

General Specifications

pH and ORP Sensors

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

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



FEATURES

Ryton pH/ORP Sensors 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 sensor can support all applications regardless of whether a holder or cleaner is used.
- The integrated-sensor design simplifies calibration with standard solutions and maintenance.
- The pH glass electrode of a pH sensor, the platinum or gold electrode of a ORP sensor and junction can be individually replaced.

Solid Electrolyte pH/ORP Sensors (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 Sensors 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 Sensor (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 Sensor for High Purity Water: PH8EHP

- The dedicated holder provides solutions to problems that arise when measuring high-purity water.
- Combined with PH202, FLXA21, PH450G, compensates for the effect of fluid temperature.

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SYSTEM CONFIGURATION


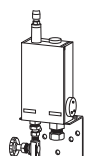
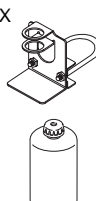
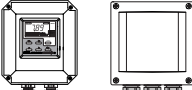
For the PH202, FLXA21 2-Wire Type pH/ORP transmitter, see GS 12B07D02-E, GS 12A01A02-01E and for the PH400G, PH450G 4-Wire Type pH Converter, see GS 12B7C1-E, GS 12B07C05-01E.

For the holders or cleaning devices, see GS 12J05C02-00E.

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	<ul style="list-style-type: none">● EXA PH dedicated Distributor PH201G● Maintenance Contact Output● Cleaning Contact Output● Fail Contact Output● General Distributor SDBT, SDBS, etc.
Accessories	Cleaning Devices		pH/ORP Transmitter
<ul style="list-style-type: none">● Sensor Stand	<ul style="list-style-type: none">● Ultrasonic Oscillator PUS400G	<ul style="list-style-type: none">● 2-wires pH/ORP Transmitter PH202G, FLXA21 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 	<ul style="list-style-type: none"> ● PH8AX ● Sensor Stand ● Calibration Reagent and KCL Solution 	<ul style="list-style-type: none"> ● 2-wires pH Transmitter PH202G, FLXA21 PH450G converter 	<p>Same as for General Purpose or Non-Explosionproof Types</p>

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SPECIFICATIONS

1. pH Sensor

1-1. Common Specifications

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

Table 1. Process Temperature Range

pH Sensor	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
	Flow-through (PH8HF)	SUS	None, Provided			-5 to 80
	Suspension (HH350G)	SUS	None, Provided			-5 to 80
	Float (PB350G, PB360G)	PP,SUS	None			-5 to 50
PH8EFP	Guide-pipe (PH8HG)	PVC	None		2 to 12	-5 to 50
		PP	None			-5 to 80
	Submersion (PH8HS)	PP,SUS	None, Provided		0 to 14	-5 to 100
						-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
	Float (PB350G, PB360G)	PP,SUS	None			-5 to 50
PH8EHP	High purity water (PH8HH)	Acryl	None		2 to 12	0 to 50
HA405 DPA405 HF405	Submersion (PH8HS)	PP,SUS	None	PVC	HA405 2 to 14	0 to 50
			Provided	PP,SUS		0 to 100
				PVC		0 to 50
				PP,SUS		0 to 80
	Flow-through (PH8HF)	PP	None, Provided	PVC	DPA405 0 to 14	0 to 50
				PP,SUS		0 to 80
				PVC		0 to 50
				PP,SUS		0 to 80
		SUS	None	PVC	HF405 2 to 11	0 to 50
				PP		0 to 80
				SUS		0 to 100
			Provided	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 12J05C02-00E.

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

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Table 2. Process Pressure Range

pH Sensor 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 12J05C02-00E.

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

(*1) When general purpose reserve tank used.

T02.EPS

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

Table 3. Selection for pH Sensor

pH Sensor 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 sensor because the table above is just for reference.

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1-2. KCl Refillable Type Sensor (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 Sensor 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; Rytan (PPS resin), glass, titanium or Hastelloy C, ceramics, teflon, 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: Sensor; Approx. 0.4kg, Tank; Approx. 0.3kg (General purpose), Approx. 1kg (Medium pressure), Approx. 0.8kg (Big-volume)

1-4. Solid Electrolyte pH Sensor (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 sensor cannot be used outdoors, even when using with a holder, this sensor cannot be used outdoors due to exposure to rain or due to condensation at a high humid place. This sensor cannot be used with a guide-pipe holder.
The sensor must be installed in a vertical position. It can not be installed from below and in a horizontal position, either.
The sensor may not stand a long-term use in solutions containing organic solvents because of the erosion of its internal electrolyte polymer.

1-5. pH Sensors 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 sensor)
(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, heat-resistant polyvinyl chloride or titanium

CAUTION ON USE:

This sensor cannot be used outdoors, even when using with a holder, this sensor cannot be used outdoors due to exposure to rain or due to condensation at a high humid place. This sensor cannot be used with a guide-pipe holder.
The sensor 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 Sensor 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 sensor cannot be used outdoors, even

when using with a holder, this sensor cannot be used outdoors due to exposure to rain or due to condensation at a high humid place. This sensor cannot be used with a guide-pipe holder.

The sensor 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" for pin terminal of PH202 or FLXA21, use "WTB10-PH6" for M4 ring terminal of FLXA21.

Use special type M3 ring terminal box of "WTB10-PH4" for 4-wire type converter "PH450G" and 2-wire type transmitter "PH202/TB".

1-8. pH Sensor 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 or Daielperfrow

CAUTION ON USE:

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

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

2. ORP Sensor

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 4. Process Temperature Range

ORP Sensor	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
			None, Provided		-5 to 80
	Float	PP,SUS	None		-5 to 50
HA485 DPA485	Submersion	PP,SUS	None	PVC	0 to 50
				PP,SUS	0 to 100
			Provided	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
			Provided	PVC	0 to 50
				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 holders GS 12J05C02-00E.

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

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Table 5. Process Pressure Range

ORP Sensor 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 500kPa	Atmospheric pressure to 250kPa
		Atmospheric pressure to 10kPa 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.

T05.EPS

2-2. KCl Refillable Type Sensor 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 Sensor 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: Sensor; Approx. 0.4kg

Tank; Approx. 0.3kg (General purpose), Approx. 1kg ((Medium pressure)

2-4. Solid Electrolyte ORP Sensor (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 sensor cannot be used outdoors, even when using with a holder, this sensor cannot be used outdoors due to exposure to rain or due to condensation at a high humid place. This sensor cannot be used with a guide-pipe holder.

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

2-5. ORP Sensors 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, heat-resistant polyvinyl chloride or titanium

CAUTION ON USE:

This sensor cannot be used outdoors, even when using with a holder, this sensor cannot be used outdoors due to exposure to rain or due to condensation at a high humid place. This sensor cannot be used with a guide-pipe holder.

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

2-6. ORP Sensor 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 sensor cannot be used outdoors and with guide-pipe holder.

The sensor 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 sensor for high purity water.

3-1. pH Sensor 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: Sensor; 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 (specify mounting bracket) or wall mounting (mounting bracket supplied with holder)

Weight: Body; Approx. 1.7kg
Mounting Bracket; Approx. 0.7kg

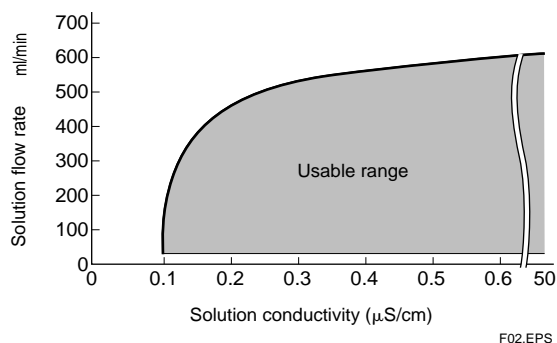


Fig.2 Solution flow rate and solution conductivity of sensor and holder for high purity water

4. Terminal Box

4-1. Terminal Box for General pH/ORP Sensors WTB10-PH1, -PH3, -PH5

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

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 sensor 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 Sensors WTB10-PH2, -PH4, -PH6

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 sensor 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 Sensor

● KCI Refillable Type pH Sensor

Model	Suffix Code	Option Code	Specifications
PH8ERP	.....	.....	KCI Refillable Type pH Sensor
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/FLXA21 (*2)
	-F	.....	For FLXA21 (*6)
	-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 sensor.

*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-PH3.

*6: Mark band is shown by numeral and M4 ring terminals are used. When terminal box is used, select WTB10-PH5.

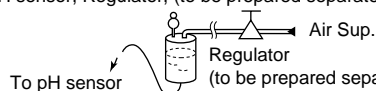
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● KCl Filling Type pH Sensor

Model	Suffix Code	Option Code	Specifications
PH8EFP	.....	.....	KCl Filling Type pH Sensor
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 (*2)
	-TT3	.....	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/FLXA21 (*4)
	-F	.....	For FLXA21 (*10)
	-B	.....	For PH100 (*5)
	-G	.....	For PH450G,PH202/TB (*9)
Style	*A		Style A
Option	O-ring	/PF	Daielperfrow (*6)
	Special glass electrode	/HA	Glass electrode for high alkali (*7)
	Special junction	/TF	Teflon junction (*8)

*1: 2-inch 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, 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 sensor, 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 sensor.

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

*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.

*10: Mark band is shown by numeral and M4 ring terminals are used.
When terminal box is used, select WTB10-PH5.

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● Solid Electrolyte pH Sensor (Xerolyt)

Model	Suffix Code	Option Code	Specifications
HA405	.....	.....	Solid electrolyte pH sensor
Insertion Length	-120	.....	120mm
Option	For PH200/PH400 Cable Length (*1)	/01	1m (Fork terminal)
		/03	3m (Fork terminal)
		/05	5m (Fork terminal)
		/10	10m (Fork terminal)
		/15	15m (Fork terminal)
		/20	20m (Fork terminal)
	For PH202/FLXA21 Cable Length (*2)	/01E	1m (Pin terminal)
		/03E	3m (Pin terminal)
		/05E	5m (Pin terminal)
		/10E	10m (Pin terminal)
		/15E	15m (Pin terminal)
		/20E	20m (Pin terminal)
	For FLXA21 Cable Length (*6)	/01F	1m (M4 ring terminal)
		/03F	3m (M4 ring terminal)
		/05F	5m (M4 ring terminal)
		/10F	10m (M4 ring terminal)
		/15F	15m (M4 ring terminal)
		/20F	20m (M4 ring terminal)
	For PH450G,PH202/TB Cable Length (*5)	/01G	1m (M3 ring terminal)
		/03G	3m (M3 ring terminal)
		/05G	5m (M3 ring terminal)
		/10G	10m (M3 ring terminal)
		/15G	15m (M3 ring terminal)
		/20G	20m (M3 ring terminal)
	Adapter (*3)	/S3	Stainless steel
		/PP	Polypropylene
		/PV	Rigid polyvinyl-chloride
/PF		Daielperfrow (*4)	
O-ring			

*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).

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

*5: Mark band is shown by numeral and M3 ring terminals are used.
When terminal box is used, select WTB10-PH4.

*6: Mark band is shown by numeral and M4 ring terminals are used.
When terminal box is used, select WTB10-PH6.

● 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/FLXA21 (*2)
	-F	.....	for FLXA21 (*4)
	-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.

*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.

*4: Mark band is shown by numeral and M4 ring terminals are used.
When terminal box is used, select WTB10-PH6.

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● pH Sensors for Chemical Processes

Model	Suffix Code	Option Code	Specifications
DPA405	.....	.....	pH sensor for chemical process
Insertion Length	-120	.....	120mm
Option	For PH200/PH400 Cable Length (*1)	/01 /03 /05 /10 /15 /20	1m (Fork terminal) 3m (Fork terminal) 5m (Fork terminal) 10m (Fork terminal) 15m (Fork terminal) 20m (Fork terminal)
	For PH202/FLXA21 Cable Length (*2)	/01E /03E /05E /10E /15E /20E	1m (Pin terminal) 3m (Pin terminal) 5m (Pin terminal) 10m (Pin terminal) 15m (Pin terminal) 20m (Pin terminal)
	For FLXA21 Cable Length (*6)	/01F /03F /05F /10F /15F /20F	1m (M4 ring terminal) 3m (M4 ring terminal) 5m (M4 ring terminal) 10m (M4 ring terminal) 15m (M4 ring terminal) 20m (M4 ring terminal)
	For PH450G,PH202/TB Cable Length (*5)	/01G /03G /05G /10G /15G /20G	1m (M3 ring terminal) 3m (M3 ring terminal) 5m (M3 ring terminal) 10m (M3 ring terminal) 15m (M3 ring terminal) 20m (M3 ring terminal)
	Adapter (*3)	/S3 /PP /PV /HPV	Stainless steel Polypropylene Rigid polyvinyl-chloride Heat-resistant polyvinyl-chloride
	O-ring	/TN /PF	Titanium 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 alkaline solution.

* 5: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH4.

* 6: Mark band is shown by numeral and M4 ring terminals are used. When terminal box is used, select WTB10-PH6.

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● Hydrofluoric Acid-Resistant pH Sensor

Model	Suffix Code	Option Code	Specifications
HF405	.....	.....	Hydrofluoric acid-resistant pH sensor
Insertion Length	-120	.....	120mm
Option	For PH200/PH400 Cable Length (*1)	/01 /03 /05 /10 /15 /20	1m (Fork terminal) 3m (Fork terminal) 5m (Fork terminal) 10m (Fork terminal) 15m (Fork terminal) 20m (Fork terminal)
	For PH202/FLXA21 Cable Length (*2)	/01E /03E /05E /10E /15E /20E	1m (Pin terminal) 3m (Pin terminal) 5m (Pin terminal) 10m (Pin terminal) 15m (Pin terminal) 20m (Pin terminal)
	For FLXA21 Cable Length (*6)	/01F /03F /05F /10F /15F /20F	1m (M4 ring terminal) 3m (M4 ring terminal) 5m (M4 ring terminal) 10m (M4 ring terminal) 15m (M4 ring terminal) 20m (M4 ring terminal)
	For PH450G,PH202/TB Cable Length (*5)	/01G /03G /05G /10G /15G /20G	1m (M3 ring terminal) 3m (M3 ring terminal) 5m (M3 ring terminal) 10m (M3 ring terminal) 15m (M3 ring terminal) 20m (M3 ring terminal)
	Adapter (*3)	/S3 /PP /PV /PF	Stainless steel Polypropylene Rigid polyvinyl-chloride Daielperfrow (*4)
	O-ring		

* 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.

* 5: Mark band is shown by numeral and M3 ring terminals are used. When terminal box is used, select WTB10-PH4.

* 6: Mark band is shown by numeral and M4 ring terminals are used. When terminal box is used, select WTB10-PH6.

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● pH Sensor for Small Culture Tanks

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

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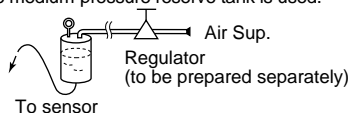
2. ORP Sensor

● KCl Filling Type ORP Sensor

Model	Suffix Code	Option Code	Specifications
OR8EFG	.....	.....	KCl Filling Type ORP Sensor
Electrode	-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 general purpose (250ml solution inlet) For medium pressure (*2) For maintenance (for TT1) For maintenance (for TT2)
Measuring System	-N -E -F -B -G	..... ..... ..... ..... .....	For OR200/OR400 (*3) For PH202/FLXA21 (*4) For FLXA21 (*7) For OR100 (*5) 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 sensor. T18.EPS

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

*7: Mark band is shown by numeral and M4 ring terminals are used. When terminal box is used, select WTB10-PH5.

● KCl Refillable Type ORP Sensor

Model	Suffix Code	Option Code	Specifications
OR8ERG	.....	.....	KCl Refillable Type ORP Sensor
Electrode	-AU -PT	..... .....	Gold Platinum
Cable Length	-03 -05 -07 -10 -15 -20	..... ..... ..... ..... ..... .....	3m 5m 7m 10m 15m 20m
Measuring System	-N -E -F -B -G	..... ..... ..... ..... .....	For OR200/OR400 (*1) For PH202/FLXA21 (*2) For FLXA21 (*5) 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 sensor. T17

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

*5: Mark band is shown by numeral and M4 ring terminals are used. When terminal box is used, select WTB10-PH5.

● Solid Electrolyte ORP Sensor (Xerolyt)

Model	Suffix Code	Option Code	Specifications
HA485	.....	.....	Solid electrolyte ORP sensor
Insertion Length	-120	.....	120mm
Option	For OR200/OR400 Cable Length (*1)	/01 /03 /05 /10 /15 /20	1m (Fork terminal) 3m (Fork terminal) 5m (Fork terminal) 10m (Fork terminal) 15m (Fork terminal) 20m (Fork terminal)
	For PH202/FLXA21 Cable Length (*2)	/01E /03E /05E /10E /15E /20E	1m (Pin terminal) 3m (Pin terminal) 5m (Pin terminal) 10m (Pin terminal) 15m (Pin terminal) 20m (Pin terminal)
	For FLXA21 Cable Length (*5)	/01F /03F /05F /10F /15F /20F	1m (M4 ring terminal) 3m (M4 ring terminal) 5m (M4 ring terminal) 10m (M4 ring terminal) 15m (M4 ring terminal) 20m (M4 ring terminal)
	For PH450G,PH202/TB Cable Length (*4)	/01G /03G /05G /10G /15G /20G	1m (M3 ring terminal) 3m (M3 ring terminal) 5m (M3 ring terminal) 10m (M3 ring terminal) 15m (M3 ring terminal) 20m (M3 ring terminal)
	Adapter (*3)	/S3 /PP /PV	Stainless steel Polypropylene 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.

*5: Mark band is shown by numeral and M4 ring terminals are used.

When terminal box is used, select WTB10-PH5.

● ORP Sensors for Chemical Processes

Model	Suffix Code	Option Code	Specifications
DPA485	.....	.....	ORP sensor for chemical process
Insertion Length	-120	.....	120mm
Option	For OR200/OR400 Cable Length (*1)	/01	1m (Fork terminal)
		/03	3m (Fork terminal)
		/05	5m (Fork terminal)
		/10	10m (Fork terminal)
		/15	15m (Fork terminal)
		/20	20m (Fork terminal)
	For PH202/FLXA21 Cable Length (*2)	/01E	1m (Pin terminal)
		/03E	3m (Pin terminal)
		/05E	5m (Pin terminal)
		/10E	10m (Pin terminal)
		/15E	15m (Pin terminal)
		/20E	20m (Pin terminal)
	For FLXA21 Cable Length (*5)	/01F	1m (M4 ring terminal)
		/03F	3m (M4 ring terminal)
		/05F	5m (M4 ring terminal)
		/10F	10m (M4 ring terminal)
		/15F	15m (M4 ring terminal)
		/20F	20m (M4 ring terminal)
	For PH450G,PH202/TB Cable Length (*4)	/01G	1m (M3 ring terminal)
		/03G	3m (M3 ring terminal)
		/05G	5m (M3 ring terminal)
		/10G	10m (M3 ring terminal)
		/15G	15m (M3 ring terminal)
		/20G	20m (M3 ring terminal)
	Adapter (*3)	/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.

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

* 5: Mark band is shown by numeral and M4 ring terminals are used. When terminal box is used, select WTB10-PH5.

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● ORP Sensor for Small Culture Tanks

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

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3. pH Measuring System for High Purity Water

● pH Sensor for High Purity Water

Model	Suffix Code	Option Code	Specifications
PH8EHP	.....	.....	pH sensor 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/FLXA21 (*3)
	-F	.....	For FLXA21 (*5)
	-G	.....	For PH450G,PH202/TB (*4)
Style	*A	.....	Style A

* 1: Only a KCl supply tube is supplied with TN1. KCl solution is supplied with TT1 and TT3.

* 2: Mark band is shown by mark and fork terminals are used. T09.EPS

* 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.

* 5: Mark band is shown by numeral and M4 ring terminals are used. When terminal box is used, select WTB10-PH5.

● pH Holder for High Purity Water

Model	Suffix Code	Option Code	Specifications
PH8HH	.....	.....	pH Holder for High Purity Water, wall-mount type
Connection ports	-JPT	.....	Rc1/4 (Inlet), Rc1/2 (Outlet)
	-NPT	.....	1/4NPT (Inlet), 1/2NPT (Outlet)
	-H	Always -H
Style	*A	Style A
Option	Mounting Bracket	/P	Pipe mounting bracket

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4. Terminal Box

● Terminal Box

Model	Suffix Code	Option Code	Specifications
WTB10	.....	.....	Terminal box
Combined System	-PH1	.....	For PH202, FLXA21 (General sensor of pin terminals)
	-PH2	.....	For PH202, FLXA21 (Special sensor, of pin terminals) (*1)
	-PH3	.....	For PH450G, PH202/TB (General sensor) (*4)
	-PH4	.....	For PH450G, PH202/TB (Special sensor) (*1) (*4)
	-PH5	.....	For FLXA21 (General sensor) (*5)
	-PH6	.....	For FLXA21 (Special sensor) (*1) (*5)
-----		-NN	Always -NN
Cable Length (*2)	-00	.....	0 m (*3)
	-05	.....	5 m
	-10	.....	10m
	-15	.....	15m
Option	Mounting Bracket	/P	Pipe mounting bracket
		/W	Wall mounting bracket
	Conduit Adapter	/AWTB	G1/2
		/ANSI	1/2NPT

* 1: Use -PH2, -PH4, -PH6 of combined system when using adapter with temperature sensor (SA405) is used.

* 2: For WTB10 of combined system, maximum cable length including sensor cable length should be 20 m.

* 3: The dedicated extension cable should be used.

* 4: M3 screw terminals and cable with M3 ring terminals are used.

* 5: M4 screw terminals and cable with M4 ring terminals are used.

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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)
	-P	.....	24 bags, each bag containing powder for 500ml solution (pH7 X 12 bags and pH4 X 12 bags) and two 500ml polyethylene bottles.
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.

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● 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.

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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
Junction		K9319NC One for PH8EFP/HA, /PF
	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
Cable with M4 ring terminal for FLXA21		K9319QB One for PH8ERP/TF, /PF, PH8EFP/TF, /PF
	1m	K9148XA for HA405,DPA405,HF405
	3m	K9148XB for HA405,DPA405,HF405
	5m	K9148XC for HA405,DPA405,HF405
	10m	K9148XD for HA405,DPA405,HF405
	15m	K9148XE for HA405,DPA405,HF405
	20m	K9148XF for HA405,DPA405,HF405

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Spare Parts for pH Meter

Part Name	Part Number	Remarks
Cable with M3 ring 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 with fork terminal 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
	3m	K9148RB for DPAS405
	5m	K9148RC for DPAS405
	10m	K9148RD for DPAS405
	15m	K9148RE for DPAS405
Cable with pin terminal for PH202/FLXA21	1m	K9148VA for HA405,DPA405,HF405
	3m	K9148VB for HA405,DPA405,HF405
	5m	K9148VC for HA405,DPA405,HF405
	10m	K9148VD for HA405,DPA405,HF405
	15m	K9148VE for HA405,DPA405,HF405
	20m	K9148VF for HA405,DPA405,HF405
	3m	K9148VH for DPAS405
	5m	K9148VJ for DPAS405
	10m	K9148VK for DPAS405
	15m	K9148VL for DPAS405
Adapter	20m	K9148VM for DPAS405
	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

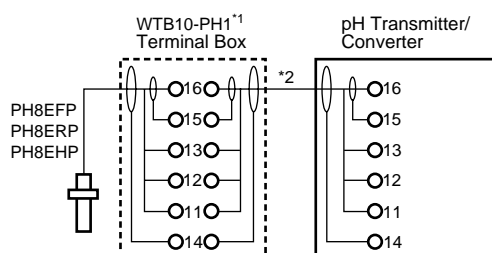
Part Name	Part Number	Remarks
Sensor	Platinum	K9142TS One for OR8ERG,OR8EFG
	Gold	K9142TT One for OR8ERG,OR8EFG
Junction		K9142TH One for OR8ERG,OR8EFG
Cable with fork terminal for OR200/OR400	1m	K9148KE for HA485,DPA485
	3m	K9148KF for HA485,DPA485
	5m	K9148KG for HA485,DPA485
	10m	K9148KH for HA485,DPA485
	15m	K9148KJ for HA485,DPA485
	20m	K9148KK for HA485,DPA485
	3m	K9148RB for DPAS485
	5m	K9148RC for DPAS485
	10m	K9148RD for DPAS485
	15m	K9148RE for DPAS485
Adapter	20m	K9148RF for DPAS485
	SUS	K9148NA for HA485,DPA485
	PP	K9148NB for HA485,DPA485
	PVC	K9148NC for HA485,DPA485
	HPVC	K9148ND for DPA485
	Titanium	K9148NE for DPA485

Part Name	Part Number	Remarks
Cable with M4 ring terminal for FLXA21	1m	K9148XA for HA485,DPA485
	3m	K9148XB for HA485,DPA485
	5m	K9148XC for HA485,DPA485
	10m	K9148XD for HA485,DPA485
	15m	K9148XE for HA485,DPA485
	20m	K9148XF for HA485,DPA485
Cable with M3 ring terminal for PH202/TB PH450G	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 with pin terminal for PH202/FLXA21	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
	3m	K9148VH for DPAS485
	5m	K9148VJ for DPAS485
	10m	K9148VK for DPAS485
	15m	K9148VL for DPAS485
KCl solution (3.3mol/l)	20m	K9148VM for DPAS485
	K9084LP	Six 250ml polyethylene bottles
	K9020XU	8 bags, each for preparation of 250ml
	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

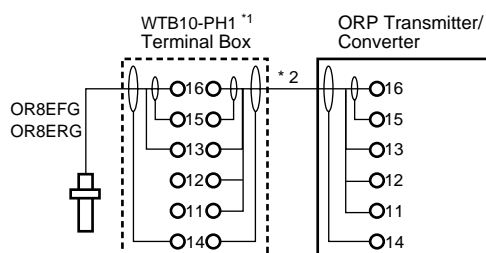
T28.EPS

WIRING DIAGRAMS

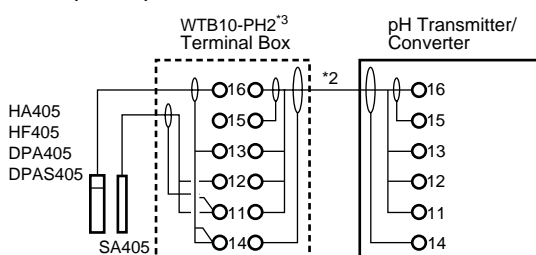
General purpose pH sensor



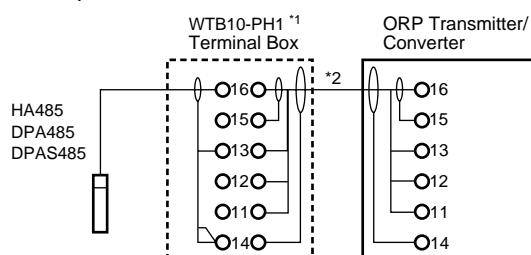
General purpose ORP sensor



Special pH sensor



Special ORP sensor



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

When combined PH450G, PH202/TB, use WTB10-PH3 terminal box. When combined by M4 ring terminals with FLXA21, use WTB10-PH5 terminal box.

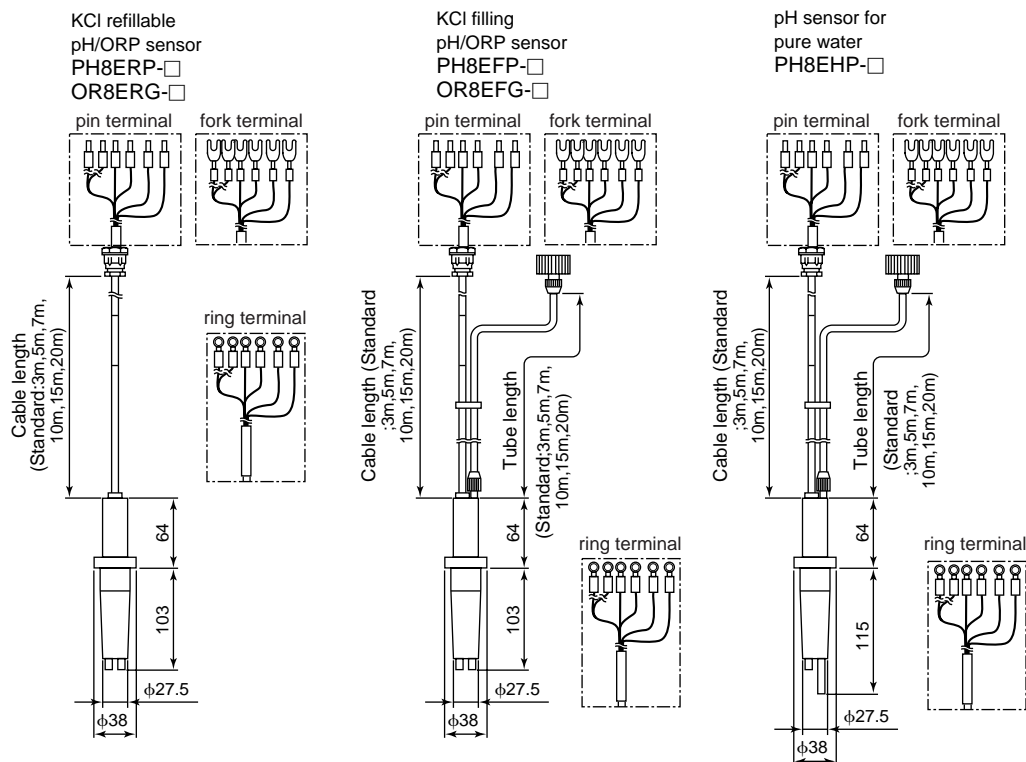
*2 : This cable is specified in the option code for the terminal box.

*3 : Should be used when using combined PH202G, FLXA21 and SA405. When combined PH450G, PH202/TB and SA405, use WTB10-PH4 terminal box. When combined by M4 ring terminals with FLXA21 and SA405, use WTB10-PH6 terminal box.

F03.EPS

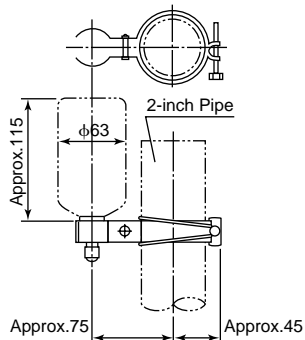
DIMENSIONS

Unit : mm

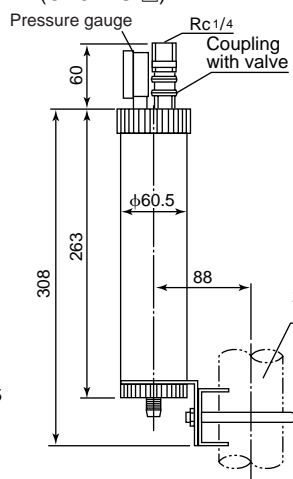


(Note) Numbers of terminal for ORP sensor is four.

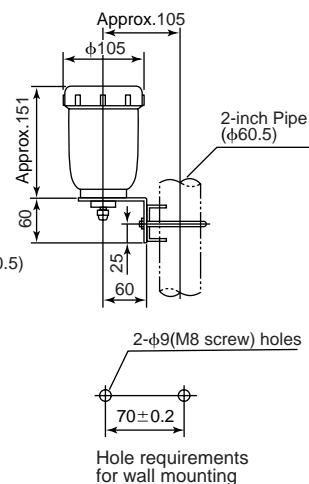
General purpose KCl reserve tank for KCl filling pH/ORP sensor and pH sensor for high purity water (with mounting bracket)
(PH8EFP-□)-TT1
(PH8EHP-□)-TT1
(OR8EFG-□)-TT1



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



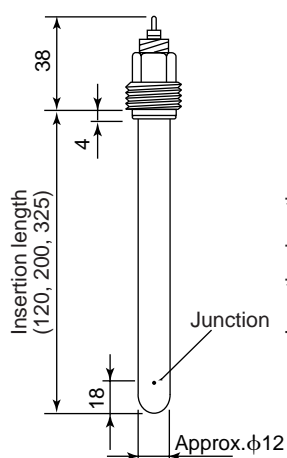
Big volume tank KCl reserve tank for KCl filling pH sensor and pH sensor for high purity water. (with mounting bracket)
(PH8EFP-□)-TT3
(PH8EHP-□)-TT3



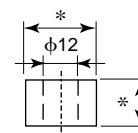
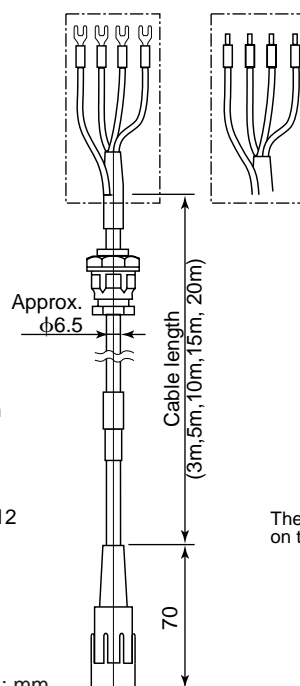
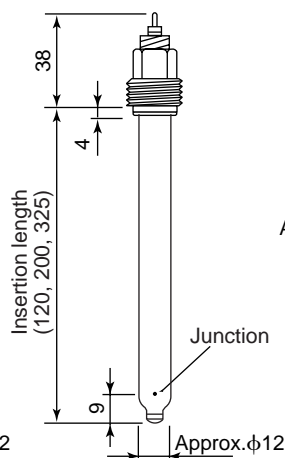
SD-01.EPS

Unit: mm

pH sensors for
small culture tanks
DPAS405



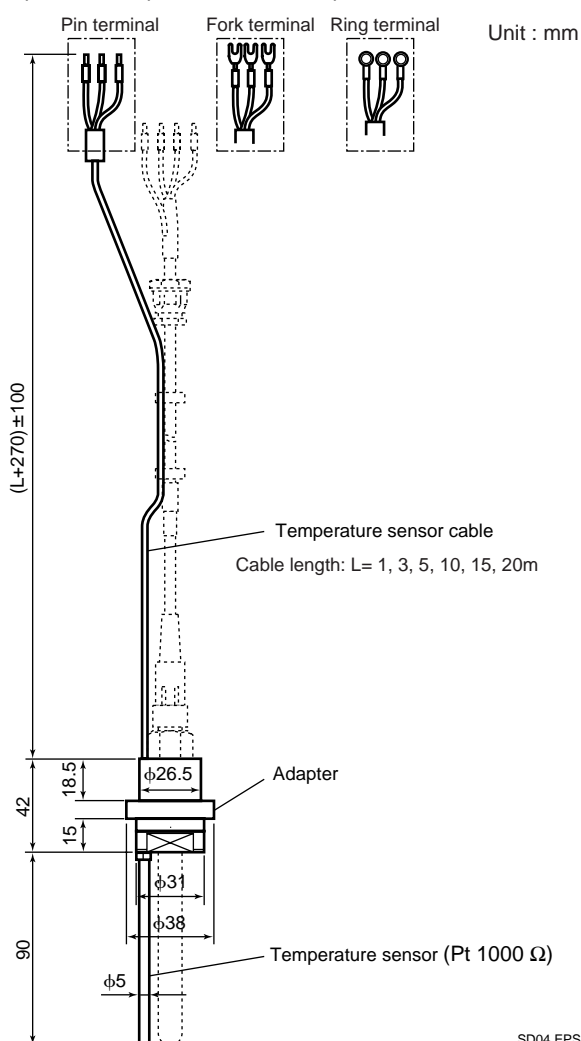
ORP sensors for
small culture tanks
DPAS485



Silicon bush

The length marked with an asterisk(*) is depending on the sensor insertion.

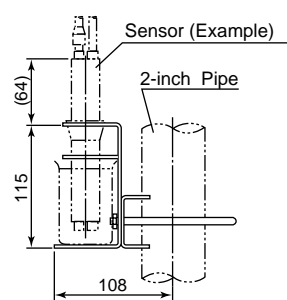
Adapter with temperature sensor for pH sensor SA405



SD04.EPS

Unit: mm

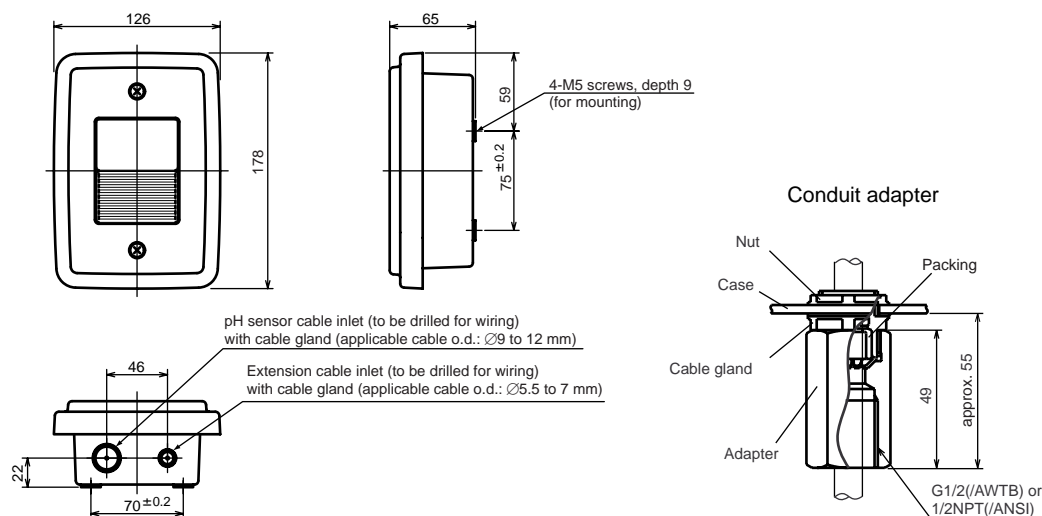
Sensor stand
(PH8AX-□)/STD
(OR8AX-□)/STD



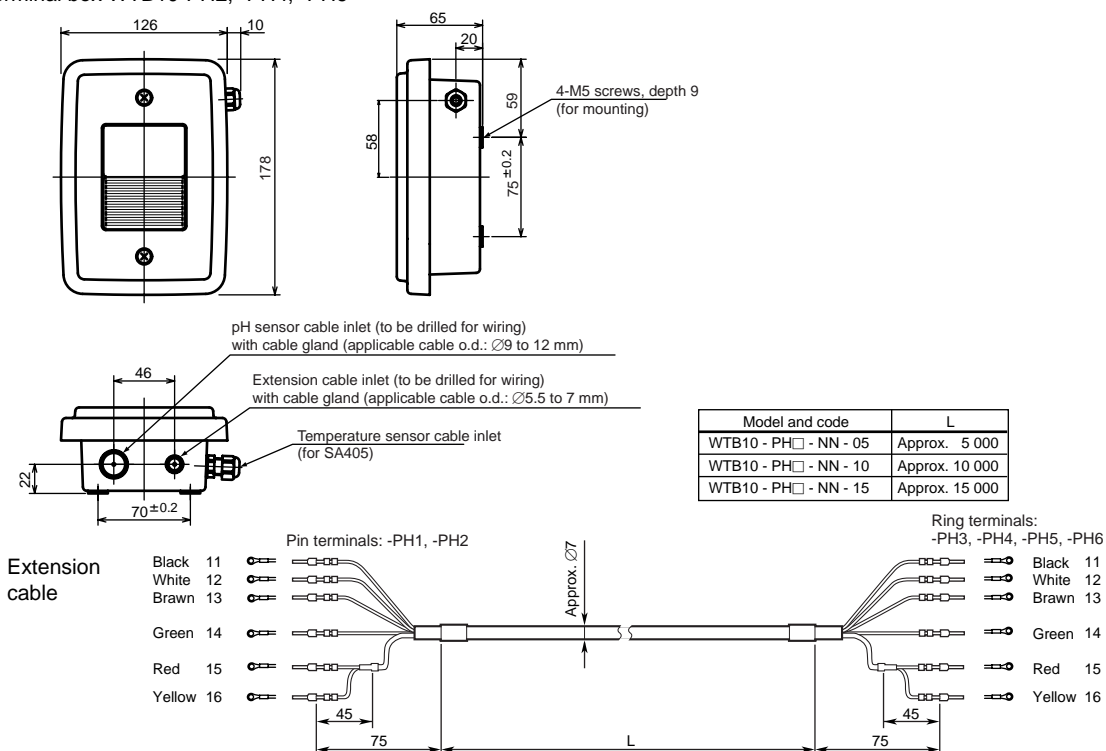
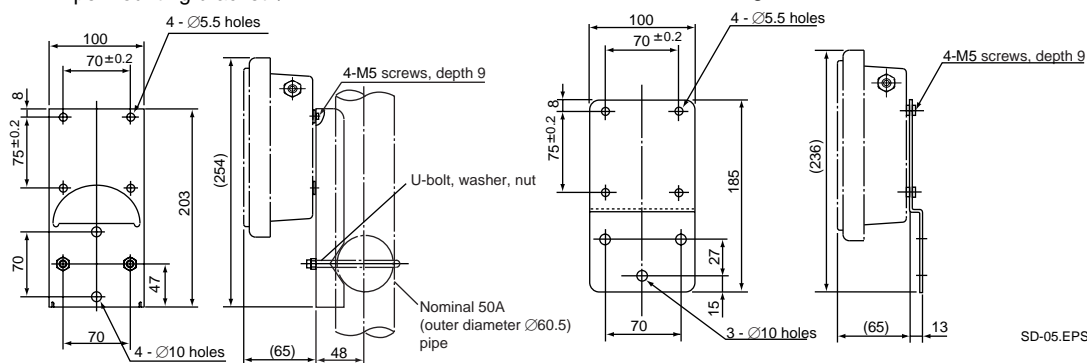
SD-06.EPS

Unit: mm

Terminal box WTB10-PH1, -PH3, -PH5



Terminal box WTB10-PH2, -PH4, -PH6

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

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 sensor 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	○	X
		0.05	2.0	○	○
	Hydrochloric acid	0.4	1.0	○	X
		0.04	2.0	○	○
	Nitric acid	0.6	1.0	○	X
		0.06	2.0	○	○
	Phosphoric acid	1.0	1.5	○	△
	Boric acid	0.6	5.0	○	○
	Carbonic acid	0.6	3.6	○	△
Organic acid	Chromic acid	1.2	0.8	○	X
	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	○	△
Alkali	Monochloroacetic acid	0.9	1.8	○	X
	Calcium hydroxide	0.2	12.4	○	○
	Potassium hydroxide	0.5	12.7	○	△
Acid salts	Sodium hydroxide	0.4	12.9	○	△
	Ammonium chloride	5		○	○
	Aluminous water	5		○	○
	Zinc chloride	5		○	○
	Ferric chloride	5		○	○
Basic salts	Ferric nitrate	5	1.3	○	△
	Sodium sulfite	5		○	○
	Sodium carbonate	5	11.8	○	○
Neutral salts	Sodium phosphate	5		○	△
	Potassium chloride	5		○	○
	Sodium sulfate	5		○	○
	Calcium chloride	5		○	○
	Sodium nitrate	5	8.2	○	X
Oxidizing agents	Aluminum chloride	5		○	○
	Hydrogen peroxide	1		○	○
	Sodium hypochlorite solution	1	12.5	○	△
	Chlorinated lime	1		○	△
Organic solvents	Potassium bichromate	5	4.5	○	○
	Alcohol	10		○	△
	Organic solvent or oil (excluding alcohol)			○	X

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

X : Unusable		Holder material		Ultrasonic transducer material Sensor solution ground tip				Seal O-ring material	Sensor body material	
		Polypropylene	SUS 316	Hastelloy C	Titanium	Viton	Ryton	Remarks		
Inorganic acid	Sulfurous acid	Concent'n Temp Judge 100 20 ◎ 90 ◎	Concent'n Temp Judge 6 30 ◎	Concent'n Temp Judge 6 30 ○	Concent'n Temp Judge 6 30 ◎	Strong acid ◎ Weak acid ◎	Concent'n Temp Judge ——			
	Hydrochloric acid	5 20 ◎ 5 80 ◎	5 30 X	5 30 ◎	5 30 ◎ 5 b X		5 30 ◎ 37 60 △ 37 90 X			
	Chromic acid	20 20 △ 20 40 X	10 b ○	20 30 ○	10 b ◎		20 20 ○			
	Hypochlorous Acid	10 20 ◎ 10 40 ○	14 30 X	15 43 ◎	20 40 ◎		5 20 ○ 40 X			
	Hydrobromic acid	——	——	——	40 30 ◎		——			
	Nitric acid	10 20 ◎ 10 80 ◎	10 30 ◎	10 30 ◎	10 100 ○		5 20 ○ 10 60 X			
	Hydroiodic acid	57 20 ◎ 57 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 ◎	Strong alkaliX Weak alkali △	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 ◎			
	Potassium chloride	sat. 60 ◎	sat. 60 ◎	sat. 60 ◎	sat. 60 ◎	——	20 90 ◎			
	Calcium chloride	sat. 80 ◎ sat. 100 ◎	25 b ○	25 b ◎	25 b ◎	——	25 90 ◎			
	Ferric chloride	20 40 ◎ 20 60 ◎	30 b X	30 b X	30 b ◎	——	20 60 ◎			
	Sodium chloride, 20% + Saturated Cl2 (Electrolysis solution)	100 ◎	90 X	90 X	90 ◎	——	20 △			
	Seawater, Magnesium chloride	24 ◎ sat. 80 ◎	24 △ 42 b △	42 b ◎	24 ◎ 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 Sodium sulfate	——	10 b ◎ 20 b ◎	10 b ◎ 20 b ◎	10 b ◎ 20 b ◎	—— ——	10 90 ◎ 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 ◎	——	——			
Others	Sodium sulfite		20 b ◎	——	20 b ◎	——	——	——		
	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 Cl2	——	95 X	95 △	95 ◎	——	——			
	Bromine gas	——	——	30 ◎	30 ◎	——	30 X			
	Hydrogen sulfide	——	20 ◎	——	20 ◎	——	——			
	Sulfurous acid gas	80 ◎ 100 ◎	——	——	30-90 ◎	——	80 ◎			

Note: "b" refers to the boiling point.

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

