General Specifications

PHΣ Series
2-Wire pH Transmitter For General Use

PHΣ

廃止

GENERAL

The PHΣ 2-wire pH transmitter system is most appropriate for large scale instrumentation or pH measurement and control system for general use.

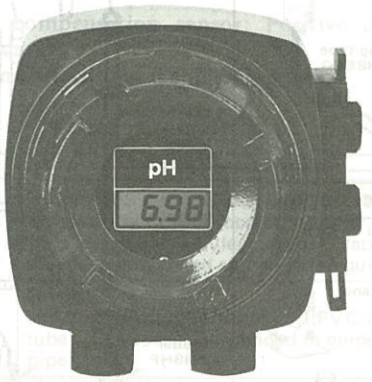
Two display types are available: digital and analog. The digital display type provides a high reading resolution of 0.01 pH, completely solving the various problems involved in using conventional analog displays.

Since its transmission output is isolated, stable measurement systems can be constructed regardless of isolation/non-isolation and new installation/existing installation for power supply and distributor. For explosion protection, the signal system is able to configure an intrinsically safe construction, and the cleaning system is able to configure a flameproof (JIS) construction. The intrinsically safe construction can be obtained in combination with BARD400 zener barriers, its transmission length being up to 800 m.

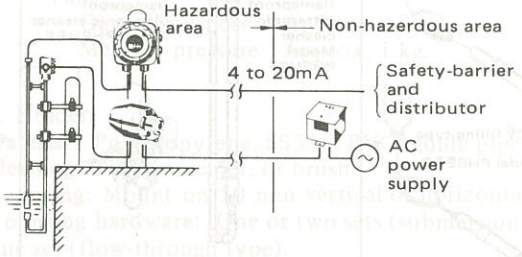
A model certified under the Japanese Measurement Law is composed of the combination of KCℓ filling type pH sensor with digital display type pH transmitter.

For boiler instrumentation, the PHΣ pH transmitter for high-purity water is provided. (See GS 12B5E1-E).

The detector, composed of common components to the PHΣ outdoor pH converter system for local AC supply and the panel mounting pH indicating controller system, enables maintenance parts for the whole plant to be decreased and thus serves to reduction of total instrumentation costs.



2-wire pH Transmitter — Digital display time — (Meter indication type is also available.)



PHΣ 2-wire pH Transmitter System (Example).

FEATURES

pH Sensor body made of Ryton*

- The body is constructed of ryton, a dream material. It is comparable to teflon in corrosion resistance and exceeds teflon in mechanical strength.
- pH Sensors of one material (2 types)
  pH Sensors are of one type regardless of the differences in holder types—submersion and flow-through—with or without cleaning device.
- Two types are available, a KCℓ filling type and a KCℓ refillable type.
- The pH Sensor can be readily checked as it can be easily dismounted from the holder.

* Trademark of Philips Petrolium Co. product.

Digital display transmitter with 0.01 pH readout increment

- Digital display facilitates buffer check.
- Liquid crystal display permits ease of outdoor readout.
- Output is isolated from pH measurement circuit. Stabilized measurements are guaranteed independently of the choice of receivers.
- Dusttight and raintight outdoor enclosure.
- Selection of meter indication type transmitters is available.

Variety of cleaning devices

- Select the devices most suitable to your application.
- Ultrasonic cleaning(stainless steel,titanium,hastelloy C)
- Jet cleaning • Brush cleaning
- YEW's unique frequency swept type ultrasonic oscillator
- Output can be held constant and alarm contact outputs can be cancelled during cleaning (brush or jet) operation. Therefore, the control system will not be disturbed.

Variety of systems for selection of appropriate one depending on installed locations and applications

- Panel mounting pH indicating controller system (GS 12B5B1-E)
- Outdoor pH converter system (GS 12B5C1-E)
- 2-wire pH transmitter system for general use (GS 12B5D1-E)
- 2-wire pH transmitter system for high-purity water (GS 12B5E1-E)

YOKOGAWA
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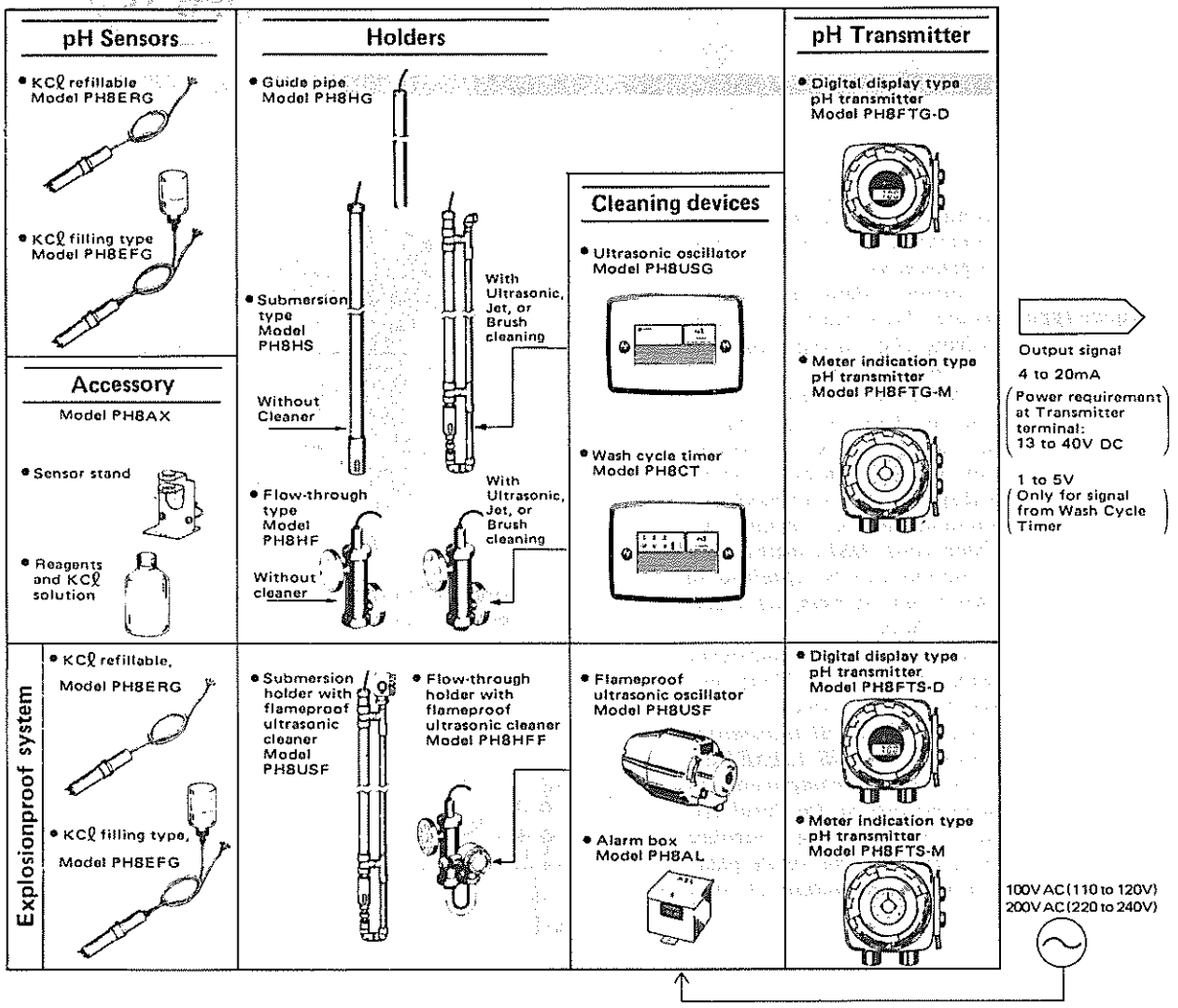
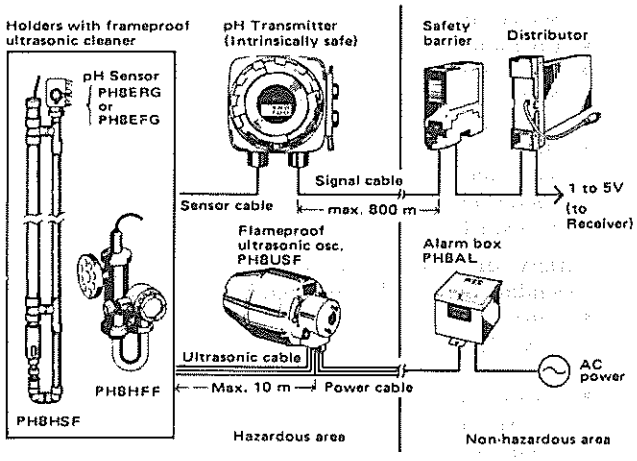
GS 12B5D1-E

5th Edition: Sept. 1990 (UP)

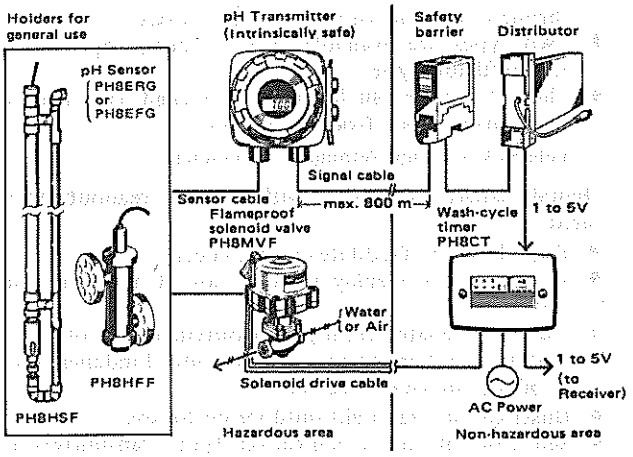
SYSTEM CONFIGURATION



Sensor Cleaning Systems for Hazardous Areas



Ultrasonic cleaning system for hazardous areas



Jet/Brush cleaning system for hazardous areas.

SPECIFICATIONS

PHΣ Series General Specifications

Measured object: Hydrogen ion concentration (pH) of various solutions.
Measuring principle: Glass electrode method.
Measuring range: 0 to 14 pH.
Measuring conditions:
Solution temperature: See Table 1.
Solution pressure: See Table 2.
Solution flow rate:
Max. 2 m/s for submersion/guide-tube types; 3 to 11 liters/min for flowthrough type.
Solution conductivity: Min. 50 μs/cm.
Temperature compensation range: −5 to 105°C

Table 1(a). pH and Temperature Ranges for pH Sensor with holder

pH Sensor	Holder type	Solution pH range	Solution temperature range (°C)
KCℓ Refillable type	Guide-pipe Submersion (*3) Flow-through	2 to 12	(*2) −5 to 80
KCℓ filling type	Guide-pipe type	2 to 12	(*2) −5 to 105
	Submersion (*3) Flow-through	(*1) 0 to 14	(*1) −5 to 105

Table 1(b). Solution Temperature Ranges for Holders

Holder type	Holder Material	Cleaner	Liquid temperatures (°C)
Guide-pipe	PV	None	−5 to 50
	PP	None	−5 to 80
Submersion	PP	None	−5 to100
		Provided	−5 to 80
	(*4) S3	None	−5 to100
		Provided	−5 to 80
(*3) Flow-through	PP	None	−5 to 80
		Provided	−5 to 80
	(*4) S3	None	−5 to105
		Provided	−5 to 80

PV: Hard PVC
PP: Polypropylene
S3: SS316

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 temperature is below 80°C, some solution can shorten the electrode service life. In this case, the KCℓ filling type is recommended.
(*2) Maximum temperature of 50°C when Hard PVC is used.
(*3) For a flow-through type, refer to solution temp/pressure diagram (followed to the MS code of flow-through type holders).
(*4) Stainless steel (SS316) is recommended for solution of 3 to 14 pH.

Table 2. Solution Pressure Range

pH sensor / Holder	KCℓ Refillable type	KCℓ Filling type
Guide-pipe & Submersion	Atmospheric pressure (max. 3 m below solution level)	
Flow-through	Atmospheric pressure to 0.5kg/cm²G	Atmospheric pressure to 0.1 kg/cm²G when general reserve tank is used.
		Atmospheric pressure to 5 kg/cm²G when medium-pressure reserve tank is used. See also the solution temperature/pressure diagram.

1. pH Sensor

A complex electrode assembly consisting of glass electrode, reference electrode, temperature sensor, and ground tip.
Measuring range: 0 to 14 pH.
Type: KCℓ filling and KCℓ refillable type.

(Refer to "Selection Criteria for pH Sensors and Holders" shown on the last page to select KCℓ filling or refillable type sensors.)

Temperature compensation sensor: Positive characteristic thermistor.
Wetted part materials: See Table below.

Wetted part materials

pH Sensor	Wetted part materials
KCℓ refillable type	Ryton (PPS resin), Glass, Ceramics, Titanium or Hastelloy C, Fluorocarbon rubber and chlorinated polyethylene rubber (cable sheath.....only when suspended in guide pipe)
KCℓ filling type	Ditto. and Temperature resistant soft PVC (KCℓ tube.....only when suspended in guide pipe).

Weight:
KCℓ refillable type: Approximately 0.4 kg.
KCℓ filling type:
Body: Approximately 0.4 kg.
Tank:
General-purpose: Approx. 0.3 kg.
Medium-pressure: Approx. 1 kg.

2. Holder

Material: Polypropyrene, SS316, PVC (guide pipe only).
Cleaning: Ultrasonic, jet, or brush.
Mounting: Mount on 50 mm vertical or horizontal pipe.
Mounting hardware: One or two sets (submersion type); One set (flow-through type).
Weight: See Table 3.

Table 3. Holder Weight

Material / Holder	Polypropylene	SS316	Hard polyvinylchloride
Submersion type	Approx. 0.5 to 1.2 kg	Approx. 1.5 to 5 kg	—
Flow-through type	Approx. 0.5 to 1 kg	Approx. 7 to 7.5 kg	—
Guide-pipe	Approx. 1 kg	—	Approx. 1.6 kg

Note:
Table 3 does not include the mounting hardware weights. Mounting hardware weight: approximately 1 kg/set for the submersion type, and approximately 0.5 kg for the flow-through type).

Utility (for jet or brush cleaning).

	Pressure (kg/cm²G)	Requisite Consumption
Water jet	2.0 to 4.0 kg/cm²	5 to 20 ℓ/min.
Water brush	1.0 to 2.5 kg/cm²	20 to 30 ℓ/min.
Air jet	2.0 to 4.0 kg/cm²	100 to 300 Nℓ/min.
Air brush	1.5 to 2.5 kg/cm²	300 to 600 Nℓ/min.

Notes:
(1) Pressure and requisite consumption should simultaneously be satisfied at the inlet-port of the holder.
(2) A large piping tube of φ22 x φ15 mm reinforced with braids is recommended to supply water or air.

3. pH Transmitter

Measuring range: pH 0 to 14 (though the same as the transmission signal range if meter indication is selected)
Display method: Digital display (liquid crystal) or meter indication
Display range: Digital . . . . . 0 to 14 pH
Meter indication . . . . . the same as the transmission signal range
Transmission signal: 4 to 20 mA, Isolated transmission output
Transmission signal range: 8 kinds such as pH 0 to 14 and pH 2 to 12 etc.
Supply voltage: 13 to 40 V DC
See Fig. 1 for the relationship between supply voltage and load resistance.
In intrinsically safe systems, use the SDBT type for distributor.
Ambient temperature:
−10 to +50 °C
Hood (option) attachable
Construction: Water tight complying with JIS C0920 equivalent to NEMA type 4.
Non-explosionproof or intrinsically safe i3aG5 (only for model PH8FTS)
Case material: Aluminum alloy casting
Finish: Baked polyurethane resin coating

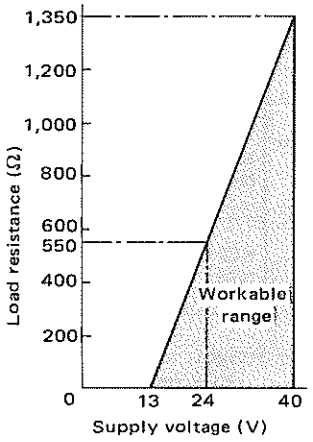


Figure 1. Workable range for Supply Voltage and Load Resistance

Coating color: Moss green (Munsell 2.5GY3.5/2)
Mounting: Mounted on a 50 mm dia. vertical or horizontal stanchion, on the wall or on a rack
Signal cable inlet port: PF½
Weight:
Body: Approx. 2.4 kg
Mounting hardware: Approx. 0.7 kg

Functional Specifications

Temperature compensating range: −5 to +105 °C
STD Adjustable range: ±1 pH
SLOPE Adjustable range: +20% and −5% for a deviation from pH 7.
Standard Performance (used with a pH sensor)
Accuracy: ±0.1 pH (for a digital display type transmitter with a KCℓ filling type pH sensor) (equivalent to JIS type III glass electrode pH meter)
±0.15 pH (for a digital display type transmitter with a KCℓ refillable pH sensor)
±0.1 pH ± 1.5% F.S. (for a meter indication type transmitter with a KCℓ filling pH sensor)
±0.15 pH ± 1.5% F.S. (for a meter indication type transmitter with a KCℓ refillable pH sensor)
Repeatability: 0.05 pH (The value for an electrode submerged 3 times in the same buffer solution)
Response time: 10 seconds (90% response with a pH sensor and buffer solution sufficiently agitated, both temperature-balanced at 20 °C.)

Specifications for pH instrument certified under the Japanese Measurement Law (optional)

- Applicable only to the glass electrode of the KCℓ filling type pH Sensor and digital display transmitter.
- Accuracy meets the following tolerances:
  Glass electrode: Deviation from theoretical EMF: 0.05 pH/1 pH.
  pH transmitter: 0.05 pH.
- Validity term of certification
  Glass electrode: One year from the first day of the month following the month of certification.
  pH transmitter: Three years from the first day of the month following the month of certification.

4A. Ultrasonic oscillator (Non-explosion proof pH8USG type)

Combination device: PHΣ Series holder with ultrasonic cleaner. (The holder is provided with a cable to transducer.)
Cleaning method: Continuous ultrasonic irradiation.
Oscillation frequency: Approx. 65 to 80 kHz
Swept period: Approx. 2 to 4 sec.
Output voltage: 150 V maximum.
Power supply: 100 or 200 V AC, or 110 to 120 V AC, or 220 to 240 V AC, ±10% of each specified voltage; 50/60 Hz
Power consumption: 15 VA
Insulation resistance: 100 MΩ or more/500 V DC between the power and ground terminals.
Dielectric strength: 1000 V AC for 1 min. between the power and ground terminals.
Ambient temperature: −10 to +50°C
Construction: JIS rainproof
Air purge connector: available (option)
Case material: Body; Glass fiber reinforced polycarbonate resin
Window; Transparent polycarbonate resin
Case colour: Grayish green (Munsell 2.5GY5.0/1.0)
Mounting: Mounted on a 50 mm dia. stanchion, on the wall or on a rack
Electrical connection:
JIS A15 watertight plastics gland (cable OD 9 to 12 mm) for power supply;
Conduit adaptors (option) are available.
JIS A8 watertight plastics gland for transducer cable.
Weight: Approx. 1.8 kg (insturment) and approx. 0.7 kg (mounting hardware).

4B 1. Flameproof ultrasonic oscillator (PH8USF type)

The same as the non-explosionproof type except for the following.
Construction: JIS Flameproof construction (d2G4).
Solution leakage into the vibrator can be detected by combining it with the PHΣ series holder with flameproof ultrasonic cleaner.
Surely use the oscillator associated with an alarm box. It provides power circuit braking and failure alarm contact outputs.
Case material: Aluminum alloy casting
Finish: Baked epoxy resin coating
Coating colour: Munsell 7.5GS4/1.5
Electrical connection: PF¾ for both ports to the ultrasonic vibrator and to the alarm box.
Cable:
To vibrator; 2-conductor shielded cable, OD10 to 12 mm, Max. length 10 m. Can be specified with suffix code /C□□.
To alarm box; 2-conductor shielded cable, OD10 to 12 mm, Max. length 1000 m.
Total resistance of two leadwires should be 10 Ω or less.
Implement the metal conduit work without fail (completely grounded in explosion protected works).
Weight: Approx. 9.5 kg

4B 2. PH8AL type alarm box specifications

Case: Square shaped, wall mounting. Made from steel plate, dust-proof type. Mounting direction free.
Coating colour: Gray (Munsell N-7.0)
Finish: Baked melamine resin coating
Associated oscillator: PH8USF type flameproof ultrasonic oscillator
Number of associated oscillator: 1
Power supply: 100 V or 110 to 120 V AC, 200 V or 220 to 240 V AC ± 10%, 50/60 Hz
Weight: Approx. 2.0 kg
Ambient temperature: −10 to +50 °C

5. Wash cycle timer (PH8CT . . . *B)

Combination devices: PHΣ Series holder with jet or brush cleaner, pH transmitter, solenoid valve, etc.
Cleaning period: 1 to 12 hours selectable.
Cleaning time: 10 to 100 seconds selectable.
Delay time: 2 to 30 min. selectable.
Power output to cleaning device: Max. 1.5 A (for ON/OFF action of solenoid valve and others. Voltage; equal to supply voltage.)
External output contact: On/off contact to display washing status. Contact rating 250 V AC 3A, 30 V DC 3A; non-inductive load.
pH transmitter output signal modification: pH output signal can be modified by connecting the pH transmitter output to the timer.

(1) Transmission output modification
The pH signal is output in one of the modes below as selected by the timer during cleaning or delay time:

HOLD . . . . . Holds the pH value immediately before the cleaning.
PRESET . . . . Outputs the pH value established previously (setting range 0 to 14 pH selectable).
THROUGH . . Outputs pH value without modification.

Input signal: 1 to 5 V
Output signal: 1 to 5 V
Cleaning mode: AUTO, MAN (ON/OFF).
Cleaning by remote interrupt: Cleaning is started by externally provided pushbutton switch (1-make type). Cleaning period is reset and counter restarts.
Power supply: 100 or 200 V AC, or 110 to 120 V AC, or 220 to 240 V AC ±10%; 50/60 Hz.
Power consumption: 3.5 VA
Ambient temperature: −10 to 50 °C
Construction, air-purge connector, case material, case color, and mounting; Same as for PHΣ Series ultrasonic cleaner (PH8USG).
Electrical connection: JIS A15 watertight plastics gland (cable OD 9 to 12 mm). Conduit adaptors (option) are available.
Weight: Approx. 2 kg (insturment), and approx. 0.7 kg (mounting hardware).

6A. Solenoid valve for jet or brush cleaning (Non-explosion proof PH8MV type)

Pilot-kick type 2-port valve – open when energized.
Fluid: Tap water or industrial water, or air
Operating pressure: 0 to 10 kg/cm^{2}G
Max. forward (reverse) pressure: 20 kg/cm^{2}G
Fluid temperature: 5 to 60 °C for water; 60 °C or less for air
CV value: 4.5
Fluid connection: PT½ female
Power supply: 100 V AC 50/60 Hz, 20 V AC 50/60 Hz, 110 V AC 60 Hz, 220 V AC 60 Hz
Rated voltage ± 10%
Power consumption: 10 W
Construction: Outdoor installation type
Material: Body: bronze. Seal: nitrile rubber. Coil case and terminal box: aluminum casting and nylon (cover)
Ambient temperature: Max. 50 °C
Electrical connection: PF½ female
Weight: Approx. 1 kg

6B. Flameproof solenoid valve for jet or brush cleaning (PH8MVF type)

The same as the non-explosionproof type except for the following.
Construction: JIS flameproof construction (d2G4).
Material: Body: bronze. Seal: nitrile rubbers. Coil case and terminal box: aluminum alloy.
Operating pressure: 0.5 to 10 kg/cm^{2}G
Max. forward (reverse) pressure: 15 kg/cm^{2}G
CV value: 3.1
Valve seat leakage: 400 Nmℓ/min (at pneumatic pressure of 0.5 to 7 kg/cm^{2}G)
Mounting attitude: Vertical mounting with coil placed upper
Weight: Approx. 3.3 kg

7. Cleaning pump/tank Ass'y

Cleaning is possible with a supply of tap water by means of the included tank with a float valve.
Cleaning water: Normal tap water or industrial water. Press. 5 kg/cm^{2}G max.
Cleaning water outlet pressure: Maximum 3 kg/cm^{2}G (Pressure and flowrate are adjustable by by-pass valve)
Cleaning outlet flow rate: Maximum 30 ℓ/min. (Pressure and flowrate are adjustable by by-pass valve)
Interconnectable device: 1 jet or brush cleaner (submersion or flow-through type) and, wash cycle timer.
Tank section: Tank with a ball tap (float valve for level control). Effective volume about 40 liters.
Pump section: Suction-type pump with single phase squirrel-case induction motor. Electromagnetic contactor with overcurrent protection.
Cleaning water inlet, outlet connecting port: PF ½ male (inlet), PF½ female (outlet port). PT½, ½"NPT are available with adaptor:
Electrical inlet: JIS A15 watertight plastics gland. Connection cable OD 9 to 12 mm. Conduit adaptors (option) are available.
Operating ambient temperature range: 5 to 50°C
Power: AC 100V or 200V ±10%, 50/60 Hz, single phase (The same power supply must be used for wash cycle timer)
Power consumption: 0.4 kW
Construction: Rain-proof construction
Color: Bright gray (Munsel 2.8GY6.4/0.9)
Dimensions: 442W x 804D x 771H
Finish: Baked urethan enamel
Weight: Approximately 55 kg

8. Terminal box

Used when pH transmitter is installed a distance away from the pH sensor.
Ambient temperature: −10 to 50°C
Construction: JIS rainproof.
Case material: Glass fiber reinforced polycarbonate resin.

Electrical connection:
pH sensor side: JIS A8 watertight plastics gland.
pH transmitter side: JIS A15 watertight plastics gland with cable (10 m max.)
Conduit adaptor (option) is available.
Case color: Grayish green (Munsell 2.5GY5.0/1.0)
Weight: Instrument 0.5 kg, mounting hardware: 0.7 kg

9. Accessories (To be purchased separately)

A set of accessories for PHΣ series pH instrument start-up
Contents: See Model and Code Table

MODELS AND CODES

When ordering, specify model and codes, item name and part numbers.

Items to be specified.	For non-hazardous area	For hazardous area (Flameproof or Intrinsic safety)
1. pH Sensor	PH8ERG or PH8EFG	PH8ERG or PH8EFG
2. Holder	PH8HG, PH8HS or PH8HF	PH8HSF or PH8HFF; PH8HS(*1), PH8HF(*1)
3. pH Transmitter	PH8FTG	PH8FTS
4. Ultrasonic oscillator (Ultrasonic cleaning)	PH8USG	PH8USF
5. Wash cycle timer (Only for jet or brush cleaning)	PH8CT	Explosion-protected system is available by installing PH8CT in a non-hazardous area and combining it with PH8MVF.
6. Solenoid valve (Only for jet or brush cleaning)	PH8MV	
7. Cleaning pump/tank (Only for jet or brush cleaning)	PH8PU1	
8. Terminal box (Only for installing pH transmitter at a distance from pH sensor)	PH8TBG	PH8TBG is useable.
9. Accessories	PH8AX	PH8AX is useable.
10. Consumable parts		

Note: (*1). These can be used if the cleaning is not required or the jet or brush cleaning is employed. Because no electrical circuit is used.

1. pH Sensor

Refer to "Selection criteria for pH Sensors and Holders" on page 18 and "Corrosion-resistive Material Table" on page 19 and 20 of this manual for selecting KCℓ filling or refillable type pH sensors.

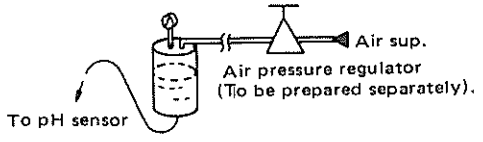
<KCℓ refillable type pH Sensor>

Model	Basic code	Description
PH8ERG	. . . . .	KCℓ refillable type sensor
Cable length	–03	3 m
	–05	5 m
Solution group tip	–TN	Titanium
	–HC	Hastelloy C
–	–NN	Always –NN
pH measuring system	–T . . .	2-wire pH transmitter system
–	*A	Style A

<KCℓ filling type pH Sensor>

Model	Basic code	Suffix code	Description
PH8EFG	. . . . .	. . . . .	KCℓ filling type sensor
Cable and KCℓ filling tube length	–03 . . .	. . . . .	3 m
	–05 . . .	. . . . .	5 m
Solution group tip	–TN . . .	. . . . .	Titanium
	–HC . . .	. . . . .	Hastelloy C
KCℓ reserve tank (with mounting hardware)	–TT1 . . .	. . . . .	For general purpose (250 mℓ)
	–TT2 . . .	. . . . .	For medium pressure (flow-through type holder for medium pressure
W/o KCℓ reserve tank (w/KCℓ filling tube)	–TN1 . . .	. . . . .	For general purpose (for maintenance)
	–TN2 . . .	. . . . .	For medium pressure (for maintenance)
———	–NN . . .	. . . . .	Always –NN
pH measuring system	–T . . .	. . . . .	2-wire pH transmitter system
———	*A	. . . . .	Style A
Option Certified version		/K . . .	Approved under the Measurement Law in Japan

Note:
Prepare an air pressure regulator as shown in the diagram below, when a medium-pressure reserve tank (PH8EFG-□-TT2) is used.



2. Holder

<Guide-pipe>

Model	Basic code	Description
PH8HG	. . . . .	Guide-pipe
Materials	–PV	Hard PVC (solution temperature max. 50°C).
	–PP	Polypropylene (solution temperature max. 80°C).
———	*A	Style A

Notes:
(1) Pipe length: 2 m
(2) Provided with mounting hardware for 50 mm pipe.

<Submersion Type>

Model	Basic code	Suffix code	Description
PH8HS . .	. . . . .	. . . . .	Submersion type holder
Material	–PP . . .	. . . . .	Polypropylene (Solution –5 to 100°C)
	–S3 . . .	. . . . .	SS316 (Solution –5 to 105°C)
Pipe length	–10 . . .	. . . . .	1.0 m
	–15 . . .	. . . . .	1.5 m
	–20 . . .	. . . . .	2.0 m
pH measuring system	–T . .	. . . . .	2-wire pH transmitter system
Cleaning device	–NN .	. . . . .	Not provided
	–S3 .	. . . . .	For ultrasonic cleaning (Transducer, SS316)*1
	–TN .	. . . . .	For ultrasonic cleaning (Transducer, Titanium)*2
	–HC .	. . . . .	For ultrasonic cleaning (Transducer, Hastelloy C)*3
	–JT .	. . . . .	For jet cleaning } Solenoid valve must be separately specified.
	–BR .	. . . . .	For brush cleaning }
Ultrasonic cleaning cable	–NN	. . . . .	Not required
	–C3	. . . . .	Cable length: 3 m
	–C5	. . . . .	Cable length: 5 m
Connector for Jet or Brush cleaner	–JP	. . . . .	PT½
	–NP	. . . . .	½NPT
———	*A	. . . . .	Style A
Options: Mounting hardware		/MS1 . .	Mounting hardware for submersion type: 1 set
		/MS2 . .	Mounting hardware for submersion type: 2 sets
		/MS3 . .	Mounting stainless steel for hardware for submersion type: 1 set
		/MS4 . .	Mounting stainless steel for hardware for submersion type: 2 sets
Options: Special mounting		F	Flange mounted

*1: For general use (normal pH: 3 to 14)
*2: For aqueous salt solution
*3: For acids (normal pH: 0 to 4)

Note:
Even though the number of mounting hardware required depends on the installation site conditions such as flow rate, one set is generally sufficient for pipe lengths of 1 meter. Otherwise, two sets are required.

<Submersion Type> (JIS Flameproof type)

Model	Basic code	Suffix code	Description
PH8HSF .	. . . . .	. . . . .	Submersion type holder
Material	–PP . .	. . . . .	Polypropylene
	–S3 . .	. . . . .	SS316
Pipe length	–10 . .	. . . . .	1.0 m
	–15 . .	. . . . .	1.5 m
	–20 . .	. . . . .	2.0 m
pH measuring system	–T . .	. . . . .	2-wire pH transmitter system
Cleaning device (ultrasonic cleaning only)	–S3	. . . . .	SS316 transducer *1
	–TN	. . . . .	Titanium transducer *2
	–HC	. . . . .	Hastelloy C transducer *3
Explosion protection	–JS	. . . . .	JIS Flameproof d2G4
———	*A	. . . . .	Style A
Options: Mounting hardware		/MS1 . .	1 set
		/MS2 . .	1 sets
		/MS3 . .	Mounting stainless steel for hardware for submersion type: 1 set
Options: Special mounting		/MS4 . .	Mounting stainless steel for hardware for submersion type: 2 sets
Options: Flameproof packing		/F.	Flange mounted
Options: Tag plate		/PG2	JIS flameproof packing type adaptor 3/4"
		/SCT	Stainless steel tag plate

*1: For general use (normal pH: 3 to 14)
*2: For aqueous salt solution
*3: For acids (normal pH: 0 to 4)

Note: Even through the number of mounting hardware required depends on the installation site conditions such as flow-rate, one set is generally sufficient for pipe lengths of 1 m. Otherwise, two sets are required.

<Flow-through type>

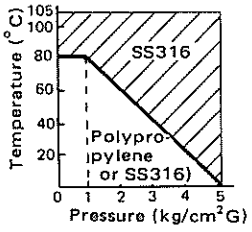
Model	Basic Code	Suffix Code	Description
PH8HF	.....	.....	Flow-through type holder
Material	–PP	.....	Polypropylene } Note
	–S3	.....	SS316 } (2)
Process connection	–JPT	.....	JIS PT 1 female thread
	–NPT	.....	1" NPT female thread screw
	–J10	.....	JIS 10 K25 A FF flange
	–A15	.....	ANSI 1" 150ℓb, FF flange (used PP materials) ANSI 1" 150ℓb, RF flange with serration (used SUS materials)
pH measuring system	–T	.....	2-wire pH transmitter system.
Cleaning device	–NN	.....	None
	–S3	.....	For ultrasonic cleaning (transducer: SS316) *1
	–TN	.....	For ultrasonic cleaning (transducer: Titanium) *2
	–HC	.....	For ultrasonic cleaning (transducer: Hastelloy C) *3
	–JT		For jet cleaning *4
	–BR		For brush cleaning *4
Ultrasonic cleaning cable connecter for Jet & Brush cleaner	–NN	.....	None
	–C1	.....	Cable length: 1m
	–C3	.....	Cable length: 3m
	–JP	.....	PT 1/2
	–NP	.....	1/2 NPT
———	*A	.....	Style A
Options		/MF1	Mounting hardware for flow-through type holder

*1: For general use (normal pH 3 to 14).
*2: For aqueous salt solution.
*3: For acid (normal pH 0 to 4).
*4: Solenoid valve must be separately specified.

Notes:

(1) No mounting hardware is required when the SS316 holder is installed in the line of a steel pipeline.
It is required where the holder is installed in a sampling rack (in this case, a U-bolt included in MF1 is not used).

(2) Criteria for material selection (PP or S3)
In general, polypropylene is recommended from the viewpoint of chemical resistance. In any of the following cases, however, SS 316 is recommended:
a. The liquid contains organic reagents, oxidizing agents, etc., which can corrode polypropylene.
b. The temperature/pressure relationship falls within the hatched portion of the diagram, below.
c. The use of polypropylene is not justified from the viewpoint of strength or empirical data.



<Flow-through Type> (JIS Flameproof type)

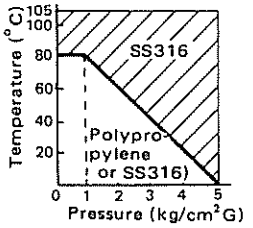
Model	Basic code	Suffix code	Description
PH8HFF		. . . . .	Flow-through type holder
Material	–PP . .	. . . . .	Polypropylene
	–S3 . .	. . . . .	Ss316
Process connection	–JPT	. . . . .	JIS PT1 female
	–NPT	. . . . .	1" NPT female
	–J10	. . . . .	JIS 10K25A, FF flange
	–A15	. . . . .	ANSI 1" 150ℓb, FF flange (used PP materials) ANSI 1" 150ℓb, RF flange with serration (used SUS materials)
pH measuring system	–T .	. . . . .	2-wire pH transmitter system
Cleaning device (ultrasonic cleaning only)	–S3	. . . . .	SS316 transducer
	–TN	. . . . .	Titanium transducer
	–HC	. . . . .	Hastelloy C transducer
Explosion protection	–JS	. . . . .	JIS Flameproof d2G4
———	*A	. . . . .	Style A
Options (Mounting hardware)	/MF1 . .		Mounting hardware for flow through type holder
Options (Flameproof packing)	/PG2 .		JIS Flameproof packing type adaptor 3/4"
Options (Tag plate)	/SCT		Stainless steel tag plate

*1: For general use (normal pH 3 to 14)
*2: For aqueous salt solution
*3: For acid (normal pH 0 to 4)

Notes:

(1) No mounting hardware is required when the SS316 holder is installed in the line of a steel pipeline.
It is required where the holder is installed in a sampling rack (in this case, a U-bolt included in MF1 is not used).

(2) Criteria for material selection (PP or S3)
In general, polypropylene is recommended from the viewpoint of chemical resistance. In any of the following cases, however, SS 316 is recommended:
a. The liquid contains organic reagents, oxidizing agents, etc., which can corrode polypropylene.
b. The temperature/pressure relationship falls within the hatched portion of the diagram, below.
c. The use of polypropylene is not justified from the viewpoint of strength or empirical data.



3. pH Transmitter

Model	Basic code	Suffix code	Description
PH8FTG			General purpose (Non-explosionproof w/o ref. temperature conversion)
PH8FTS			General purpose (Intrinsically safe w/o ref. temperature conversion)
Field display	–D		Digital display
	–M		Meter indication
Transmission signal range	–01		0 to 14 pH
	–02		0 to 10 pH
	–03		0 to 8 pH
	–04		2 to 12 pH
	–05		3 to 11 pH
	–06		4 to 14 pH
	–07		4 to 10 pH
	–08		6 to14 pH (Digital display only)
Explosion protection	–NN		Always –NN for model PH8FTG
	–JS		JIS Intrinsic safety
——	*A		Style A
Options (Mounting hardware)		/P	Pipe mounting hardware
		/W	Wall mounting hardware
Options (Hood)		/H	With hood
Options (Approval under Law)		/K	Approved under the Measurement Law in Japan
Options (Tag plate)		/SCT	Stainless steel tag plate fixed with rivets

4A. Ultrasonic Oscillator (Non-explosionproof type)

Model	Basic code	Suffix code	Description
PH8USG			Ultrasonic oscillator
Supply voltage	–3		200 V AC, 50/60 Hz
	–4		220 to 240 V AC, 50/60 Hz
	–5		100 V AC, 50/60 Hz
	–7		110 to 120 V AC, 50/60 Hz
——	*B		Style B
Options (Mounting hardware)		/P	Pipe mounting hardware
		/W	Wall mounting hardware
Options (Air purge connector)		/AP1	PT¼ female
		/AP2	¼NPT female
Options (Conduit work adaptor)		/AUSG	PF½ female

Note:
For 110 to 120 V AC or 220 to 240 V AC power supplies, specify the voltage when ordering. Tolerance is ±10% of the rated voltage. (example) Power supply voltage: 115 V.

4B 1. Flameproof Ultrasonic oscillator

Model	Basic code	Suffix code	Description
PH8USF			Flameproof ultrasonic oscillator
Supply voltage	–3		200 V AC, 50/60 Hz
	–4		220 to 240 V AC, 50/60 Hz
	–5		100 V AC, 50/60 Hz
	–7		110 to 220 V AC, 50/60 Hz
Explosion protection	–JS		JIS Flameproof d2G4
——	*A		Style A
Options (Mounting hardware)		/PM	Pipe mounting hardware
Options (Cable between oscillator and holder)		/C□□	Enter the length in □□ in m. No end treatment. Ex. If length is 3 m, etner /C03 Standard cable lenght: 3, 7, 10 m
Options (Flameproof packing)		/PG2	JIS flameproof packing adaptor 3/4", 2 places
Options (Tag plate)		/SCT	Stainless steel tag plate

Surely use it with PH8AL type alarm box.

Note:
For 110 to 120 V AC or 220 to 240 V AC power supplies, specify the voltage when ordering. Tolerance is ±10% of the rated voltage. (example) Power supply voltage: 115 V.

4B 2. PH8AL type Alarm Box

Model	Basic code	Suffix code	Description
PH8AL			Alarm box
Supply voltage	–3		200 V AC, 50/60 Hz
	–4		220 to 240 V AC, 50/60 Hz
	–5		100 V AC, 50/60 Hz
	–7		110 to 120 V AC, 50/60 Hz
——	*A		Style A
Option		/APC	Air purge connector PT¼

5. Wash cycle timer

Model	Basic Code	Suffix Code	Description
PH8CT			Wash cycle timer
Supply voltage	–3		200 V AC, 50/60 Hz
	–4		220 to 240 V AC, 50/60 Hz
	–5		100 V AC, 50/60 Hz
	–7		110 to 120 V AC, 50/60 Hz
——	*B		Style B
Options (Mounting hardware)		/P	Pipe mounting hardware
		/W	Wall mounting hardware
Options (Airpurge connector)		/AP1	PT 1/4 female
		/AP2	1/4 NPT female
Options (Conduit adaptor)		/ACTG	PF½ thread (female)

Note:
For 110 to 120 V AC or 220 to 240 V AC power supplies, specify the voltage when ordering. Tolerance is ±10% of the rated voltage. (example) Power supply voltage: 115 V.

6A. Solenoid valve

Model	Basic Code	Description
PH8MV	. . . . .	Solenoid valve for Jet or brush cleaning
Fluid	–A	Air
	–W	Water
Supply voltage	–200	200 V AC
	–220	220 V AC (Only 60 Hz available)
	–100	100 V AC
	–110	110 V AC (Only 60 Hz available)
Power frequency	–50 . . .	50 Hz
	–60 . . .	60 Hz
———	*B .	Style B

Note: Power supply voltage should be 100 V AC, ±10%, 50/60 Hz, or 110 V AC ±10%, 60 Hz.

6B. Flameproof Type Solenoid Valve

Model	Basic code	Suffix code	Description
PH8MVF	. . . . .	. . . . .	Flameproof solenoid valve
Fluid	–A	. . . . .	Air
	–W	. . . . .	Water
Supply voltage	–200	. . . . .	200 V AC 50/60 Hz
	–220	. . . . .	220 V AC (only 60 Hz available)
	–100	. . . . .	100 V AC 50/60 Hz
	–110	. . . . .	110 V AC (Only 60 Hz available)
Power frequency	–50	. . . . .	50 Hz
	–60	. . . . .	60 Hz
Explosion protection	–JS	. . . . .	Flameproof d2G4
———	*A		Style A
Options Tag plate		/SCT	Stainless steel tag plate

7. Cleaning Pump/Tank Ass'y

Model	Basic Code	Suffix Code	Description
PH8PU1	.....	.....	Pump/Tank Assy for Jet/Brush cleaning
Power	–3	.....	AC 200 V, 50/60 Hz
	–5	.....	AC 100 V, 50/60 Hz
———	*A	.....	Style A
Special connection for cleaning water inlet, outlet		/PT	PT½ (with adaptor)
		/NP	½NPT (with adaptor)
Anchor bolt		/AN	L-type M12x160 4 pieces
Conduit adaptor		/APUG..	PF½ thread (female)

Note: The same power must be supplied for wash cycle timer.

8. Terminal box

Model	Basic Code	Suffix Code	Description
PH8TBG	.....	.....	Terminal box
———	*A	.....	Style A
Options: Mounting hardware		/P	Pipe mounting hardware
		/W	Wall mounting hardware
Signal cable (between terminal box and converter)		/C□ ...	Specify cable length in □, (max. 20 m) Ex: /C03 when 3 m.
Conduit adaptor		/ATBG	PF½ thread (female)

Note: /C03, /C07 and /C10 are standard cable lengths.

9. Accessories

Model	Basic Code	Suffix Code	Description
PH8AX	.....	.....	pHΣ accessories *1
Calibration reagents	–L	.....	Two bottles, each containing 250 mℓ solution (pH 7 and 4) Total of 24 bags, each bag containing powder for 500mℓ solution (pH7 or 4), and two 500 mℓ polyethylene bottles.
	–P	.....	
———	*A	.....	Style A
Options		/STD	Sensor stand with mounting hardware for mounting to 50 mm pipe.
		/KCLL..	KCℓ solution (250 mℓ polyethylene bottle) *2
		/KCLP ..	KCℓ powder (3 bags, each for 250 mℓ solution) *2
		/TMP	Thermometer (0 to 100°C)

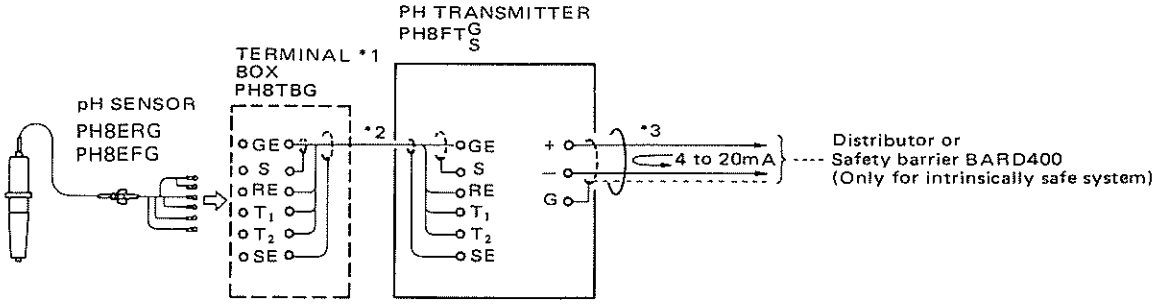
Notes:
(*1) Includes the following:
(1) 200 mℓ polyethylene cup x 2 pcs
(2) Cleaning bottle x 1 pc
(*2) Either KCLL or KCLP is required for PH8EF$\frac{G}{S}$-□-TT2.

10. Consumable Parts

Part Name		Part Number	Remarks
Glass electrode	General purpose	K9142TN	For KCℓ filling and refillable pH sensor
	Certified	K9142TP	Certified version only for KCℓ filling pH sensor
Junction		K9142TH	For KCℓ filling and refillable pH sensor
Desiccant		K9020XR	One bag
KCℓ solution (3.3M)		K9084LP	250 mℓ polyethylene bottles, 6 pcs.
Buffer solution for calibration (pH4)(*1)		K9084LL	250 mℓ polyethylene bottles, 6 pcs.
Buffer solution for calibration (pH7)(*1)		K9084LM	250 mℓ polyethylene bottles, 6 pcs.
Buffer solution for calibration (pH9)(*1)		K9084LN	250 mℓ polyethylene bottles, 6 pcs.
Powder for buffer solution (pH4)		K9020XA	12 bags, each for preparation of 500 mℓ solution.
Powder for buffer solution (pH7)		K9020XB	12 bags, each for preparation of 500 mℓ solution
Powder for buffer solution (pH9)		K9020XC	12 bags, each for preparation of 500 mℓ solution
KCℓ powder for KCℓ filling type sensor		K9020XU	8 bags, each for preparation of 250 mℓ solution
KCℓ powder for KCℓ refillable type sensor		K9142UT	2 bags of powder, 1 bottle of 3.3M solution, and 1 syringe
Brush		K9143KM	Brush Assy for replacement

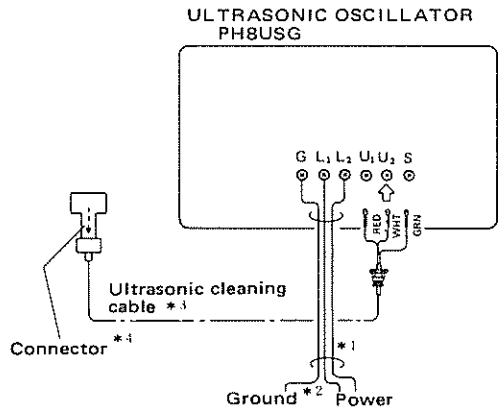
Note:
(*1) The pH value of calibrating buffer solution may vary depending on the storage conditions. Prepare a new solution from powder for accurate instrument calibration such as for certified version.

WIRING DIAGRAMS



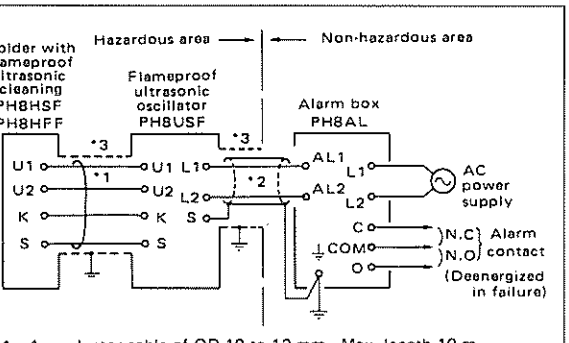
*1: Terminal Box is used only where pH Transmitter is installed at a distance from pH Sensor (ordinarily not needed.)
*2: This cable is specified with the suffix code of PH8TBG. Max. 20 m.
*3: Use cables with an outside diameter of 10 to 12 mm, and a shielded cable must be grounded on the power supply side.

<Wiring for non-explosionproof ultrasonic cleaning system>



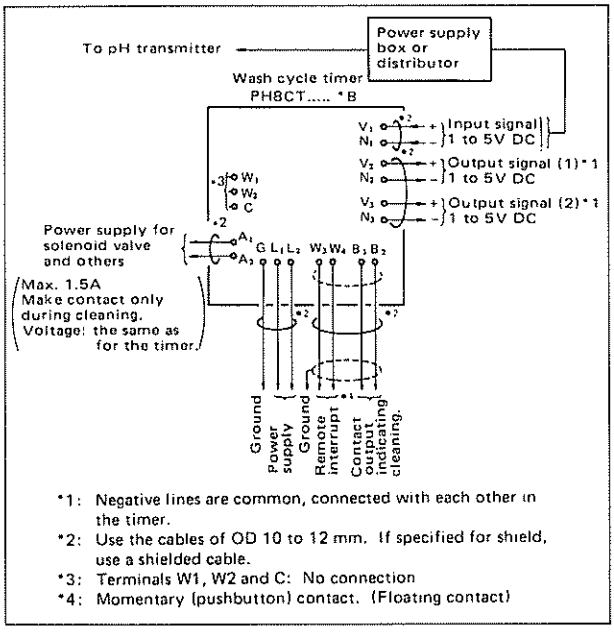
*1: Use a cable with an outside diameter of 9 to 12 mm.
*2: Grounding is necessary.
*3: This exclusive cable is specified by the basic code of Holders (–C□)
*4: Ultrasonic transducer is disconnected by this connector for replacement.

<Wiring for flameproof ultrasonic cleaning system>



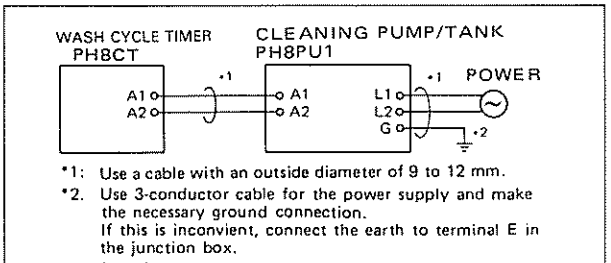
*1: 4-conductor cable of OD 10 to 12 mm. Max. length 10 m.
(Ex.) CVV 1.25 mm² x 4C
*2: 2-conductor shielded cable of OD 10 to 12 mm.
Max. length 1,000 m.
*3: Metal conduit or flexible conduit (only for flameproof packing type)

<Wiring for wash cycle timer>



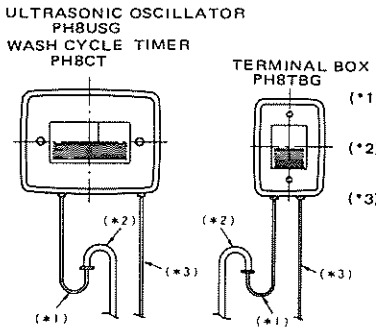
*1: Negative lines are common, connected with each other in the timer.
*2: Use the cables of OD 10 to 12 mm. If specified for shield, use a shielded cable.
*3: Terminals W1, W2 and C: No connection
*4: Momentary (pushbutton) contact. (Floating contact)

<Wiring between wash cycle timer and cleaning pump/tank ass'y>



*1: Use a cable with an outside diameter of 9 to 12 mm.
*2. Use 3-conductor cable for the power supply and make the necessary ground connection.
If this is inconvient, connect the earth to terminal E in the junction box.
(Note) Confirm that the power supply specification are the same for PH8PU1 cleaning pump/tank and PH8CT wash cycle/timer.
Example:
If PH8CT....100V AC, then PH8PU1.....AC100V.
If PH8CT....200V AC, then PH8PU1.....AC200V.

— Notes for conduit works —

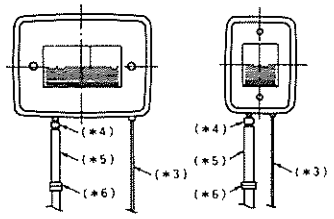


(*1): Hanging (for drip)

(*2) Bend (for rain proof)

(*3): Conduit work is prohibited for Sensor cable and Ultrasonic cleaning cable.

(a) Recommended conduit works — not needing conduit adaptor —



(*4): Conduit adaptor

(*5): Flexible conduit

(*6): Union

(*3): Conduit works is prohibited for Sensor cable and Ultrasonic cleaning cable.

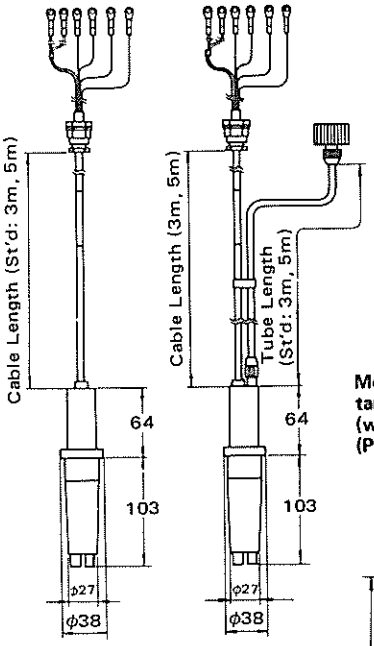
(b) Conduit works using a conduit adaoptor

DIMENSIONS

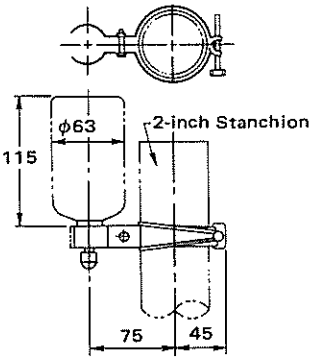
UNIT: mm

KCℓ refillable pH Sensor PH8ERG-□

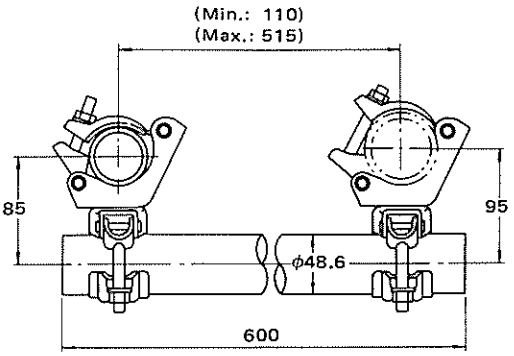
KCℓ filling pH Sensor PH8EFG-□



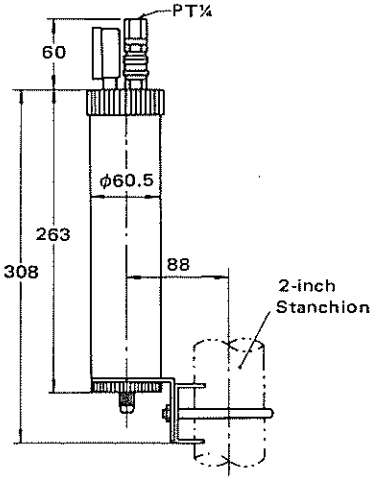
General purpose KCℓ reserve tank for KCℓ filling pH Sensor (with mounting hardware) (PH8EFG-□)-TT1

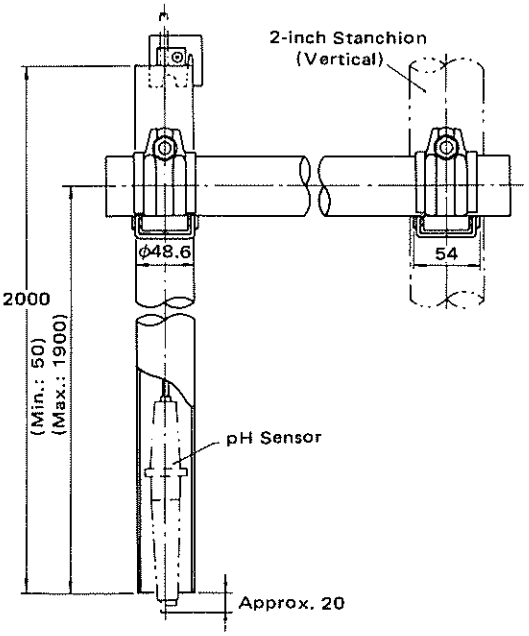


Guide pipe (with mounting hardware) PH8HG



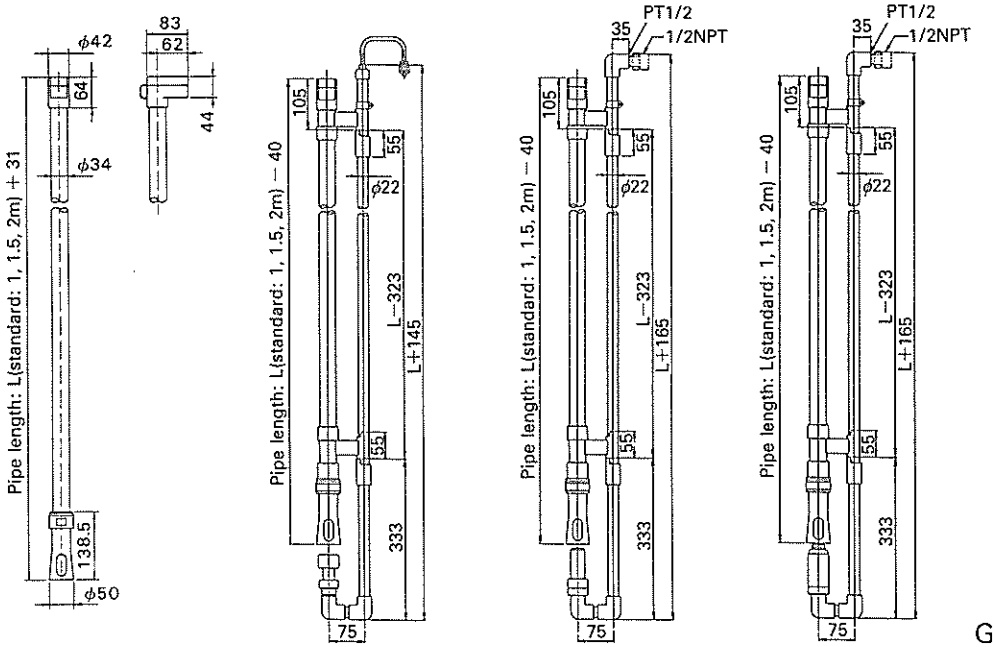
Medium pressure KCℓ reserve tank for KCℓ filling pH Sensor (with mounting hardware) (PH8EFG-□)-TT2



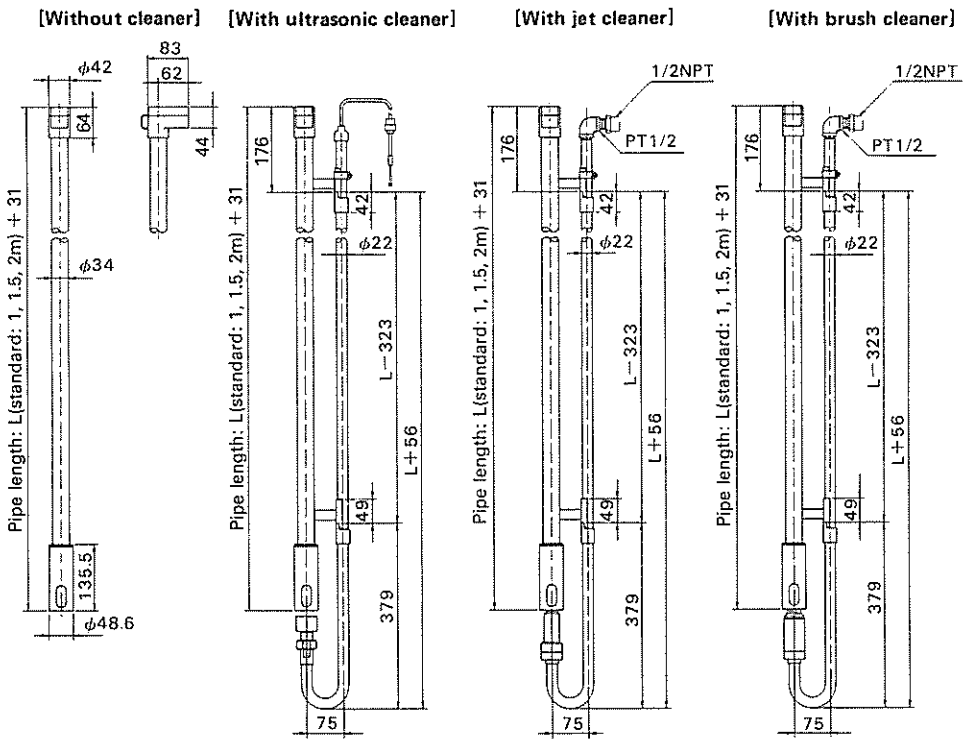


Submersion holder—polypropylene — (See separate drawings for mounting hardware) PH8HS-PP

[Without cleaner] [With ultrasonic cleaner] [With jet cleaner] [With brush cleaner]

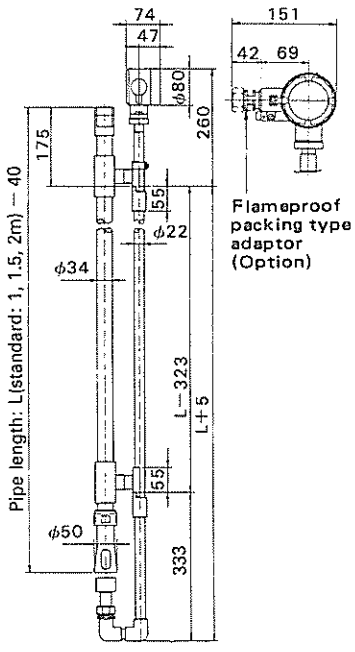


Submersion type holder — SS316 — (See separate drawings for mounting hardware)
PH8HS-S3

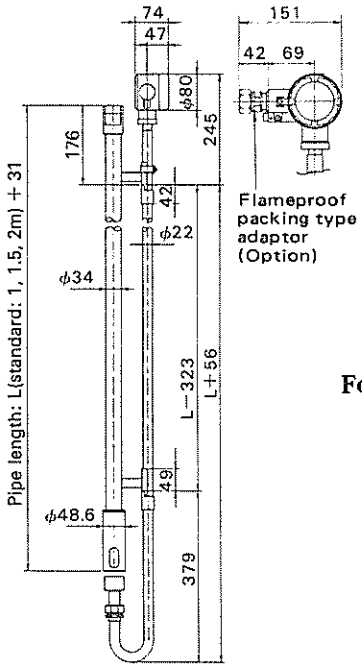


Mounting hardware for submersion type holder
(PH8HS, PH8HSF)/MS1 . . . . . 1 set
(PH8HS, PH8HSF)/MS2 . . . . . 2 sets

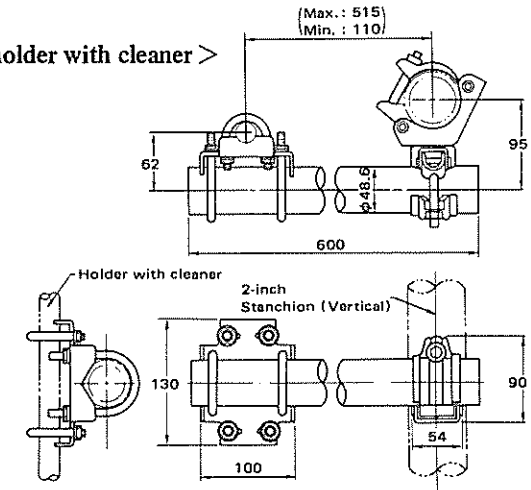
Submersion type holder with flameproof ultrasonic cleaner — Polypropylene — (See separate drawings for mounting hardware.) PH8HSF-PP



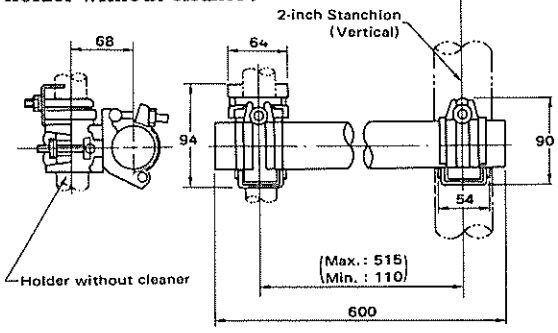
Submersion type holder with flameproof ultrasonic cleaner — SS316 — (See separate drawings for mounting hardware.) PH8HSF-S3



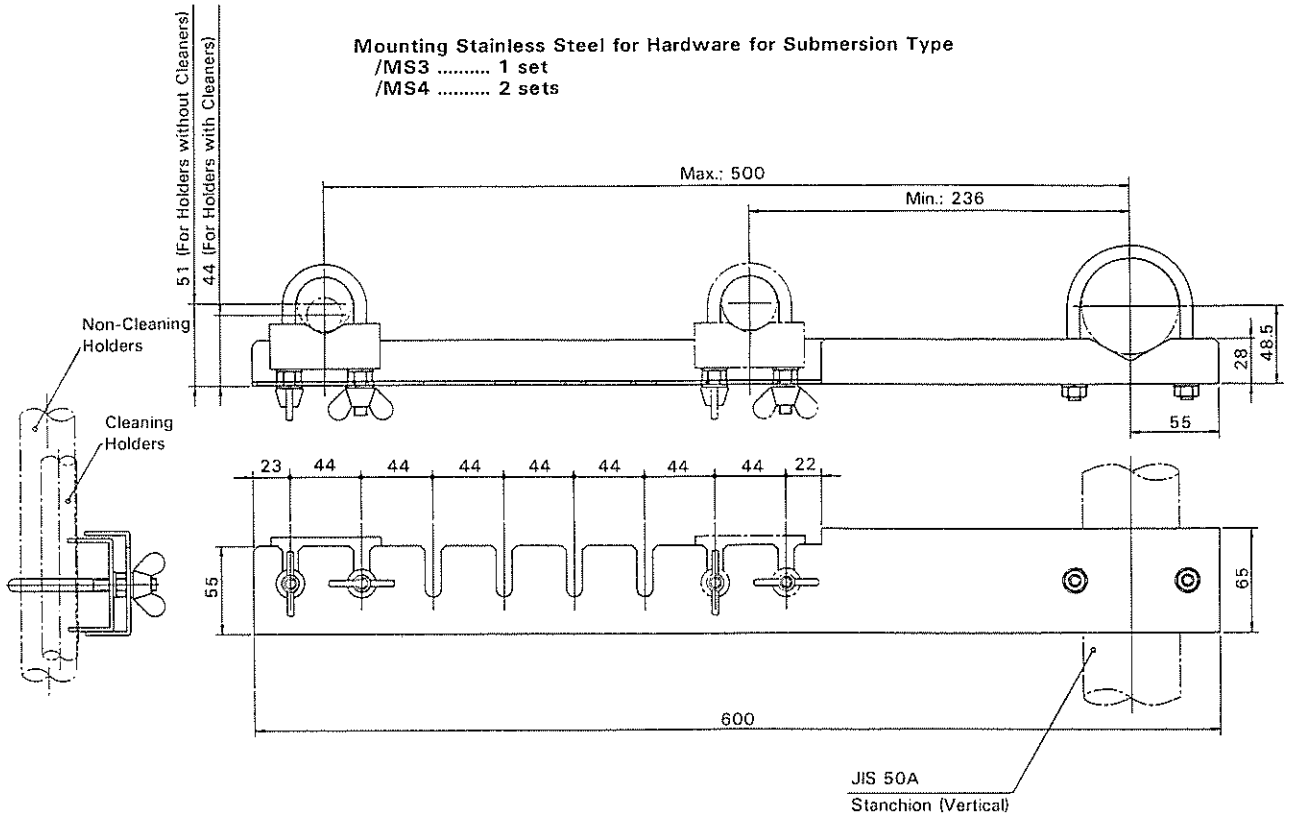
< For holder with cleaner >



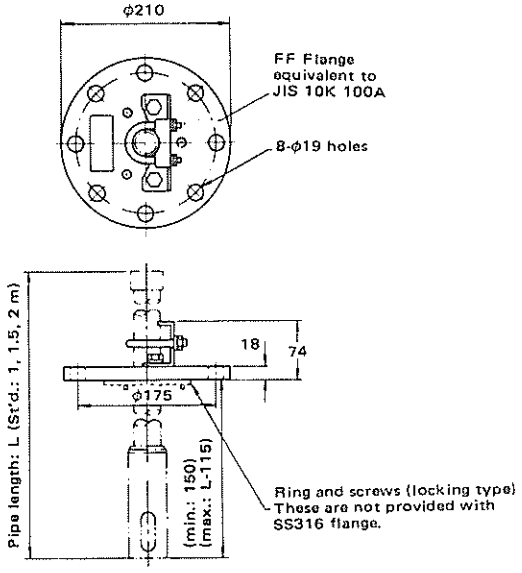
For holder without cleaner >



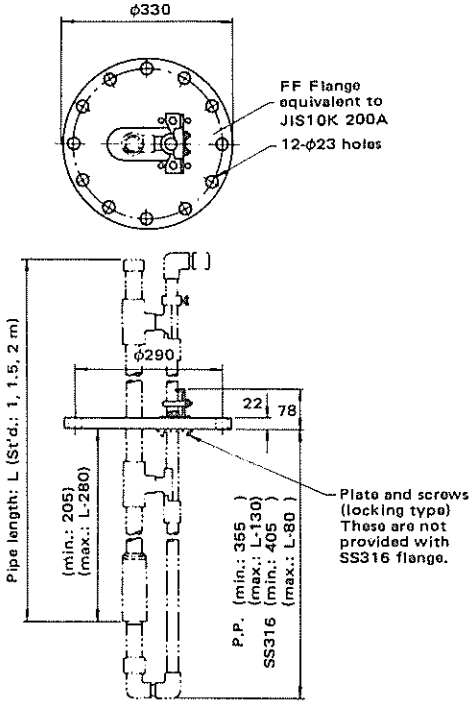
Mounting Stainless Steel for Hardware for Submersion Type
/MS3 ..... 1 set
/MS4 ..... 2 sets



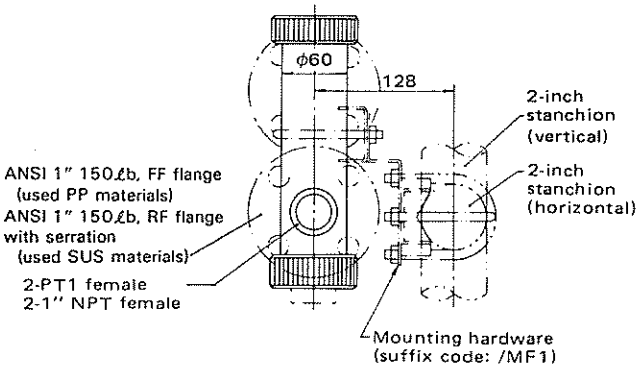
Mounting hardware for submersion type holder
– Flange mounting hardware for holder without cleaner –
– Material: Polypropylene or SS316 –

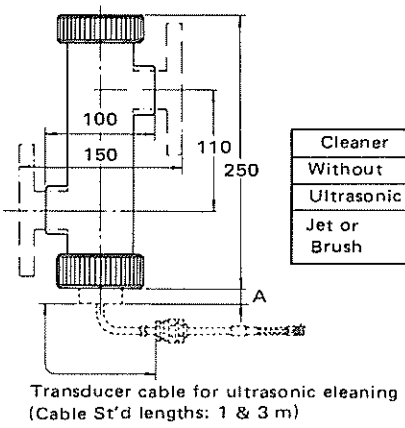


Mounting hardware for submersion type holder
– Flange mounting hardware for the holder with cleaner –
– Material: Polypropylene or SS316 –



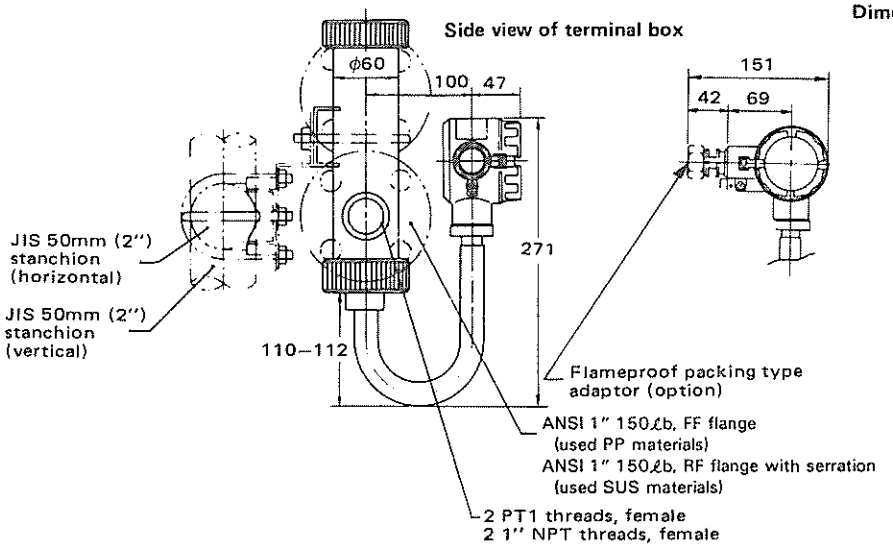
Flow-through type holder with mounting hardware
PH8HF



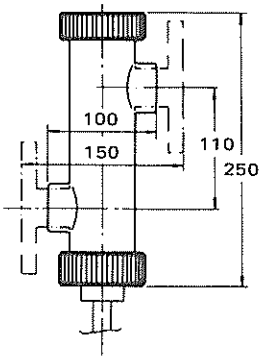


Cleaner	Dimension A	Connection
Without	0	—
Ultrasonic	35	Cable
Jet or Brush	12	PT 1/2
	49 ± 8	1/2 NPT

Flow-through type holder withfflameproof ultrasonic cleaner and mounting hardware
PH8HFF

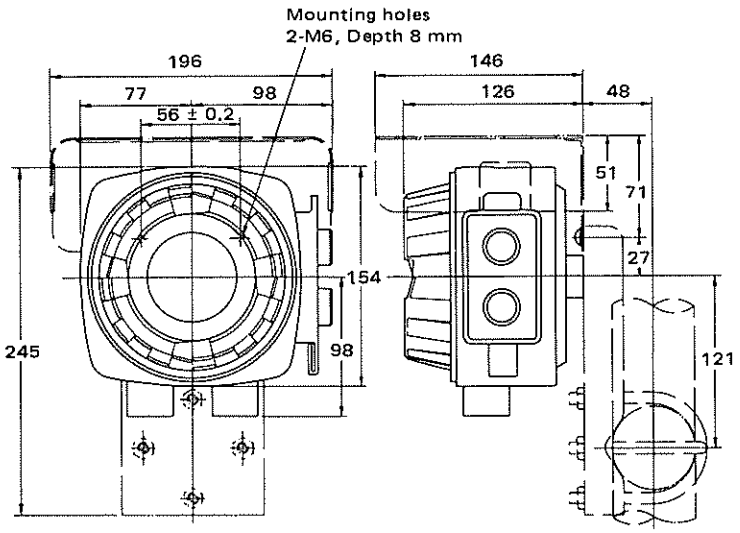


Dimensions for connection to piping

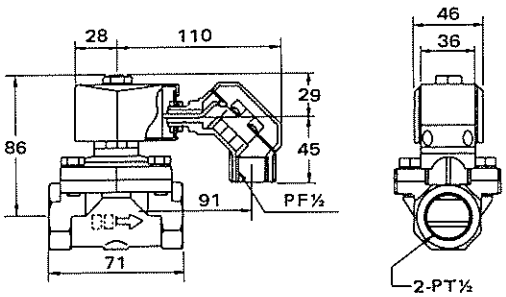


2-wire pH Transmitter PH8FT$^{G}_{S}$

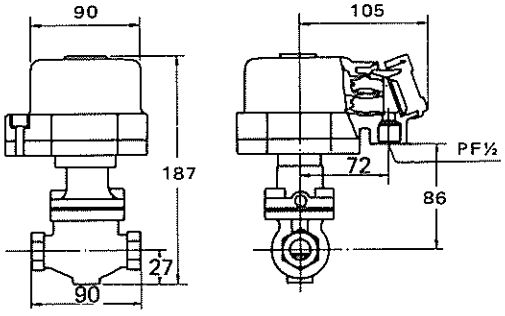
(See separate drawings for mounting hardware.)



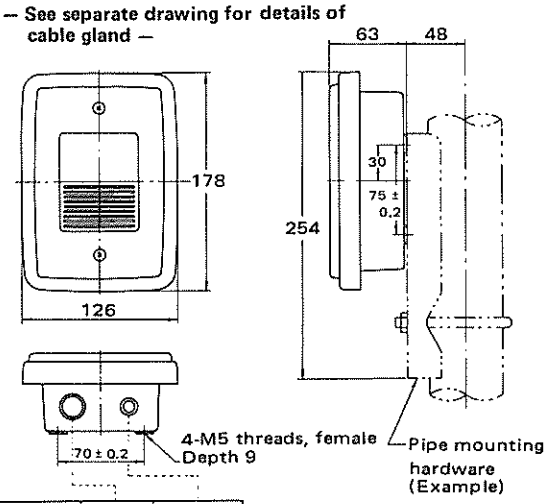
Solenoid Valve
PH8MV ..... *B



Flameproof solenoid valve PH8MVF



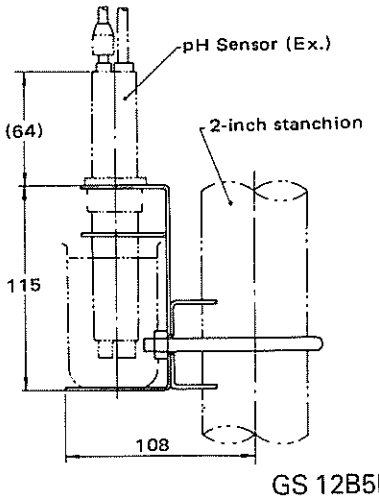
Terminal box
PH8TBG
– See separate drawing for mounting hardware –
– See separate drawing for details of cable gland –



PH8TBG	Cable to converter	pH sensor cable
Cable gland	A15	A8

Note: Cable OD for A15 should be 9-12 m.

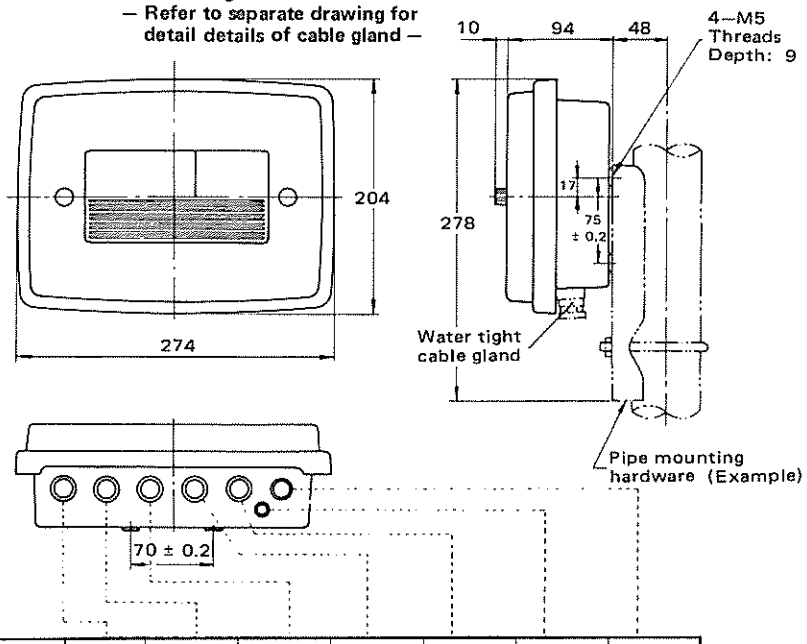
Sensor stand
(PH8AX-□)/STD



Installation Suggestions for Solenoid Valve

1. Take precautions against substitution or backward-flow of solution to solenoid valve. For example, install a check-valve in the line from the solenoid valve to the holder, or install the solenoid valve higher than the holder, etc.
2. Confirm that the vapour from the solution do not corrode the valve wetted material (Bronze and Nitrile rubber).

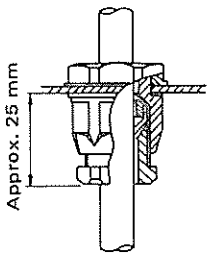
Ultrasonic oscillator PH8USG
Wash cycle timer PH8CT
– Refer to separate drawing for mounting hardware –
– Refer to separate drawing for detail details of cable gland –



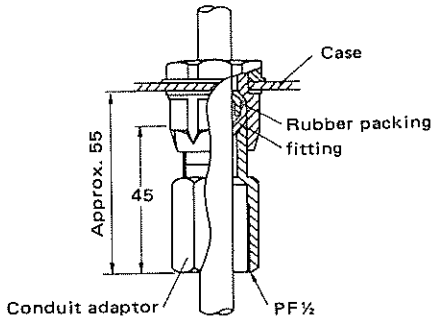
PH8USG	——	——	Power/ ground cable	——	——	Air purge connector	Ultrasonic cleaning cable
PH8CT	Power/ground cable	Cable to solenoid valve, etc	Cleaning display cable	Input signal cable	Output signal cable	Air purge connector	——
Cable gland	A15	A15	A15	A15	A15	Note(2)	A8

Notes:
(1) Cable OD for A15 cable gland should be 9 to 12 mm.
(2) Air purge connector fitting: PT 1/4 or 1/4 NPT.

Detailed drawing of cable gland for Ultrasonic oscillator, Wash cycle timer, and Terminal box.



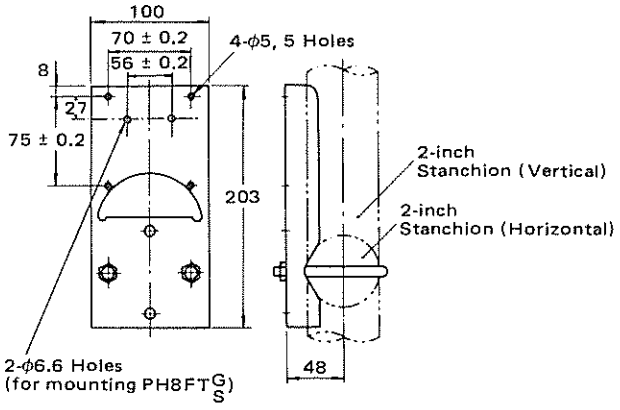
(a) Watertight plastics cable gland (St'd)



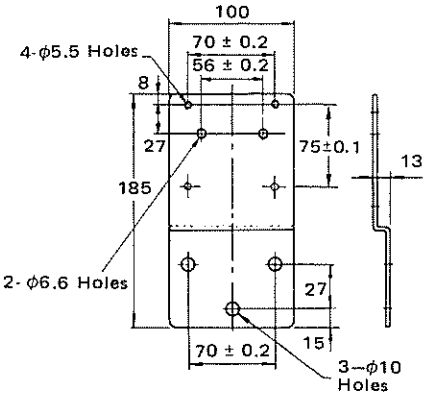
(b) Watertight plastics cable gland with a conduit adaptor (option)

Mounting hardware for pH Transmitter, Ultrasonic oscillator, Wash cycle timer, Terminal box
(PH8FT$^{G}_{S}$, PH8USG, PH8CT, PH8TBG) ..... /P, /W

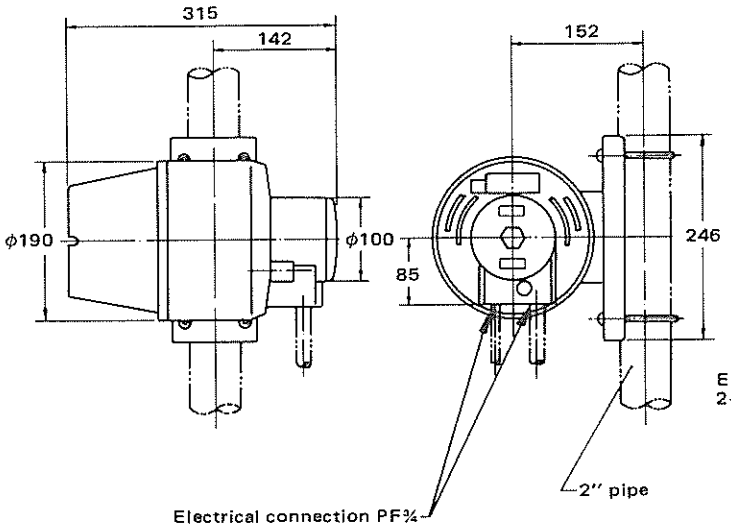
[Pipe-mounting hardware]



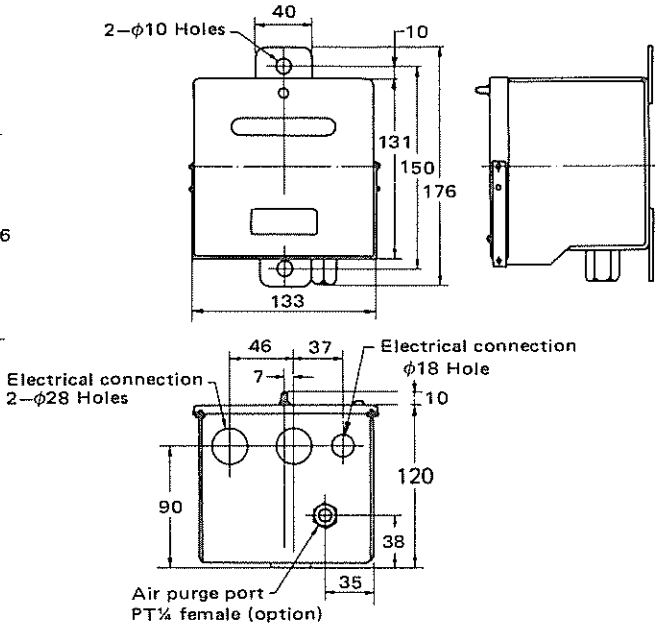
[Wall-mounting hardware]



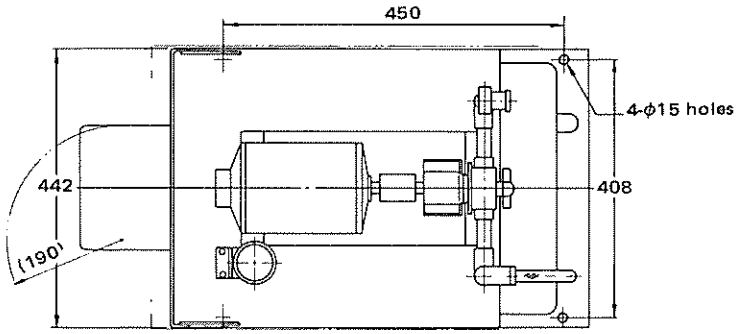
Flameproof ultrasonic oscillator PH8USF

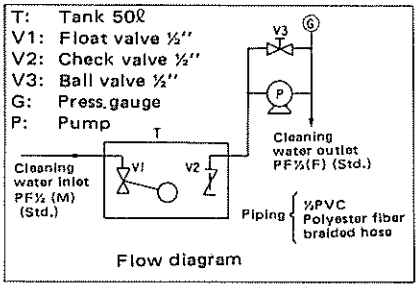


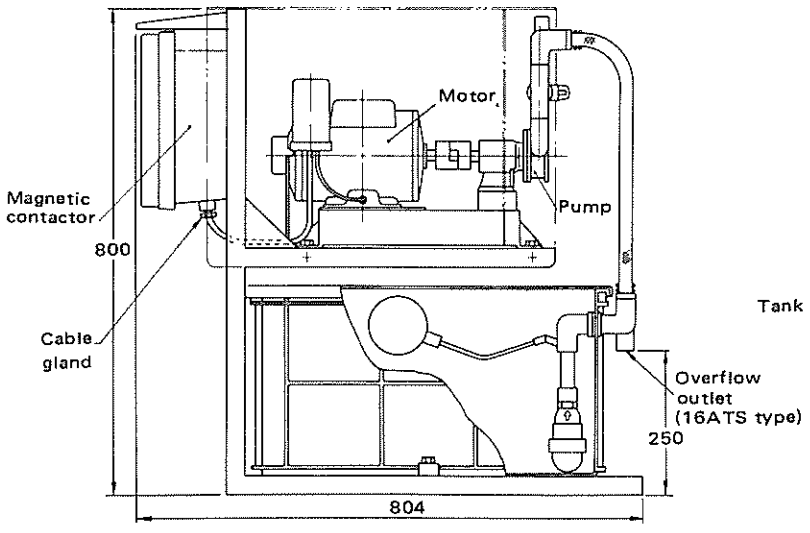
Alarm box PH8AL

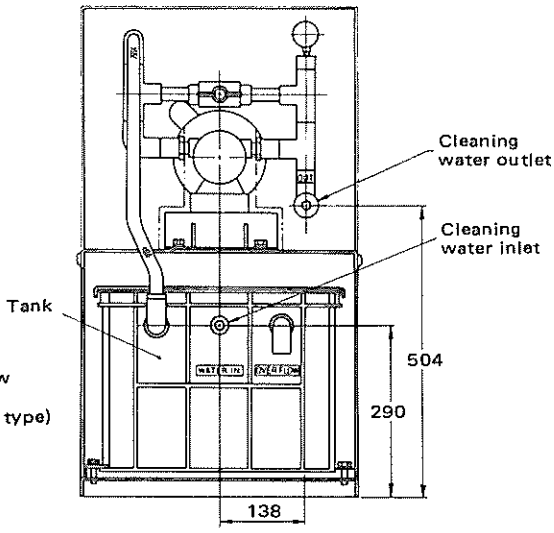


Cleaning pump/tank ass'y PH8PU1









SELECTION CRITERIA FOR pH SENSORS AND HOLDERS

• 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 holders.
   - The solution is out of the range $2 < pH < 12$.
   - The solution contains organic solvent or oil in the order of a few percent.
2. When any of the two conditions listed below are applicable, consult our sales.
   - Strong oxidizing solutions such as aqua regia, chromic acid, hypochlorous acid, perchloric acid etc.
   - The solution contains corrosive gases (ammonia, chlorine, hydrogen sulfide).

• Individual criteria

O: can be used Δ: shortens useful life X: cannot be used

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

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

TABLE OF CORROSION-RESISTIVE MATERIALS

Note: This table shows corrosion resistance of each single substance. If a sample contains two or more substances or chemicals, its corrosion resistance may be different from the value in this table.

◎ Excellent
○ Good
△ Not so good
X Unusable

Concentration 100%
Temperature 20°C
Judgement

		Holder material	Ultrasonic transducer material pH sensor solution ground tip			Seal O-ring material	pH sensor body material	
		Polypropylene	SUS316	Hastelloy C	Titanium	Viton	Ryton	Remarks
Inorganic acids	Sufurous acid	100 20 ◎ 80 ◎	6 30 ◎	6 30 ○	6 30 ◎			
	Hydrochloric acid	5 20 ◎ 80 ◎	5 30 X	5 30 ◎ 30	5 30 ◎ 1 b X		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 ◎		5 20 ○ 40 X	
	Hydrobromic acid				40 30 ◎	Strong acid ◎		
	Nitric acid	10 20 ◎ 80 ◎	10 30 ◎	10 30 ◎	10 100 ○	Weak acid ◎	5 20 ○ 10 60 X	
	Hydroiodic acid	57 20 ◎ 70 ◎	57 25 X		57 30 ○			
	Sulfuric acid	3 20 ◎ 3 100 ◎	5 30 ◎ 5 100 X	5 30 ◎ 5 70 ◎	5 30 ◎ 5 100 X		90 20 ◎ 30 90 ○	
	Phospharic 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 ◎ 28 65 ◎	10 b ◎ 28 65 ◎		15 30 ◎	
	Caustic potash		10 b ◎ 25 b ◎	10 b ◎ 25 b ◎	10 b ◎ 25 b ○		10 20 ◎ 10 90 △	
	Caustic soda	20 80 ◎ 20 100 ◎	20 30 ◎ 20 b ◎	20 30 ◎ 20 b ◎	20 30 ◎ 20 b ◎	Strong alkali X	10 20 ◎ 10 90 △	
	Caustic soda 9–11% +Sodium chloride 15%	100 ◎			93 ◎	Weak alkali △	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 (Electrolytic salution)	100 ◎	90 X	90 X	90 ◎		20 △	
	Sea water	24 ◎	24 △		24 ◎		24 ◎	
	Magnesium chloride	sat. 80 ◎	42 b △	42 b ◎	40 b ◎		80 ○	
Sulfates	Ammonium sulfate	5 60 ◎	20 b ◎ sat. 30	20 b ◎ sat. 30 ◎	20 b ◎ sat. 30 ◎		10 90 ◎	Polypropylene sometimes may be abraded with ammonium sulfate crystals
	Potassium sulfate		10 b ◎	10 b ◎	10 b ◎		10 90 ◎	
	Sodium sulfate	Corrosion resistivity is good for usually used salts.	20 b ◎	20 b ◎	20 b ◎		10 90 ◎	
Nitrates	Ammonium nitrate		20 b ◎	20 b ◎	20 b ◎		10 90 ◎	
	Sodium nitrate		50 b ◎		50 b ◎			
Others	Sodium sulfite		20 b ◎		20 b ◎			
	Hydrogen peroxide		10 30 ◎		10 30 ◎		10 30 ◎	
	Sodium hypochlorite	10 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			30 ◎	30 ◎		10 30 X	
	Hydrogen sulfide		20 ◎		20 ◎			
	Sufurous acid gas	80 ◎ 100 ◎			30–90 ◎		80 ◎	

Note: b shows temperatures up to its boiling point.

		Holder material	Ultrasonic transducer material pH sensor solution ground tip			Seal O-ring material	pH sensor body material	
	Polypropylene		SUS316	Hastelloy C	Titanium	Viton	Rytor body	Remarks
Organic substance	Acetaldehyde	20 ◎	100 30 ◎				100 20 ○	
	Acetone	100 20 ○	50 25 ◎ 100 110 ○			100 25 X	100 b ○	
	Aniline	100 20 ◎ 100 70 ○ 100 100 Δ	100 25 ◎				100 90 ○	
	Ether	100 20 Δ	100 25 ◎				100 20 ◎	
	Ethylene glycol	100 70 ◎ 100 100 ◎	100 25 ◎					
	Ethyl alcohol	96 70 ◎	100 b ◎				100 90 ◎	
	Methyl chloride	100 20 X	100 25 ◎					
	Glacial acetic acid	100 70 ◎ 100 100 ○				100 24 X	100 20 ◎	
	Glycerin	100 70 ◎ 100 100 ◎	100 25 ◎					
	Chlorophenol	100 20 ◎ 100 70 Δ 100 100 X					100 20 ◎	
	Xylene	100 20 X					100 20 ○	
	Chlorobenzene	100 20 X 100 100 X						
	Chloroform	100 20 X	100 b ◎	100 b ◎	100 b ◎		100 90 Δ	
	Dioxane	100 20 ○ 100 70 Δ 100 100 X 100 20 Δ					100 90 ◎	
	Dichloroethane	100 70 X						
	Ethyl acetate	100 20 ◎ 100 Δ	100 105 ◎				100 90 ○	
	Carbon tetrachloride	100 20 X	99 b Δ		99 b ◎	100 24 X		
	Trichloroethylene	100 20 X	100 b ○	100 b ◎	100 b ◎		100 90 X	
	Toluene	100 20 X			145 ◎		100 90 ◎	
	Benzophenone							
	Benzaldehyde	100 20 ◎ 100 70 ○ 100 100 X					100 20 Δ 100 90 X	
	Benzyl alcohol benzene	100 20 Δ	100 30 ◎		100 30 ◎	100 25 ○	100 90 ◎	
	Formaldehyde	10 70 ◎ 10 100 ◎	37 b ◎	37 b ◎	37 b ◎			
	Methylnaphthalene							
	Methyl ethyl keton	100 20 ○ 100 70 Δ					100 90 ◎	
	Methyl alcohol	100 20 ◎	100 25 ◎				100 25 ◎	
	Nitrobenzene	100 20 ◎ 100 70 ○ 100 100 X					100 90 X	
	Lactic acid	100 20 ◎ 100 70 Δ 100 100 X	10 b ◎		10 b ◎			
	Phenol	100 20 ◎ 100 20 ◎ 100 100 ○	95 30 ◎	95 30 ○	95 30 ◎		100 90 Δ	
	Benzoic acid							
	Motor oil	100 20 ◎ 100 70 ○ 100 100 Δ					100 20 ◎	
	Petroleum ether	100 20			181 ◎		100 20 ○	
	Kerosene	100 20 ○ 100 70 X			181 ◎		100 20 ○	
	Tartaric acid	10 40 ◎ 10 60 ○ 10 80 Δ	50 100 Δ	50 100 Δ	50 100 ◎			
	Oils and fats	100 70 ◎	100 25 ◎	100 180 ◎	100 180 ◎			
	Carbon disulfide	100 20 X	100 25 ◎			100 25 ◎		

Note: b shows temperatures up to its boiling point.

========== ORDERING INSTRUCTIONS =========

1. Model, basic codes and specific items to be specified.
2. Suffix codes if necessary

========== RELATED INSTRUMENTS ==========

1. Safety barrier . . . . . GS 1B4S1-E (BARD400)
2. Distributor . . . . . GS 1B4T1-E (SDBT for 1 point SDBS for 4 points)
3. Signal converter . . . . . GS 19B1F1 (model 8966)

Printed in Japan; Aug. (C)1990/800(U.P.)