General Specifications

pH and ORP Sensors

EXA PH

GS 12B07B02-E

■ GENERAL

Yokogawa's process pH (PH8EFP, PH8ERP) and ORP (OR8EFG, OR8ERG) 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.
For reliable measurement of pH of high purity water in boilers and semiconductor process applications, the pH sensor PH8EHP and holder PH8HH are offered.
This GS is mentiones about PH8EFP, PH8ERP, OR8EFG and OR8ERG. See GS12B10B00-01EN about PH4/OR4 Sensor Series pH/ORP Sensor.

■ FEATURES

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

- With the body made of Ryton, a strong engineering plastic, which is comparable to Fluoropolymer (PTFE) 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.

pH Sensor for High Purity Water: PH8EHP

- The dedicated holder provides solutions to problems that arise when measuring high-purity water.
- Combined with PH202, FLXA202/FLXA21, PH450G, compensates for the effect of fluid temperature.

■ SYSTEM CONFIGURATION

For the PH202, FLXA202, FLXA21 2-Wire Type pH/ORP transmitter, see GS 12B07D02-E, GS 12A01A03-01EN, GS 12A01A02-01E and for the PH450G 4-Wire Type pH Converter, see GS 12B07C05-01E.

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

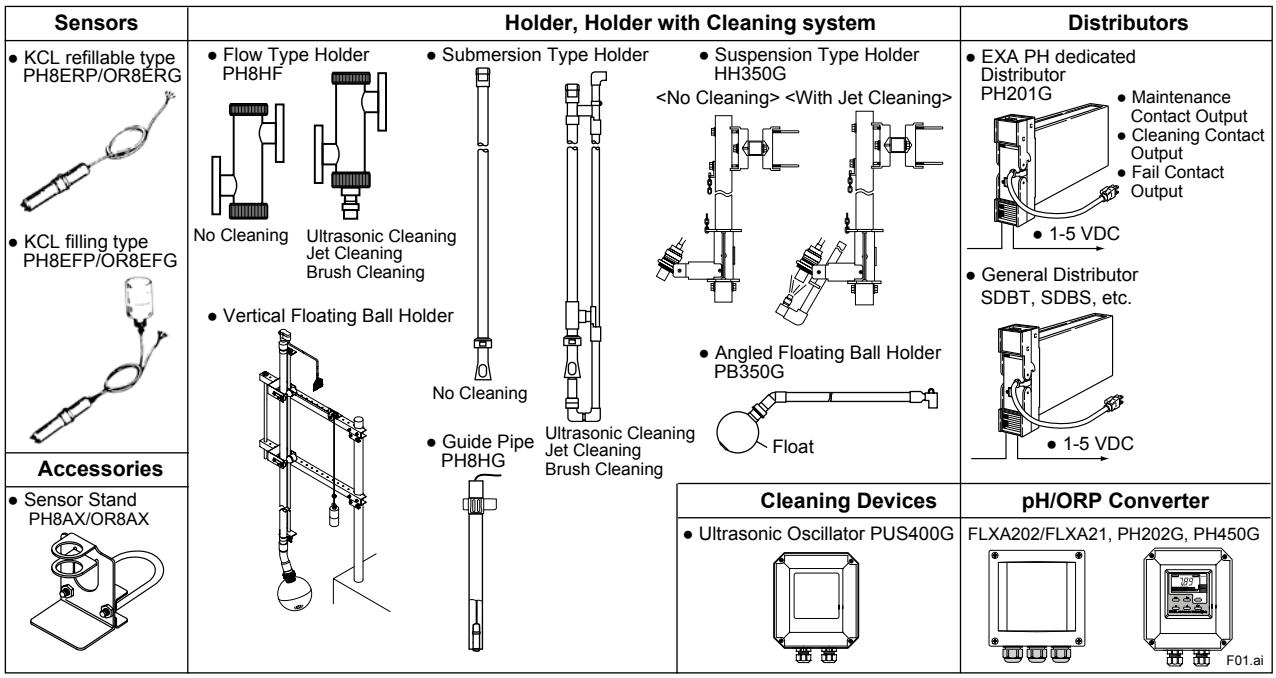

Fig.1-a System Configuration (General Purpose, Non-Explosionproof Types)

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GS 12B07B02-E

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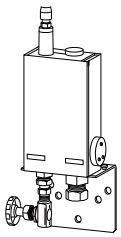
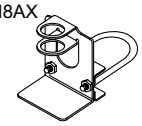
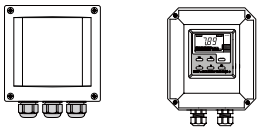
pH sensor	Holder	Accessories	pH Converter	Distributors
● For pure water PH8EHP 	● For pure water PH8HH 	● Sensor Stand PH8AX  ● Calibration Reagent and KCL Solution 	FLXA202/FLXA21, PH202G, PH450G 	Same as for General Purpose or Non-Explosionproof Types F01.ai

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

■ 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 (*2)	Holder Material (*1)	Cleaner	pH Range	Temperature (°C)
PE8ERP	Guide-pipe (PH8HG)	PVC	None	2 to 12	-5 to 50
		PP	None		-5 to 80
	Submersion (PH8HS) Flow-through (PH8HF)	PP	None, Provided		-5 to 80
		SS	None, Provided		-5 to 80
	Suspension (HH350G)	SS	None, Provided		-5 to 80
	Float (PB350G, PB360G)	PP, SS	None		-5 to 50
PH8EFP	Guide-pipe (PH8HG)	PVC	None	2 to 12	-5 to 50
		PP	None		-5 to 80
	Submersion (PH8HS)	PP, SS	None	0 to 14	-5 to 100
			Provided		-5 to 80
	Flow-through (PH8HF)	PP	None, Provided		-5 to 80
		SS	None		-5 to 105
			Provided		-5 to 80
	Suspension (HH350G)	SS	None, Provided		-5 to 80
	Float (PB350G, PB360G)	PP, SS	None		-5 to 50
PH8EHP	High purity water(PH8HH)	Acryl	None	2 to 12	0 to 50

Note: PV: Rigid Polyvinyl, PP: Polypropylene, SS: Stainless Steel
*1 Stainless steel holder should be used when the pH value of the solution is pH3 or more acidic.
*2 For flow-through types, refer also to the solution temperature and pressure diagram of Holder GS 12J05C02-00E.

Table 2. Process Pressure Range

pH Sensor / Holder	PH8ERP	PH8EFP
Submersion	Atmospheric pressure (Submersion depth: Max. 3 m)	
Guide-pipe Suspension Float	Atmospheric pressure (Submersion depth: Max.3 m)	
Flow-through (*1)	Atmospheric pressure to 50 kPa	Atmospheric pressure to 10 kPa (*2)
		Atmospheric pressure to 500 kPa (*3)

*1 For flow-through types, refer also to the solution temperature and pressure diagram of Holder GS 12J05C02-00E.
*2 When general purpose reserve tank used.
*3 When medium-pressure reserve tank used.

Table 3. Selection for pH Sensor

pH Sensor / Application	PH8ERP PH8EFP	PH8EHP
General purpose	○	×
High purity water	×	○
Contaminating and sulfide-containing solutions	×	×
Caustic electrolysis solutions Solutions containing organic solvents	×	×
Waste water containing hydrofluoric acid	×	×

Note: Consult sales personnel about selection for pH sensor because the table above is just for reference.

1-2. KCl Refillable Type Sensor (PH8ERP)

Measuring range: pH2 to 12
Measuring temperature: -5 to 80°C
(See Table 1 when using holder)
Measuring pressure: Atmospheric pressure to 50 kPa
(See Table 2 when using holder)
Temperature compensation sensor: Pt1000
Wetted part materials:
Body; Ryton (PPS resin), glass, titanium or Hastelloy C, ceramics, Fluoro rubber (FKM) or Perfluoroelastomer (FFKM)
Cable; Chlorinated polyethylene rubber (Cable sheath)
Weight: Approx. 0.4 kg

1-3. KCl Filling Type Sensor PH8EFP

Measuring range: pH0 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 10 kPa
(General purpose or big volume tank 500 mL)
(See Table 2 when using holder)
Atmospheric pressure to 500 kPa
(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 or Fluoropolymer (PTFE), Fluoro rubber (FKM) rubber or Perfluoroelastomer (FFKM)
Cable; Chlorinated polyethylene rubber (Cable sheath)
KCl tube; Heat-resistant soft PVC (General purpose or big volume tank 500 mL), Polyethylene (Medium pressure)
Weight:
Sensor; Approx. 0.4 kg
Tank; Approx. 0.3 kg (General purpose)
Approx. 1 kg (Medium pressure)
Approx. 0.8 kg (Big-volume)

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 (*2)	Holder Material (*1)	Cleaner	Temperature (°C)
OR8ERG	Guide-pipe	PVC	None	-5 to 50
		PP	None	-5 to 80
	Submersion, Flow-through	PP	None, Provided	-5 to 80
		SS	None, Provided	-5 to 80
	Suspension	SS	None, Provided	-5 to 80
	Float	PP, SS	None	-5 to 50
OR8EFG	Guide-pipe	PVC	None	-5 to 50
		PP	None	-5 to 80
	Submersion	PP, SS	None	-5 to 100
			Provided	-5 to 80
	Flow-through	PP	None, Provided	-5 to 80
		SS	None	-5 to 105
			Provided	-5 to 80
	Suspension	SS	None, Provided	-5 to 80
	Float	PP, SS	None	-5 to 50

Note: PV: Rigid Polyvinyl, PP: Polypropylene, SS: Stainless Steel
*1 Stainless steel holder and should be used when the pH value of the solution is pH3 or more acidic.
*2 For flow-through types, refer also to the solution temperature and pressure diagram of holders GS 12J05C02-00E.

Table 5. Process Pressure Range

ORP Sensor / Holder	OR8ERG	OR8EFG
Submersion	Atmospheric pressure (Submersion depth: Max. 3 m)	
Guide-pipe Suspension Float	Atmospheric pressure (Submersion depth: Max. 3 m)	
Flow-through (*1)	Atmospheric pressure to 50 kPa	General purpose Atmospheric pressure to10 kPa
		Medium pressure Atmospheric pressure to 500 kPa

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

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 50 kPa
(See Table 5 when using holder)
Wetted part materials:
Body; Ryton (PPS resin), platinum-glass or gold-epoxy resin, titanium, ceramics, Fluoro rubber (FKM)
Cable; Chlorinated polyethylene rubber (Cable sheath)
Weight: Approx. 0.4 kg

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 10 kPa
(General purpose or big volume tank 500 mL)
(See Table 5 when using holder)
Atmospheric pressure to 500 kPa
(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, Fluoro rubber (FKM)
Cable; Chlorinated polyethylene rubber (Cable sheath)
KCl tube; Heat-resistant soft PVC (General purpose), Polyethylene (Medium pressure)
Weight:
Sensor; Approx. 0.4 kg
Tank; Approx. 0.3 kg (General purpose)
Approx. 1 kg (Medium pressure)

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, Fluoro rubber (FKM)
Cable; Chlorinated polyethylene rubber (Cable sheath)
KCl tube; Heat-resistant soft PVC
Weight: Sensor ; Approx. 0.4 kg
Tank ; Approx. 0.3 kg (General purpose)

3-2. Holder for High Purity Water PH8HH

Material:
Wet part; Acrylic resin (holder), Stainless steel (316 SS), chloroprene rubber, NBR (Nitrile-butadien rubber)
Holder; Stainless steel (304 SS)
Mounting bracket: Stainless steel (304 SS)
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. 1.7 kg
Mounting Bracket; Approx. 0.7 kg

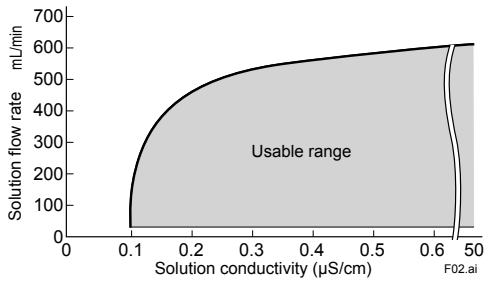


Fig.2 Solution flow rate and solution conductivity of sensor and holder for high purity water

4. Terminal Box

4-1. Terminal Box for General pH/ORP Sensors and PH4/OR4 Sensors (WTB10-PH1, -PH3, -PH5)

Used when transmitter or converter is installed remotely from general pH/ORP sensors and PH4/OR4 Sensors (PH4☐ in nocombination with SA405, OR4☐, or PH4☐T).

Maximum cable length including sensor cable length should be within 20 m.

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;
ø21 mm hole (With G1/2 plastic gland)
pH Transmitter or Converter side;
ø13 mm hole (With G1/2 plastic gland)
With Cable (Maximum length 20 m)
Conduit adapter(optional)

4-2. Terminal Box for PH4☐ Sensors (WTB10-PH2, -PH4, -PH6)

Used when transmitter or converter is installed remotely from PH4☐ in combination with SA405.

Maximum cable length including sensor cable length should be within 20 m.

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:
ø21 mm hole (With G1/2 plastic gland)
pH Transmitter or Converter side:
ø13 mm hole (With G1/2 plastic gland)
With Cable (Maximum length 20 m)
Conduit adapter(optional)
Temperature sensor side:
Pg7 plastic gland

5. Accessories (Purchased Separately)

See Model and Suffix Codes.

■ Compliance with the simple apparatus requirements

PH8EFP, PH8ERP and PH8EHP meet the simple apparatus requirements defined in the following standards.

Note: TIIS certified types cannot be connected.

Use the sensors under the conditions of use required by the standards.

Applicable standards:

ANSI/ISA-60079-11 (2014)
ANSI/ISA-60079-0 (2009)
CAN/CSA-C22.2 NO. 60079-11:14
CAN/CSA-C22.2 NO. 60079-0:11
방호장치 의무안전인증 고시

GB 3836.4-2010

Conditions of use:

(1) Use in combination with an internally isolated transmitter, or use with, a transmitter in combination with isolated barrier.
The FLXA21 is internally isolated.

(2) Upper limit of the process temperature.
The upper limit of process temperature is indicated below when the sensor is used in combination with a YOKOGAWA transmitter.

For FLXA21, model and suffix code below is available.

FLXA21-D-□-D-EA-P1-○-A-N-LA-N-NN
□ can be any value.
○ must be NN or P1.
Any option code is available.

For PH202S, model and suffix code below is available.

PH202S-○-E
○ must be C or U.
There are no PH202S models that meet the Korean explosion proof standards.
Any option code is available.

- **Upper limit of process temperature on the PH8EFP**

Transmitter used in combination	FLXA21		PH202S	
Ambient temperature Ta / Temperature class	40°C	60°C	40°C	60°C
T6	16	16	28	28
T5	81	31	95 (*1)	43
T4	105	66	105	78
T3	105	105	105	105
T2	105	105	105	105
T1	105	105	105	105

*1: Care about upper limit 100°C of temperature class T5 should be taken.

- **Upper limit of process temperature on the PH8ERP**

Transmitter used in combination	FLXA21		PH202S	
Ambient temperature Ta / Temperature class	40°C	60°C	40°C	60°C
T6	16	16	28	28
T5	80	31	80	43
T4	80	66	80	78
T3	80	80	80	80
T2	80	80	80	80
T1	80	80	80	80

- **Upper limit of process temperature on the PH8EHP**

Transmitter used in combination	FLXA21		PH202S	
Ambient temperature Ta / Temperature class	40°C	60°C	40°C	60°C
T6	16	16	28	28
T5	50	31	50	43
T4	50	50	50	50
T3	50	50	50	50
T2	50	50	50	50
T1	50	50	50	50

Other warnings are provided in the user's manual.

■ MODEL AND SUFFIX CODES

1. pH Sensor

- **KCl Refillable Type pH Sensor**

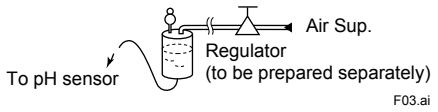
Model	Suffix Code	Option Code	Specifications
PH8ERP	.....	.....	KCl Refillable Type pH Sensor
Cable Length	**-03**	.....	3 m
	-05	.....	5 m
	-07	.....	7 m
	-10	.....	10 m
	-15	.....	15 m
	-20	.....	20 m
Solution Ground Tip	**-TN**	.....	Titanium
	-HC	.....	Hastelloy C
–	**-N**	.....	Always -N
pH Measuring System	**-T**	.....	For PH200/PH400 (*1)
	-E	.....	For PH202/FLXA202/FLXA21 (*2)
	-F	.....	For FLXA202/FLXA21 (*6)
	-B	.....	For PH100 (*3)
	-G	.....	For PH450G,PH202/TB (*5)
Style	***A**	.....	Style A
Option O-ring	**/PF**	.....	Perfluoroelastomer (FFKM) (*4)

*1: Mark band is shown by alphanumeric and fork terminals are used.
*2: Mark band is shown by numeral and pin terminals are used. When terminal box is used, select WTB10-PH1.
*3: The tag which indicated the color, the sign, and the number is attached to the cable of a sensor.
*4: Choose Perfluoroelastomer (FFKM) 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.

- **KCl Filling Type pH Sensor**

Model	Suffix Code	Option Code	Specifications
PH8EFP	.....	.....	KCl Filling Type pH Sensor
Cable Length and KCl Tube Length	**-03**	.....	3 m
	-05	.....	5 m
	-07	.....	7 m
	-10	.....	10 m
	-15	.....	15 m
	-20	.....	20 m
Solution Ground Tip	**-TN**	.....	Titanium
	-HC	.....	Hastelloy C
KCl Reserve Tank (*1)	**-TT1**	.....	For general purpose (250 mL solution inlet)
	-TT2	.....	For medium pressure (*2)
	-TT3	.....	Big volume tank (With 500 mL 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/FLXA202/FLXA21(*4)
	-F	.....	For FLXA202/FLXA21 (*10)
	-B	.....	For PH100 (*5)
	-G	.....	For PH450G,PH202/TB (*9)
Style	***A**	.....	Style A
Option O-ring	**/PF**	.....	Perfluoroelastomer (FFKM) (*6)
Special glass electrode	**/HA**	.....	Glass electrode for high alkali (*7)
Special junction	**/TF**	.....	PTFE 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 alphanumeric and fork terminals are used.
*4: Mark band is shown by numeral and pin terminals are used. When terminal box is used, select WTB10-PH1.
*5: The tag which indicated the color, the sign, and the number is attached to the cable of a sensor.
*6: Choose Perfluoroelastomer (FFKM) when this is used in organic solvent, high temperature alkaline solution.
*7: Choose when using in high alkali or high temperature alkaline 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.

2. ORP Sensor

• KCl Refillable Type ORP Sensor

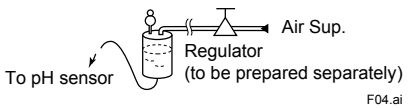
Model	Suffix Code	Option Code	Specifications
OR8ERG	.....	.....	KCl Refillable Type ORP Sensor
Electrode	**-AU**	.....	Gold
	-PT	.....	Platinum
Cable Length	**-03**	.....	3 m
	-05	.....	5 m
	-07	.....	7 m
	-10	.....	10 m
	-15	.....	15 m
	-20	.....	20 m
Measuring System	**-N**	.....	For OR200/OR400 (*1)
	-E	.....	For PH202/FLXA202/FLXA21 (*2)
	-F	.....	For FLXA202/FLXA21 (*5)
	-B	.....	For OR100 (*3)
	-G	.....	For PH450G,PH202/TB (*4)
Style	***A**	.....	Style A

*1: Mark band is shown by alphanumeric and fork terminals are used.
*2: Mark band is shown by numeral and pin terminals are used. When terminal box is used, select WTB10-PH1.
*3: The tag which indicated the color, the sign, and the number is attached to the cable of a sensor.
*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.

• KCl Filling Type ORP Sensor

Model	Suffix Code	Option Code	Specifications
OR8EFG	.....	.....	KCl Filling Type ORP Sensor
Electrode	**-AU**	.....	Gold
	-PT	.....	Platinum
Cable Length and KCl Tube Length	**-03**	.....	3 m
	-05	.....	5 m
	-07	.....	7 m
	-10	.....	10 m
	-15	.....	15 m
	-20	.....	20 m
KCl Reserve Tank (*1)	**-TT1**	.....	For general purpose (250 mL solution inlet)
	-TT2	.....	For medium pressure (*2)
	-TN1	.....	For maintenance (for TT1)
	-TN2	.....	For maintenance (for TT2)
Measuring System	**-N**	.....	For OR200/OR400 (*3)
	-E	.....	For PH202/FLXA202/FLXA21 (*4)
	-F	.....	For FLXA202/FLXA21 (*7)
	-B	.....	For OR100 (*5)
	-G	.....	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 alphanumeric and fork terminals are used.
*4: Mark band is shown by numeral and pin terminals are used. When terminal box is used, select WTB10-PH1.
*5: The tag which indicated the color, the sign, and the number is attached to the cable of a sensor.
*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.

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**	.....	3 m
	-05	.....	5 m
	-07	.....	7 m
	-10	.....	10 m
	-15	.....	15 m
	-20	.....	20 m
Solution Ground Tip	**-TN**	.....	Titanium
KCl Reserve Tank (*1)	**-TT1**	.....	For general purpose (250 mL solution inlet)
	-TT3	.....	Big volume tank (With 500 mL tank)
	-TN1	.....	For maintenance (for TT1)
–	**-N**	.....	Always -N
Measuring System	**-H**	.....	For PH200/PH400 (*2)
	-E	.....	For PH202/FLXA202/FLXA21 (*3)
	-F	.....	For FLXA202/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 alphanumeric and fork terminals are used.
*3: Mark band is shown by numeral and pin terminals are used. When terminal box is used, select WTB10-PH1.
*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

4. Terminal Box

• Terminal Box

Model	Suffix Code	Option Code	Specifications
WTB10	.....	.....	Terminal box
Combined System	**-PH1**	.....	For PH202, FLXA202/FLXA21 (General sensor and PH4/OR4 sensor of pin terminals) (*6) (*7)
	-PH2	.....	For PH202, FLXA202/FLXA21 (PH4/OR4 sensor of pin terminals) (*1) (*6)
	-PH3	.....	For PH450G, PH202/TB (General sensor and PH4/OR4 sensor of M3 ring terminals) (*4) (*7)
	-PH4	.....	For PH450G, PH202/TB (PH4/OR4 sensor of M3 ring terminals) (*1) (*4)
	-PH5	.....	For FLXA202/FLXA21 (General sensor and PH4/OR4 sensor of M4 ring terminals) (*5) (*7)
	-PH6	.....	For FLXA202/FLXA21 (PH4/OR4 sensor of M4 ring terminals) (*1) (*5)
–	**-NN**	.....	Always -NN
Cable Length (*2)	**-00**	.....	0 m (*3)
	-05	.....	5 m
	-10	.....	10 m
	-15	.....	15 m
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.
*6: M4 screw terminals and cable with pin terminals are used.
*7: Use -PH1, -PH3, -PH5 of combinated system when not using SA405 in case of PH4/OR4.

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 250 mL solution (pH7 and pH4)
	-P	.....	24 bags, each bag containing powder for 500 mL solution (pH7 X 12 bags and pH4 X 12 bags) and two 500 mL polyethylene bottles.
Style	***A**	.....	Style A
Option (*2)		**/STD**	Sensor stand (with mounting bracket for 50A 2-inch pipe)
		/KCLL	KCl solution (one 250 mL polyethylene bottle)
		/KCLP	KCl powder (three bags, 250 mL solution each)
		/TMP	Thermometer (0 to 100°C)

*1: Including the following:
Two 200 mL polyethylene cups
One cleaning bottle
*2: Either /KCLL or /KCLP is required for PH8EFP-□-□-TT2.

• 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 250 mL polyethylene bottle)
		/KCLP	KCl powder (three bags, 250 mL solution each)
		/TMP	Thermometer (0 to 100°C)

*1: Including the following:
Two 200 mL polyethylene cups
One cleaning bottle
One pack of quinhydrone reagent powder (three bags, 250 mL solution each)
One 250 mL polyethylene bottle
*2: Either /KCLL or /KCLP is required for PH8EFP-□-□-TT2.

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
	Fluoropolymer (PTFE)	K9142HW	One for PH8EFP/TF
		K9319QB	One for PH8EFP/TF/PF

Spare Parts for pH Meter

Part Name	Part Number	Remarks
KCl solution (3.3 mol/L)	K9084LP	Six 250 mL polyethylene bottles
Buffer solution for calibration (pH4)	K9084LL	Six 250 mL polyethylene bottles
Buffer solution for calibration (pH7)	K9084LM	Six 250 mL polyethylene bottles
Buffer solution for calibration (pH9)	K9084LN	Six 250 mL polyethylene bottles
Powder for buffer solution (pH4)	K9020XA	12 bags,each for preparation of 500 mL
Powder for buffer solution (pH7)	K9020XB	12 bags, each for preparation of 500 mL
Powder for buffer solution (pH9)	K9020XC	12 bags, each for preparation of 500 mL
KCl powder (for PH8EFP, PH8EHP)	K9020XU	8 bags, each for preparation of 250 mL
KCl powder (for PH8ERP)	K9142UT	2 bags, 1 bottle of 3.3 mol/L KCl, 1 syringe

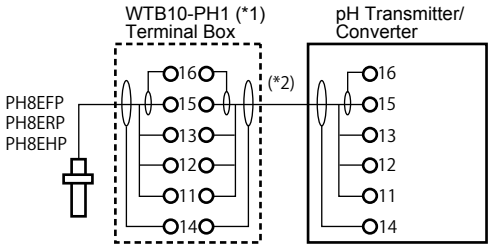
Note: The pH value of the calibrating buffer solution may vary depending on storage conditions.
Prepare a new solution from powder for accurate instrument calibration

Spare Parts for ORP Meter

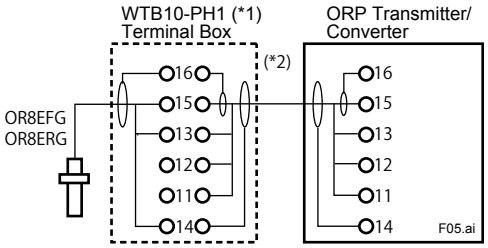
Part Name		Part Number	Remarks
Sensor	Platinum	K9142TS	One for OR8ERG,OR8EFG
	Gold	K9142TT	One for OR8ERG,OR8EFG
Junction		K9142TH	One for OR8ERG,OR8EFG
KCl solution (3.3 mol/L)		K9084LP	Six 250 mL polyethylene bottles
KCl powder (for OR8EFG)		K9020XU	8 bags, each for preparation of 250 mL
KCl powder (for OR8ERG)		K9142UT	2 bags 1 bottle of 3.3 mol/L KCl, 1 syringe
Reagent for check	Quinhydrone	K9024EC	3 bags, each for preparation of 250 mL
	Iron	K9024ED	3 bags, each for preparation of 250 mL

■ WIRING DIAGRAMS

General purpose pH sensor



General purpose ORP sensor



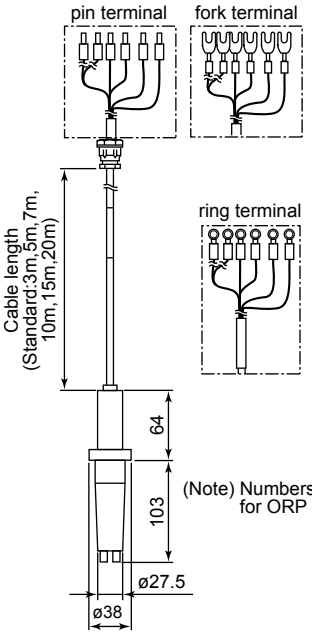
*1 : Terminal box is used only where pH transmitter/converter or ORP transmitter/converter is installed remotely from pH or ORP sensor (normally not needed).
Should be used when using combined by pin terminals with PH202G, FLXA202/FLXA21.
When combined by M3 ring terminals with PH450G, PH202/TB, use WTB10-PH3 terminal box. When combined by M4 ring terminals with FLXA202/FLXA21, use WTB10-PH5 terminal box.

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

■ DIMENSIONS

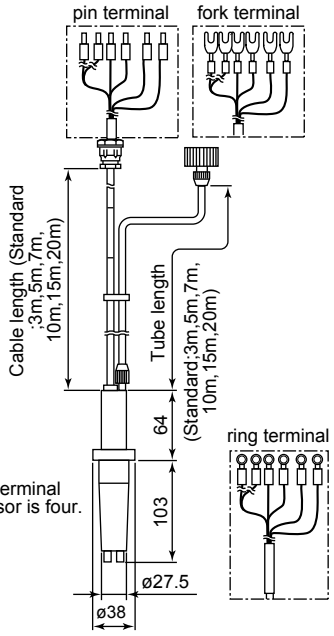
Unit : mm

KCl refillable pH/ORP sensor
PH8ERP-☐
OR8ERG-☐

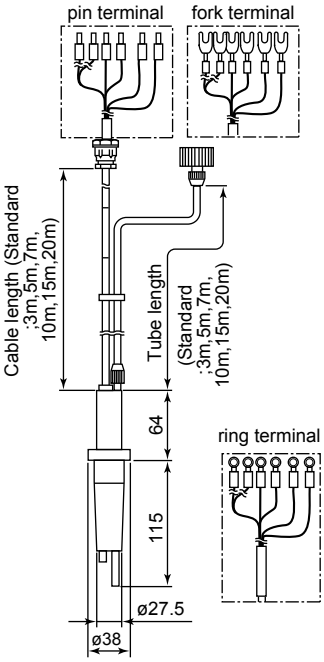


(Note) Numbers of terminal for ORP sensor is four.

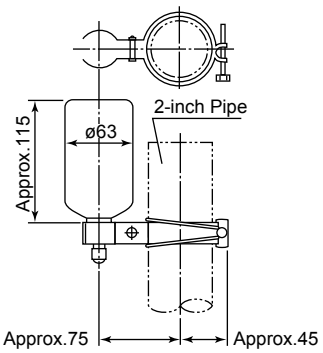
KCl filling pH/ORP sensor
PH8EFP-☐
OR8EFG-☐



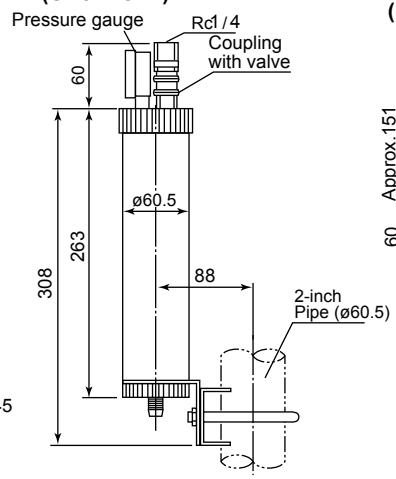
pH sensor for pure water
PH8EHP-☐



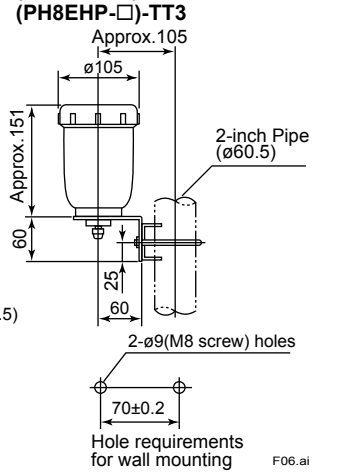
General purpose KCl reserve tank for KCl filling pH/ORP sensor and pH sensor for high purity water (with mounting bracket)
(PH8EFP-☐)-TT1
(PH8EHP-☐)-TT1
(OR8EFG-☐)-TT1



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

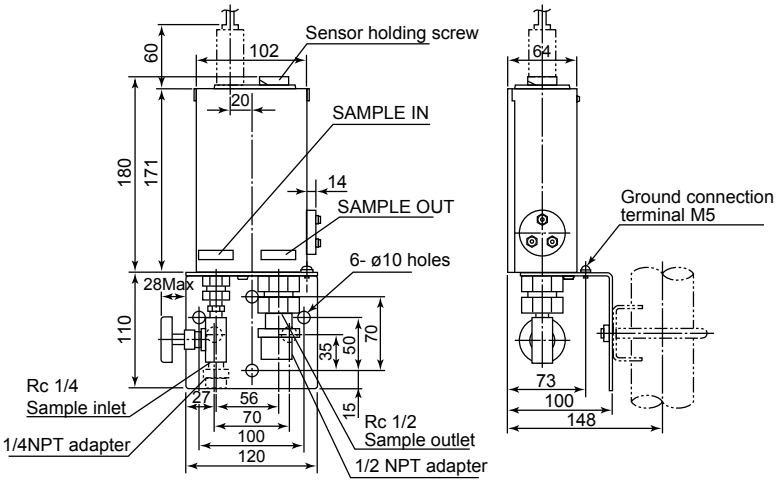


Big volume tank KCl reserve tank for KCl filling pH sensor and pH sensor for high purity water. (with mounting bracket)
(PH8EFP-☐)-TT3
(PH8EHP-☐)-TT3

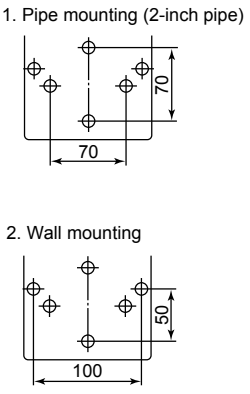


Holder for high purity water PH8HH

Unit : mm



Hole dimensions for Holder mounting



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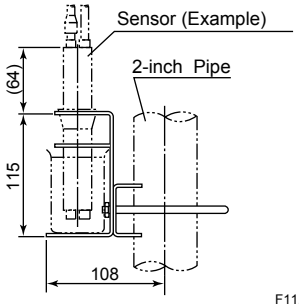
Unit : mm

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



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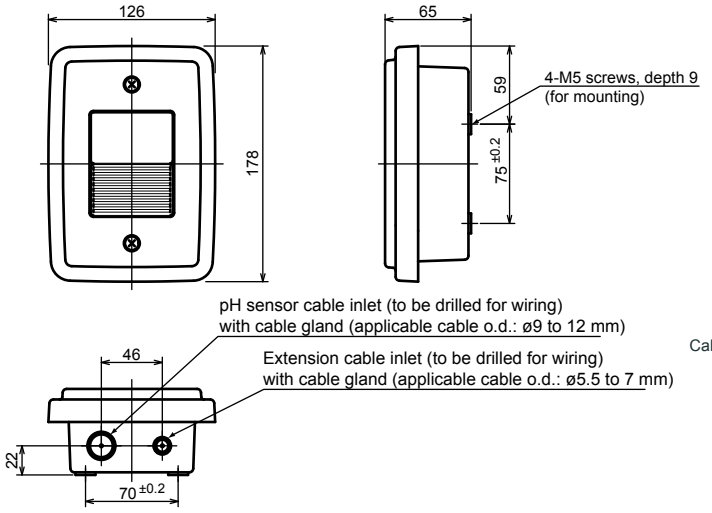
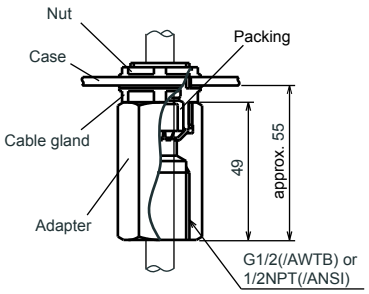
Unit : mm

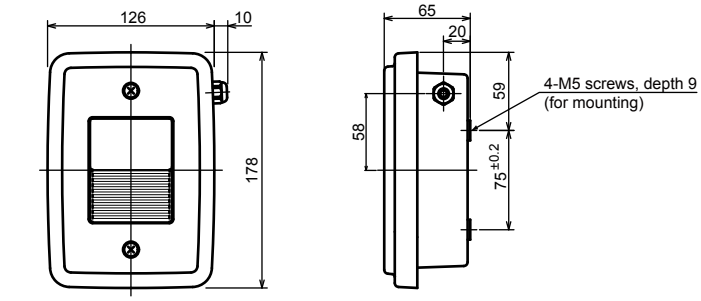
Terminal box WTB10-PH1, -PH3, -PH5



Conduit adapter

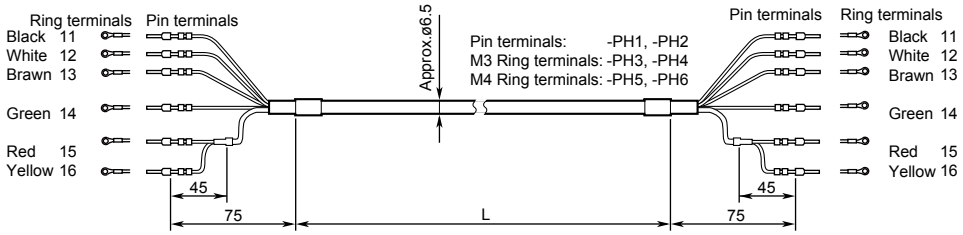


Terminal box WTB10-PH2, -PH4, -PH6



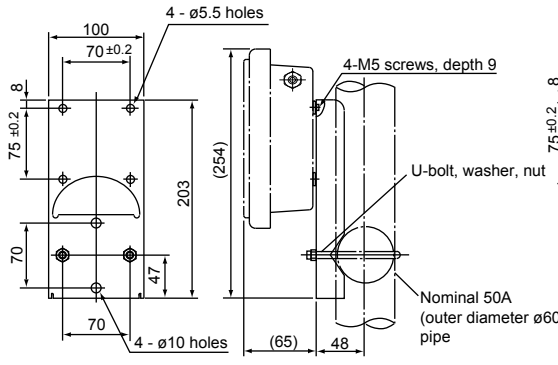
Model and code	L
WTB10 - PH□ - NN - 05	Approx. 5 000
WTB10 - PH□ - NN - 10	Approx. 10 000
WTB10 - PH□ - NN - 15	Approx. 15 000

Extension cable

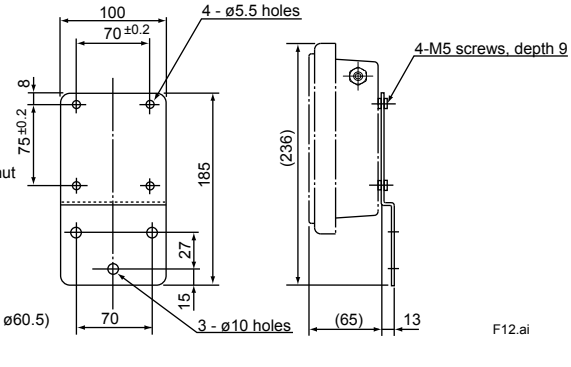


Mounting bracket for terminal box

<Pipe mounting bracket: /P>



<Wall mounting bracket: /W>



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■ 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 < 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, ×:Cannot be used

	Chemical	Concentration W/V (%)	pH *1 (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	○	○
	Carbonic acid	0.6	3.6	○	△
	Chromic acid	1.2	0.8	○	×
	Sulfurous acid	0.8	1.4	○	△
Organic acid	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 chlorine	5		○	○
	Sodium nitrate	5	8.2	○	×
	Aluminum chloride	5		○	○
Oxdizing 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)			○	×

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

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.

		Holder material			Ultrasonic transducer material Sensor solution ground tip									Seal O-ring material	Sensor body material			
		Polypropylene			316 SS			Hastelloy C			Titanium			Fluoro rubber (FKM)	Ryton			Remarks
		Concent'n	Temp	Judge	Concent'n	Temp	Judge	Concent'n	Temp	Judge	Concent'n	Temp	Judge		Concent'n	Temp	Judge	
Inorganic acid	Sulfurous acid	100	20	◎	6	30	◎	6	30	○	6	30	◎	Strong acid ◎ Weak acid ◎	–			
			90	◎														
	Hydrochloric acid	5	20	◎	5	30	×	5	30	◎	5	30	◎		5	30	◎	
		5	80	◎							5	b	×		37	60	△	
															37	90	×	
	Chromic acid	20	20	△	10	b	○	20	30	○	10	b	◎		20	20	○	
		20	40	×														
	Hypochlorous Acid	10	20	◎	14	30	×	15	43	◎	20	40	◎		5	20	○	
		10	40	○												40	×	
	Hydrobromic acid		–			–			–		40	30	◎			–		
	Nitric acid	10	20	◎	10	30	◎	10	30	◎	10	100	○		5	20	○	
		10	80	◎											10	60	×	
	Hydroiodic acid	57	20	◎	57	25	×		–		57	30	○			–		
		57	70	◎														
	Sulfuric acid	3	20	◎	6	30	◎	5	30	◎	5	30	◎		90	20	◎	
		3	100	◎	5	100	×	5	70	◎	5	100	×		30	90	○	
	Phosphoric acid	30	60	◎	15	30	◎	5	30	◎	5	30	◎		85	90	◎	
		30	100	△	5	b	◎	5	b	◎	5	60	○					
Alkali	Ammonia water	15	80	◎	10	b	◎	10	b	◎	10	b	◎	Strong alkali × Weak alkali △	15	30	◎	
		15	100	○	28	65	◎	20	65	◎	20	65	◎					
	Potassium hydroxide		–		10	b	◎	10	b	◎	10	b	◎		10	20	◎	
					25	b	◎	25	b	◎	25	b	○		10	90	△	
	Sodium hydroxide	20	80	◎	20	30	◎	20	30	◎	20	30	◎		10	20	◎	
		20	100	◎	20	b	◎	20	b	◎	20	b	◎		10	90	△	
	Sodium hydroxide, Sodium hydroxide9 to 11% +Sodium chloride 15%		100	◎		–			–			93	◎			90	○	
	Potassium carbonate		–		5	b	◎	5	b	◎	5	b	◎		5	b	◎	
					35	b	◎	35	b	◎	35	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	×		–		10	b	◎	–		–		
					25	25	×				25	b	×					
	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	◎	25	b	○	25	b	◎	25	b	◎	–	25	90	◎	
		sat.	100	◎														
	Ferric chloride	20	40	◎	30	b	×	30	b	×	30	b	◎	–	20	60	◎	
		20	60	◎														
	Sodium chloride, 20% + Saturated Cl2 (Electrolysis solution)		100	◎		90	×		90	×		90	◎	–		20	△	
	Seawater, Magnesium chloride		24	◎		24	△					24	◎	–		24	◎	
		sat.	80	◎	42	b	△	42	b	◎	40	b	◎			80	○	
Sulfates	Ammonium sulfate	5	60	◎	20	b	◎	20	b	◎	20	b	◎	–	10	90	◎	Polypropylene may sometimes be eroded by ammonium sulfate crystals
				◎	sat.	30		sat.	30	◎	sat.	30	◎					
	Potassium sulfate		–		10	b	◎	10	b	◎	10	b	◎	–	10	90	◎	
	Sodium sulfate	Corrsion resistance is good for usual salts.			20	b	◎	20	b	◎	20	b	◎	–	10	90	◎	
Nitrates	Ammonium nitrate				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	◎	2	60-90	×	2	60-90	△	15	30	◎	–	5	90	◎	
		20	80	◎														
	Potassium bichromate				10	b	◎	10	b	◎	10	b	◎	–		–		
	Sodium sulfide	60	80	◎	10	b	◎		–		10	b	◎	–	10	90	◎	
	Sodium bisulfate		–		10	b	△		–		10	b	◎	–		–		
Gases	Wet chlorine gas		20	○		30	×		30	△		30	◎	–		20	×	
			40	△														
			60	×														
	Sea water + Saturated Cl2		–			95	×		95	△		95	◎	–		–		
	Bromine gas		–			–			30	◎		30	◎	–		30	×	
	Hydrogen sulfide		–			20	◎		–			20	◎	–		–		
	Sulfurous acid gas		80	◎		–			–			30-90	◎	–		80	◎	
			100	◎														

(Note): "b" refers to the boiling point.

		Holder material			Ultrasonic transducer material Sensor solution ground tip									Seal O-ring material			Sensor body material			
		Polypropylene			316 SS			Hastelloy C			Titanium			Fluoro rubber (FKM)			Ryton			Remarks
		Concent'n	Temp	Judge	Concent'n	Temp	Judge	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	×	100	b	○	
					100	110	◎													
	Aniline	100	20	◎	100	25	◎	–			–			–			100	90	○	
		100	70	○																
		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	×	100	25	◎	–			–			–			–			
	Glacial acetic acid	100	70	◎	–			–			–			100	24	×	100	20	◎	
		100	100	○																
	Glycerin	100	70	◎	100	25	◎	–			–			–			–			
		100	100	◎																
	Chlorophenol	100	20	◎	–			–			–			–			100	20	◎	
		100	70	△																
		100	100	×																
	Xylene	100	20	×	–			–			–			–			100	20	◎	
	Chlorobezene	100	20	×	–			–			–			–			–			
		100	100	×																
	Chloroform	100	20	×	100	b	◎	100	b	◎	100	b	◎	–			100	90	△	
	Dioxane	100	20	◎	–			–			–			–			100	90	◎	
		100	70	△																
		100	100	×																
	Dichloroethare	100	70	×	–			–			–			–			–			
	Ethyl nitrate	100	20	◎	100	105	◎	–			–			–			100	90	○	
		100		△																
	Carbon tetrachloride	100	20	×	90	b	△	–			90	b	◎	100	24	×	–			
	Trichloroethylene	100	20	×	100	b	○	100	b	◎	100	b	◎	–			100	90	×	
	Toluene	100	20	×	–			–			145		◎	–			100	90	◎	
	Benzophenone				–			–			–			–			–			
	Benzaldehyde	100	20	◎	–			–			–			–						
		100	70	○													100	20	△	
		100	100	×													100	90	×	
	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	◎	
			70	△																
	Methyl alcohol	100	20	◎	100	25	◎	–			–			–			100	25	◎	
	Nitrobenzene	100	20	◎	–			–			–			–			100	90	×	
		100	70	○																
		100	100	×																
	Acetic acid	100	20	◎	10	b	◎	–			10	b	◎	–			–			
		100	70	△																
		100	100	×																
	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	×																
	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	×	100	25	◎	–			–			100	25	◎	–			

(Note): "b" refers to the boiling point.

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.

Enquiry Specifications Sheet for pH/ORP Sensor

For enquires on the Yokogawa pH/ORP sensors, 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) Combined transmitter ; ☐ FLXA202/FLXA21, ☐ PH202, ☐ PH450, ☐ PH400, ☐ OR400, ☐ PH100, ☐ OR100, ☐ _____
(3) System configuration selection; ☐ Sensor, ☐ Holder, ☐ pH/ORP Transmitter/Converter, ☐ Cleaning system, ☐ Terminal box, ☐ Accessories
(4) Sensor cable length ; ☐ 3 m, ☐ 5 m, ☐ 7 m, ☐ 10 m, ☐15 m, ☐ 20 m, ☐_____m
(5) Sensor 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 ; _____