

General Specifications

PH400G 4-Wire Type pH Meter

EXA PH

GS 12B7C1-E

GENERAL

The EXA PH intelligent pH converter is a highly reliable advanced function pH measurement system designed for wide application in all industries such as for medium-scale waste water treatment system, and general-purpose pH measurement and control systems.

The EXA PH intelligent pH converter features highly effective built-in functions for electrode diagnosis similar to EXA PH202 2-wire pH transmitter. These functions monitor sensor errors even while pH measurements are in progress, enabling more highly reliable pH measurement.

The converter also offers an interactive system for setting the various parameters, facilitating effective use of its wealth of functions.

The EXA PH intelligent pH converter is available not only in versions for general-purpose applications but also for high-purity water service.

High-Purity Water pH Measurements

High-purity water today is widely used in numerous process plants in a variety of chemical processes and boilers, with heavy emphasis placed on pH measurement and monitoring for water quality control and water purification unit operational control.

However, the use of general-purpose pH meters for pH measurements in high-purity water meets with the following problems.

- Since measurement solutions are chemically pure, their pH values may vary owing to carbon dioxide in the atmosphere and / or impurities in measurement lines.
 - The pH electrode output is likely to be affected by streaming potentials, externally induced potentials, etc. and thus likely to produce measurement error because the liquid resistance between the electrodes in measurement solution is high owing to low solution conductivity.
- Since the pH electrodes and their holders for high-purity water service have been designed considering countermeasures against the above problems, they can provide highly reliable pH measurements. Moreover, since the EXA PH intelligent pH converter is equipped with a reference temperature conversion function to compensate for pH variation owing to measured liquid temperature variation, any effect from sample liquid temperature fluctuation is slight, and devices such as sampling system coolers, etc. can thus be simplified.

FEATURES

Microprocessor - Based Intelligent pH converter

- Sensor failure can be monitored even during pH measurement.
- Automatic calibration using standard buffer solutions can be initiated by merely a single touch of a key. Tables for three types of standard solution are incorporated. This allows for simple automatic calibration.



PH400G

- Electrode characteristic deterioration is automatically checked during automatic calibration using the standard solutions. The electrode replacement time that previously depended on intuition can now be decided automatically.
- Daily operation can be performed without opening the case. Even in rainy weather, since the routine maintenance operation such as calibration using standard solutions can be performed without opening the case lid, there is no worry about insulation deterioration.
- Ranges can be freely set in the field if the span is 1 pH or more.
- A timer function for cleaning is incorporated.
- Abundant built-in contact output function
- Operating panel has excellent operability.

Ryton pH Electrode Body

- The electrode body uses Ryton which compares with Teflon in corrosion resistance and heat resistance and has excellent mechanical properties. This pH electrode can cover most applications.
- This pH electrode is easy to handle. As this is a composite pH electrode, calibration using standard solutions or maintenance can be easily performed. Glass electrode and junction can also be simply replaced.

SYSTEM CONFIGURATION

For the pH electrodes, see GS 12B07B02-E.

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

Fig. 1-a System Configuration (General Purpose)

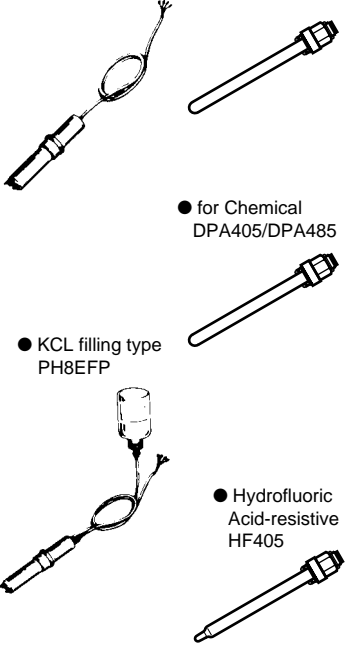
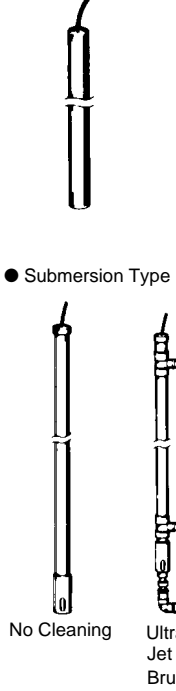
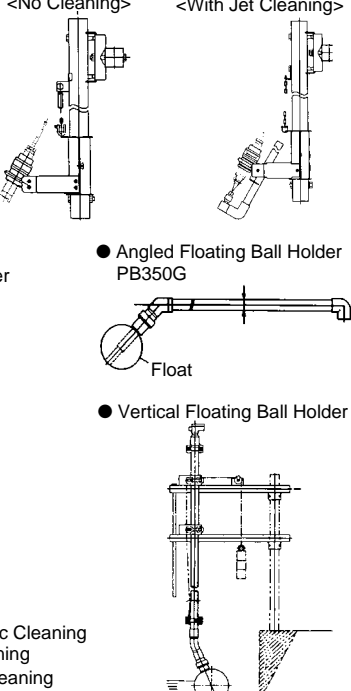
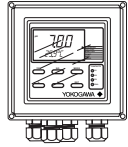
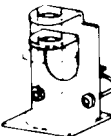
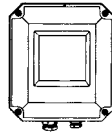


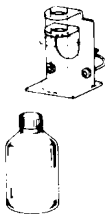
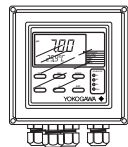
pH electrodes	Holder, Holder with Cleaning system		pH Converter
<ul style="list-style-type: none"> ● KCL refillable type PH8ERP ● Xerolyt HA405/HA485 ● for Chemical DPA405/DPA485 ● KCL filling type PH8EFP ● Hydrofluoric Acid-resistant HF405 	<ul style="list-style-type: none"> ● Guide Pipe PH8HG ● Submersion Type Holder ● Flow Type Holder PH8HF  <p>No Cleaning Ultrasonic Cleaning Jet Cleaning Brush Cleaning</p>	<ul style="list-style-type: none"> ● Suspension Type Holder HH350G ● Angled Floating Ball Holder PB350G ● Vertical Floating Ball Holder <p><No Cleaning> <With Jet Cleaning></p>  <p>Float</p> <p>Ultrasonic Cleaning Jet Cleaning Brush Cleaning</p>	<ul style="list-style-type: none"> ● 4-wires pH Converter PH400G 
Accessories	Cleaning Devices		
<ul style="list-style-type: none"> ● Sensor Stand 	<ul style="list-style-type: none"> ● Ultrasonic Oscillator PUS400G 		

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

pH electrode	Holder	Accessories	pH Converter
<ul style="list-style-type: none"> ● For pure water PH8EHP 	<ul style="list-style-type: none"> ● For pure water PH8HH 	<ul style="list-style-type: none"> PH8AX ● Sensor Stand ● Calibration Reagent and KCL Solution 	<ul style="list-style-type: none"> ● 4-wires pH Converter PH400G 

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CAUTION



Installation Location of Holders (Guide Pipe, Submersion Type, etc)
The holder should be used in a place that is as vibration free as possible.
Using the holder in a place where it is affected by vibration, may result in damage to the holder.

SPECIFICATIONS

EXA PH Series General Specifications

Measured object: Hydrogen ion concentration (pH) in aqueous solutions

Measuring principle: Glass electrode method

Measuring range: 0 to 14 pH

Measuring conditions:

Solution temperature: See Table 1, for high-purity water, 0 to 50°C

Solution pressure: See Table 2, for high-purity water, atmospheric pressure (measured liquid outlet side open to atmosphere)

Solution flow rate: Max. 2 m/s for submersion guide-pipe type 3 to 11 l/min for flow-through type, for high-purity water, see Figure 2.

Solution conductivity: Min. 50 μS/cm, for high-purity water, see Figure 1.

Temperature compensation range: -10 to 130°C (for pH converter)

Table 1. Process Temperature Range

(a) pH and Liquid Temperature Ranges for pH Electrodes

pH Electrode	Holder Type	Solution pH Ranges	Solution Temperature Ranges (°C)
KCl refillable type	Guide-pipe ^{*3} Solution Flow-through	2 to 12	-5 to 80 ^{*2}
KCl filling type	Guide-pipe	2 to 12	-5 to 80 ^{*2}
	Submersion ^{*3} Flow-through	0 to 14 ^{*1}	-5 to 105 ^{*1}

T01.EPS

(b) Solution Temperature Ranges for Holders

Holder Type	Holder Material	Cleaner	Liquid Temperature (°C)
Guide-pipe	PV	None	-5 to 50
	PP	None	-5 to 80
Submersion	PP	None	-5 to 100
		Provided	-5 to 80
	S3 ^{*4}	None	-5 to 100
		Provided	-5 to 80
Flow-through ^{*3}	PP	None	-5 to 80
		Provided	-5 to 80
	S3 ^{*4}	None	-5 to 105
		Provided	-5 to 80

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PV: Hard PVC
PP: Polypropylene
S3: Stainless steel (SUS 316)

Notes:

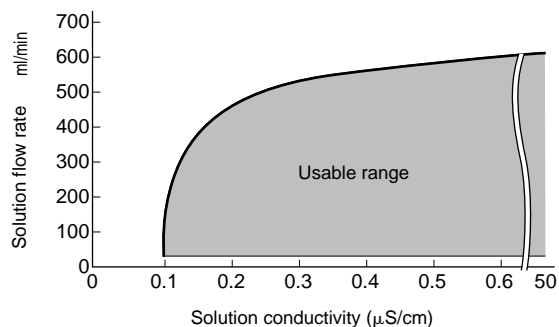
- (*1): The solution temperature should preferably be below 80°C when the pH value is in the range 11 to 14. Even if the solution is below 80°C, electrode service life may be shortened in store solutions. In such cases the KCl filling type is recommended.
- (*2): Maximum temperature 50°C when Hard PVC guide-pipe is used.
- (*3): For flow-through types, refer also to the solution temperature and pressure graph (in notes following Model and Suffix code table for flow-through type holders).
- (*4): Solutions with normal pH ranges of 3 to 14 are recommended for stainless steel (SUS316).

Table 2. Process Pressure Range

pH Electrode Holder	PH8ERP	PH8EFP
Submersion	Atmospheric pressure (Submersion depth: Max. 3m)	
Guide-pipe Suspension Float	Atmospheric pressure (Submersion depth: Max.3m)	
Flow-through	Atmospheric pressure to 50kPa	Atmospheric pressure to 10 kPa when general purpose reserve tank used.
		Atmospheric pressure to 500 kPa when medium-pressure reserve tank used.

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

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

1. pH Electrodes: PH8ERP, PH8EFP, PH8EHP

A compound electrode assembly consisting of glass electrode, reference electrode, temperature sensor, and ground tip.

Type: KCl filling and KCl refillable types

Measuring range: 0 to 14 pH for KCl refillable type; normal pH =2 to 12 pH)

Refer to "Selection Criteria for pH Electrodes and Holders" shown on the last page to select KCl filling or refillable type electrodes.

Temperature compensation sensor: Platinum RTD (Pt1000)

Wetted part materials:

pH Electrode	Wetted parts materials
KCl refillable type	Ryton (PPS resin), glass, ceramics, titanium or Hastelloy C, fluorocarbon rubber and chlorinated polyethylen rubber (carbon sheath only when suspended in guide-pipe)
KCl filling type	Same as above. Plus heat resistant soft PVC (KCl tube only when suspended in guide-pipe)

T04.EPS

Weight: KCl refillable type; Approx. 0.4 kg
KCl filling type;

Body: Approx. 0.4 kg

Tank: { General purpose: Approx. 0.3 kg
Medium-pressure: Approx. 1 kg
For high-purity water; Body: Approx. 0.4 kg
Tank: Approx. 0.3 kg

Note: Although electrodes other than the EXA PH pH electrode (Pt1000 temperature sensor) can also be used, there are some restrictions on function. Also, since reference performance values will differ, please consult your Yokogawa representative.

2. Holders

2.1 General-Purpose Holders: PH8HG, PH8HF, PH8HS

Materials: Polypropylene, Stainless steel, PVC (guide-pipe only)

Cleaning: Ultrasonic, jet, or brush cleaning

Cleaning Unit Wetted Materials:

Ultrasonic unit: Stainless steel, PVC (guide-pipe only)

Jet unit: Polypropylene

Brush unit: Polypropylene, titanium (shaft), Ryton®(bearings)

Mounting: Mount on 50 A vertical or horizontal pipe

Mounting hardware: One or two sets (submersion type) or one set (flow-through type)

Weight: See Table 3.

Table 3. Holder Weight

Materials Holder	Polyethylen	Stainless steel (SUS316)	Hard PVC
Submersion	Approx. 0.5 to 2.2kg	Approx. 1.5 to 6kg	—
Flow-through	Approx. 0.5 to 2kg	Approx. 7 to 8.5kg	—
Guide-pipe	Approx. 1kg	—	Approx. 1.6kg

T05.EPS

Note: Table does not include mounting hardware weights.

Mounting hardware weight:

{ For submersion type: Approx. 1 kg / set
For flow-through type: Approx. 0.5 kg

Table 4. Utilities (For Jet Cleaning or Brush Cleaning)

	Pressure (kPa)	Flow Rate
Water jet	200 to 400 + Liquid pressure	5 to 20 l/min
Water brush	100 to 250 + Liquid pressure	20 to 30 l/min
Air jet	200 to 400 + Liquid pressure	100 to 300 NI/min
Air brush	150 to 250 + Liquid pressure	300 to 600 NI/min

T06.EPS

2.2 Holder For High-purity Water: PH8HH

Materials: Acrylic resin, SUS316, chloroprene rubber
Process connections: Rc1/4 (inlet) and R1/2 (outlet), or 1/4 NPT (inlet) and 1/2 NPT (outlet)

Mounting: Mount on 50 A vertical or horizontal pipe, or wall-mount (specify mounting hardware)

Weight:

Body: 1.7 kg

Mounting hardware: 0.7 kg

3. 4-wires type pH Converters: PH400G

Measuring Range

pH: - 2 to 15 pH

Temperature : -10 to 130°C

Display Method: Digital display

Display Range

pH : -2 to 15 pH

Temperature : -10 to 130°C

Transmission Signal Output

4 to 20 mA DC, isolated transmission

output, Max. load 600 Ω

0 to 1 V DC, isolated transmission

output, Minimum load 1 kΩ

(However, the above current (4 to 20 mA) signal and the voltage (0 to 1 V) signal are not isolated from each other.)

} pH or temperature can be freely set.

Transmission Signal Range

pH: Freely adjustable to any desired range of 1 pH span or greater (set at 0 to 14 pH when shipped).

Temperature: Freely settable to any desired range of 50°C span or greater (set to 0 to 100°C when shipped).

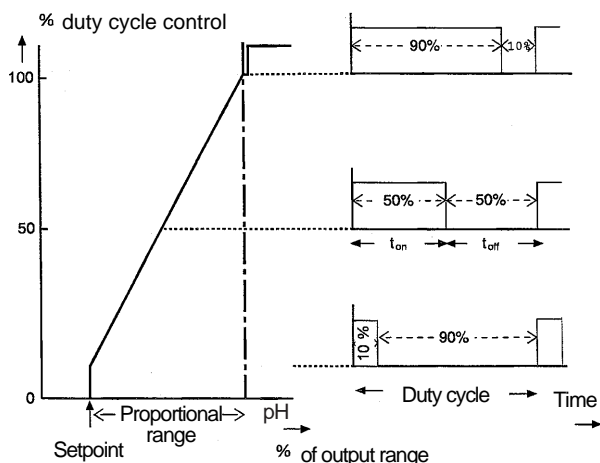
Contact Output

·Contact output function that can be set

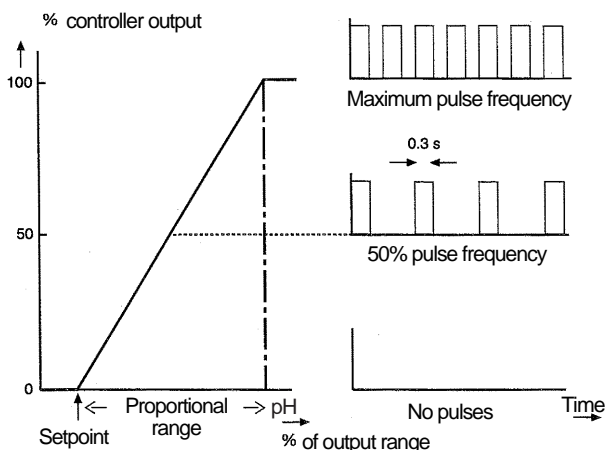
Contact	Function	
S1	Setting (free selectable)	Operation (free selectable)
	OFF, low limit, high limit, HOLD	ON/OFF, Proportional duty pulses ^{*1} Proportional frequency pulses ^{*2}
S2	OFF, low limit, high limit, HOLD	Ditto
S3	OFF, low limit, high limit, HOLD, Cleaning timer, Hi - Hi limit, Lo - Lo limit	Ditto
FAIL	Failure	ON/OFF

(*1) and (*2) are effective when the low high limit contact output is to be used. T07.EPS

(*1) Proportional duty pulse
Example of high limit alarm (control) output



(*2) Proportional frequency pulse
Example of high limit alarm (control) output



- Settable parameters
- pH value setpoint
 - Control range
 - Pulse periode

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Contact ON / OFF

S1, S2, S3

	Power		
	ON	Closed	Open
Action	ON	Closed	Open
	OFF	Open	

FAIL

	Power		
	ON	Closed	OFF
Action	ON	Closed	Closed
	OFF	Open	

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When closed, each indicator lamp is lit corresponding to each contact status.

- Contact Type: Relay contact output (dry contact)
- Contact Rating
250 V AC, 2 A, Max. 100 VA
220 V DC, 2 A, Max. 50 W

Contact Input: Dry contact for manual start for automatic cleaning

Ambient Temperature: -10 to 55°C
(hood may be fitting as option)

Storage Temperature: -30 to 70°C

Ambient Humidity: 10 to 90% RH

Construction: Watertight complying with JIS C0920 equivalent to NEMA 4 waterproof construction

Material:

- Case; Aluminum alloy casting
- Cover and window; Polycarbonate
- Finish: Baked polyurethane resin coating

Colors:

- Cover; Deep sea moss green (Munsell 0.6GY3.1/2.0)
- Case; Frosty white (Munsell 2.5Y8.4/1.2)

Mounting: Pipe mounting, wall mounting or rack mounting
Panel mounting

Power Supply Voltage: 88 to 132 V AC, 50 / 60 Hz
176 to 264 V AC, 50/60 Hz

Power Consumption: Approx. 8.5 VA

Electrical Connection:

pH electrode: Watertight plastic gland equivalent to JIS A8 attached to pH electrode side, $\phi 13.5$ hole

Others: Watertight plastic gland equivalent to JIS A15 (for cable OD. 9 to 12 mm) attached, $\phi 21$ hole

Weight:

- Body: Approx. 2.5 kg
- Mounting bracket: Approx. 0.4 kg
- Dimensions: 144 (W) x 144 (H) x 135 (D) mm

Function Specifications

Input Impedance: $10^{12} \Omega$ or more

Note: Use a electrode with solution earth electrode because of differential amplifier (that uses two high-impedance amplifiers).

Asymmetry Potential Adjustable Range: pH 7 ± 2 pH

Slope Adjusting Range: Adjustable in the range from 70 % to 110 % of the theoretical value.

Automatic Temperature Compensation Range:

-10 to 130°C (manual compensation is also available)

Reference Temperature Conversion Coefficient (Reference Temperature 25°C):

- On shipment: 0
- Adjustable range: -1.00 to 1.00 pH / 10°C
- Conversion to the reference temperature is used only for high-purity water or when the measured solution temperature coefficient is known.

Standard Performance

(performance when combined with a pH electrode)
 Repeatability: 0.05 pH (electrode submerged 3 times in the same buffer solution)
 Response Time: 10 sec (90 % response, using pH electrode and buffer solution both at temperature equilibrium at 20°C, with adequate agitation)
 Accuracy: ±0.1 pH (using KCl filling type pH electrode or high-purity water pH electrode)
 ±0.15 pH (using KCl refillable pH electrode)
 Temperature Repeatability: 1°C

Operating Functions

Display: 3 1/2 digit digital display (data display)
 Six digit alphanumeric (message or data display)

Display function:

- pH value
- Temperature value
- mA output
- mV output
- Reference electrode impedance
- The e.m.f. slope
- Asymmetry potential
- mV (e.m.f.)
- 90% response time
- Error display (at error occurrence)
- Hold display (when holding)
- Manual temperature compensation display (in manual temperature compensation setting)
- Interactive message
- Key operation requesting display

Functions that can be set or executed at operation level:

- One-touch calibration (Buffer selection is manual but indication stability check is automatic.)
- Measurement of electrode 90 % response time
- Manual calibration
- Selection of message area display contents
- Temperature coefficient setting
- Auto / manual temperature compensation selection
- Manual temperature setting
- Hold set / reset

Functions that can be set or executed at setting level:

- pH value setting for contacts (S1, S2, and S3)
- Output range setting (mA and mV outputs)
- Hold parameter setting:
 - Hold provided / no selection
 - Selection of holding either the value immediately before or the preset value
 - Preset value setting (mA and mV outputs)

Cleaning parameter setting:

- Auto / manual cleaning selection
- Manual cleaning start / stop selection
- Automatic cleaning ON / OFF selection
- Cleaning period: Setting range 0.1 to 36 hours
- Relaxation time: Setting range 0.1 to 10 min
- Cleaning time: setting range 0.1 to 10 min

Functions that can be set or executed at service level:

- °C / °F selection
- Use / no use of conversion to reference temperature
- Temperature sensor selection
- Checking item setting (asymmetry potential, e.m.f. slope, reference electrode impedance)

Setting of reference electrode impedance high limit value
 Setting of response time high limit value
 One-point temperature calibration
 Electrode type selection (glass electrode or antimony electrode)
 Error reset
 pH display value selection (0.1 pH / 0.01 pH)
 Half value recovery time check ON / OFF
 Half value recovery time setting (0.1 to 10 min)
 Burn-up or burn-down ON/OFF
 Response stabilization judging parameter setting
 Auto-return (approx. 60 min) ON/OFF
 pH standard solution temperature characteristics setting
 Temperature sensor cable length correction
 Signal output selection

4 to 20mA DC	OFF, pH Temperature
0 to 1V DC	OFF, pH Temperature

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Contact (S1, S2, or S3) output selection
 Setting of contact output delay time (0.1 to 20 sec) and hysteresis (0.01 pH to 0.2 pH)
 Setting of proportional duty pulse contact output period (5 to 100 sec)
 Setting of maximum frequency (50 to 120 pulses / min) at the proportional frequency pulse contact output
 Control range (0 to 10 pH)

Details of failure detection by self-diagnosis function:

Response time error during calibration (time until pH value is settled)
 Asymmetry potential failure
 e.m.f. slope failure
 Temperature range failure
 pH range failure
 Glass electrode impedance failure (measured solution must be 50 μS/cm or more and temperature 60°C or less)
 Reference electrode impedance failure (measured solution must be 50 μS/cm or more)
 Half value recovery time failure
 90% response time failure
 Calibrating solution temperature failure

4. Ultrasonic Oscillator (Model PUS400G)

Combination device:
 Holder with ultrasonic cleaner (PH8HS, PH8HF)
 Connection cable are provided with holders.
 Cleaning method: Continuous ultrasonic emission
 (Frequency sweep method)
 Oscillation frequency: Approx. 65 to 81 kHz
 Output voltage: Approx. 70V
 Power supply: 100/110/115/200/220/240 V AC \pm 10%
 50/60 Hz
 Power consumption: Approx. 15 VA
 Insulation resistance: Power supply to G: 100 M Ω or
 greater / 500 V DC
 Output terminals to G: 100 M Ω
 or greater/500 V DC
 Withstand voltage: Power supply to G;
 1000/1500 V AC for 1min.
 Output terminals to G;
 1000/1500 V AC for 1min.
 Ambient Temperature: -10 to 50 °C
 (hood may be fitting as option)
 Storage Temperature: -25 to 70 °C
 Construction: JIS C0920 Watertight (NEMA 4 equivalent
 waterproof construction)
 Material: Case: Aluminum alloy casting
 Window: Polycarbonate
 Mounting bracket: Stainless steel
 Finish: Baked polyurethane resin (Standard)
 Baked epoxy resin (Option)
 Color: Case; Frosty white (Munsell 2.5Y8.4/1.2 or
 equivalent)
 Cover; Deep sea-moss green (Munsell 0.6GY3.1/
 2.0 equivalent)
 Mounting: (2-inch) pipe mounting, wall or rack mounting
 or panel mounting
 Cable inlet: ϕ 22.7 x 2 Pg16 watertight plastic gland
 Cable / Terminal: For 7 to 12 mm, M4
 Conduit adapter: Power Supply side only (Option)
 Connection: G 1/2 or 1/2 NPT
 Weight: Body; Approx. 2.5 kg
 Mounting bracket; Approx. 0.7 kg
 (Note) Output of ultrasonic oscillator changes with power
 supply voltage or connected cable length.

5. Solenoid Valve for Jet/Brush Cleaning PH8MV

Pilot kick operated, 2-port valve. Open when energized.

Fluid: Normal tap water, industrial water, or air
 Operating pressure: 0 to 1 MPa
 Forward (reverse) pressure resistance: 2 MPa
 Fluid temperature: Water; 5 to 60°C , Air; 60°C or less
 Cv: 4.5
 Process connection: Rc 1/2
 Power supply: 100/110/200/220 V AC, 50/60 Hz
 Construction: Drip-proof JIS C0920
 Material:
 Body: Bronze
 Sealing: Nitrile rubber
 Coil case and terminal box: Aluminum alloy, nylon (lid)
 Ambient temperature: Maximum 50°C
 Electric connection: G 1/2
 Weight: Approx. 1 kg

6. Cleaning Pump/Tank Assembly PH8PU1

Pump/tank assembly for water jet cleaning. Allows tap water to be used for cleaning, using a level-controlled tank.

Cleaning water: Normal tap water or industrial water
 (when isolation from other water lines is required);
 maximum pressure of 500 kPa
 Cleaning water outlet pressure: Max. 300 kPa,
 (which can be regulated by the bypass valve.)
 Cleaning water outlet flow rate: Max. 30 l/min,
 (which can be regulated by the bypass valve.)
 Connectable unit: Holder or electrode with the jet
 cleaning system
 Tank: With a ball tap (ball float valve for level control)
 Effective capacity of approx. 40 liters.
 Pump: Suction pump with capacitor-starting-type
 induction motor. Equipped with an electro-
 magnetic actuator with overcorrect protec-
 tion.
 Cleaning water inlet connection:
 G 1/2
 Cleaning water outlet connections:
 G 1/2 (Optional Rc 1/2 or ANSI 1/2NPT adapters are
 available.)
 Electric connection:
 Plastic watertight gland equivalent to JIS A15.
 Applicable cable outside diameter: 9 to 12 mm
 Conduit adapter: Optional
 Ambient temperature: 5 to 50°C
 Power supply: 100 or 200 V AC \pm 10%, 50/60 Hz, single
 phase
 (Must be equal to the converter's power supply.)
 Power consumption: 0.4 kW
 Construction: Rainproof
 Color: Light gray (Munsell 2.8GY6.4/0.9 equivalent)
 Dimensions: Approx. 442 (W) x 804 (D) x 800 (H) mm
 Finish: Baked polyurethane
 Weight: Approx. 55 kg

7. Terminal Box PH8TBG

Used when pH converter is installed remotely from the pH electrode.

Ambient temperature: -10 to 50 °C
 Construction: JIS waterproof
 Case material: Fiberglass reinforced polycarbonate resin
 Case color: Grayish green (Munsell 2.5GY5.0/1.0)
 Electrical connections:
 pH Converter side:
 ϕ 21mm hole (With G1/2 plastic gland)
 pH electrode side:
 ϕ 13mm hole (With G1/2 plastic gland)
 With Cable (Maximum length 20 m)
 Conduit adapter(optional)

8. Accessories (Purchased Separately)

See Model and Suffix Codes.

MODEL AND SUFFIX CODES

When ordering, specify model and codes, product name and / or part numbers.

Item to be specified.

1. pH Electrode	PH8ERP, PH8EFP	
2. Holder	PH8HG, PH8HS, PH8HF or PH8HH	
3. pH Converter	PH400G	
4. Ultrasonic oscillator for ultrasonic cleaning	PUS400G	
5. Solenoid valve	} For jet or brush cleaning only	PH8MV
6. Cleaning pump/tank		PH8PU1
7. Terminal box	Only for installation of pH converter at distance from pH electrode.	PH8TBG
8. Accessories		PH8AX

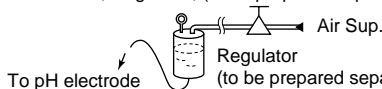
T10.EPS

● KCl Filling Type pH Electrode

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

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

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



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

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1. pH Electrodes

For selection of KCl filling or refillable type pH electrodes, refer to "Selection Criteria For pH Electrodes and Holders" on page 24, and "Table of Corrosion-Resistant Materials" on page 25 of this manual.

● KCl Refillable Type pH Electrode

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

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

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

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

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

T11.eps

*5: Mark band is shown by numeral and M3 ring terminals are used.

● pH Electrode for High-Purity Water

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

* 1: Since a KCl solution is not supplied with TT3, arrange it from among accessories or auxiliary parts.

T13.eps

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

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

* 4: Mark band is shown by numeral and M3 ring terminals are used.

2. Holders

● Guide-pipe Type

Model	Suffix Code	Option Code	Description
PH8HG	.....	.....	Guide-pipe (*1)
Material	-PV	.....	Polyvinylchloride (fluid temperature 50°C or less)
	-PP	.....	Polypropylene (fluid temperature 80°C or less)
Style Code	*A	.....	Style A
Option, Mounting Bracket (*2)		/MS5	Stainless steel mounting bracket (1 set)

*1 : Pipe length: 2 m

*2 : A set of 2-inch galvanized pipe mounting bracket is provided as standard.

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● Submersion Type

Model	Suffix Code	Option Code	Description
PH8HS	Submersion type holder
Material	-PP	.....	Polypropylene
	-S3	.....	Stainless steel
Pipe length	-10	.....	1.0m
	-15	.....	1.5m
	-20	.....	2.0m
	-25	.....	2.5m
	-30	.....	3.0m
pH Measuring System	-T	.....	Always -T
Cleaning System	-NN	.....	None
	-S3	.....	For ultrasonic cleaning (Transducer: SUS316) (*1)
	-TN	.....	For ultrasonic cleaning (Transducer: Titanium) (*2)
	-HC	.....	For ultrasonic cleaning (Transducer: Hastelloy C) (*3)
	-JT	.....	For jet cleaning. The solenoid valve must be specified separately.
Cable Length for Ultrasonic Cleaning	-BR	.....	For brush cleaning. The solenoid valve must be specified separately.
	-NN	.....	None
	-C3	.....	3m
	-C5	.....	5m
	-C6	.....	7m
	-C7	.....	10m
Connector for Jet or Brush Cleaning	-C8	.....	15m
	-C9	.....	20m
	-JP	.....	Rc1/2
	-NP	.....	1/2 NPT
	Style Code	*A
Options	Mounting Bracket (*5)	/MS1	Mounting bracket : 1 set
		/MS2	Mounting bracket : 2 sets
		/MS3	Stainless steel mounting bracket : 1 set
		/MS4	Stainless steel mounting bracket : 2 sets
	Special Mounting	/F1	With flange (Without Cleaning System)
		/F2	With flange (With Cleaning System)
	O-ring	/PF	Daielper (*4)

*1: General purpose (Normal pH3 to 14) *2: For salt water *3: For acid (Normal pH0 to 4)

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

*5: The required number of mounting bracket sets depends on the installation location and flow rate. In general, one set is sufficient for pipe lengths of 1 meter, and otherwise two sets are required.

T15.EPS

● Flow-Through Type

Model	Suffix Code	Option Code	Description
PH8HF	.....	.....	Flow-through type holder
Material	-PP	.....	Polypropylene } Refer to note below Stainless steel } for selection
	-S3	.....
Process Connection	-JPT	.....	Rc1
	-NPT	.....	1 NPT female thread
	-J10	.....	JIS 10K 25 FF flange
	-A15	.....	ANSI Class 150 1 FF flange equivalent (for polypropylene holder -PP) ANSI Class 150 1 RF flange with serration (for Stainless steel holder -S3)
pH Measuring System	-T	.....	Always -T
Cleaning System	-NN	.....	None
	-S3	.....	For ultrasonic cleaning (Transducer: SUS316) (*1)
	-TN	.....	For ultrasonic cleaning (Transducer: Titanium) (*2)
	-HC	.....	For ultrasonic cleaning (Transducer: Hastelloy C) (*3)
	-JT	.....	For jet cleaning. The solenoid valve must be specified separately
	-BR	.....	For brush cleaning. The solenoid valve must be specified separately
Cable Length for Ultrasonic Cleaning	-NN	.....	None
	-C1	.....	1m
	-C3	.....	3m
	-C5	.....	5m
	-C6	.....	7m
	-C7	.....	10m
	-C8	.....	15m
	-C9	.....	20m
	Connector for Jet or Brush Cleaning	-JP	.....	Rc1/2
-NP		.....	1/2 NPT
Style Code	*A	.....	Style A
Options	O-ring	/MF1	Mounting bracket (stainless steel)
		/PF	Daielperfrow (*4)

*1: General purpose (Normal pH 3 to 14) *2: For salt water *3: For acid (Normal pH 0 to 4)

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

Notes:(1) Mounting bracket is generally not required when the stainless steel holder is installed in-line in a pipe
It is required where the holder is installed in a sampling rack (in which case the U-bolt included in /MF1 in not used).

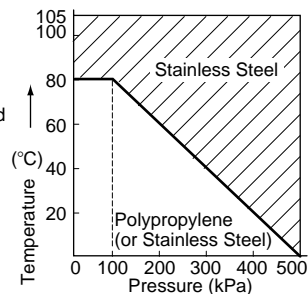
(2) Criteria for material selection (-PP or -S3)

In general, polypropylene is recommended from the viewpoint of chemical resistance.

However stainless steel is recomend in any of the following cases: *

- (a) The liquid contains organic reagent, oxidizing agents, etc., which can attack polypropylene.
- (b) The temperature/pressure correlation of the process condition falls within the hatched area of the diagram shown right.
- (c) The use of polypropylene is not reasonable from a viewpoint of strength or past experience.

(3) For stainless steel, normally a 3 to 14 pH value is recommended.



T16.EPS

● pH Holder for High Purity Water

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

T17.EPS

3. Interigent pH Converter

● 4-Wire Type pH Converter

Model	Suffix Code	Option Code	Description
PH400G	.....	.....	4-wire pH Converter
Power Supply	-1	.....	100/110 V AC, 50/60 Hz
	-2	.....	200/220 V AC, 50/60 Hz
Language for warning, etc	-J	.....	Japanese
	-E	.....	English
_____	A	.....	Always A
_____	*B	.....	Style B
Options	Mounting hardware	/U	Pipe, wall mounting bracket (stainless steel)
	Hood	/PM	Panel mounting bracket (stainless steel)
	Hood	/H3	Awning hood (carbon steel)
		/H4	Awning hood (stainless steel)
	Tag plate	/X1	Baked epoxy resin
		/SCT	Stainless steel tag plate
	Conduit Adapter	/AFTG	G1/2
		/ANSI	1/2 NPT
	/SPS	Teflon coated SUS steel screws	

T18.EPS

4. Ultrasonic Oscillator (PUS400G)

Model	Suffix Code	Option Code	Description
PUS400G	.....	.....	Ultrasonic oscillator for pH meter
_____	-NN	.....	Always -NN
Application	-NN	.....	General purpose
Power Supply	-1	.....	100V AC 50/60HZ
	-2	.....	110V AC 50/60HZ
	-3	.....	115V AC 50/60HZ
	-4	.....	200V AC 50/60HZ
	-5	.....	220V AC 50/60HZ
	-6	.....	240V AC 50/60HZ
Language	-J	.....	Japanese
	-E	.....	English
Options	Mounting Bracket	/PS	Pipe mounting bracket (stainless steel)
		/W	Wall mounting bracket (stainless steel)
		/PA	Panel mounting bracket (stainless steel)
	Hood	/H	Awning hood
	Special Finish	/X1	Baked epoxy resin
	Tag Plate	/SCT	Stainless steel tag plate
	Conduit Adapter	/AFTG	G1/2
		/ANSI	1/2 NPT
/SPS		Teflon coated SUS steel screws	

T19.EPS

5. Solenoid Valve

Model	Suffix Code	Option Code	Description
PH8MV	.....	.....	Solenoid valve
Fluid	-A	.....	Air
	-W	.....	Water
Power Supply voltage	-100	.....	100V AC
	-110	.....	110V AC
	-200	.....	200V AC
	-220	.....	220V AC
Power Supply Frequency	-50	.....	50Hz
	-60	.....	60Hz
Style Code	*C	.....	Style C

T20.EPS

6. Cleaning Pump / Tank

Model	Suffix Code	Option Code	Description
PH8PU1	.....	.....	Cleaning tank / pump assembly
Power Supply	-3	.....	200V AC, 50/60 Hz
	-5	.....	100V AC, 50/60 Hz
Style code	*B	.....	Style B
Options		/PT	With Rc 1/2 adapter
Cleaning Water Inlet/Outlet		/NP	With 1/2 NPT adapter
Anchor volts		/AN	4 L-shape M12 x 160 (SS41) bolts
Conduit adapter		/APUG	G 1/2
		/ANSI	1/2NPT

T21.EPS

7. Terminal Box

Model	Suffix Code	Option Code	Specifications
PH8TBG	.....	.....	Terminal Box
-----	*A	.....	Style A
Option	Mounting hardware	/ P / W	Pipe mounting hardware Wall mounting hardware
Option	Length of special cable (max. 20 m)	/ C □□	□: Standard 03 (3 m), 07 (7 m), 10 (10 m)
Option	Adapter for conduit construction	/ ATBG	Rc 1/2 screw thread

T22.eps

Model	Suffix Code	Option Code	Specifications
PH8TBS	.....	.....	Terminal Box
-----	-A	.....	Always -A
Option	Mounting hardware	/ P / W	Pipe mounting hardware Wall mounting hardware
Option	Length of special cable (max. 20 m)	/ C □□	□: Standard 03 (3 m), 07 (7 m), 10 (10 m)
Option	Adapter for conduit construction	/ ATBG	Rc 1/2 screw thread

T22-1.eps

8. Accessories

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

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

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

T23.EPS

9. Consumables

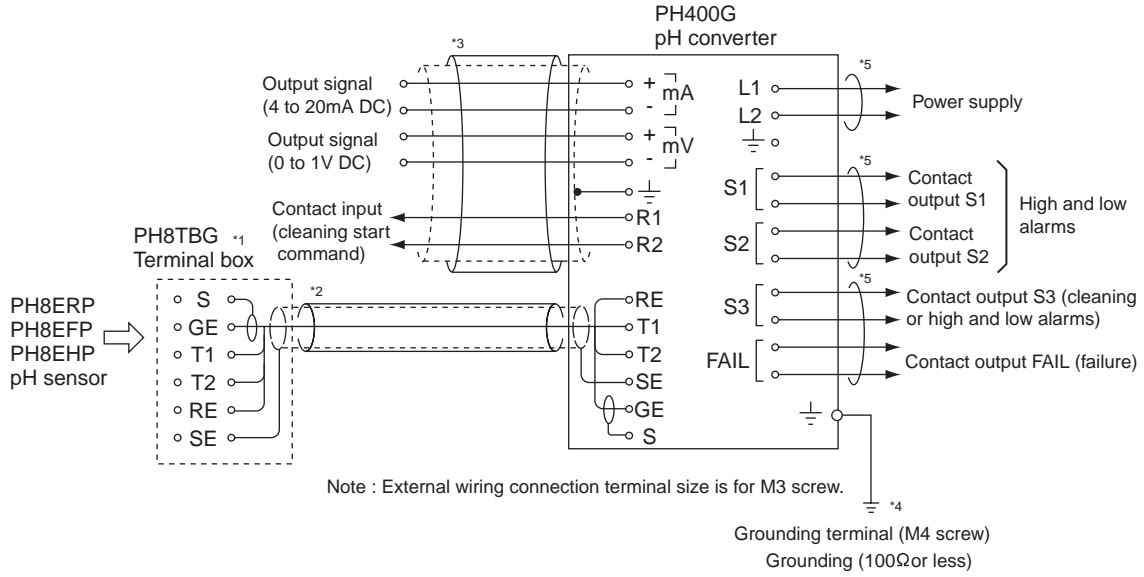
Part Name	Part Number	Remarks
Glass electrode	General purpose	K9142TN One for PH8ERP, PH8EFP, PH8EHP
		K9319NA One for PH8ERP/PF, PH8EFP/PF
	High alkali	K9142TU One for PH8EFP/HA
		K9319NC One for PH8EFP/HA, /PF
Junction	General purpose	K9142TH One for PH8ERP, PH8EFP
		K9319QA One for PH8ERP, PH8EFP/PF
Junction	High purity water	K9142TK One for PH8EHP
	Teflon	K9142HW One for PH8ERP/TF, PH8EFP/TF
		K9319QB One for PH8ERP/TF, /PF,PH8EFP/TF, /PF
KCl solution (3.3mol/l)	K9084LP	Six 250 ml polyethylene bottles
Buffer solution for calibration (pH 4)	K9084LL	Six 250 ml polyethylene bottles
Buffer solution for calibration (pH 7)	K9084LM	Six 250 ml polyethylene bottles
Buffer solution for calibration (pH 9)	K9084LN	Six 250 ml polyethylene bottles
Powder for buffer solution (pH 4)	K9020XA	12 bags, each for preparation of 500 ml
Powder for buffer solution (pH 7)	K9020XB	12 bags, each for preparation of 500 ml
Powder for buffer solution (pH 9)	K9020XC	12 bags, each for preparation of 500 ml
KCl powder (for PH8EFP, PH8EHP)	K9020XU	8 bags, each for preparation of 250ml
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

T24.EPS

WIRING DIAGRAMS

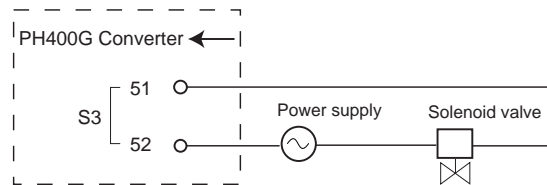
(1) Wiring for pH converter



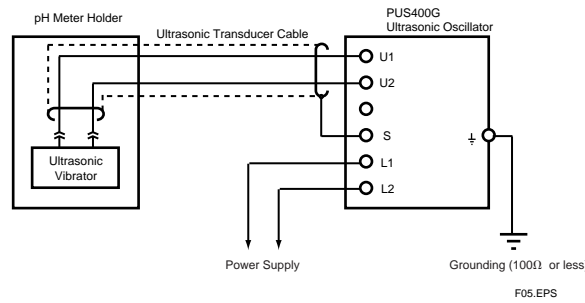
- *1: Terminal box is used only where pH converter is installed some distance from pH sensor (ordinary not needed).
- *2: This cable is specified in the option code for the PH8TBG.
- *3: Use only shielded cable with an outside diameter of 9 to 12 mm.
- *4: Be sure to ground pH converter case grounding terminal (grounding resistance; 100Ω or less).
Only when the above grounding is impossible, ground at power cable side. But be sure to avoid two point-grounding.
- *5: Be sure to use cable with the outside diameter of 9 to 12 mm.

F04.EPS

Wiring to use S3 contact output for cleaning

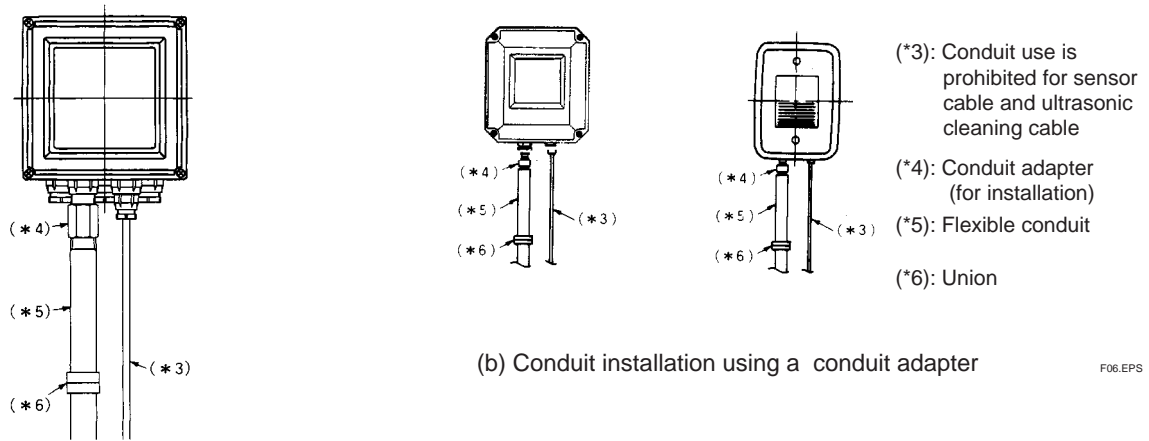
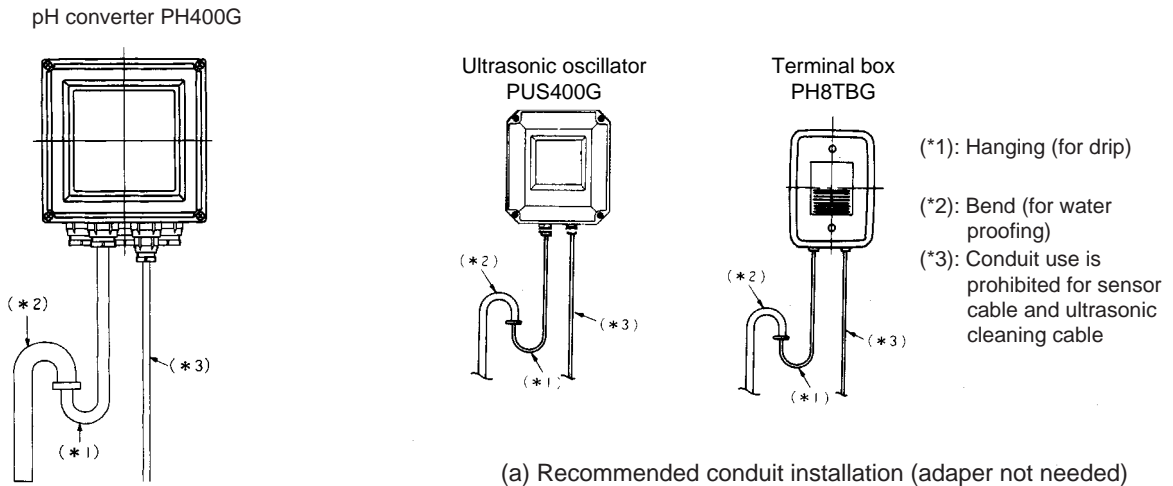


(2) Wiring for ultrasonic cleaning system



WIRING USING CONDUIT INSTALLATION

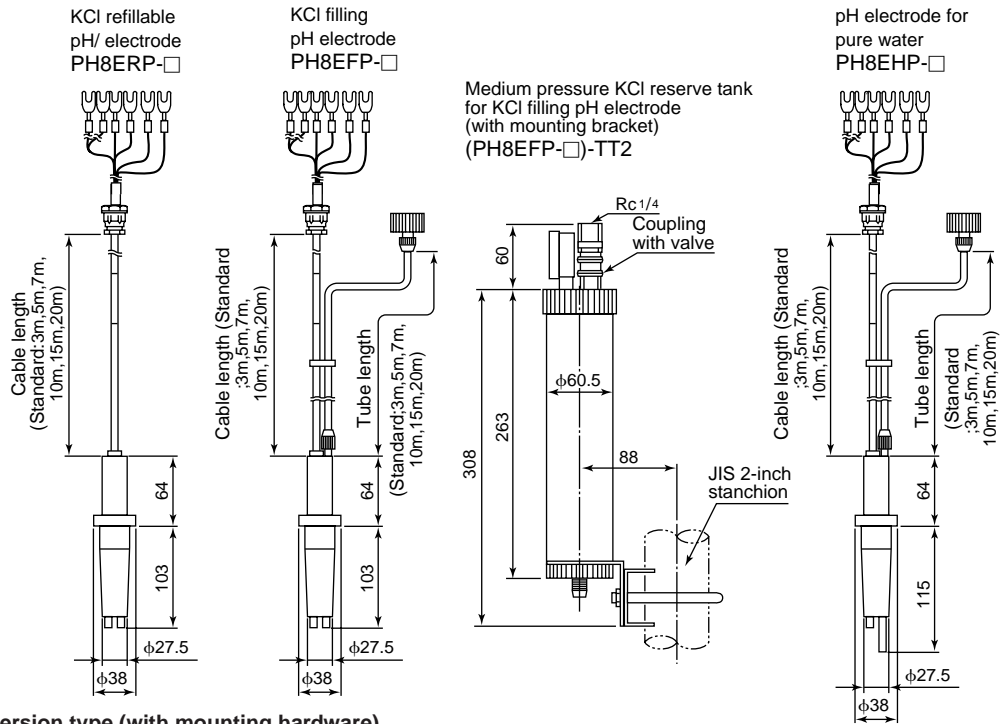
Notes for Conduit Installation



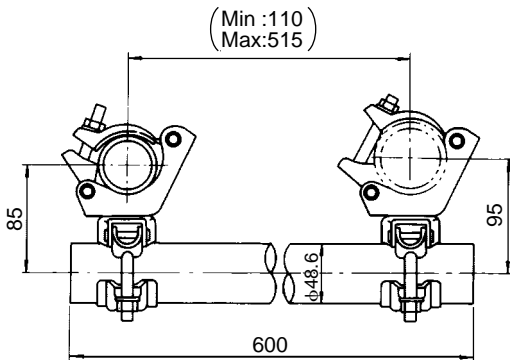
F06.EPS

DIMENSIONS

Unit : mm

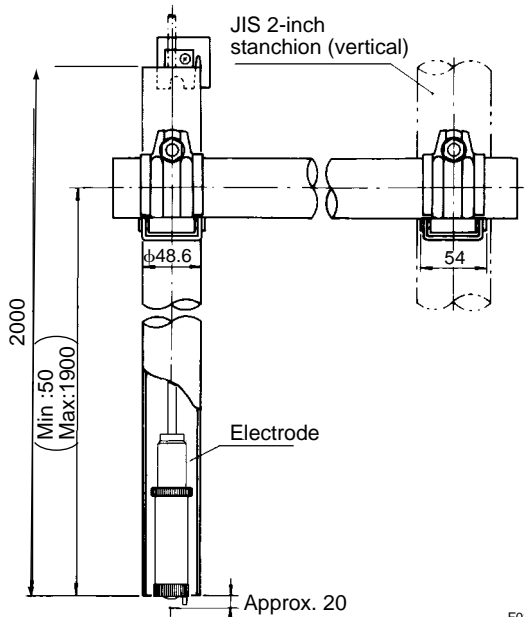
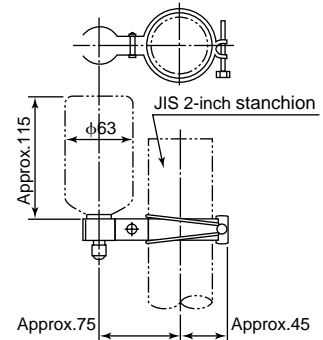


Guide-pipe for submersion type (with mounting hardware) PH8HG



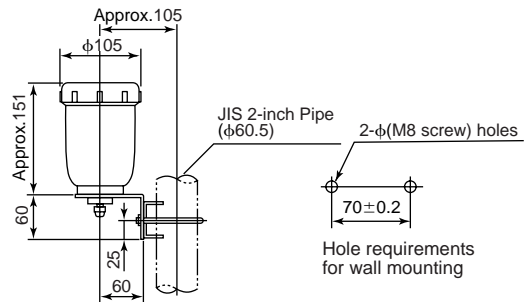
General purpose KCl reserve tank for KCl filling pH electrode and pH electrode for high purity water (with mounting bracket) (PH8EFP-□)-TT1 (PH8EHP-□)-TT1

F07.EPS



F08.EPS

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



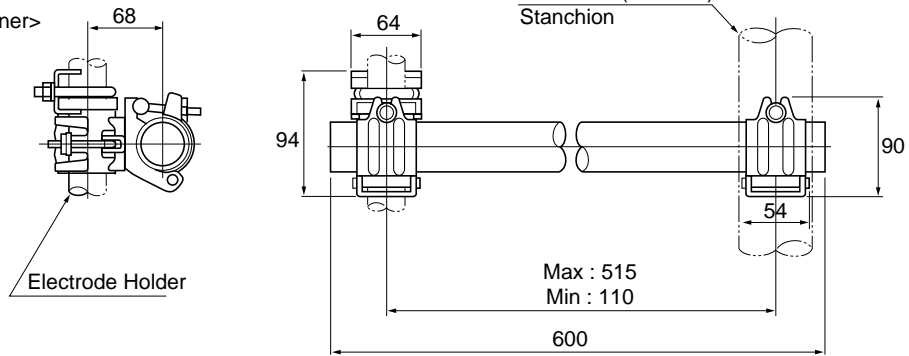
Mounting hardware for submersion type holder

PH8HS.../MS1 1 set

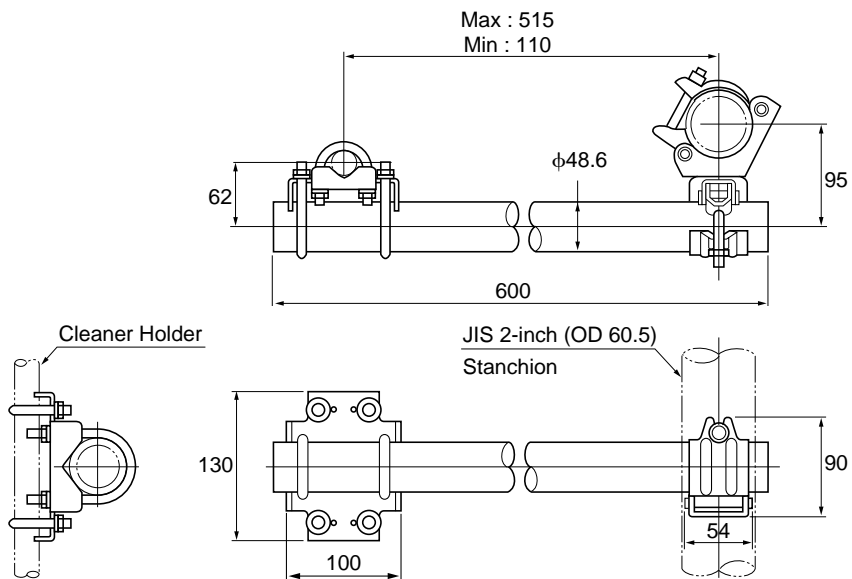
PH8HS.../MS2 2 sets

UNIT: mm

<For Holder without cleaner>



<For Holder with Cleaner>

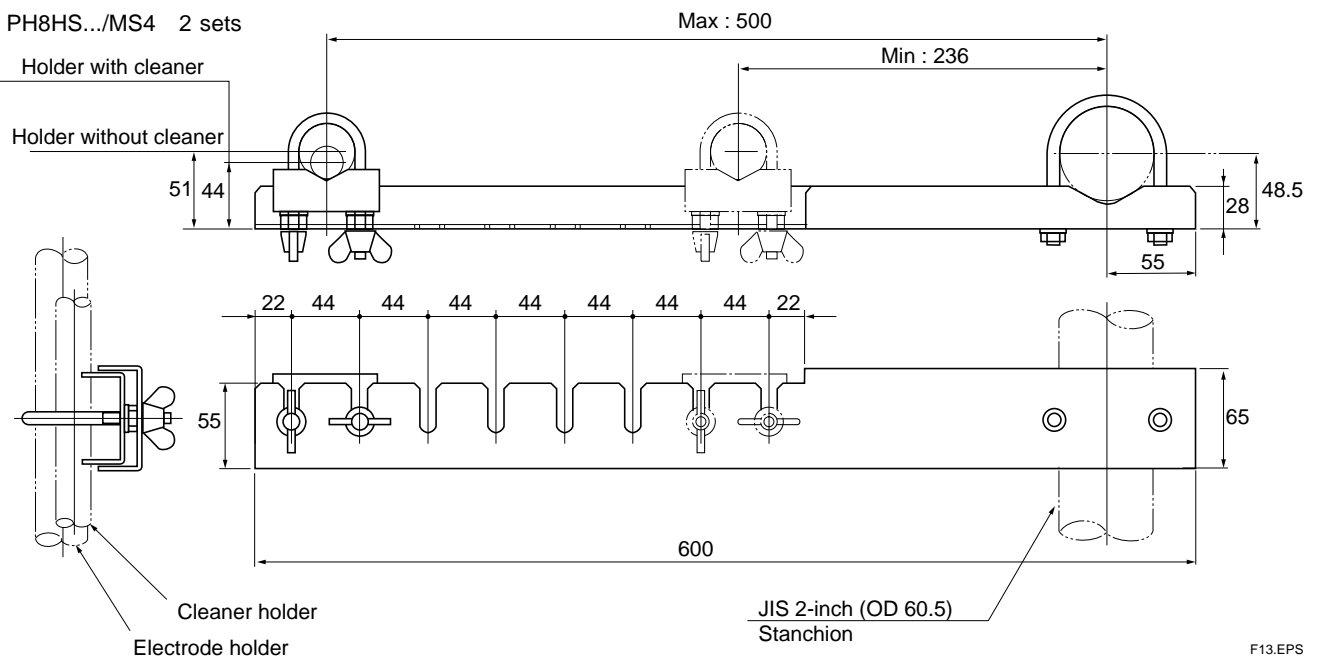


Stainless steel hardware for mounting submersion type holder

PH8HS.../MS3 1 set

PH8HS.../MS4 2 sets

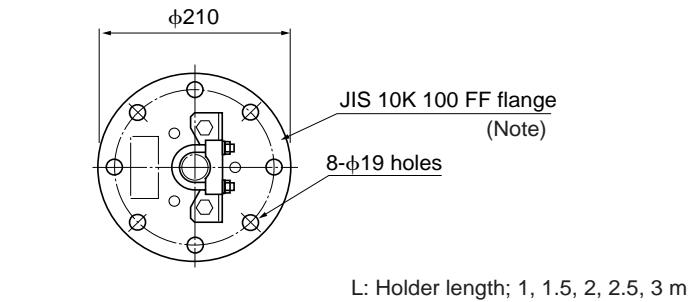
F12.EPS



F13.EPS

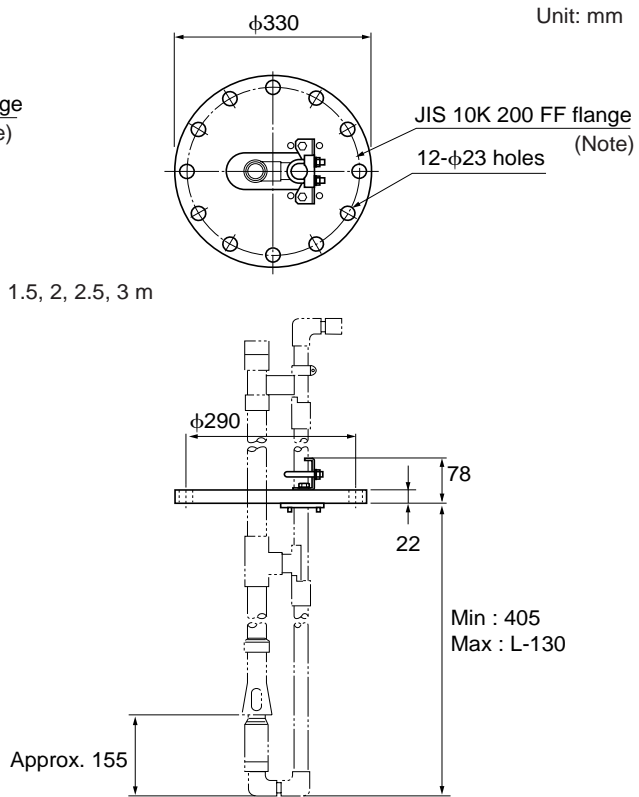
Mounting hardware for submersion type holder

- Flange mounting hardware for holder without cleaner
- Material: Polypropylene or Stainless steel



Mounting hardware for submersion type holder

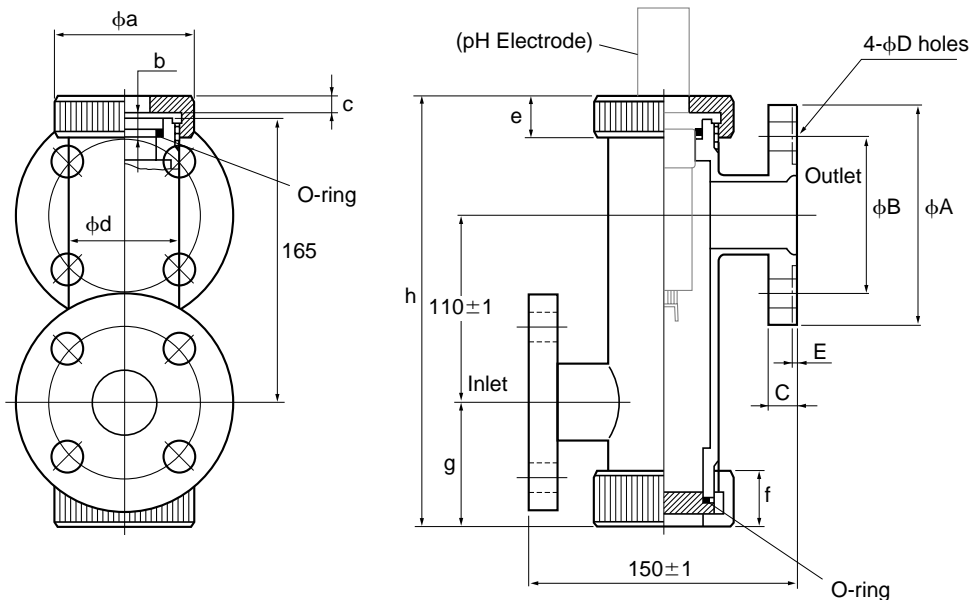
- Flange mounting hardware for holder with cleaner
- Material: Polypropylene or Stainless steel



Note: Only mating dimensions are according to flange standard.

Flow-through type holder with mounting hardware PH8HF

F14.EPS



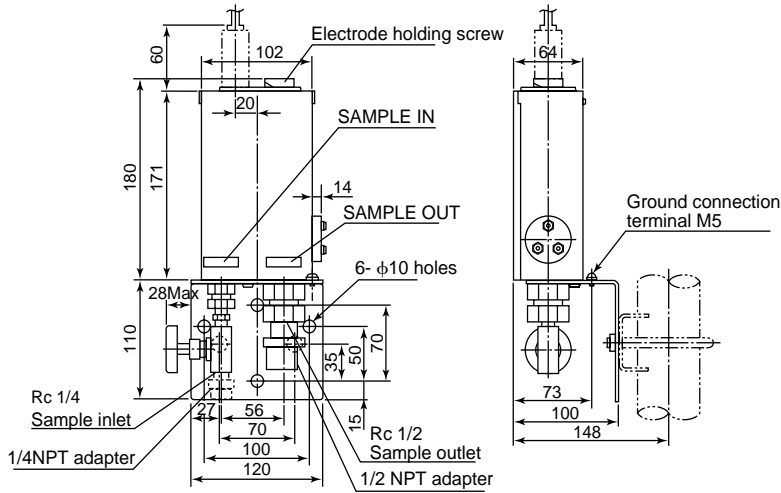
Model and Code	A	B	C	D	E	a	b	c	d	e	f	g	h (Approx.)
PH8HF-PP-J10-T-NN-NN	125	90	14	19	-	80	9	11	60	25	30	70	250
PH8HF-PP-A15-T-NN-NN	108	79.2	14.2	15.7	-	80	9	11	60	25	30	70	250
PH8HF-S3-J10-T-NN-NN	125	90	14	19	-	70	10	6	60.5	26	26	69	245
PH8HF-S3-A15-T-NN-NN	108	79.2	12	15.7	2	70	10	6	60.5	26	26	69	245

F15.EPS

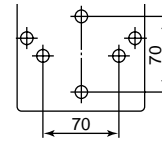
Holder for high purity water PH8HH

Unit : mm

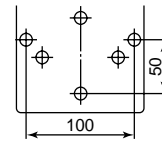
Hole dimensions for Holder mounting



1. Pipe mounting (2-inch pipe)

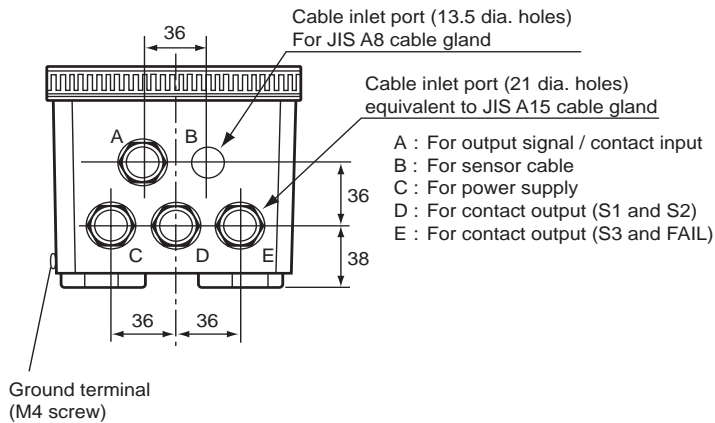
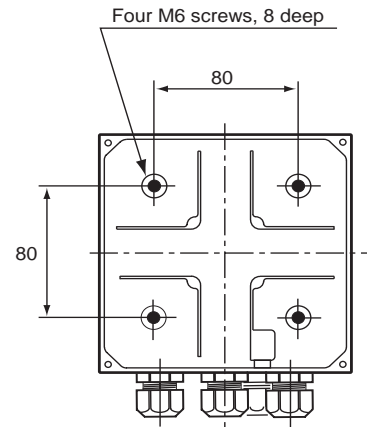
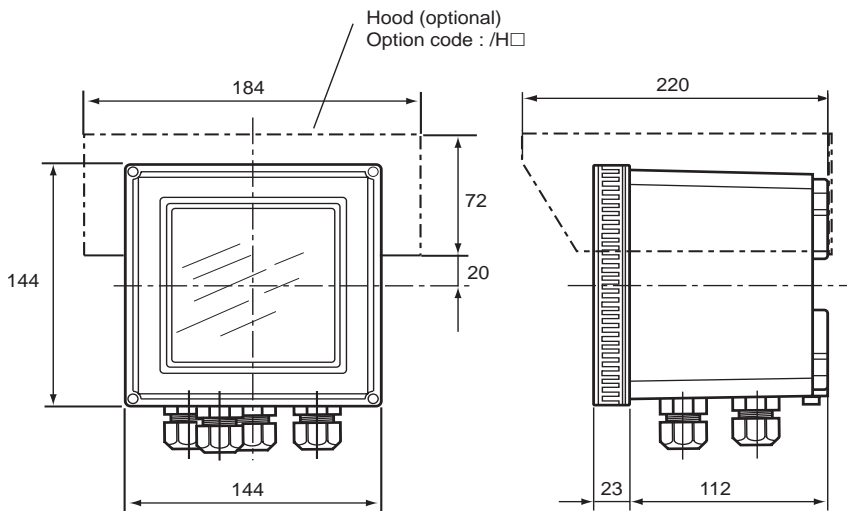


2. Wall mounting

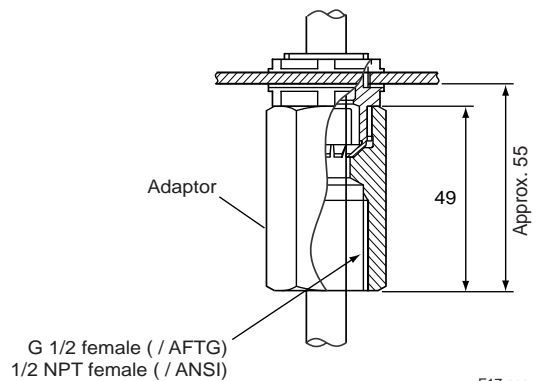


F16.EPS

Interigent pH Converter PH400G



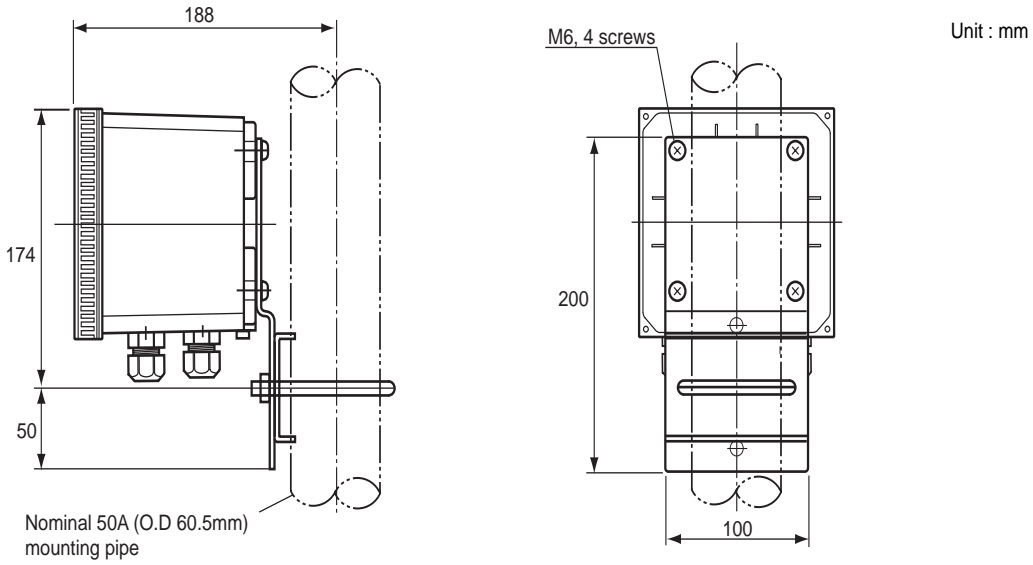
Adaptor for conduit work (option code : /AFTG, /ANSI)



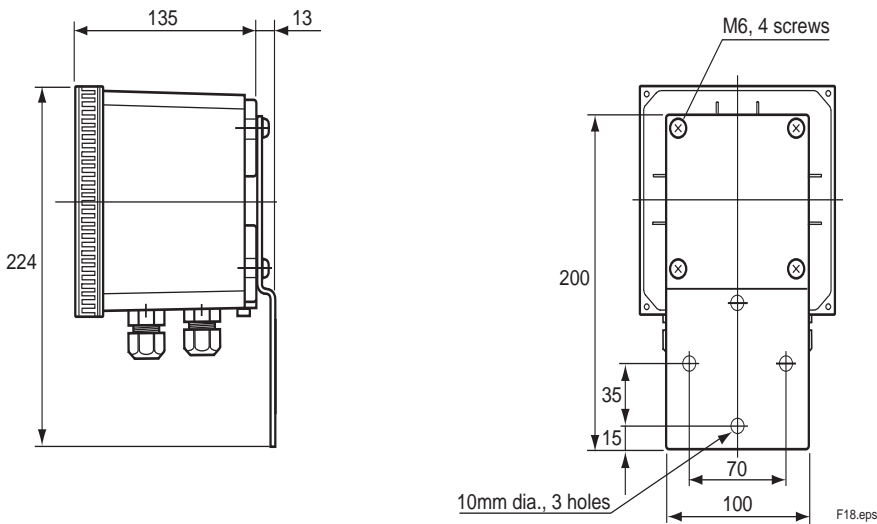
F17.eps

Pipe Mounting Bracket / Wall Mounting Bracket (option code : /U)

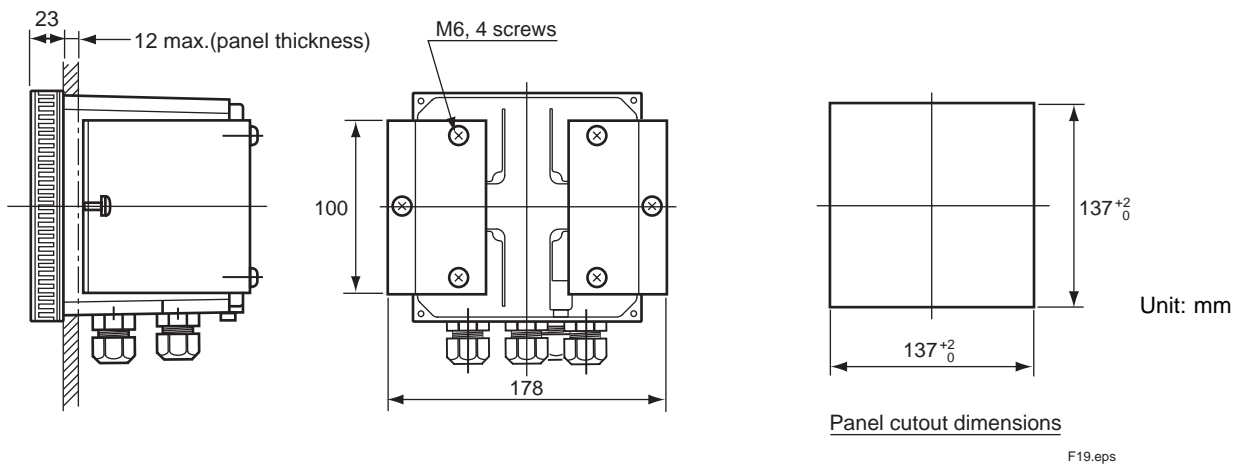
•Example of bracket used for pipe mounting



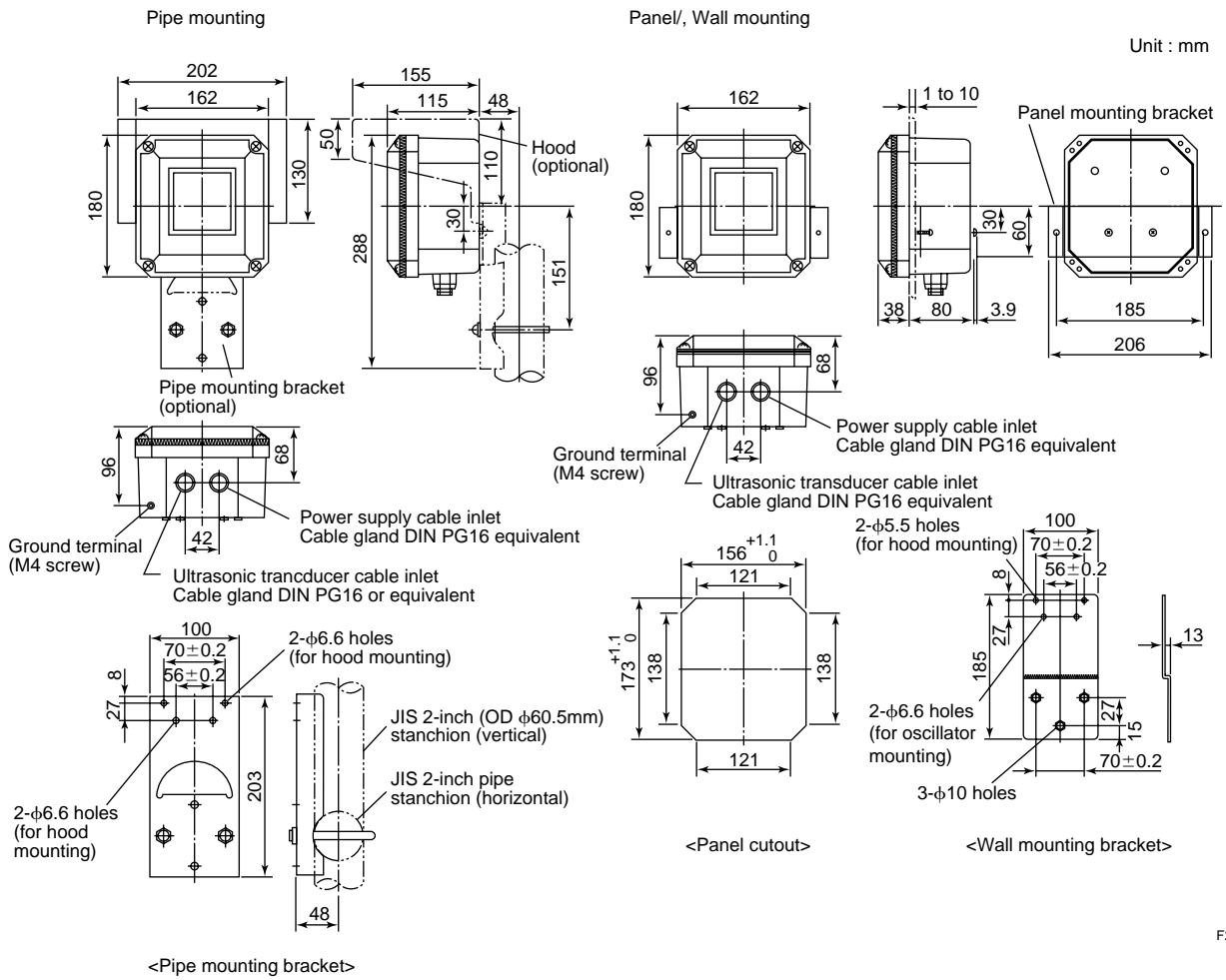
•Example of bracket used for wall mounting



Panel Mounting Bracket (option code : / PM)

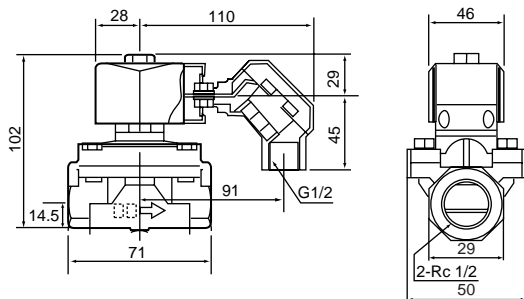


Ultrasonic oscillator (PUS400G)



F20.EPS

General Purpose Solenoid Valve PH8MV

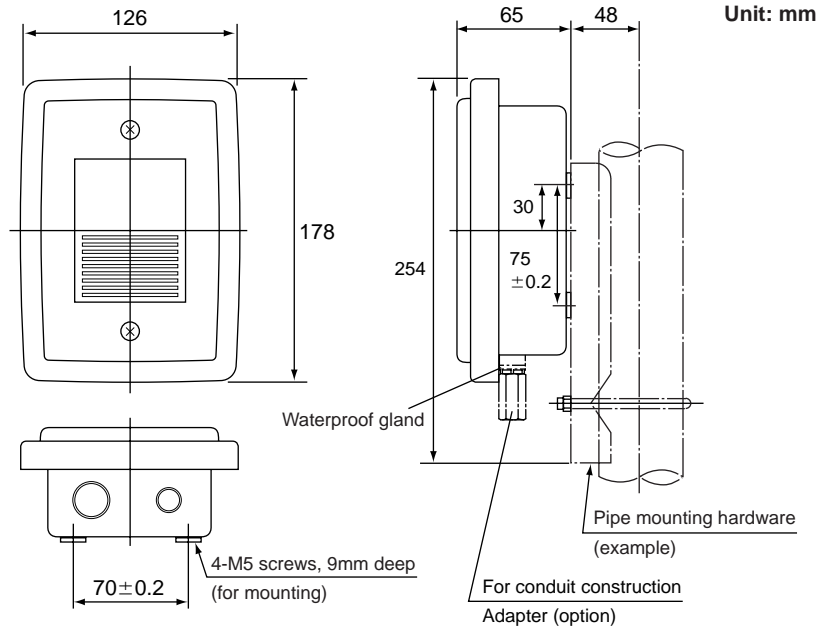


Cautions on Installation of Solenoid Valve for Jet / Brush Cleaning

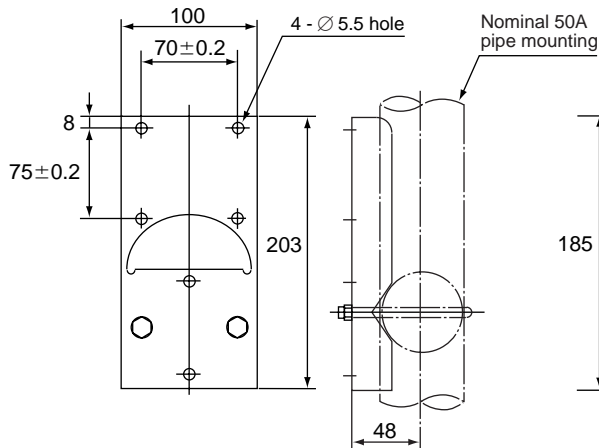
- Do not allow a sample solution to flow backward into the solenoid valve or to be replaced with the driving fluid.
For this take relevant measures; e.g. install a check valve to prevent inverse pressure between the inlet and outlet of the solenoid valve, or install the solenoid valve higher than the holder, especially when using the air jet/brush cleaning system.
- Make sure to avoid the risk of corrosion of the solenoid body (bronze) and seal (nitrile rubber) by vapor or gaseous components generated from a sample solution, especially when using the air jet/brush cleaning system.

F21.EPS

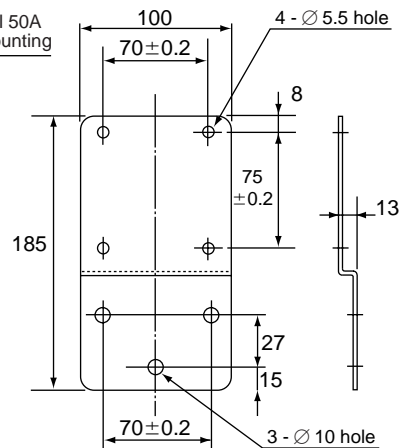
Terminal Box PH8TBG



<Pipe mounting hardware>

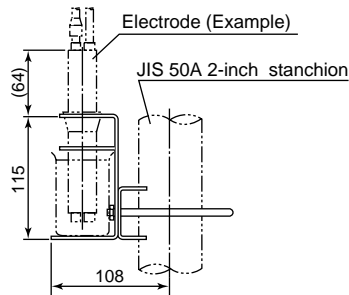


<Wall mounting hardware>



F22.eps

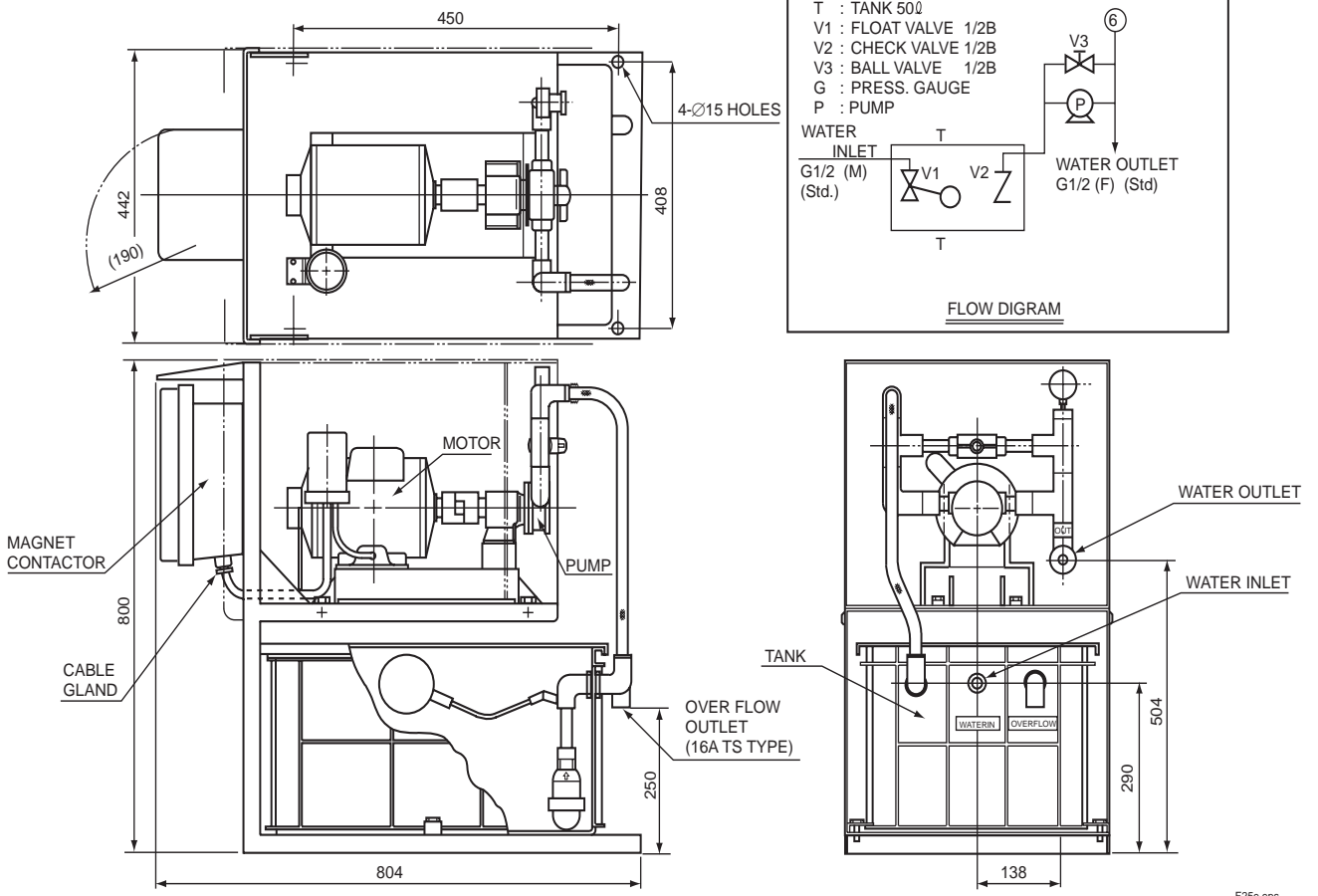
Sensor stand (PH8AX-□)/STD



F24.EPS

Cleaning Pump/Tank Assembly PH8PU1

Unit: mm



F25e.eps

SELECTION CRITERIA FOR pH ELECTRODES AND HOLDERS

<General Overall Criteria>

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

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

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

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

<Individual Criteria>


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

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

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

T25.EPS

CAUTION



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

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

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

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

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

Note: "b" refers to the boiling point.

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

Note: "b" refers to the boiling point.

T27.EPS

Enquiry Specifications Sheet for PH400G pH Converter System

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

1 General Information

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

2 Measurement Conditions

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

3 Installation Site

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

4 Requirements

(1) Measuring range; pH 0 to 14 _____
(2) Transmission output; 4 to 20 mA DC _____
(3) System configuration selection; Electrode, Holder, pH Converter, Cleaning system, Terminal box,
 Accessories
(4) Electrode cable length; 3m, 5m, 7m, 10m, 15m, 20m, _____m
(5) Electrode operating pressure; 10 kPa or less, Greater than 10kPa
(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; _____