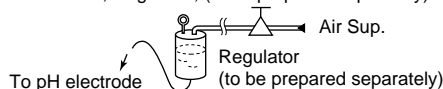
- *1: Mark band is shown by mark and fork terminals are used.
- *2: Mark band is shown by numeral and pin terminals are used.
- *3: The tag which indicated the color, the sign, and the number is attached to the cable of a electrode.
- *4: Choose Daielperfrow when this is used in organic solvent, high alkali or high temperature solution. T07.EPS
- *5: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH3.

● KCl Filling Type pH Electrode

Model	Suffix Code	Option Code	Specifications
PH8EFP	.....	.....	KCl Filling Type pH Electrode
Cable Length and KCl Tube Length	-03	.....	3m
	-05	.....	5m
	-07	.....	7m
	-10	.....	10m
	-15	.....	15m
	-20	.....	20m
Solution Ground Tip	-TN	.....	Titanium
	-HC	.....	Hastelloy C
KCl Reserve Tank (*1)	-TT1	.....	For general purpose (250ml solution inlet)
	-TT2	.....	For medium pressure, Big volume tank (With 500ml tank)
	-TN1	.....	For maintenance (for TT1, TT3)
	-TN2	.....	For maintenance (for TT2)
	-N	.....	Always -N
pH Measuring System	-T	.....	For PH200/PH400 (*3)
	-E	.....	For PH202 (*4)
	-B	.....	For PH100 (*5)
	-G	.....	For PH450G,PH202/TB (*9)
Style	*A	.....	Style A
Option	O-ring	/PF	Daielperfrow (*6)
	Special glass sensor	/HA	Glass sensor for high alkali (*7)
	Special junction	/TF	Teflon junction (*8)

*1: A 50A pipe mounting bracket is supplied with TT1, TT2 and TT3. Only a supply tube, but no KCl solution, is supplied with TN1 and TN2. Since a KCl solution is not supplied with TT2 and TT3, arrange it from among accessories or auxiliary parts.

*2: Prepare an air pressure regulator as shown in the diagram below when the medium-pressure reserve tank is used.
To pH electrode, Regulator, (to be prepared separately)



- *3: Mark band is shown by mark and fork terminals are used.
- *4: Mark band is shown by numeral and pin terminals are used.
- *5: The tag which indicated the color, the sign, and the number is attached to the cable of a electrode.
- *6: Choose Daielperfrow when this is used in organic solvent, high alkali or high temperature solution. T08.EPS
- *7: Choose when using in high alkali solution.
- *8: Choose when using in the heavily contaminated application.
- *9: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH3.

● Solid Electrolyte pH Electrode (Xerolyt)

Model	Suffix Code	Option Code	Specifications
HA405	.....	.....	Solid electrolyte pH electrode
Insertion Length	-120	.....	120mm
Option	For PH200/PH400 Cable Length (*1)	/01	1m
		/03	3m
		/05	5m
		/10	10m
		/15	15m
	For PH202 Cable Length (*2)	/20	20m
		/01E	1m
		/03E	3m
		/05E	5m
		/10E	10m
	For PH450G,PH202/TB Cable Length (*5)	/15E	15m
		/20E	20m
		/01G	1m
		/03G	3m
		/05G	5m
Adapter (*3)	/10G	10m	
	/15G	15m	
	/20G	20m	
	/S3	Stainless steel	
	/PP	Polypropylene	
O-ring	/PV	Rigid polyvinyl-chloride	
	/PF	Daielperfrow (*4)	

- * 1: Mark band is shown by mark and fork terminals are used.
- * 2: Mark band is shown by numeral and pin terminals are used.
- * 3: This is needed when using submersion type or flow-through type holder. However this is not needed when using adapter with temperature sensor (SA405). T11.EPS
- * 4: Choose Daielperfrow when this is used in organic solvent, high alkali or high temperature solution.
- * 5: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH4.

● Hydrofluoric Acid-Resistant pH Electrode

Model	Suffix Code	Option Code	Specifications
HF405	.....	.....	Hydrofluoric acid-resistant pH electrode
Insertion Length	-120	.....	120mm
Option	For PH200/PH400 Cable Length (*1)	/01	1m
		/03	3m
		/05	5m
		/10	10m
		/15	15m
	For PH202 Cable Length (*2)	/20	20m
		/01E	1m
		/03E	3m
		/05E	5m
		/10E	10m
	For PH450G,PH202/TB Cable Length (*5)	/15E	15m
		/20E	20m
		/01G	1m
		/03G	3m
		/05G	5m
Adapter (*3)	/10G	10m	
	/15G	15m	
	/20G	20m	
	/S3	Stainless steel	
	/PP	Polypropylene	
O-ring	/PV	Rigid polyvinyl-chloride	
	/PF	Daielperfrow (*4)	

- * 1: Mark band is shown by mark and fork terminals are used.
- * 2: Mark band is shown by numeral and pin terminals are used.
- * 3: This is needed when using submersion type or flow-through type holder. However this is not needed when using adapter with temperature sensor (SA405). T11A.EPS
- * 4: Choose Daielperfrow when this is used in organic solvent, high alkali or high temperature solution.
- * 5: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH4.

● pH Electrodes for Chemical Processes

Model	Suffix Code	Option Code	Specifications
DPA405	.....	.....	pH electrodes for chemical processes
Insertion Length	-120	.....	120mm
Option	For PH200/PH400 Cable Length (*1)	/01	1m
		/03	3m
		/05	5m
		/10	10m
		/15	15m
	For PH202 Cable Length (*2)	/20	20m
		/01E	1m
		/03E	3m
		/05E	5m
		/10E	10m
	For PH450G,PH202/TB Cable Length (*5)	/15E	15m
		/20E	20m
		/01G	1m
		/03G	3m
		/05G	5m
Adapter (*3)	/10G	10m	
	/15G	15m	
	/20G	20m	
	/S3	Stainless steel	
	/PP	Polypropylene	
O-ring	/PV	Rigid polyvinyl-chloride	
	/HPV	Heat-resistant polyvinyl-chloride	
	/TN	Titanium	
	/PF	Daielperfrow (*4)	

- * 1: Mark band is shown by mark and fork terminals are used.
- * 2: Mark band is shown by numeral and pin terminals are used.
- * 3: This is needed when using submersion type or flow-through type holder. However this is not needed when using adapter with temperature sensor (SA405).
- * 4: Choose Daielperfrow when this is used in organic solvent, high alkali or high temperature solution. T12.EPS
- * 5: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH4.

● Adapter with Temperature Sensor (for pH Meter)

Model	Suffix Code	Option Code	Specifications
SA405	.....	.....	Adapter with temperature sensor
Measuring System	-A	.....	for PH200/PH400 (*1)
	-E	.....	for PH202 (*2)
	-G	.....	for PH450G,PH202/TB(*3)
Material of Temp. Sensor Cover/ Adapter	-HC	.....	Hastelloy C / Hastelloy C
	-S3	.....	Stainless steel / PEEK
	-TN	.....	Titanium / Titanium
Cable Length	-01		1m
	-03		3m
	-05		5m
	-10		10m
	-15		15m
	-20		20m

- (Note) Use O-ring covered by Teflon (K9148MR) when using a special holder for electrolytic processes. T16.EPS
- * 1: Mark band is shown by mark and fork terminals are used.
 - * 2: Mark band is shown by numeral and pin terminals are used.
 - * 3: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH4.

● pH Electrode for Small Culture Tanks

Model	Suffix Code	Option Code	Specifications
DPAS405	.....	.....	pH electrode for small culture tanks
Insertion Length (*1)	-120 -200 -325	..... ..... .....	120mm 200mm 325mm
Option	For PH200/PH400 Cable Length (*2)	/01	1m
		/03	3m
		/05	5m
		/10	10m
		/15	15m
	For PH202 Cable Length (*3)	/20	20m
		/01E	1m
		/03E	3m
		/05E	5m
		/10E	10m
		/15E	15m
		/20E	20m
	O-ring	/PF	Daielperfrow (*4)

* 1: Use silicon bush or socket (DIN Pg13.5 female) for an insertion length of 120mm and 200mm.

* 2: Mark band is shown by mark and fork terminals are used.

* 3: Mark band is shown by numeral and pin terminals are used.

* 4: Choose Daielperfrow when this is used in organic solvent, high alkali or high temperature solution.

T13.EPS

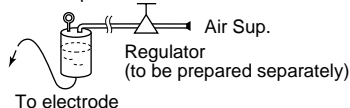
2. ORP Electrode

● KCl Filling Type ORP Electrode

Model	Suffix Code	Option Code	Specifications
OR8EFG	.....	.....	KCl Filling Type ORP Electrode
Sensor	-AU -PT	..... .....	Gold Platinum
Cable Length and KCl Tube Length	-03 -05 -07 -10 -15 -20	.....	3m
		.....	5m
		.....	7m
		.....	10m
		.....	15m
		.....	20m
		KCl Reserve Tank (*1)	-TT1 -TT2 -TN1 -TN2
.....	For medium pressure (*2)		
.....	For maintenance (for TT1)		
.....	For maintenance (for TT2)		
Measuring System	-N -E -B -G			.....	For OR200/OR400 (*3)
		.....	For PH202 (*4)
		.....	For OR100 (*5)
		.....	For PH450G,PH202/TB (*6)
		.....	For PH450G,PH202/TB (*6)
Style		*A	Style A

* 1: A 50A(2-inch) pipe mounting bracket is supplied with TT1 and TT2 . Only a supply tube, but no KCl solution, is supplied with TN1 and TN2. Since a KCl solution is not supplied with TT2, arrange it from among accessories or auxiliary parts.

* 2: Prepare an air pressure regulator as shown in the diagram below when the medium-pressure reserve tank is used.



* 3: Mark band is shown by mark and fork terminals are used.

* 4: Mark band is shown by numeral and pin terminals are used.

* 5: The tag which indicated the color, the sign, and the number is attached to the cable of a electrode.

T18.EPS

* 6: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH3.

● KCl Refillable Type ORP Electrode

Model	Suffix Code	Option Code	Specifications
OR8ERG	.....	.....	KCl Refillable Type ORP Electrode
Sensor	-AU -PT	..... .....	Gold Platinum
Cable Length	-03 -05 -07 -10 -15 -20	.....	3m
		.....	5m
		.....	7m
		.....	10m
		.....	15m
		.....	20m
		Measuring System	-N -E -B -G	.....	For OR200/OR400 (*1)
.....	For PH202 (*2)		
.....	For OR100 (*3)		
.....	For PH450G,PH202/TB (*4)		
Style		*A	Style A

*1: Mark band is shown by mark and fork terminals are used.

*2: Mark band is shown by numeral and pin terminals are used.

*3: The tag which indicated the color, the sign, and the number is attached to the cable of a electrode.

T17

*4: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH3.

● Solid Electrolyte ORP Electrode (Xerolyt)

Model	Suffix Code	Option Code	Specifications
HA485	.....	.....	Solid electrolyte ORP electrode
Insertion Length	-120	.....	120mm
Option	For OR200/OR400 Cable Length (*1)	/01	1m
		/03	3m
		/05	5m
		/10	10m
		/15	15m
	For PH202 Cable Length (*2)	/20	20m
		/01E	1m
		/03E	3m
		/05E	5m
		/10E	10m
For PH450G,PH202/TB Cable Length (*4)	/15E	15m	
	/20E	20m	
	/01G	1m	
	/03G	3m	
	/05G	5m	
	/10G	10m	
	/15G	15m	
Adapter (*3)	/20G	20m	
	/S3	Stainless steel	
	/PP	Polypropylene	
	/PV	Rigid polyvinyl-chloride	

*1: Mark band is shown by mark and fork terminals are used.

*2: Mark band is shown by numeral and pin terminals are used.

T19.EPS

*3: This is needed when using submersion type or flow-through type holder.

*4: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH3.

● ORP Electrodes for Chemical Processes

Model	Suffix Code	Option Code	Specifications
DPA485	.....	.....	Solid electrolyte ORP electrode
Insertion Length	-120	.....	120mm
Option	For OR200/OR400 Cable Length (*1)	/01	1m
		/03	3m
		/05	5m
		/10	10m
		/15	15m
	For PH202 Cable Length (*2)	/20	20m
		/01E	1m
		/03E	3m
		/05E	5m
		/10E	10m
	For PH450G,PH202/TB Cable Length (*4)	/15E	15m
		/20E	20m
		/01G	1m
		/03G	3m
		/05G	5m
Adapter (*3)	/10G	10m	
	/15G	15m	
	/20G	20m	
	/S3	Stainless steel	
	/PP	Polypropylene	
	/PV	Rigid polyvinyl-chloride	
	/HPV	Heat-resistant polyvinyl-chloride	
	/TN	Titanium	

- * 1: Mark band is shown by mark and fork terminals are used.
- * 2: Mark band is shown by numeral and pin terminals are used.
- * 3: This is needed when using submersion type or flow-through type holder. T20.EPS
- * 4: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH3.

● ORP Electrode for Small Culture Tanks

Model	Suffix Code	Option Code	Specifications
DPAS485	.....	.....	ORP Electrode for small culture tanks
Insertion Length (*1)	-120 -200 -325	..... ..... .....	120mm 200mm 325mm
Option	For OR200/OR400 Cable Length (*2)	/01	1m
		/03	3m
		/05	5m
		/10	10m
		/15	15m
	For PH202 Cable Length (*3)	/20	20m
		/01E	1m
		/03E	3m
		/05E	5m
		/10E	10m
		/15E	15m
		/20E	20m

- * 1: Use silicon bush or socket (DIN Pg13.5 female) for an insertion length of 120mm and 200mm.
- * 2: Mark band is shown by mark and fork terminals are used.
- * 3: Mark band is shown by numeral and pin terminals are used. T21.EPS

4. Terminal Box

● Terminal Box

See right table.

3. pH Measuring System for High Purity Water

● pH Electrode for High Purity Water

Model	Suffix Code	Option Code	Specifications
PH8EHP	.....	.....	pH electrode for high purity water
Cable Length	-03	.....	3m
	-05	.....	5m
	-07	.....	7m
	-10	.....	10m
	-15	.....	15m
	-20	.....	20m
	Solution Ground Tip	-TN	.....	Titanium
KCl Reserve Tank (*1)	-TT1	.....	For general purpose (250ml solution inlet)
	-TT3	.....	Big volume tank (With 500ml tank)
	-TN1	.....	For maintenance (for TT1)
	-N	.....	Always -N
Measuring System	-H	.....	For PH200/PH400 (*2)
	-E	.....	For PH202 (*3)
	-G	.....	For PH450G,PH202/TB (*4)
Style	*A	.....	Style A

- * 1: Since a KCl solution is not supplied with TT3, arrange it from among accessories or auxiliary parts. T09.EPS
- * 2: Mark band is shown by mark and fork terminals are used.
- * 3: Mark band is shown by numeral and pin terminals are used.
- * 4: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH3.

● pH Holder for High Purity Water

Model	Suffix Code	Option Code	Specifications
PH8HH	.....	.....	pH holder for high purity water
Connection ports	-JPT	.....	Inlet;Rc1/4, Outlet;Rc1/2
	-NPT	.....	Inlet;1/4NPT, Outlet;1/2NPT
	-H	.....	Always -H
Style	*A	.....	Style A
Option Mounting Bracket	/P /W		Pipe mounting bracket Wall mounting bracket

T10.EPS

Model	Suffix Code	Option Code	Specifications
WTB10	.....	.....	Terminal box
Combined System	-PH1	.....	For PH202 (General electrode)
	-PH2	.....	For PH202 (Special electrode) (*1)
	-PH3	.....	For PH450G,PH202/TB (General electrode)(*4)
	-PH4	.....	For PH450G,PH202/TB (Special electrode) (*1)(*4)
	-NN	.....	Always -NN
Cable Length (*2)	-00	.....	0m (*3)
	-05	.....	5m
	-10	.....	10m
	-15	.....	15m
	-20	.....	20m
	Option Mounting Bracket	/P		Pipe mounting bracket
/W			Wall mounting bracket
Conduit Adapter		/AWTB /ANSI	G1/2 1/2NPT

- * 1: Use -PH2 and -PH4 of combined system when using adapter with temperature sensor (SA405) is used.
- * 2: For WTB10 of combined system, maximum cable length including electrode cable length should be 20 m.
- * 3: Should be used the dedicated extension cable. T22-24.EPS
- * 4: M3 screw terminals and cable with M3 ring terminals are used.

5. Accessories

● Accessories for pH Meter

Model	Suffix Code	Option Code	Specifications
PH8AX	.....	.....	Accessories for pH meter (*1)
Calibration Reagents	-L	.....	Two bottles, each containing 250ml solution (pH7 and pH4) 24 bags, each bag containing powder for 500ml solution (pH7 X 12 bags and pH4 X 12 bags) and two 500ml polyethylene bottles.
	-P	.....
Style	*A	.....	Style A
Option (*2)		/STD	Sensor stand (with mounting bracket for 50A 2-inch pipe)
		/KCLL	KCl solution (one 250ml polyethylene bottle)
		/KCLP	KCl powder (three bags, 250ml solution each)
		/TMP	Thermometer (0 to 100 °C)

* 1: Including the following:
Two 200ml polyethylene cups
One cleaning bottle

* 2: Either /KCLL or /KCLP is required for PH8EFP-□-□-TT2.

T25.EPS

● Accessories for ORP Meter

Model	Suffix Code	Option Code	Specifications
OR8AX	.....	.....	Accessories for ORP meter(*1)
Style	*A	.....	Style A
Option (*2)		/STD	Sensor stand (with mounting bracket for 50A 2-inch pipe)
		/KCLL	KCl solution (one 250ml polyethylene bottle)
		/KCLP	KCl powder (three bags, 250ml solution each)
		/TMP	Thermometer (0 to 100 °C)

* 1: Including the following:
Two 200ml polyethylene cups
One cleaning bottle
One pack of quinhydrone reagent powder (three bags, 250ml solution each)
One 250ml polyethylene bottle

* 2: Either /KCLL or /KCLP is required for OR8EFG-□-□-TT2.

T26.EPS

6. Spare Parts

● Spare Parts for pH Meter

Part Name	Part Number	Remarks
Glass electrode	General purpose	K9142TN One for PH8ERP, PH8EFP, PH8EHP
		K9319NA One for PH8ERP/PF, PH8EFP/PF
	Certified version	K9142TP One for PF8EFP
		K9319NB One for PH8EFP/PF
High alkali	K9142TU One for PH8EFP/HA	
	K9319NC One for PH8EFP/HA, /PF	
Junction	General purpose	K9142TH One for PH8ERP, PH8EFP
		K9319QA One for PH8ERP, PH8EFP/PF
	High purity water	K9142TK One for PH8EHP
	Teflon	K9142HW One for PH8ERP/TF, PH8EFP/TF
K9319QB One for PH8ERP/TF,/PF,PH8EFP/TF,/PF		

Part Name	Part Number	Remarks	
Cable for PH202/TB PH450G (*1)	1m	K9148WA for HA405,DPA405,HF405	
	3m	K9148WB for HA405,DPA405,HF405	
	5m	K9148WC for HA405,DPA405,HF405	
	10m	K9148WD for HA405,DPA405,HF405	
	15m	K9148WE for HA405,DPA405,HF405	
	20m	K9148WF for HA405,DPA405,HF405	
Cable for PH200/PH400	1m	K9148KE for HA405,DPA405,HF405	
	3m	K9148KF for HA405,DPA405,HF405	
	5m	K9148KG for HA405,DPA405,HF405	
	10m	K9148KH for HA405,DPA405,HF405	
	15m	K9148KJ for HA405,DPA405,HF405	
	20m	K9148KK for HA405,DPA405,HF405	
	1m	K9148RA for DPAS405	
	3m	K9148RB for DPAS405	
	5m	K9148RC for DPAS405	
	10m	K9148RD for DPAS405	
	15m	K9148RE for DPAS405	
	20m	K9148RF for DPAS405	
	Cable for PH202	1m	K9148VA foHA405,DPA405,HF405
		3m	K9148VB foHA405,DPA405,HF405
5m		K9148VC foHA405,DPA405,HF405	
10m		K9148VD foHA405,DPA405,HF405	
15m		K9148VE foHA405,DPA405,HF405	
20m		K9148VF foHA405,DPA405,HF405	
1m		K9148VG for DPAS405	
3m		K9148VH for DPAS405	
5m		K9148VJ for DPAS405	
10m		K9148VK for DPAS405	
15m		K9148VL for DPAS405	
20m		K9148VM for DPAS405	
Adapter		SUS316	K9148NA for HA405, HA406, DPA405, DPA406, HF405
		Polypropylene	K9148NB for HA405, HA406, DPA405, DPA406, HF405
	Rigid polyvinyl-chloride	K9148NC for HA405, HA406, DPA405, DPA406, HF405	
	Heat-resistant polyvinyl-chloride	K9148ND for DPA405, DPA406	
KCl solution (3.3mol/l)	K9084LP	Six 250ml polyethylene bottles	
Buffer solution for calibration (pH4)	K9084LL	Six 250ml polyethylene bottles	
Buffer solution for calibration (pH7)	K9084LM	Six 250ml polyethylene bottles	
Buffer solution for calibration (pH9)	K9084LN	Six 250ml polyethylene bottles	
Powder for buffer solution (pH4)	K9020XA	12 bags,each for preparation of 500ml	
Powder for buffer solution (pH7)	K9020XB	12 bags, each for preparation of 500ml	
Powder for buffer solution (pH9)	K9020XC	12 bags, each for preparation of 500ml	
KCl powder (for PH8EFP, PH8EHP)	K9020XU	8 bags, each for preparation of 250ml	
KCl powder (for PH8ERP)	K9142UT	2 bags, 1 bottle of 3.3mol/l KCl, 1 syringe	

(*1) Applicable terminal box are WTB10-PH3 or WTB10-PH4.

(Note) The pH value of the calibrating buffer solution may vary depending on storage conditions.

Prepare a new solution from powder for accurate instrument calibration

T27.EPS

Spare Parts for ORP Meter

Part Name	Part Number	Remarks
Glass electrode	Platinum	K9142TS One for OR8ERG,OR8EFG
	Gold	K9412TT One for OR8ERG,OR8EFG
Junction	K9142TH	One for OR8ERG,OR8EFG
Cable for OR200/OR400	1m	K9148KE for HA485,DPA485
	3m	K9148KF for HA485,DPA485
	5m	K9148KG for HA485,DPA485
	10m	K9148KH for HA485,DPA485
	15m	K9148KJ for HA485,DPA485
	20m	K9148KK for HA485,DPA485
	1m	K9148RA for DPAS485
	3m	K9148RB for DPAS485
	5m	K9148RC for DPAS485
	10m	K9148RD for DPAS485
	15m	K9148RE for DPAS485
	20m	K9148RF for DPAS485
Adapter	SUS	K9148NA for HA485,DPA485
	PP	K9148NB for HA485,DPA485
	PVC	K9148NC for HA485,DPA485
	HPVC	K9148ND for DPA485
	Titanium	K9148NE for DPA485

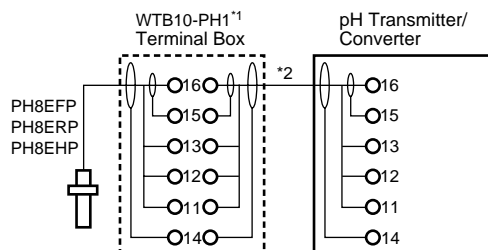
(*1) Applicable terminal box are WTB10-PH3 or WTB10-PH4.

T28.EPS

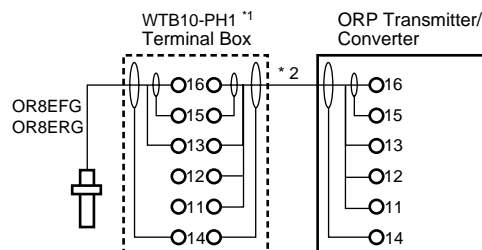
Part Name	Part Number	Remarks	
Cable for PH202/TB PH450G (*1)	1m	K9148WA for HA485,DPA485	
	3m	K9148WB for HA485,DPA485	
	5m	K9148WC for HA485,DPA485	
	10m	K9148WD for HA485,DPA485	
	15m	K9148WE for HA485,DPA485	
	20m	K9148WF for HA485,DPA485	
Cable for PH202	1m	K9148VA for HA485,DPA485	
	3m	K9148VB for HA485,DPA485	
	5m	K9148VC for HA485,DPA485	
	10m	K9148VD for HA485,DPA485	
	15m	K9148VE for HA485,DPA485	
	20m	K9148VF for HA485,DPA485	
	1m	K9148VG for DPAS485	
	3m	K9148VH for DPAS485	
	5m	K9148VJ for DPAS485	
	10m	K9148VK for DPAS485	
15m	K9148VL for DPAS485		
20m	K9148VM for DPAS485		
KCl solution (3.3mol/l)	K9084LP	Six 250ml polyethylene bottles	
KCl powder (for OR8EFG)	K9020XU	8 bags, each for preparation of 250ml	
KCl powder (for OR8ERG)	K9142UT	2 bags 1 bottle of 3.3mol/l KCl, 1 syringe	
Reagent for check	Quinhydrone	K9024EC	3 bags, each for preparation of 250ml
	Iron	K9024ED	3 bags, each for preparation of 250ml

WIRING DIAGRAMS

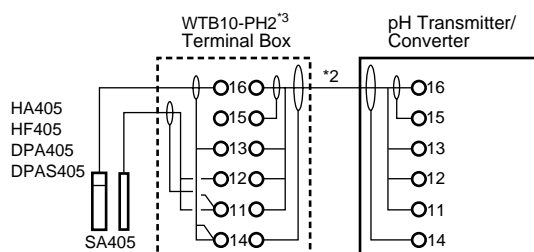
General purpose pH electrode



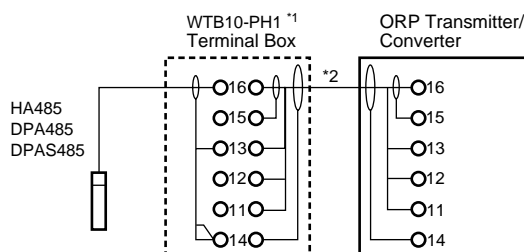
General purpose ORP electrode



Special pH electrode



Special ORP electrode



*1 : Terminal box is used only where pH/ORP transmitter is installed remotely from pH or ORP electrode (normally not needed).

When combined PH450G, PH202/TB, use WTB10-PH3 terminal box.

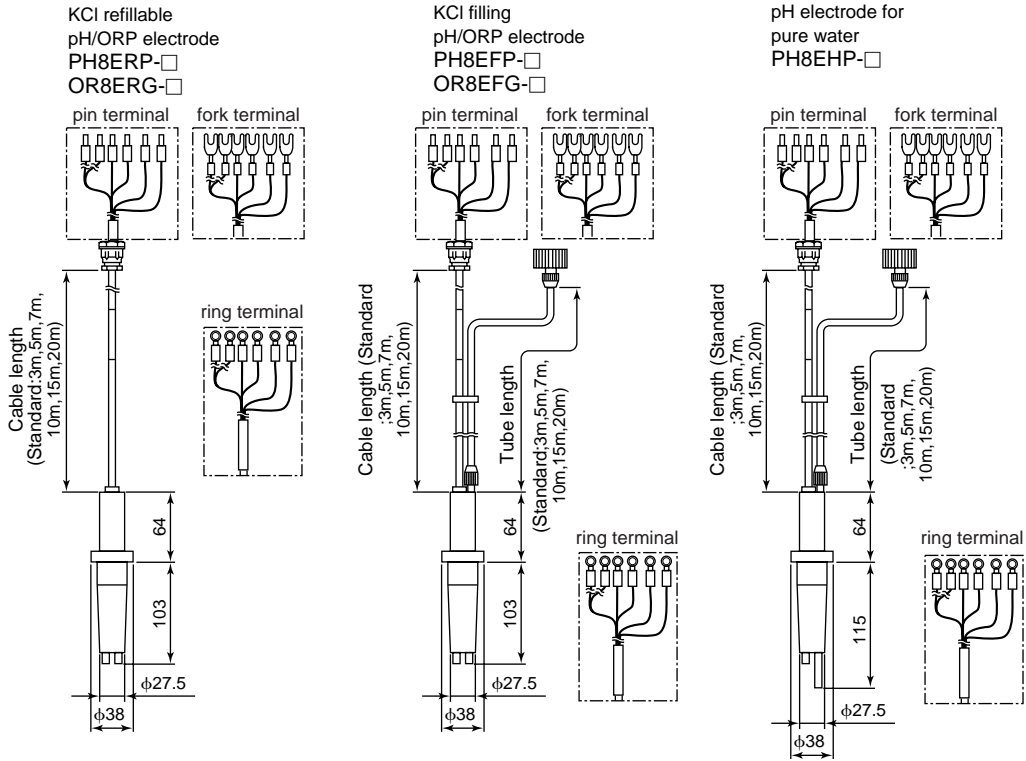
*2 : This cable is specified in the option code for the terminal box.

*3 : Should be used when using combined PH202G and SA405. When combined PH450G, PH202/TB and SA405, use WTB10-PH4 terminal box.

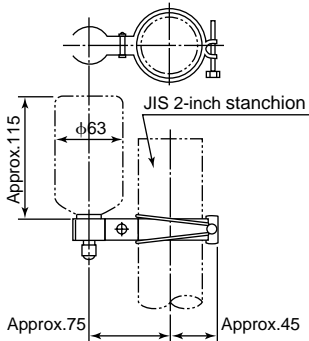
F03.EPS

DIMENSIONS

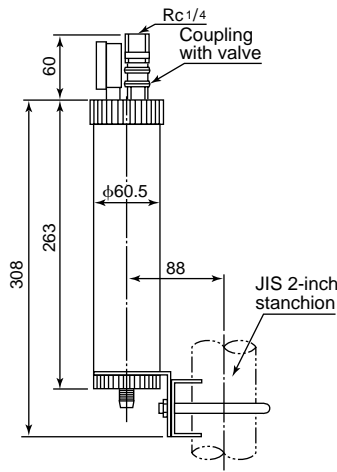
Unit : mm



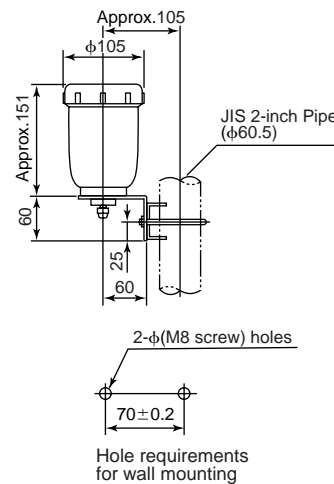
General purpose KCl reserve tank for KCl filling pH/ORP electrode and pH electrode for high purity water (with mounting bracket)
(PH8EFP-□)-TT1
(PH8EHP-□)-TT1
(OR8EFG-□)-TT1



Medium pressure KCl reserve tank for KCl filling pH/ORP electrode (with mounting bracket)
(PH8EFP-□)-TT2
(OR8EFG-□)-TT2



Big volume tank KCl reserve tank for KCl filling pH electrode and pH electrode for high purity water. (with mounting bracket)
(PH8EFP-□)-TT3
(PH8EHP-□)-TT3

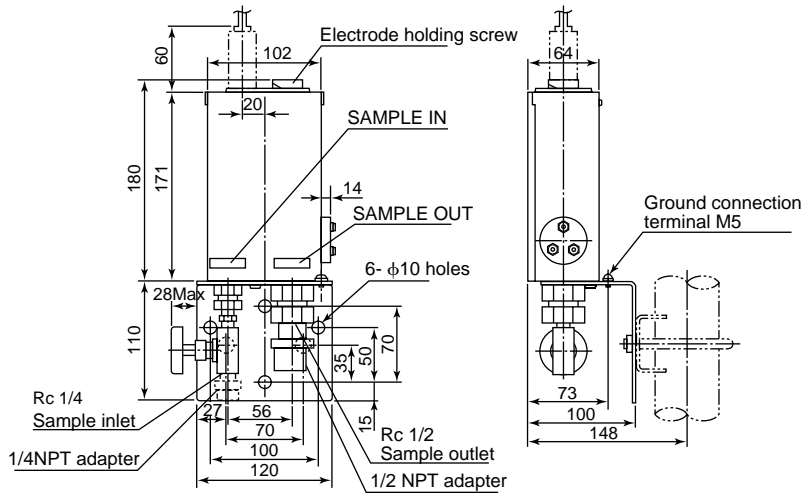


SD1.EPS

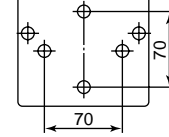
Holder for high purity water PH8HH

Unit : mm

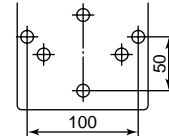
Hole dimensions for Holder mounting



1. Pipe mounting (2-inch pipe)



2. Wall mounting



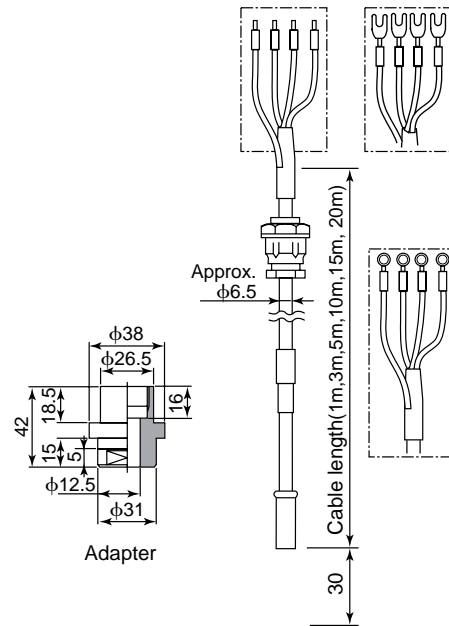
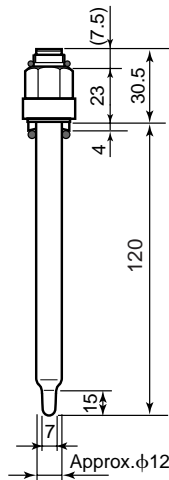
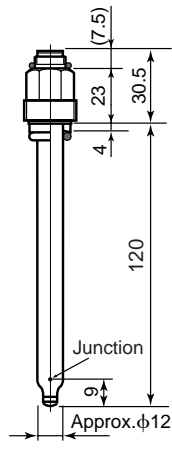
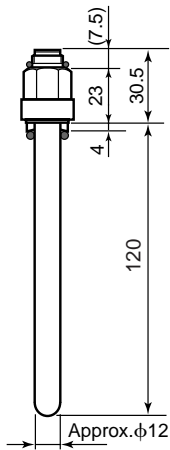
SD02.1.EPS

Solid electrolyte pH electrode (Xerolyt) HA405

Solid electrolyte ORP electrode (Xerolyt) HA485

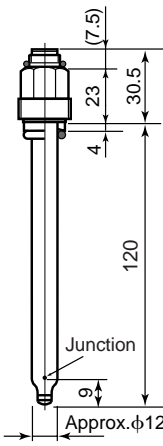
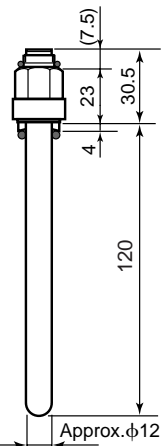
Hydrfluoric Acid-Resistant pH electrode HF405

Unit: mm



pH electrodes for chemical processes DPA405

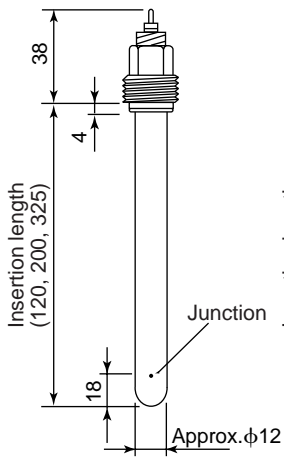
ORP electrodes for chemical processes DPA485



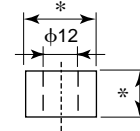
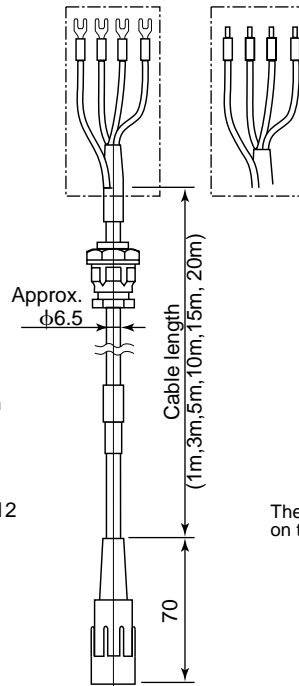
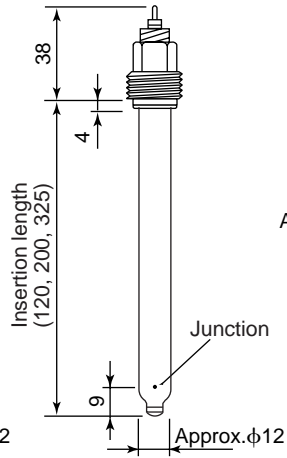
SD-02.2.EPS

Unit: mm

pH electrodes for small culture tanks DPAS405

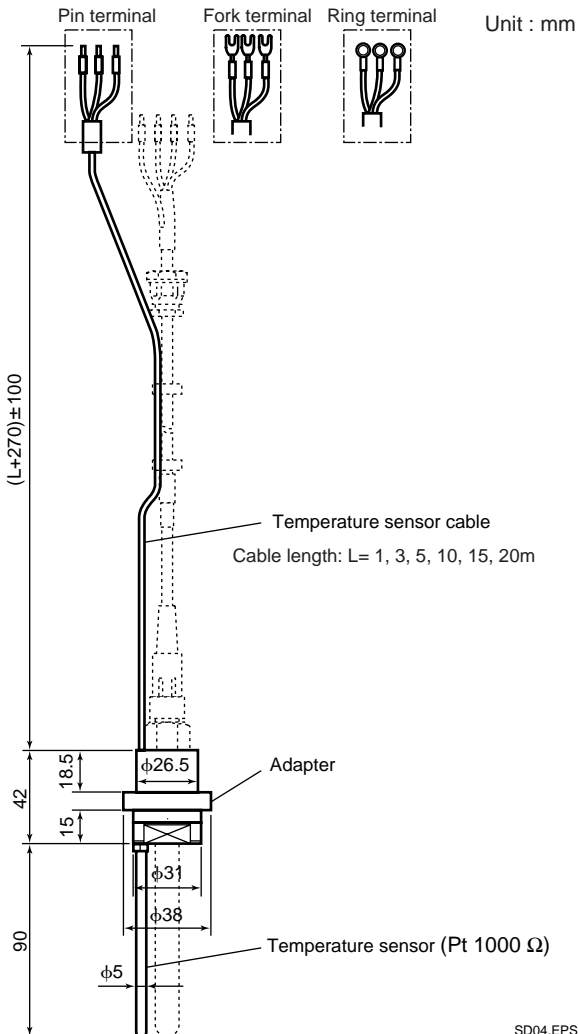


ORP electrodes for small culture tanks DPAS485



Silicon bush
The length marked with an asterisk(*) is depending on the electrode insertion.

Adapter with temperature sensor for pH electrode SA405

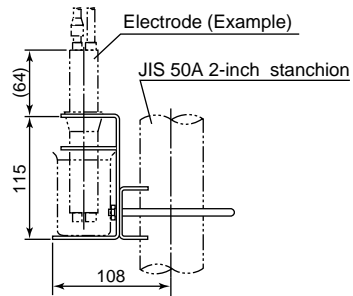


Unit : mm

SD-03.EPS

Sensor stand (PH8AX-□)/STD (OR8AX-□)/STD

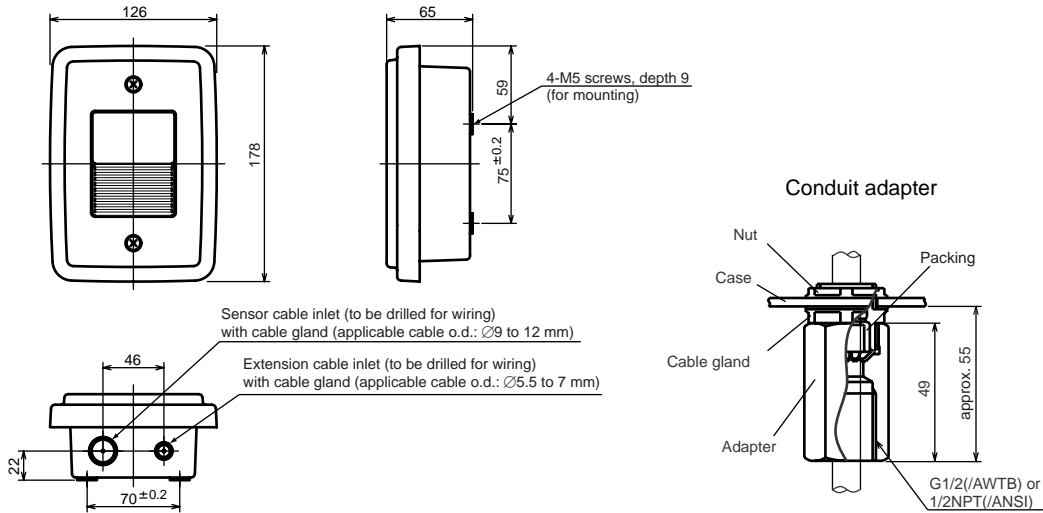
Unit: mm



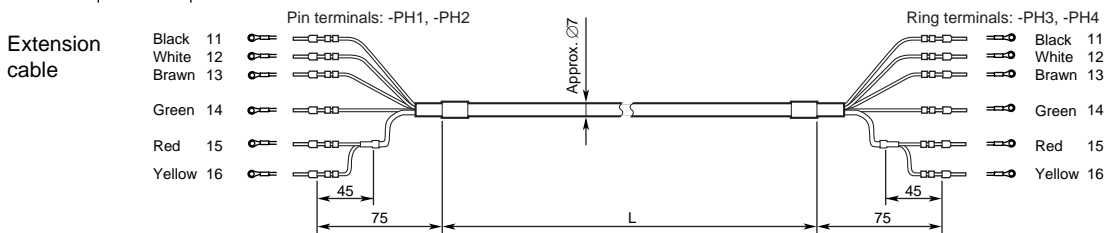
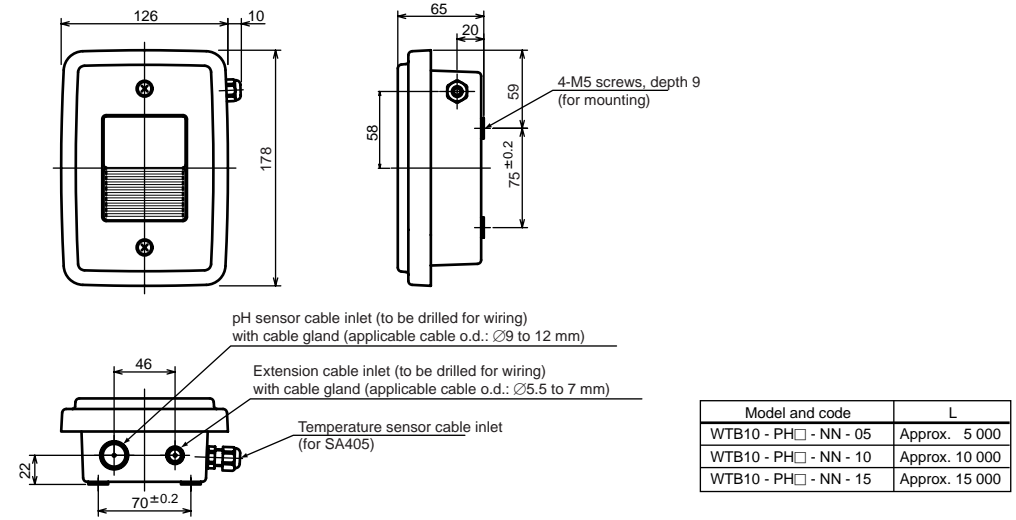
SD-06.EPS

Unit: mm

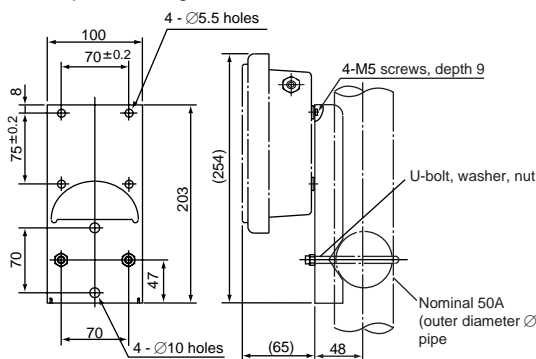
Terminal box WTB10-PH1, -PH3



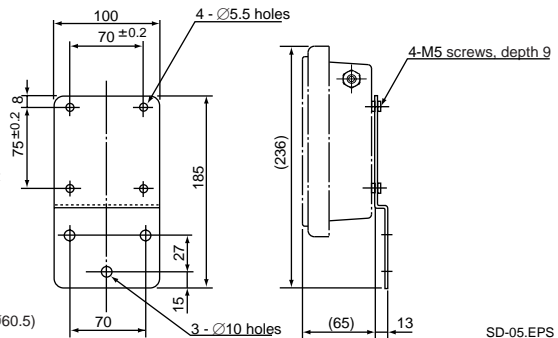
Terminal box WTB10-PH2, -PH4



Mounting bracket for terminal box
<Pipe mounting bracket: /P>



<Wall mounting bracket: /W>



SD-05.EPS

SELECTION CRITERIA FOR pH/ORP SENSOR AND HOLDER

<General Overall Criteria>

(1) When any of the two conditions listed below are applicable, select a KCl filling type pH electrode and either the submersion or flow-through type holder.

- The solution is out of the range $2 < \text{pH} < 12$.
- The solution contains organic or oil in the order of a few percent.

(2) When any of the two conditions listed below are applicable, consult our salesperson.

- Strong oxidizing solutions such as aqua regia, chromic acid, hypochloric acid, perchloric acid.
- The solution contains corrosive gases (ammonia, chlorine, hydrogen sulfide).

<Individual Criteria>


○: Can be used, △: Shortens useful life, X: Cannot be used

	Chemical	Concentration W/V (%)	pH * (25 °C)	Holder	
				Flow-through, Submersion	Guide-pipe
Inorganic acid	Sulfuric acid	0.5	1.0	○	×
		0.05	2.0	○	○
	Hydrochloric acid	0.4	1.0	○	×
		0.04	2.0	○	○
	Nitric acid	0.6	1.0	○	×
		0.06	2.0	○	○
	Phosphoric acid	1.0	1.5	○	△
	Boric acid	0.6	5.0	○	○
Organic acid	Carbonic acid	0.6	3.6	○	△
	Chromic acid	1.2	0.8	○	×
	Sulfurous acid	0.8	1.4	○	△
	Acetic acid	0.6	2.8	○	○
	Formic acid	0.5	2.3	○	○
	Oxalic acid	0.9	1.0	○	○
	Lactic acid	0.9	2.4	○	○
Phenol acid		0.9	5.4	○	△
	Monochloroacetic acid	0.9	1.8	○	×
Alkali	Calcium hydroxide	0.2	12.4	○	○
	Potassium hydroxide	0.5	12.7	○	△
	Sodium hydroxide	0.4	12.9	○	△
Acid salts	Ammonium chloride	5		○	○
	Aluminous water	5		○	○
	Zinc chloride	5		○	○
	Ferric chloride	5		○	○
	Ferric nitrate	5	1.3	○	△
Basic salts	Sodium sulfite	5		○	○
	Sodium carbonate	5	11.8	○	○
	Sodium phosphate	5		○	△
Neutral salts	Potassium chloride	5		○	○
	Sodium sulfate	5		○	○
	Calcium chloride	5		○	○
	Sodium nitrate	5	8.2	○	×
	Aluminum chloride	5		○	○
Oxidizing agents	Hydrogen peroxide	1		○	○
	Sodium hypochlorite solution	1	12.5	○	△
	Chlorinated lime	1		○	△
	Potassium bichromate	5	4.5	○	○
Organic solvents	Alcohol	10		○	△
	Organic solvent or oil (excluding alcohol)			○	×

Note: pH values in table are calculated from dissociation constant (including measured value).

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CAUTION



Select the material of wetted parts with careful consideration of process characteristics. Inappropriate selection may cause leakage of process fluids, which greatly affects facilities. Considerable care must be taken particularly in the case of strongly corrosive process fluid such as hydrochloric acid, sulfuric acid, hydrogen sulfide, and sodium hypochlorite. If you have any questions about the wetted part construction of the product, be sure to contact Yokogawa.

Table of Corrosion-Resistant Materials (The data should be used for reference only)

Note: This table shows corrosion resistance for each single substance alone. If a sample contains two or more substances, then the corrosion resistance may differ from that given in this table.

- ◎ : Excellent
- : Good
- △ : Not so good
- X : Unusable

	Holder material			Ultrasonic transducer material Electrode solution ground tip				Seal O-ring material	Electrode body material		Remarks
	Polypropylene	SUS 316	Hastelloy C	Titanium	Viton	Ryton					
Inorganic acid	Sulfurous acid	Concent'n Temp Judge	Concent'n Temp Judge	Concent'n Temp Judge	Concent'n Temp Judge	Strong acid ◎ Weak acid ◎	Concent'n Temp Judge				
		100 20 ◎ 90 ◎	6 30 ◎	6 30 ○	6 30 ◎		—				
	Sulfuric acid	5 20 ◎ 80 ◎	5 30 X	5 30 ◎ 30	5 30 ◎ 1 b X	5 30 ◎ 37 60 ○ 37 90 X					
		Chromic acid	20 20 △ 40 X	10 b ○	20 30 ○	10 b ◎	20 20 ○				
	Hypochlorous Acid		10 20 ◎ 40 ○	14 30 X	15 43 ◎	20 40 ◎	5 20 ○ 40 X				
		Hydrobromic acid	—	—	—	40 30 ◎	—				
	Nitric acid	10 20 ◎ 80 ◎	10 30 ◎	10 30 ◎	10 100 ○	5 20 ○ 10 60 X					
	Hydroiodic acid	57 20 ◎ 70 ◎	57 25 X	—	57 30 ○	—					
	Sulfuric acid	3 20 ◎ 3 100 ◎	6 30 ◎ 5 100 X	5 30 ◎ 5 70 ◎	5 30 ◎ 5 100 X	90 20 ◎ 30 90 ○					
		Phosphoric acid	30 60 ◎ 30 100 △	15 30 ◎ 5 b ◎	5 30 ◎ 5 b ◎	5 30 ◎ 5 60 ○	85 90 ◎				
Alkali	Ammonia water		15 80 ◎ 15 100 ○	10 b ◎ 28 65 ◎	10 b ◎ 20 65 ◎	10 b ◎ 20 65 ◎	15 30 ◎				
		Potassium hydroxide	—	10 b ◎ 25 b ◎	10 b ◎ 25 b ◎	10 b ◎ 25 b ◎	10 20 ◎ 10 90 △				
	Sodium hydroxide	20 80 ◎ 20 100 ◎	20 30 ◎ 20 b ◎	20 30 ◎ 20 b ◎	20 30 ◎ 20 b ◎	10 20 ◎ 10 90 △					
		Sodium hydroxide, 9 to 11% +Sodium chloride 15%	100 ◎	—	—	93 ◎	90 ○				
	Potassium carbonate	—	5 b ◎ 35 b ◎	5 b ◎ 35 b ◎	5 b ◎ 35 b ○	5 b ◎ 35 b ○					
	Sodium carbonate	sat. 100 ◎	25 b ◎	25 b ◎	25 b ◎	25 90 ◎					
Chlorides	Zinc chloride	—	20 b △	20 b ◎	20 b ◎	—					
	Aluminum chloride	—	25 25 X 25 25 X	—	10 b ◎ 25 b X	—					
		Ammonium chloride	35 40 ◎	25 b △	25 b ◎	25 b ◎	25 90 ◎ 20 90 ◎				
	Potassium chloride	—	sat. 60 ◎	sat. 60 ◎	sat. 60 ◎	—					
	Calcium chloride	sat. 80 ◎ sat. 100 ◎	25 b ○	25 b ◎	25 b ◎	25 90 ◎					
	Ferric chloride	20 40 ◎ 60 ◎	30 b X	30 b X	30 b ◎	20 60 ◎					
	Sodium chloride, 20% + Saturated Cl ₂ (Electrolysis solution)	100 ◎	90 X	90 X	90 ◎	20 △					
	Seawater, Magnesium chloride	24 ◎ sat. 80 ◎	24 △ 42 b △	42 b ◎	40 b ◎	24 ◎ 80 ○					
Sulfates	Ammonium sulfate	5 60 ◎ ◎	20 b ◎ sat. 30	20 b ◎ sat. 30	20 b ◎ sat. 30 ◎	10 90 ◎	Polypropylene may sometimes be eroded by ammonium sulfate crystals				
	Potassium sulfate	—	10 b ◎	10 b ◎	10 b ◎	10 90 ◎					
	Sodium sulfate	—	20 b ◎	20 b ◎	20 b ◎	10 90 ◎					
Nitrates	Ammonium nitrate	Corrsion resistance is good for usual salts.	20 b ◎	20 b ◎	20 b ◎	10 90 ◎					
	Sodium nitrate		50 b ◎	—	50 b ◎	—					
	Sodium sulfite		20 b ◎	—	20 b ◎	—					
Others	Hydrogen peroxide	10 30 ◎	—	10 30 ◎	—	10 30 ◎					
	Sodium sulfide	30 90 ◎ 20 80 ◎	2 60-90 X	2 60-90 △	15 30 ◎	5 90 ◎					
	Potassium bichromate	—	10 b ◎	10 b ◎	10 b ◎	—					
	Sodium sulfide	60 80 ◎	10 b ◎	—	10 b ◎	10 90 ◎					
Gases	Sodium bisulfate	—	10 b △	—	10 b ◎	—					
	Wet chlorine gas	20 ○ 40 △ 60 X	30 X	30 △	30 ◎	20 X					
		Sea water + Saturated Cl ₂	—	95 X	95 △	95 ◎	—				
	Bromine gas	—	—	30 ◎	30 ◎	10 30 X					
	Hydrogen sulfide	—	20 ◎	—	20 ◎	—					
Sulfurous acid gas	80 ◎ 100 ◎	—	—	30-90 ◎	80 ◎						

Note: "b" refers to the boiling point.

T.A.EPS

	Holder material			Ultrasonic transducer material Electrode solution ground tip				Seal O-ring material	Electrode body material	Remarks							
	Polypropylene			SUS 316		Hastelloy C	Titanium	Viton	Ryton								
	Concent'n	Temp	Judge	Concent'n	Temp	Judge	Concent'n	Temp	Judge		Concent'n	Temp	Judge				
Organic substances	Acetaldehyde	20	◎	100	30	◎	—	—	—	100	20	○					
	Acetone	100	20	○	50	25	◎	—	—	100	25	X					
				100	110	◎				100	b	○					
	Aniline	100	20	◎	100	70	○	100	25	◎	—	—	—				
		100	100	△													
	Ether	100	20	△	100	25	◎	—	—	—	100	20	◎				
	Ethylene glycol	100	70	◎	100	25	◎	—	—	—	—	—	—				
		100	100	◎													
	Ethyl alcohol	96	70	◎	100	b	◎	—	—	—	100	90	◎				
	Methyl chloride	100	20	X	100	25	◎	—	—	—	—	—	—				
	Glacial acetic acid	100	70	◎	—	—	—	—	—	100	24	X	100	20	◎		
		100	100	○													
	Glycerin	100	70	◎	100	25	◎	—	—	—	—	—	—	—			
		100	100	◎													
	Chlorophenol	100	20	◎	—	—	—	—	—	—	100	20	◎	—			
		100	70	△													
		100	100	X													
	Xylene	100	20	X	—	—	—	—	—	—	100	20	◎	—			
	Chlorobezene	100	20	X	—	—	—	—	—	—	—	—	—	—			
		100	100	X													
	Chloroform	100	20	X	100	b	◎	100	b	◎	100	b	◎	—	100	90	△
	Dioxane	100	20	◎	—	—	—	—	—	—	—	—	—	100	90	◎	
		100	70	△													
		100	100	X													
	Dichloroethare	100	70	X	—	—	—	—	—	—	—	—	—	—	—	—	
	Ethyl nitrate	100	20	◎	100	105	◎	—	—	—	—	—	—	100	90	○	
		100		△													
	Carbon tetrachloride	100	20	X	90	b	△	—	90	b	◎	100	24	X	—	—	
	Trichloroethylene	100	20	X	100	b	○	100	b	◎	100	b	◎	—	100	90	X
	Toluene	100	20	X	—	—	—	—	145	◎	—	—	—	100	90	◎	
	Benzophenone	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Benzaldehyde	100	20	◎	—	—	—	—	—	—	—	—	—	100	20	△	
		100	70	○										100	90	X	
	100	100	X														
Benzyl alcohol benzene	100	20	◎	100	30	△	—	100	30	○	100	25	○	100	90	◎	
Fomaldehyde	10	70	◎	37	b	◎	37	b	◎	37	b	◎	—	—	—		
	10	100	◎														
Methylnaphthelen	—	—	◎	—	—	—	—	—	—	—	—	—	—	—	—		
Methyl ethyl ketone	100	20	○	—	—	—	—	—	—	—	—	—	100	90	◎		
	100	70	△														
Methyl alcohol	100	20	◎	100	25	◎	—	—	—	—	—	—	100	25	◎		
Nitrobenzene	100	20	◎	—	—	—	—	—	—	—	—	—	100	90	X		
	100	70	○														
	100	100	X														
Acetic acid	100	20	◎	10	b	◎	—	10	b	◎	—	—	—	—	—		
	100	70	△														
	100	100	X														
Phenol	100	20	◎	95	30	◎	95	30	○	95	30	◎	—	100	90	△	
	100	100	○														
Benzonic acid	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Motor oil	100	20	◎	—	—	—	—	—	—	—	—	—	100	20	◎		
	100	70	○														
	100	100	△														
Petroleum ether	100	20	◎	—	—	—	—	—	—	—	—	—	100	20	○		
Kerosene	100	20	○	—	—	—	—	101	◎	—	—	—	100	20	○		
	100	70	X														
Tartaric acid	10	40	◎	50	100	△	50	100	△	50	100	◎	—	—	—		
	10	60	○														
	10	80	△														
Oil and fats	100	70	◎	100	25	◎	100	180	◎	100	180	◎	—	—	—		
Carbon sulfide	100	20	X	100	25	◎	—	—	—	100	25	◎	—	—	—		

Note: "b" refers to the boiling point.

TB.EPS

Enquiry Specifications Sheet for pH/ORP Electrode

For enquires on the Yokogawa pH/ORP electrodes, please tick (v)the appropriate box and write down the relevant information in the blanks.

1 General Information

Company name; _____
Contact Person; _____ Department; _____
Plant name; _____
Measurement location; _____
Purpose of use; Indication, Recording, Alarm, Control
Power supply; _____ V AC _____ Hz

2 Measurement Conditions

(1) Process temperature; _____ to _____ Normally _____ [°C]
(2) Process pressure; _____ to _____ Normally _____ [kPa]
(3) Flow rate; _____ to _____ Normally _____ [l/min]
(4) Flow speed; _____ to _____ Normally _____ [m/s]
(5) Slurry or contaminants; No, Yes _____
(6) Name of process fluid; _____
(7) Components of process fluid; _____
(8) Others; _____

3 Installation Site

(1) Ambient temperature; _____
(2) Location; Outdoors, Indoors _____
(3) Others; _____

4 Requirements

(1) Measuring range; pH 0 to 14, _____
(2) Transmission output; 4 to 20 mA DC , _____
(3) System configuration selection; Electrode, Holder, pH/ORP Transmitter/Converter, Cleaning system,
 Terminal box, Accessories
(4) Electrode cable length; 3 m, 5 m, 7 m, 10 m, 15 m, 20 m, ____m
(5) Electrode operating pressure; 10 kPa or less, Greater than 10 kPa
(6) Type of holder; Guide pipe, Submersion, Flow-through, Suspension, Angled floating ball,
 Vertical floating ball
(7) Cleaning method; No cleaning, Ultrasonic cleaning, Jet cleaning, Brush cleaning
(8) Sample temperature; -5 to 105°C, -5 to 100°C, - 5 to 80°C
(9) Others; _____