

# General Specifications

## pH and ORP Sensors

### 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 mentions PH8EFP, PH8ERP, OR8EFG and OR8ERG. See GS 12B10B00-01EN 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 Fluororesin (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 FLXA™202/FLXA™21, FLXA™402, compensates for the effect of fluid temperature.

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All other company and product names mentioned in this GS are registered trademarks or trademarks of their respective companies.

## ■ SYSTEM CONFIGURATION

For the FLXA202, FLXA21 2-Wire Analyzer, see GS 12A01A03-01EN, GS 12A01A02-01E, for the FLXA402 4-Wire Converter, see GS 12A01F01-01EN. For FLXA402T, see GS 12F05B10-01EN, GS 12E01B30-01EN and GS 12E04B40-01EN.

For the FC800D, FLXA402T, Non-reagent type Free Available Chlorine Analyzer, see GS 12F05B10-01EN.

For the TB820D, FLXA402T, Right Angle Scattered Light Turbidity Analyzer, see GS 12E01B30-01EN.

For the TB830D, FLXA402T, Surface Scattering Light Turbidity Analyzer, see GS 12E04B40-01EN.

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

For the PG400 pulse generator for clean unit, see GS 19C01B05-01EN.


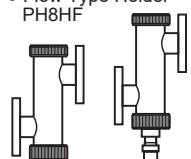
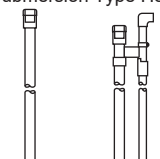
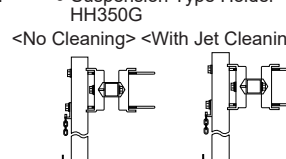
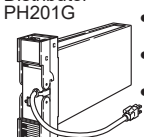

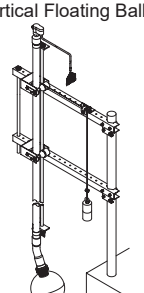

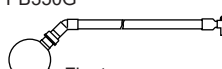
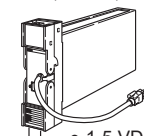


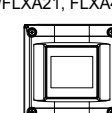
Sensors	Holder, Holder with Cleaning system			Distributors
<ul style="list-style-type: none"><li>• KCL refillable type PH8ERP/OR8ERG</li></ul> 	<ul style="list-style-type: none"><li>• Flow Type Holder PH8HF</li></ul>  <p>No Cleaning      Ultrasonic Cleaning Jet Cleaning Brush Cleaning</p>	<ul style="list-style-type: none"><li>• Submersion Type Holder</li></ul>  <p>No Cleaning</p>	<ul style="list-style-type: none"><li>• Suspension Type Holder HH350G</li></ul> <p>&lt;No Cleaning&gt; &lt;With Jet Cleaning&gt;</p> 	<ul style="list-style-type: none"><li>• EXA PH dedicated Distributor PH201G</li></ul>  <ul style="list-style-type: none"><li>• Maintenance Contact Output</li><li>• Cleaning Contact Output</li><li>• Fail Contact Output</li></ul> <p>• 1-5 VDC</p>
<ul style="list-style-type: none"><li>• KCL filling type PH8EFP/OR8EFG</li></ul> 	<ul style="list-style-type: none"><li>• Vertical Floating Ball Holder</li></ul> 	<ul style="list-style-type: none"><li>• Guide Pipe PH8HG</li></ul>  <p>No Cleaning</p>	<ul style="list-style-type: none"><li>• Angled Floating Ball Holder PB350G</li></ul>  <p>Float</p>	<ul style="list-style-type: none"><li>• General Distributor SDBT, SDBS, etc.</li></ul>  <p>• 1-5 VDC</p>
Accessories	Cleaning Devices			Converter
<ul style="list-style-type: none"><li>• Sensor Stand PH8AX/OR8AX</li></ul> 	<ul style="list-style-type: none"><li>• Pulse Generator for Clean Unit, PG400</li></ul> 			<ul style="list-style-type: none"><li>FLXA202/FLXA21, FLXA402, FLXA402T</li></ul> 

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


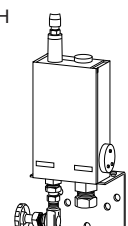
pH sensor	Holder	
<ul style="list-style-type: none"> <li>• For pure water PH8EHP</li> </ul> 	<ul style="list-style-type: none"> <li>• For pure water PH8HH</li> </ul> 	<p>Accessories, pH Converter, Distributors are same type as those for General Purpose or Non-Explosionproof Types (See Fig. 1-a)</p>

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  
 Installation: Mounting in PH8HS submersion holder  
 Mounting in PH8HG guide-pipe holder  
 Mounting in PH8HF flow-through holder

Note: If any of the following solutions are measured, install the sensor either in a flow-through or submersion holder.

- When the solution temperature exceeds 80°C.
- When the pH of the solution is 2 or less or 12 or greater.
- When a strong acid solution is to be measured (e.g., aqua regia, chromic acid, hypochlorous acid or perchloric acid, etc.).
- When the solution contains corrosive gases (e.g., ammonia, chlorine, hydrogen sulfide, etc).
- When the solution contains a small percentage of organic solvent or oil.

Measurement conditions:

Process temperature ; See Table 1

Process pressure ; See Table 2

Conductivity ; 50 µS/cm or higher

Note: Use PH8EHP (a sensor for high purity water) if the conductivity is lower than 50 µS/cm.

**Table 1. Process Temperature Range**

pH Sensor	Holder Type (*2) (*3)	Holder Material (*1)	Cleaner	pH Range	Temperature (°C)
PH8ERP	Guide-pipe (PH8HG)	PVC	None	2 to 12	-5 to 50
		PP	None		-5 to 80
	Submersion (PH8HS)	PP	None, Provided		-5 to 80
	Flow-through (PH8HF)	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	None, Provided		-5 to 80
		SS	None, Provided		-5 to 105
	Flow-through (PH8HF)	PP	None, Provided		-5 to 80
		SS	None, Provided		-5 to 105
	Suspension (HH350G)	SS	None, Provided		-5 to 80
		PP, SS	None		-5 to 50
	Float (PB350G, PB360G)	PP, SS	None		-5 to 50
		PP, SS	None		-5 to 50
PH8EHP	High purity water (PH8HH)	Acryl	None	2 to 12	0 to 50

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.

\*3 When sensors are used with Variopin connectors, the sensors can connect to Submersion-type or Flow-through type of holders.

**Table 2. Process Pressure Range**

pH Sensor Holder	PH8ERP	PH8EFP
Submersion	Atmospheric pressure (Submersion depth: 3 m max.)	
Guide-pipe Suspension Float	Atmospheric pressure (Submersion depth: 3 m max.)	
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	OK	NA
High purity water	NA	OK
Contaminating and sulfide-containing solutions	NA	NA
Caustic electrolysis solutions	NA	NA
Solutions containing organic solvents	NA	NA
Waste water containing hydrofluoric acid	NA	NA

Note: The table above is just for reference. Consult sales personnel about selection.

#### 1-2. KCI 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 or Fluororesin (PTFE), Fluoro rubber (FKM) or Perfluoroelastomer (FFKM)

Cable; Chlorinated polyethylene rubber (Cable sheath)

Weight: Approx. 0.4 kg

When /CAL (with PH calibration setting data) is specified, keep the sensor in an environment protected from freezing and direct sunlight. (-5°C to 40°C) The calibration setting data attached to the product at the time of shipment is valid for 3 months after manufacture.

#### 1-3. KCI 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

(For general purpose or Big volume tank)

(See Table 2 when using holder)

Atmospheric pressure to 500 kPa

(For 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 Fluororesin (PTFE), Fluoro rubber (FKM) rubber or Perfluoroelastomer (FFKM)

Cable; Chlorinated polyethylene rubber (Cable sheath)  
KCl tube; Heat-resistant soft PVC (For general purpose\* or Big volume tank\*), Polyethylene (For medium pressure), Fluororesin (with /FEP)

\*: Use a polyethylene tube when the KCl tube comes into contact with food containing oil or fatty organic matter.

Weight:

Sensor; Approx. 0.4 kg

Tank; Approx. 0.3 kg (For general purpose)

Approx. 1 kg (For medium pressure)

Approx. 0.8 kg (Big volume tank)

When /CAL (with PH calibration setting data) is specified, keep the sensor in an environment protected from freezing and direct sunlight. (-5°C to 40°C)

The calibration setting data attached to the product at the time of shipment is valid for 3 months after manufacture.

## 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
OR8EFG	Guide-pipe	PVC	None	-5 to 50
		PP	None	-5 to 80
	Submersion	PP	None, Provided	-5 to 80
		SS	None, Provided	-5 to 105
	Flow-through	PP	None, Provided	-5 to 80
		SS	None, Provided	-5 to 105
	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: 3 m max.)	
Guide-pipe Suspension Float	Atmospheric pressure (Submersion depth: 3 m max.)	
Flow-through (*1)	Atmospheric pressure to 50 kPa	General purpose Atmospheric pressure to 10 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.

**Table 6. Selection of ORP sensor**

Application		ORP sensor OR8ERG, OR8EFG	
		Platinum	Gold
General purpose		OK	NA
Drainage treatment	Cyanogen treatment	NA	OK
	Chrome treatment	NA	OK
Contaminated solutions		NA	NA
Solutions containing sulfide ion		NA	NA
Electrolytic process solutions		NA	NA

Note: The table above is just for reference. Consult sales personnel about the selection.

### 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) or Perfluoroelastomer (FFKM)

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 or Fluororesin (PTFE), Fluoro rubber (FKM) or Perfluoroelastomer (FFKM)

Cable; Chlorinated polyethylene rubber (Cable sheath)  
KCl tube; Heat-resistant soft PVC (General purpose), Polyethylene (Medium pressure), Fluororesin (with /FEP)

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, Acrylic resin, 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

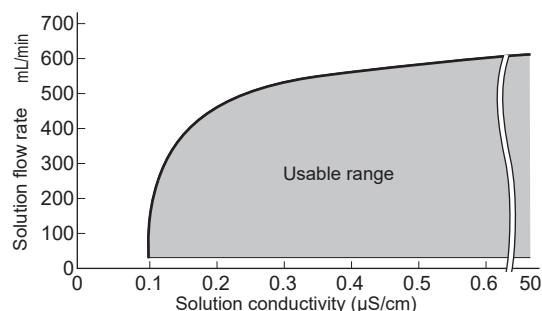


Fig.2 Solution flow rate and solution conductivity of sensor and holder for high purity water

### 4. Terminal Box

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

Used when analyzer or converter is installed remotely from general pH/ORP sensors and PH4/OR4 Sensors (PH4□ in no combination 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 Analyzer 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 analyzer 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 Analyzer 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, PH8EHP, PH8ECP, OR8EFG, and OR8ERG 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

IEC 60079-11

방호장치 의무안전인증 고시

GB 3836.4-2010

### Conditions of use:

- (1) Use in combination with an internally isolated analyzer, or use with, an analyzer in combination with isolated barrier.

The FLXA21/202 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 analyzer.

For FLXA21/202, model and suffix code below is available.

FLXA21-D-□-D-◇-P1-○-A-N-LA-N-NN

□ can be any value.

◇ must be CB, CD, CH, or EG.

○ must be NN or P1.

Any option code is available

FLXA202-D-□-D-◇-P1-○-A-N-LA-N-NN

□ can be any value.

◇ must be CB, CD, CG, or CH.

○ 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.

- Upper limit of process temperature on the PH8EFP, PH8ECP and OR8EFG

Analyzer used in combination	FLXA202 FLXA21		PH202S	
	40°C	60°C	40°C	60°C
Ambient temperature Ta				
Temperature class				
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, OR8ERG, PH8ECP and OR8EFG

Analyzer used in combination	FLXA202 FLXA21		PH202S	
	40°C	60°C	40°C	60°C
Ambient temperature Ta				
Temperature class				
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

Analyzer used in combination	FLXA202 FLXA21		PH202S	
	40°C	60°C	40°C	60°C
Ambient temperature Ta				
Temperature class				
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

#### ● KCI Refillable Type pH Sensor

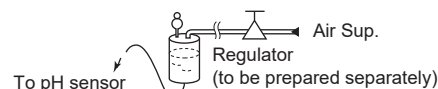
Model	Suffix Code	Option Code	Specifications
<b>PH8ERP</b>	.....	.....	KCI Refillable Type pH Sensor
Cable Length	-03 -05 -07 -10 -15 -20 -NN	..... ..... ..... ..... ..... ..... .....	3 m 5 m 7 m 10 m 15 m 20 m No cable (*7)
Solution Ground Tip	-TN -HC	..... .....	Titanium Hastelloy C
—	-N	.....	Always -N
pH Measuring System	-T -E  -F -B -G  -V	..... .....  ..... ..... .....  .....	For PH200, PH400 (*1) For FLXA402, FLXA402T, PH202, FLXA202, FLXA21 (*2) For FLXA202, FLXA21 (*6) For PH100 (*3) For FLXA402, FLXA402T, PH450G, PH202/TB (*5) Variopin connector (*8)
Style	*A	.....	Style A
Option	O-ring Special Glass Sensor Special Junction Degreasing treatment Material Certificate	/PF /HA /TF /DG1 /MC1	Perfluoroelastomer (FFKM) (*4) Glass electrode for high alkali (*9) PTFE junction (*10) Oil-free finish wetted part With a material certificate of Solution Ground Tip
Calibration setting data	/CAL	.....	With PH calibration setting data (*11)

- \*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.  
 \*7: Select -V for a measuring system.  
 \*8: Select -NN for the cable length. Submersion type or Flow-through type holders can be combined with Variopin connector.  
 \*9: Choose this option when this is used in high alkali or high temperature alkaline solution.  
 \*10: Choose this when using in the heavily contaminated solution application.  
 \*11: The product is shipped after being tested with pH7 and pH4 standard solutions. The calibration setting data labeled on the analog pH sensor body can be used with the FLXA402, FLXA402T, FLXA202, FLXA21, and PH450G. Cannot be used with -T, -B, -V, /HA, /TF, /DG1.  
 Calibration setting data is valid for 3 months after manufacture (\*).  
 \*: In unused condition, approximately  $\pm 0.2$  pH shift may be observed in the standard solution at 25°C during this period.

#### ● KCI Filling Type pH Sensor

Model	Suffix Code	Option Code	Specifications
<b>PH8EFP</b>	.....	.....	KCI Filling Type pH Sensor
Cable Length and KCI Tube Length	-03 -05 -07 -10 -15 -20 -V3 -V5 -V7 -VA -VB -VC	..... ..... ..... ..... ..... ..... ..... ..... ..... ..... ..... .....	3 m 5 m 7 m 10 m 15 m 20 m For Variopin connector 3m (*11) For Variopin connector 5m (*11) For Variopin connector 7m (*11) For Variopin connector 10m (*11) For Variopin connector 15m (*11) For Variopin connector 20m (*11)
Solution Ground Tip	-TN -HC	..... .....	Titanium Hastelloy C
KCI Reserve Tank (*1)	-TT1 -TT2 -TT3 -TN1 -TN2	..... ..... ..... ..... .....	For general purpose For medium pressure (*2) Big volume tank (With 500 mL tank) For maintenance (for -TT1, -TT3) For maintenance (for -TT2)
—	-N	.....	Always -N
pH Measuring System	-T -E  -F -B -G  -V	..... .....  ..... ..... .....  .....	For PH200, PH400 (*3) For FLXA402, FLXA402T, PH202, FLXA202, FLXA21 (*4) For FLXA202, FLXA21 (*10) For PH100 (*5) For FLXA402, FLXA402T, PH450G, PH202/TB (*9) Variopin connector (*12)
Style	*A	.....	Style A
Option	Special Glass Sensor Special Junction O-ring Tube Material Degreasing treatment Material Certificate	/HA /TF /PF /FEP /DG1 /MC1	Glass electrode for high alkali (*7) PTFE junction (*8) Perfluoroelastomer (FFKM) (*6) KCI tube: Fluororesin (*13) Oil-free finish wetted part With a material certificate of Solution Ground Tip
Calibration setting data	/CAL	.....	With PH calibration setting data (*14)

- \*1: A 50A (2-inch) pipe mounting bracket is supplied with -TT1, -TT2 and -TT3.  
 Only supply tube is supplied, but KCI tank is not supplied for -TN1 or -TN2.  
 KCL solution is supplied with -TT1 and -TT3.  
 No KCI solution bottle is supplied for -TT2. Arrange it from 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: 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.  
 \*11: Select -V for a measuring system.  
 \*12: Option /K (with measurement law of Japan certificate) cannot be specified.  
 Do not allow the part above the sensor flange to contact with the solution.  
 \*13: If you select -TT2 or -TN2 and use it in a place with strong ultraviolet rays, be sure to select this.

\*14: The product is shipped after being tested with pH7 and pH4 standard solutions. The calibration setting data labeled on the analog pH sensor body can be used with the FLXA402, FLXA402T, FLXA202, FLXA21, and PH450G. Cannot be used with -T, -B, -V, /K, /HA, /CJ, /TF, /DG1. Calibration setting data is valid for 3 months after manufacture (\*).

\*: In unused condition, approximately  $\pm 0.2$  pH shift may be observed in the standard solution at 25°C during this period.

## 2. ORP Sensor

### • KCI Refillable Type ORP Sensor

Model	Suffix Code	Option Code	Specifications
<b>OR8ERG</b>	.....	.....	KCI Refillable Type ORP Sensor
Electrode	<b>-AU</b> <b>-PT</b>	..... .....	Gold Platinum
Cable Length	<b>-03</b> <b>-05</b> <b>-07</b> <b>-10</b> <b>-15</b> <b>-20</b>	..... ..... ..... ..... ..... .....	3 m 5 m 7 m 10 m 15 m 20 m
Measuring System	<b>-N</b> <b>-E</b> <b>-F</b> <b>-B</b> <b>-G</b>	..... ..... ..... ..... .....	For OR200, OR400 (*1) For FLXA402, PH202, FLXA202, FLXA21 (*2) For FLXA202, FLXA21 (*5) For OR100 (*3) For FLXA402, PH450G, PH202/TB (*4)
Style	<b>*A</b>	.....	Style A
Option	O-ring Degreasing treatment Material Certificate	<b>/PF</b> <b>/DG1</b> <b>/MC1</b>	Perfluoroelastomer (FFKM) (*6) Oil-free finish wetted part With a material certificate of Solution Ground Tip

\*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.

\*6: Choose Perfluoroelastomer (FFKM) when this is used in organic solvent, high alkali or high temperature solution.

### • KCI Filling Type ORP Sensor

Model	Suffix Code	Option Code	Specifications
<b>OR8EFG</b>	.....	.....	KCI Filling Type ORP Sensor
Electrode	<b>-AU</b> <b>-PT</b>	..... .....	Gold Platinum
Cable Length and KCI Tube Length	<b>-03</b> <b>-05</b> <b>-07</b> <b>-10</b> <b>-15</b> <b>-20</b>	..... ..... ..... ..... ..... .....	3 m 5 m 7 m 10 m 15 m 20 m
KCI Reserve Tank (*1)	<b>-TT1</b> <b>-TT2</b> <b>-TN1</b> <b>-TN2</b>	..... ..... ..... .....	For general purpose For medium pressure (*2) For maintenance (for -TT1) For maintenance (for -TT2)
Measuring System	<b>-N</b> <b>-E</b> <b>-F</b> <b>-B</b> <b>-G</b>	..... ..... ..... ..... .....	For OR200, OR400 (*3) For FLXA402, PH202, FLXA202, FLXA21 (*4) For FLXA202, FLXA21 (*7) For OR100 (*5) For FLXA402, PH450G, PH202/TB (*6)
Style	<b>*A</b>	.....	Style A
Option	Special junction O-ring Tube Material Degreasing treatment Material Certificate	<b>/TF</b> <b>/PF</b> <b>/FEP</b> <b>/DG1</b> <b>/MC1</b>	PTFE junction (*8) Perfluoroelastomer (FFKM) (*9) KCI tube: Fluororesin (*10) Oil-free finish wetted part With a material certificate of Solution Ground Tip

\*1: A 50A (2-inch) pipe mounting bracket is supplied with -TT1 and -TT2.

The number of bottles filled with 250 mL KCI solution, which are supplied respectively, are as follows:

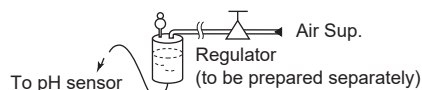
-TT1 : 1 bottle

-TT2 : 0 bottle

No KCI solution bottle is supplied for -TT2. Arrange it from accessories or auxiliary parts.

Only supply tube is supplied, but KCI tank is not supplied for -TN1 or -TN2.

\*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.

\*8: Choose when using in the heavily contaminated application.

\*9: Choose Perfluoroelastomer (FFKM) when this is used in organic solvent, high alkali or high temperature solution.

\*10: If you select -TT2 or -TN2 and use it in a place with strong ultraviolet rays, be sure to select this.

### 3. pH Measuring System for High Purity Water

#### • pH Sensor for High Purity Water

Model	Suffix Code	Option Code	Specifications
<b>PH8EHP</b>	.....	.....	pH sensor for high purity water
Cable Length	<b>-03</b>	.....	3 m
	<b>-05</b>	.....	5 m
	<b>-07</b>	.....	7 m
	<b>-10</b>	.....	10 m
	<b>-15</b>	.....	15 m
	<b>-20</b>	.....	20 m
	<b>-V3</b>	.....	For Variopin connector 3m (*6)
	<b>-V5</b>	.....	For Variopin connector 5m (*6)
	<b>-V7</b>	.....	For Variopin connector 7m (*6)
	<b>-VA</b>	.....	For Variopin connector 10m (*6)
	<b>-VB</b>	.....	For Variopin connector 15m (*6)
	<b>-VC</b>	.....	For Variopin connector 20m (*6)
Solution Ground Tip	<b>-TN</b>	.....	Titanium
KCl Reserve Tank (*1)	<b>-TT1</b>	.....	For general purpose
	<b>-TT3</b>	.....	Big volume tank (With 500 mL tank)
	<b>-TN1</b>	.....	For maintenance (for -TT1)
—	<b>-N</b>	.....	Always -N
Measuring System	<b>-H</b>	.....	For PH200, PH400 (*2)
	<b>-E</b>	.....	For FLXA402, FLXA402T, PH202, FLXA202, FLXA21 (*3)
	<b>-F</b>	.....	For FLXA202, FLXA21 (*5)
	<b>-G</b>	.....	For FLXA402, FLXA402T, PH450G, PH202/TB (*4)
	<b>-V</b>	.....	Variopin connector (*7)
Style	<b>*A</b>	.....	Style A

\*1: The number of bottles filled with 250 mL KCl solution, which are supplied respectively, are as follows:

-TT1 : 1 bottle  
-TT3 : 2 bottles

Only a supply tube is supplied, but no KCl tank is supplied for -TN1.

\*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.

\*6: Select -V for a measuring system.

\*7: Do not allow the part above the sensor flange to contact with the solution.

#### • pH Holder for High Purity Water

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

### 4. Terminal Box

#### • Terminal Box

Model	Suffix Code	Option Code	Specifications
<b>WTB10</b>	.....	.....	Terminal box
Combined System	<b>-PH1</b>	.....	For FLXA402, FLXA402T, PH202, FLXA202, FLXA21 (General sensor and PH4/OR4 sensor of pin terminals) (*6) (*7)
	<b>-PH2</b>	.....	For PH202, FLXA202, FLXA21 (PH4/OR4 sensor of pin terminals) (*1) (*6)
	<b>-PH3</b>	.....	For FLXA402, FLXA402T, PH450G, PH202/TB (General sensor and PH4/OR4 sensor of M3 ring terminals) (*4) (*7)
	<b>-PH4</b>	.....	For FLXA402, FLXA402T, PH450G, PH202/TB (PH4/OR4 sensor of M3 ring terminals) (*1) (*4)
	<b>-PH5</b>	.....	For FLXA202, FLXA21 (General sensor and PH4/OR4 sensor of M4 ring terminals) (*5) (*7)
	<b>-PH6</b>	.....	For FLXA202, FLXA21 (PH4/OR4 sensor of M4 ring terminals) (*1) (*5)
—	<b>-NN</b>	.....	Always -NN
Cable Length (*2)	<b>-00</b>	.....	0 m (*3)
	<b>-05</b>	.....	5 m
	<b>-10</b>	.....	10 m
	<b>-15</b>	.....	15 m
Option	Mounting Bracket	<b>/P</b>	Pipe mounting bracket
	Conduit Adapter	<b>/W</b>	Wall mounting bracket
		<b>/AWTB</b>	G1/2
		<b>/ANSI</b>	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 combined 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)		/KCLL	KCl solution (one 250 mL polyethylene bottle)
		/KCLP	KCl powder (three bags, 250 mL solution each)
		/STD	Sensor stand (with mounting bracket for 50A 2-inch pipe)

\*1: Including the following:  
Two 200 mL polypropylene 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)		/KCLL	KCl solution (one 250 mL polyethylene bottle)
		/KCLP	KCl powder (three bags, 250 mL solution each)
		/STD	Sensor stand (with mounting bracket for 50A 2-inch pipe)

\*1: Including the following:  
Two 200 mL polypropylene 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
	High alkali	K9142TU	One for PH8ERP/HA, PH8EFP/HA
		K9319NC	One for PH8ERP/HA/PF, PH8EFP/HA/PF
Junction	General purpose	K9142TH	One for PH8ERP, PH8EFP
		K9319QA	One for PH8ERP, PH8EFP/PF
	High purity water	K9142TK	One for PH8EHP
	Fluororesin (PTFE)	K9142HW	One for PH8ERP/TF, PH8EFP/TF
		K9319QB	One for PH8ERP/TF/PF, PH8EFP/TF/PF
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.

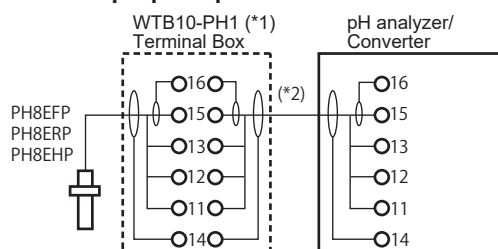
Prepare a new solution from powder for accurate instrument calibration

### • Spare Parts for ORP Meter

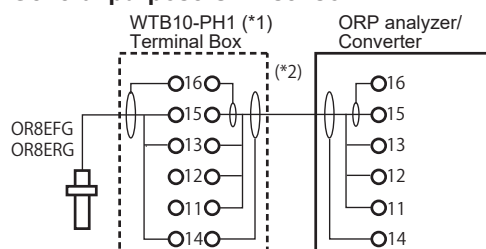
Part Name		Part Number	Remarks
Indicator electrode	Platinum	K9142TS	One for OR8ERG, OR8EFG
		K8022GP	One for OR8ERG/PF, OR8EFG/PF
	Gold	K9142TT	One for OR8ERG, OR8EFG
		K8022GQ	One for OR8ERG/PF, OR8EFG/PF
Junction	General purpose	K9142TH	One for OR8ERG, OR8EFG
		K9319QA	One for OR8EFG/PF, OR8EFG/PF
	Fluororesin (PTFE)	K9142HW	One for OR8FEG/TF
		K9319QB	One for OR8FEG/TF/PF
	Ceramics	K9142UH	One for OR8FEG/CJ
		K9142UL	One for OR8FEG/CJ/PF
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 analyzer/converter or ORP analyzer/converter is installed remotely from pH or ORP sensor (normally not needed).

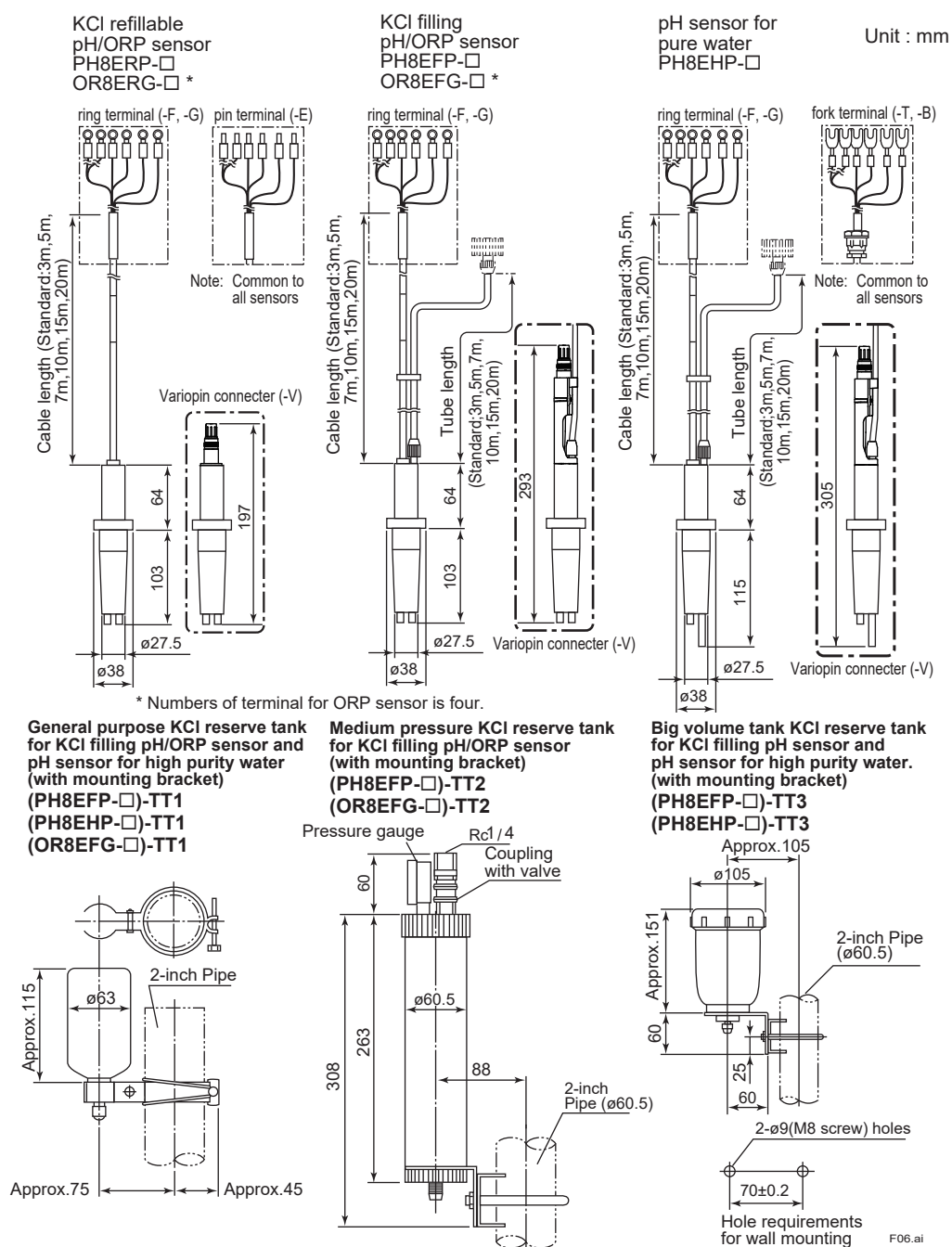
Use this terminal box to connect to FLXA402, FLXA402T (except for ORP), PH202G, FLXA202/FLXA21 with pin terminals.

Use WTB10-PH3 terminal box to connect to FLXA402, FLXA402T (except for ORP), PH450G or PH202/TB with M3 ring terminals.

Use WTB10-PH5 terminal box to connect to FLXA202/FLXA21 with M4 ring terminals.

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

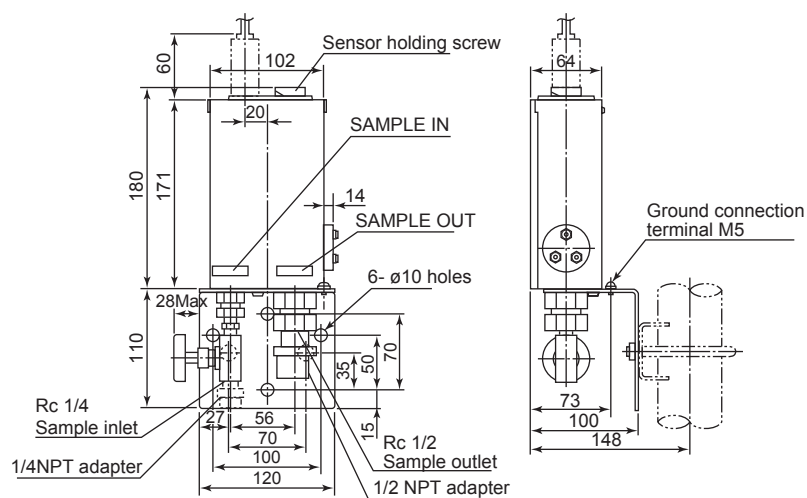
## DIMENSIONS



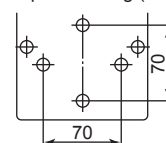
# Holder for high purity water PH8HH

Unit : mm

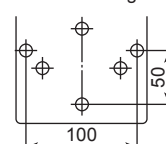
## Hole dimensions for Holder mounting



## 1. Pipe mounting (2-inch pipe)



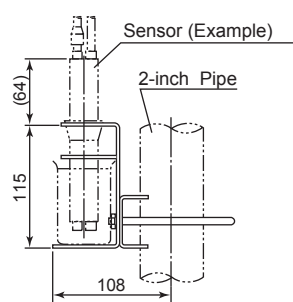
## 2. Wall mounting



F07.ai

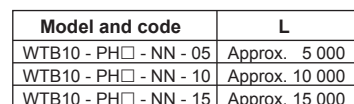
Unit : mm

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



F11.ai

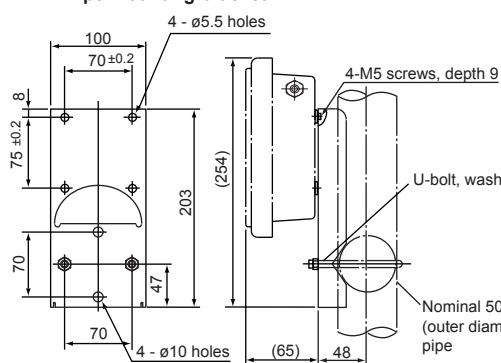
## Unit : mm



The diagram illustrates the cable assembly with the following details:

- Dimensions:**
  - 45: Distance from the end of the cable to the first set of terminals.
  - 75: Distance from the first set of terminals to the second set of terminals.
  - L: Total length of the cable.
  - Approx.  $\phi 6.5$ : Approximate diameter of the cable.
- Terminal Connections:**
  - Left Side:**
    - Ring terminals: Black 11, White 12, Brown 13, Green 14, Red 15, Yellow 16.
    - Pin terminals: -PH1, -PH2, -PH3, -PH4, -PH5, -PH6.
  - Right Side:**
    - Pin terminals: -PH1, -PH2, -PH3, -PH4, -PH5, -PH6.
    - Ring terminals: Black 11, White 12, Brown 13, Green 14, Red 15, Yellow 16.

<Pipe mounting bracket: /P>



Technical drawing showing the front and side views of a rectangular plate.

**Front View Dimensions:**

- Overall width: 100
- Overall height: 185
- Distance between vertical centerlines of holes:  $70 \pm 0.2$
- Distance between horizontal centerlines of holes: 70
- Distance from bottom edge to center of bottom holes: 15
- Distance from bottom edge to center of top holes: 27
- Number of holes: 4 -  $\varnothing 5.5$  holes (top) and 3 -  $\varnothing 10$  holes (bottom)

**Side View Dimensions:**

- Overall height: 236
- Overall width: 65
- Distance from bottom edge to center of screws: 13
- Number of screws: 4-M5 screws, depth 9

## ■ 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).
- (3) 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.

### <Individual Criteria>

1: Can be used, 2: Shortens useful life, N/A: 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	1	N/A
		0.05	2.0	1	1
	Hydrochloric acid	0.4	1.0	1	N/A
		0.04	2.0	1	1
	Nitric acid	0.6	1.0	1	N/A
		0.06	2.0	1	1
	Phosphoric acid	1.0	1.5	1	2
	Boric acid	0.6	5.0	1	1
	Carbonic acid	0.6	3.6	1	2
Organic acid	Chromic acid	1.2	0.8	1	N/A
	Sulfurous acid	0.8	1.4	1	2
	Acetic acid	0.6	2.8	1	1
	Formic acid	0.5	2.3	1	1
	Oxalic acid	0.9	1.0	1	1
	Lactic acid	0.9	2.4	1	1
	Phenol acid	0.9	5.4	1	2
Alkali	Monochloroacetic acid	0.9	1.8	1	N/A
	Calcium hydroxide	0.2	12.4	1	1
	Potassium hydroxide	0.5	12.7	1	2
Acid salts	Sodium hydroxide	0.4	12.9	1	2
	Ammonium chloride	5		1	1
	Aluminous water	5		1	1
	Zinc chloride	5		1	1
	Ferric chloride	5		1	1
	Ferric nitrate	5	1.3	1	2
Basic salts	Sodium sulfite	5		1	1
	Sodium carbonate	5	11.8	1	1
	Sodium phosphate	5		1	2
Neutral salts	Potassium chloride	5		1	1
	Sodium sulfate	5		1	1
	Calcium chloride	5		1	1
	Sodium nitrate	5	8.2	1	N/A
	Aluminum chloride	5		1	1
Oxidizing agents	Hydrogen peroxide	1		1	1
	Sodium hypochlorite solution	1	12.5	1	2
	Chlorinated lime	1		1	2
	Potassium bichromate	5	4.5	1	1
Organic solvents	Alcohol	10		1	2
	Organic solvent or oil (excluding alcohol)			1	N/A

\*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)**

This table shows corrosion resistance for each single substance alone. If a sample contains two or more substances, the corrosion resistance may differ from that given in this table. The three columns in each cell read from the left: Concentration (%); Temperature (°C), Level of corrosion resistance. The corrosion resistance level; ◎: Excellent, ○: Good, △: poor, ×: unusable. "b" in the table refers to boiling point of each solution.

		Holder material			Ultrasonic transducer material Sensor solution ground tip				Seal O-ring material	Sensor body material	Remarks							
		Polypropylene			316 SS		Hastelloy C		Titanium			Fluoro rubber (FKM)	Ryton					
Inorganic acid	Sulfurous acid	100	20	◎	6	30	◎	6	30	◎	Strong acid ◎ Weak acid ◎	-						
	Hydrochloric acid	5	20	◎	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	◎	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 hydroxide 9 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	◎	-		-		
		-			25	25	×	-		10	b	◎	-		-			
	Aluminum chloride				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	◎	
		sat.	80	◎	25	b	○	25	b	◎	25	b	◎	-	25	90	◎	
	Calcium chloride	sat.	100	◎														
		20	40	◎	30	b	×	30	b	×	30	b	◎	-	20	60	◎	
		20	60	◎														
Ferric chloride																		
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	○		

		Holder material			Ultrasonic transducer material Sensor solution ground tip				Seal O-ring material	Sensor body material	Remarks
		Polypropylene			316 SS	Hastelloy C	Titanium		Fluoro rubber (FKM)	Ryton	
Sulfates	Ammonium sulfate	5 60 ◎ ◎	20 sat. b 30 ◎	20 sat. b 30 ◎	20 sat. b 30 ◎	20 sat. b 30 ◎	20 sat. b 30 ◎	20 sat. b 30 ◎	—	10 90 ◎	Polypropylene may sometimes be eroded by ammonium sulfate crystals
	Potassium sulfate	—	10 b ◎	10 b ◎	10 b ◎	10 b ◎	10 b ◎	10 b ◎	—	10 90 ◎	
	Sodium sulfate	Corrosion resistance is good for usual salts.	20 b ◎	20 b ◎	20 b ◎	20 b ◎	20 b ◎	20 b ◎	—	10 90 ◎	
Nitrates	Ammonium nitrate		20 b ◎	20 b ◎	20 b ◎	20 b ◎	20 b ◎	20 b ◎	—	10 90 ◎	
	Sodium nitrate		50 b ◎	—	50 b ◎	—	50 b ◎	—	—	—	
Others	Sodium sulfite	30 90 ◎ 20 80 ◎	20 b ◎	—	20 b ◎	—	20 b ◎	—	—	—	
	Hydrogen peroxide		10 30 ◎	—	10 30 ◎	—	10 30 ◎	—	—	10 30 ◎	
	Sodium sulfide	30 90 ◎ 20 80 ◎	2 60-90 ×	2 60-90 △	15 30 ◎	—	5 90 ◎	—	—	—	
	Potassium bichromate	—	10 b ◎	10 b ◎	10 b ◎	—	—	—	—	—	
	Sodium sulfide	60 80 ◎	10 b ◎	—	10 b ◎	—	10 b ◎	—	—	10 90 ◎	
	Sodium bisulfate	—	10 b △	—	10 b ◎	—	—	—	—	—	
	Wet chlorine gas	20 ○ 40 △ 60 ×	30 ×	30 △	30 ◎	—	—	—	—	20 ×	
Gases	Sea water + Saturated Cl <sub>2</sub>	—	95 ×	95 △	95 ◎	—	—	—	—	—	
	Bromine gas	—	—	30 ◎	30 ◎	—	—	—	—	30 ×	
	Hydrogen sulfide	—	20 ◎	—	20 ◎	—	—	—	—	—	
	Sulfurous acid gas	80 ◎ 100 ◎	—	—	30-90 ◎	—	—	—	—	80 ◎	
	Acetaldehyde	20 ◎	100 30 ◎	—	—	—	—	—	—	100 20 ○	
Organic substances	Acetone	100 20 ○	50 25 ◎ 100 110 ◎	—	—	—	—	—	100 25 ×	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 ×	100 25 ◎	—	—	—	—	—	—	—	
	Glacial acetic acid	100 70 ◎ 100 100 ○	—	—	—	—	—	—	100 24 ×	100 20 ◎	
	Glycerin	100 70 ◎ 100 100 ◎	100 25 ◎	—	—	—	—	—	—	—	
	Chlorophenol	100 20 ◎ 100 70 △ 100 100 ×	—	—	—	—	—	—	—	100 20 ◎	
	Xylene	100 20 ×	—	—	—	—	—	—	—	100 20 ◎	
	Chlorobenzene	100 20 ×	—	—	—	—	—	—	—	—	
	Chloroform	100 20 ×	100 b ◎	100 b ◎	100 b ◎	—	—	—	—	100 90 △	
	Dioxane	100 20 ◎ 100 70 △ 100 100 ×	—	—	—	—	—	—	—	100 90 ◎	
	Dichloroethane	100 70 ×	—	—	—	—	—	—	—	—	
	Ethyl nitrate	100 20 ◎ 100 △	100 105 ◎	—	—	—	—	—	—	100 90 ○	
	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 ○ 100 100 ×	—	—	—	—	—	—	—	100 20 △ 100 90 ×	
	Benzyl alcohol benzene	100 20 ◎	100 30 △	—	100 30 ○	100 25 ○	100 90 ◎	—	—	—	
	Formaldehyde	10 70 ◎ 10 100 ◎	37 b ◎	37 b ◎	37 b ◎	—	—	—	—	—	

		Holder material		Ultrasonic transducer material Sensor solution ground tip				Seal O-ring material	Sensor body material	Remarks
		Polypropylene	316 SS	Hastelloy C	Titanium	Fluoro rubber (FKM)	Ryton			
Organic substances	Methylnaphthelen	◎	—	—	—	—	—	—		
	Methyl ethyl ketone	100 20 ○ 70 △	—	—	—	—	—	100 90 ◎		
	Methyl alcohol	100 20 ◎	100 25 ◎	—	—	—	—	100 25 ◎		
	Nitrobenzene	100 20 ◎ 100 70 ○ 100 100 ×	—	—	—	—	—	100 90 ×		
	Acetic acid	100 20 ◎ 100 70 △ 100 100 ×	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 ×	—	—	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 ×	100 25 ◎	—	—	100 25 ◎	—	—		

**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 analyzer ; ☐ FLXA202, ☐ FLXA21, ☐ FLXA402, ☐ FLXA402T, ☐ PH450, ☐ PH202,  
☐ PH400, ☐ OR400, ☐ PH100, ☐ OR100, ☐ \_\_\_\_\_  
 (3) System configuration selection; ☐ Sensor, ☐ Holder, ☐ pH/ORP Analyzer/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 ; \_\_\_\_\_