









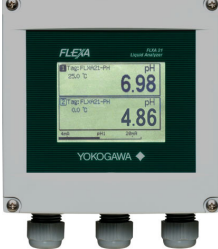




TI 12B07A03-03E

■ pH/ORP Sensors

<p>Model PH8EFP KCl Filling type pH Sensor</p>  <p>Model PH8ERP KCl Refillable type pH Sensor</p>  <p>Model PH8EHP pH Sensor for High Purity Water</p>  <p>Model FU20 pH, Redox and Temperature Sensor</p>  <p>Model PH10RP KCl Replenish-free type pH Sensor</p>  <p>Model HA405/HA406^{*1} Solid Electrolyte pH Sensor</p>  <p>Model DPA405/DPA406^{*1} pH Sensor for Chemical Processes</p>  <p>Model HF405^{*1} Hydrofluoric Acid-resistant pH Sensor</p> 	<p>Model PH450G pH/ORP Converter</p> 	<p>Model PH400G^{*1} pH Converter</p> 
	<p>Model FLXA21 Modular Two-wire Liquid Analyzer</p> 	<p>Model PH202G, S, SJ^{*2} pH/ORP Transmitter</p> 
	<p>Model OR400G^{*1} ORP Converter</p> 	

(*1) These products are available only in China, Korea, Taiwan and Russia.

(*2) This product (PH202SJ) is available only in Japan.

■ pH Sensor Selection Guide and Compatible Instruments

Model Name	General Ryton pH Sensor			Specialty pH Sensor		
	PH8EFP	PH8ERP	PH8EHP	HA405 ^{*8}	HA406 ^{*8}	DPA405 ^{*8}
Product Name	KCl filling type	KCl refillable type	For high purity water	Solid electrolyte type	Solid electrolyte type	For chemical process
Specifications						
Normal measuring range	0 to 14 pH	2 to 12 pH	2 to 12 pH	2 to 12 pH	2 to 12 pH	0 to 14 pH
Process temperature	-5 to 105 °C ¹	-5 to 80 °C ¹	0 to 50 °C	0 to 110 °C ¹	0 to 100 °C ¹	0 to 100 °C ¹
Process pressure	AP to 10 kPa ²	AP to 50 kPa ²	AP	AP to 1.6 MPa (sol temp 25 °C) AP to 600 kPa (sol temp 100 °C) ²		AP to 250 kPa ²
Process conductivity	≥50 μS/cm	≥50 μS/cm		≥50 μS/cm	≥50 μS/cm	≥50 μS/cm
Integral temperature element	Pt1000	Pt1000	Pt1000	Not integrated ³	Pt1000	Not integrated ³
Applications						
General chemical process	B ⁴	X	X	C	C	B
Chemical process containing Cl ₂ , H ₂	X	X	X	X	X	A
High purity water (0.1-50 μS/cm)	X	X	A	X	X	X
Solution containing organic compounds	B	X	X	A	A	C
Organic solvent rich solution	X	X	X	X	X	B
Solution containing fluorine	X	X	X	X	X	X
High alkaline process (≥10 pH)	A ⁴	X	X	B	B	A
Bioprocess with steam sterilization	X	X	X	X	X	X
Industrial wastewater, sewage	A ⁵	X	X	B	B	B
Human waste treatment	C ⁵	X	X	C	C	X
Plating process	B	X	X	C	C	A
Effluent	A	B	X	B	B	C
Flue gas desulfurization system ⁶	B	X	X	A	A	X
Converter/Transmitter Compatibility						
PH450G 4-Wire pH/ORP Converter	B	B	B	B	B	B
PH400G 4-Wire pH Converter	B	B	B	B	B	B
FLXA21/PH202G 2-Wire pH/ORP Transmitter	B	B	B	B	B	B
PH202SJ 2-Wire pH/ORP Transmitter	B	B	B	B	B	B
PH202S 2-Wire pH/ORP Transmitter	B	B	B	B	B	B
Holder Compatibility						
PH8HG Guide Pipe	B	B	X	X	X	X
PH8HS Immersion Type Holder	B	B	X	B	B	B
PH8HSF Immersion Type Holder (Flameproof Version, available only in Japan)	B	B	X	X	X	X
PH8HF Flow-Thorough Type Holder	B	B	X	B	B	B
PH8HFF Flow-Through Type Holder (Flameproof Version, available only in Japan)	B	B	X	X	X	X
PH8HH Holder for High Purity Water	X	X	A	X	X	X
HH350G Suspension Type Holder	B	B	X	X	X	X
PB350G Angled Floating Ball Holder	B	B	X	X	X	X
PB360G Vertical Floating Ball Holder	B	B	X	X	X	X
PH10HG Guide Pipe	X	X	X	X	X	X
PH10HLD Immersion Type Holder	X	X	X	X	X	X

Rating: A=Recommended, B=Applicable, C=Acceptable, X=Not applicable

AP = Atmospheric Pressure

*1: When using in conjunction with holder, see Appendix 1 on page 5.

*2: When using in conjunction with holder, see Appendix 2 on page 5.

*3: For automatic temperature compensation, use adapter with SA405 temperature sensor.

*4: For high alkaline solutions, specify appropriate optional glass electrode.

*5: Specify optional Teflon junction.

*6: When using in flue gas desulfurization system, use Chemical Cleaning pH Measuring System (PH8HS3+PH8SM3).

*7: Maximum hydrofluoric acid concentration is limited by pH.

*8: These products are available only in China, Korea, Taiwan and Russia.

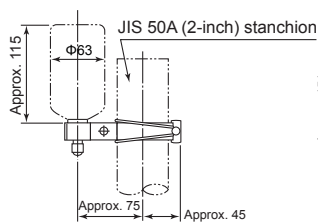
Specialty pH Sensor			Dedicated to PH100 Converter			
DPA406 ^{*8}	HF405 ^{*8}	FU20	PH10FP	PH10RP	Model Name	
For chemical process	Hydrofluoric acid resistant	pH/ORP combination	KCl refillable type	KCl replenish-free type	Product Name	
Specifications						
0 to 14 pH	2 to 11 pH	2 to 12 pH	0 to 14 pH	2 to 12 pH	Normal measuring range	
0 to 100 °C ¹	0 to 80 °C ¹	-10 to 105 °C (sensor body)	0 to 70 °C	0 to 60 °C	Process temperature	
AP to 250 kPa ²	Same as HA405 ²	0 to 1 MPa	AP (max depth: 3 m)	AP (max depth: 3 m)	Process pressure	
≥50 μS/cm	≥50 μS/cm	≥50 μS/cm	≥50 μS/cm	≥50 μS/cm	Process conductivity	
Pt1000	Not integrated ³	Pt1000	Pt1000	Pt1000	Integral temperature element	
Applications						
	B	B	C	X	X	General chemical process
	A	X	X	X	X	Chemical process containing Cl ₂ , H ₂
	X	X	X	X	X	High purity water (0.1-50 μS/cm)
	C	B	X	X	X	Solution containing organic compounds
	B	X	X	X	X	Organic solvent rich solution
	X	A ⁷	X	X	X	Solution containing fluorine
	A	X	X	X	X	High alkaline process (≥10 pH)
	X	X	X	X	X	Bioprocess with steam sterilization
	B	X	A	C	C	Industrial wastewater, sewage
	X	X	A	X	X	Human waste treatment
	A	X	X	X	X	Plating process
	C	C	A	B	B	Effluent
	X	X	X	X	X	Flue gas desulfurization system ⁶
Converter/Transmitter Compatibility						
	B	B	B	X	X	PH450G 4-Wire pH/ORP Converter
	B	B	B	X	X	PH400G 4-Wire pH Converter
	B	B	B	X	X	FLXA21/PH202G 2-Wire pH/ORP Transmitter
	B	B	B	X	X	PH202SJ 2-Wire pH/ORP Transmitter
	B	B	B	X	X	PH202S 2-Wire pH/ORP Transmitter
Holder Compatibility						
	X	X	X	X	X	PH8HG Guide Pipe
	B	C	X	X	X	PH8HS Immersion Type Holder
	X	X	X	X	X	PH8HSF Immersion Type Holder (Flameproof Version, available only in Japan)
	B	B	X	X	X	PH8HF Flow-Thorough Type Holder
	X	X	X	X	X	PH8HFF Flow-Through Type Holder (Flameproof Version, available only in Japan)
	X	X	X	X	X	PH8HH Holder for High Purity Water
	X	X	X	X	X	HH350G Suspension Type Holder
	X	X	X	X	X	PB350G Angled Floating Ball Holder
	X	X	X	X	X	PB360G Vertical Floating Ball Holder
	X	X	X	A	A	PH10HG Guide Pipe
	X	X	X	A	A	PH10HLD Immersion Type Holder

Rating: A=Recommended, B=Applicable, C=Acceptable, X=Not applicable
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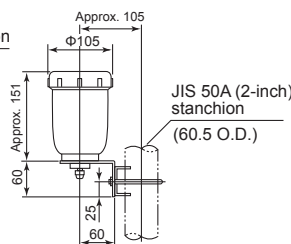
Unit: mm

KCl Reserve Tanks for KCl Filling Type pH/ORP Sensors and pH Sensor for High Purity Water

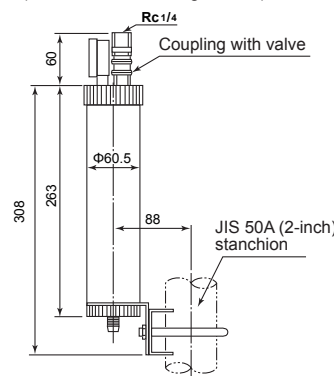
General Purpose KCl Reserve Tank
 (250 mL, with mounting bracket)



Large Volume KCl Reserve Tank
 (500 mL, with mounting bracket)



Medium Pressure KCl Reserve Tank
 (250 mL, with mounting bracket)



When medium pressure KCl reserve tank is not needed, large volume (500 mL) KCl reserve tank is recommended.

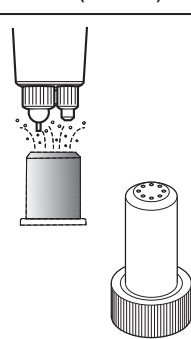
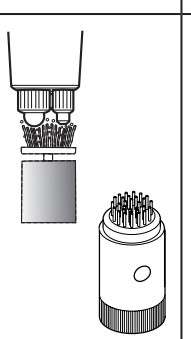
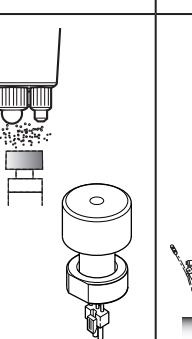
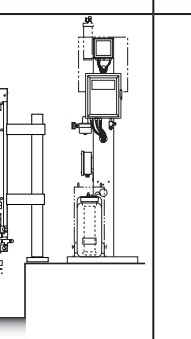
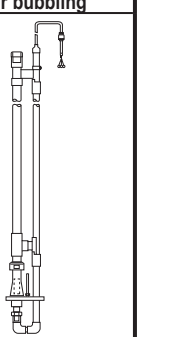
pH Converter/Transmitter Selection Guide

	Model Name	PH450G	PH400G	FLXA21/PH202G	PH202SJ ^{*1}	PH202S
	Product Name	4-wire pH/ORP converter	4-wire pH converter	2-wire pH/ORP transmitter	2-wire pH/ORP transmitter	2-wire pH/ORP transmitter
Installation site	Indoors	B	B	B	B	B
	Outdoors (non-hazardous area)	B	B	B	B	B
	Outdoors (hazardous area)	X	X	X	A	A
Application	For integration	B	B			
	Small-scale instrumentation					
	General purpose Medium-scale instrumentation	A	A	B	B	B
	Remotely located instrument panel room			A	A	A

Rating: A=Recommended, B=Applicable, X=Not applicable

*1 This product is TIIS Intrinsically Safe type transmitter and available only in Japan.

Automatic Cleaning Systems for pH Sensors

	Jet (water/air)	Brush	Ultrasonic	Chemical	Ultrasonic + air bubbling
Cleaning system	 Deposits on the electrode are removed by a water or air jet (intermittent cleaning) Effective against suspended matter, etc.	 Deposits on the electrode are removed by brush revolving hydraulically or pneumatically (intermittent cleaning). Effective against absorption deposits, etc.	 Deposits are prevented by cavitation by ultrasonic vibration (continuous cleaning). Effective against crystalline scale.	 Sensor is lifted from process solution at specified intervals and washed with chemicals (plus air bubbling) in cleaning chamber. Field proven in flue gas desulfurization systems.	 Deposits that are difficult to remove by ultrasonic cleaning, are removed by air bubbling (continuous blowing). Effective in pulping waste liquor.
Compatible holder	PH8HF PH8HS	PH8HF PH8HS	PH8HF/PH8HFF PH8HS/PH8HSF	PH8HS3 (automatic chemical cleaning system)	Custom-designed
Compatible sensor	PH8EFP, PH8ERP HA405/HA406 DPA405/DPA406 HF405	PH8EFP, PH8ERP	PH8EFP, PH8ERP	PH8EFP HA405/HA406	PH8EFP, PH8ERP

Effect of Cleaning Contaminations by System

Contamination	Process involved	Cleaning System				
		Jet (water/air)	Brush	Ultrasonic	Chemical	Ultrasonic + air bubbling
Crystalline scale	Sugar, fertilizer, soda, glass	B	B	B	A	A
Suspended matter, fiber	Ceramic, pulp and paper, textile, metal, water treatment, iron & steel wastewater, dairy	B	B	B	B	B
Viscosity	Flour milling, food processing	B	B	C	A	A
Algae, microorganism	River, seawater, industrial wastewater	A	B	B	A	B
Absorption deposit	Metal processing/treating, wastewater treatment (coagulation sedimentation)	C	A	C	A	B

Rating: A=Good, B=Fair, C=Poor

This information should only be used as a reference.

Appendix 1 Process Temperature Range

Sensor	Holder Type (Model Name)	Holder Material	Cleaning System	Adapter Material	Process Temp (°C)
PH8EFP OR8EFG	Guide pipe (PH8HG)	PVC	without	Adapter is not used	-5 to 50
		PP	without		-5 to 80
	Immersion type (PH8HS)	PP, SUS	without		-5 to 100
			with		-5 to 80
	Flow-through type (PH8HF)	PP	with or without		-5 to 80
		SUS	without		-5 to 105
Suspension type (HH350G)	SUS	with	-5 to 80		
Floating ball type (PB350G, PB360G)	PP, SUS	with or without	-5 to 80		
PH8ERP OR8ERG	Guide pipe (PH8HG)	PVC	without	Adapter is not used	-5 to 50
		PP	without		-5 to 80
	Immersion type (PH8HS)	PP	with or without		-5 to 80
	Flow-through type (PH8HF)	SUS	with or without		-5 to 80
	Suspension type (HH350G)	SUS	with or without		-5 to 80
Floating ball type (PB350G, PB360G)	PP, SUS	without	-5 to 50		
PH8EHP	For high purity water (PH8HH)	Acrylic	without	Adapter is not used	0 to 50
HA405 HA406 DPA405 DPA406 HF405 HA485 DPA485	Immersion type (PH8HS)	PP, SUS	without	PVC	0 to 50
			with jet cleaning	PP, SUS	0 to 100
	Flow-through type (PH8HF)	PP	with jet cleaning or without	PVC	0 to 50
				PP, SUS	0 to 80
		SUS	without	PVC	0 to 50
				PP	0 to 80
				SUS	0 to 100
				PP, SUS	0 to 80
with jet cleaning	PVC	0 to 50			

PVC = Rigid Polyvinyl Chloride, PP = Polypropylene, SUS = Stainless Steel

Note: SUS holder and SUS adapter should be used in process solution with 3 pH or greater.

Appendix 2 Process Pressure Range

Sensor	Holder Type (Model Name)	KCI Reserve Tank	Process Pressure
PH8EFP OR8EFG	Immersion type (PH8HS)	General purpose type, large volume type	AP (max depth: 3 m)
	Guide pipe (PH8HG) Suspension type (HH350G) Floating ball type (PB350G, PB360G)	General purpose type, large volume type	AP (max depth: 3 m)
	Flow-through type (PH8HF)	General purpose type, large volume type	AP to 10 kPa
		Medium pressure type	AP to 500 kPa
PH8ERP OR8ERG	Immersion type (PH8HS)	NA	AP (max depth: 3 m)
	Guide pipe (PH8HG) Suspension type (HH350G) Floating ball type (PB350G, PB360G)	NA	AP (max depth: 3 m)
	Flow-through type (PH8HF)	NA	AP to 50 kPa
	For high purity water (PH8HH)	General purpose type, large volume type	AP (outlet is vented to atmosphere)
HA405, HA406 HF405, HA485	Immersion type (PH8HS)	NA	AP (max depth: 3 m)
	Flow-through type (PH8HF)	NA	AP to 500 kPa
DPA405, DPA406 DPA485	Immersion type (PH8HS)	NA	AP (max depth: 3 m)
	Flow-through type (PH8HF)	NA	AP to 250 kPa

NA=Not applicable

AP = Atmospheric Pressure

ORP Sensor Selection Guide and Compatible Instruments

	General Ryton ORP Sensor				
Model Name	OR8EFG-PT	OR8EFG-AU	OR8ERG-PT	OR8ERG-AU	
Product Name	KCl filling type	KCl filling type	KCl refillable type	KCl refillable type	
Specifications					
Measuring range	-1500 to 1500 mV	-1500 to 1500 mV	-1500 to 1500 mV	-1500 to 1500 mV	
Indicator electrode	Platinum	Gold	Platinum	Gold	
Process temperature	-5 to 105 °C ¹	-5 to 105 °C ¹	-5 to 80 °C ¹	-5 to 80 °C ¹	
Process pressure	AP to 10 kPa ²	AP to 10 kPa ²	AP to 50 kPa ²	AP to 50 kPa ²	
Process pH	No limit	No limit	No limit	No limit	
Applications					
General chemical process	B	X	B	X	
Wastewater (cyanide) treatment	X	B	X	B	
Wastewater (chromate) treatment	X	B	X	B	
Organic solvent rich solution	X	X	X	X	
Sewage	X	X	X	X	
Human waste treatment	X	X	X	X	
Plating process	B	X	B	X	
Electrolyte (caustic solution)	X	X	X	X	
Converter/Transmitter Compatibility					
PH450G 4-Wire pH/ORP Converter	B	B	B	B	
OR400G 4-Wire ORP Converter	B	B	B	B	
FLXA21/PH202G 2-Wire pH/ORP Transmitter	B	B	B	B	
PH202SJ 2-Wire pH/ORP Transmitter	B	B	B	B	
PH202S 2-Wire pH/ORP Transmitter	B	B	B	B	
Holder Compatibility					
PH8HG Guide Pipe	B	B	B	B	
PH8HS Immersion Type Holder	B	B	B	B	
PH8HSF Immersion Type Holder (Flameproof Version, available only in Japan)	B	B	B	B	
PH8HF Flow-Thorough Type Holder	B	B	B	B	
PH8HFF Flow-Through Type Holder (Flameproof Version, available only in Japan)	B	B	B	B	
PH8HH Holder for High Purity Water	X	X	X	X	
HH350G Suspension Type Holder	B	B	B	B	
PB350G Angled Floating Ball Holder	B	B	B	B	
PB360G Vertical Floating Ball Holder	B	B	B	B	
PH10HG Guide Pipe	X	X	X	X	
PH10HLD Immersion Type Holder	X	X	X	X	

Rating: A=Recommended, B=Applicable, C=Acceptable, X=Not applicable

AP = Atmospheric Pressure

*1: When using in conjunction with holder, see Appendix 1 on page 5.

*2: When using in conjunction with holder, see Appendix 2 on page 5.

*3: These products are available only in China, Korea, Taiwan and Russia.

ORP Converter/Transmitter Selection Guide

	Model Name	PH450G	OR400G	FLXA21/PH202G	PH202SJ ¹	PH202S
	Product Name	4-wire pH/ORP converter	4-wire ORP converter	2-wire pH/ORP transmitter	2-wire pH/ORP transmitter	2-wire pH/ORP transmitter
Installation site	Indoors	B	B	B	B	B
	Outdoors (non-hazardous area)	B	B	B	B	B
	Outdoors (hazardous area)	X	X	X	A	A
Application	For integration					
	Small-scale instrumentation	B	B			
	General purpose					
	Medium-scale instrumentation	A	A	B	B	B
	Remotely located instrument panel room			A	A	A

Rating: A=Recommended, B=Applicable, X=Not applicable

*1 This product is TIIS Intrinsically Safe type transmitter and available only in Japan.

Specialty ORP Sensor		Dedicated to ORP100 Converter		
HA485 ^{*3}	DPA485 ^{*3}	OR10FP	OR10RP	Model Name
Solid electrolyte type	For chemical process	KCl refillable type	KCl replenish-free type	Product Name
Specifications				
-1500 to 1500 mV	-1500 to 1500 mV	-1500 to 1500 mV	-1500 to 1500 mV	Measuring range
Platinum	Platinum	Platinum	Platinum	Indicator electrode
0 to 110 °C ^{*1}	0 to 100 °C ^{*1}	0 to 70 °C	0 to 60 °C	Process temperature
AP to 1.6 MPa (sol temp 25 °C) AP to 600 kPa (sol temp 100 °C) ^{*2}	AP to 250 kPa ^{*2}	AP (max depth: 3 m)	AP (max depth: 3 m)	Process pressure
2 to 14 pH	No limit	No limit	No limit	Process pH
Applications				
B	B	B	B	General chemical process
X	X	X	X	Wastewater (cyanide) treatment
X	X	X	X	Wastewater (chromate) treatment
X	B	X	X	Organic solvent rich solution
B	X	X	X	Sewage
B	X	X	X	Human waste treatment
X	B	B	B	Plating process
X	B	X	X	Electrolyte (caustic solution)
Converter/Transmitter Compatibility				
B	B	X	X	PH450G 4-Wire pH/ORP Converter
B	B	X	X	OR400G 4-Wire ORP Converter
B	B	X	X	FLXA21/PH202G 2-Wire pH/ORP Transmitter
B	B	X	X	PH202SJ 2-Wire pH/ORP Transmitter
B	B	X	X	PH202S 2-Wire pH/ORP Transmitter
Holder Compatibility				
X	X	X	X	PH8HG Guide Pipe
B	B	X	X	PH8HS Immersion Type Holder
X	X	X	X	PH8HSF Immersion Type Holder (Flameproof Version, available only in Japan)
B	B	X	X	PH8HF Flow-Thorough Type Holder
X	X	X	X	PH8HFF Flow-Through Type Holder (Flameproof Version, available only in Japan)
X	X	X	X	PH8HH Holder for High Purity Water
X	X	X	X	HH350G Suspension Type Holder
X	X	X	X	PB350G Angled Floating Ball Holder
X	X	X	X	PB360G Vertical Floating Ball Holder
X	X	A	A	PH10HG Guide Pipe
X	X	A	A	PH10HLD Immersion Type Holder

Rating: A=Recommended, B=Applicable, C=Acceptable, X=Not applicable

AP = Atmospheric Pressure

*1: When using in conjunction with holder, see Appendix 1 on page 5

*2: When using in conjunction with holder, see Appendix 2 on page 5

*3: These products are available only in China, Korea, Taiwan and Russia.

Revision Information

- Title : pH/ORP Analyzer Selection Guide
- Manual No. : TI 12B07A03-03E

Oct. 2011/2nd Edition

PH100, OR100 are deleted (termination of products).

Jun. 2009/1st Edition

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