

Panel mounted type Industrial pH Meter (4-wire type)
HP-480



Overview

This instrument can be connected to pH electrodes to measure pH. The measurement values and various setting values are displayed on the LCD display, and errors in the instrument can be detected by the extensive self-diagnosis capabilities. The manual cleaning frequency of the pH electrodes can be extended by combining with a cleaner (ultrasound cleaner).

Measurement target

pH of solutions

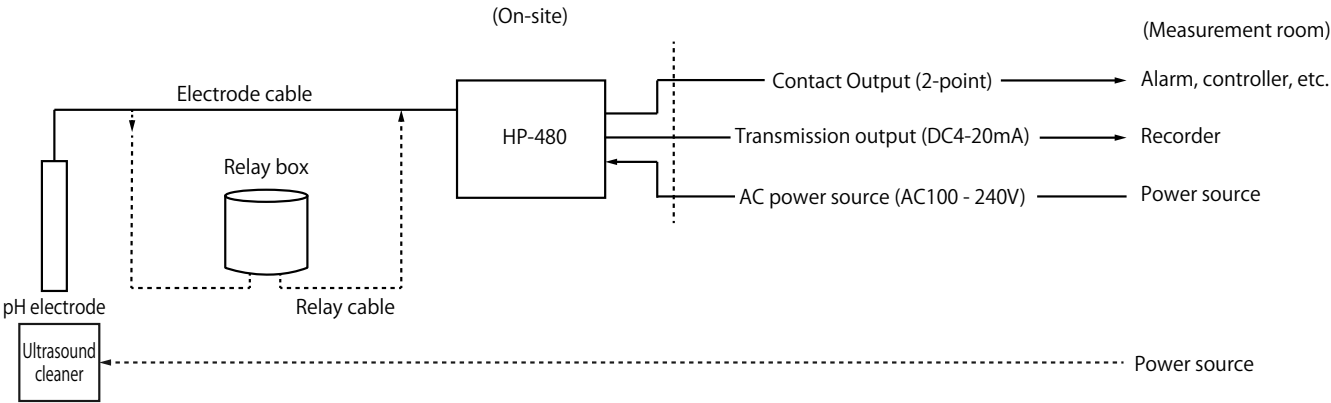
Measuring principle

Glass electrode method

Uses

Control and monitoring of drain water processing and production processes.

System Configuration

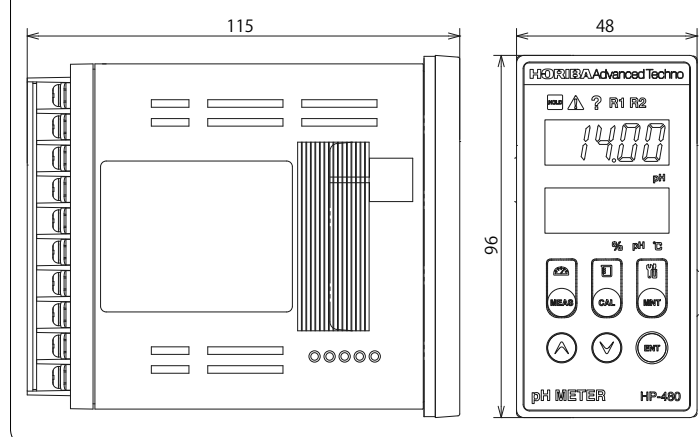


HP-480 pH Indication Converter (overview)

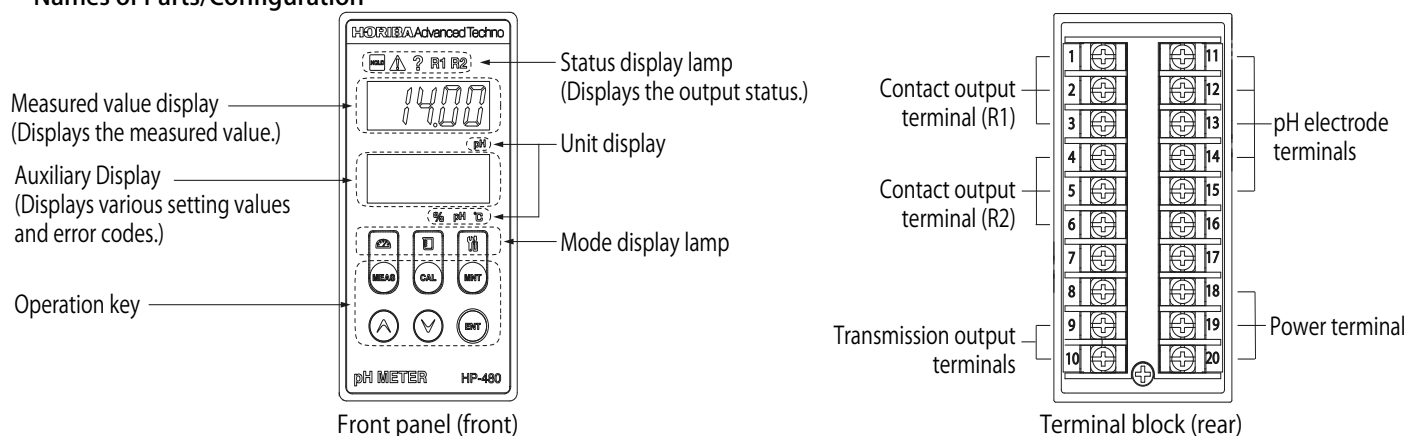
Features

- IP65 Splash-proof panel
- Selectable simultaneous temperature display
- All operations can be performed from front screen keys
- Compatible with 5 types of standard solutions (a combination of two of pH7 and pH2, 4, 9 or 10)
- Full range of maintenance functions (self-diagnosis capabilities)
- Free range of transmission output
- Free power source (AC 100 - 240V, 50/60Hz)
- Memory backup
- Easy-to-read display
- Improved key operability through the use of embossed sheets
- Increased continuous load resistance value for transmission output (maximum 900 Ω)
- Substantial status display utilizing icons
- Compact size (20% lower volume compared to our conventional models)
- Compatible with 5 types of temperature compensation coefficient electrodes (350 Ω , 500 Ω , 6.8k Ω , 1k Ω , 10k Ω), also compatible with no temperature compensation

External dimensions



Names of Parts/Configuration



Power Source

- The instrument power source is a free power source with a rated voltage of AC100-240 V, 50/60Hz. The maximum output is 10VA.

Contact output

- Two contact outputs are included. • The contact capacity is less than AC 240V and 3A or DC 30V and 3 A.

Transmission output

- One transmission output is included. A DC 4 - 20 mA signal compatible with the measurement range is output.
- Receiving resistance on the receiving instrument side is a maximum of 900 Ω .

pH electrode

- One pH electrode can be connected.

Glass electrode method

pH can be measured using methods such as 1) indicator method, 2) hydrogen electrode method, 3) quinhydrone electrode method, 4) antimony electrode method, 5) glass electrode method, and 6) semiconducting sensor method.

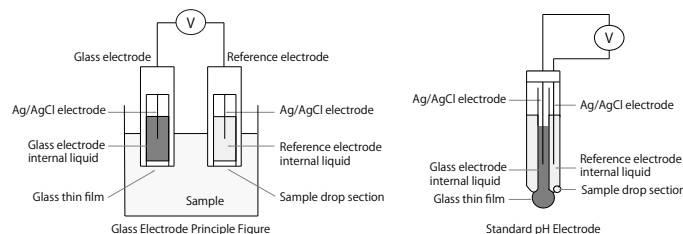
This instrument uses the glass electrode method to measure pH.

The glass electrode method uses two electrodes, a glass electrode and a comparison electrode, and measures the pH of a solution by finding the voltage (potential difference) between the two electrodes.

The glass electrode indicates the potential that is equivalent to the intensity of hydrogen ions. (The potential changes according to the pH.) On the other hand, the potential at the comparison electrode remains constant irrespective of the intensity of hydrogen ions in the sample. The potential difference that occurs between the two electrodes is measured as the pH value.

When the sample temperature is 25 °C and the potential difference between the two electrodes is approximately 60mV, the pH is 1.

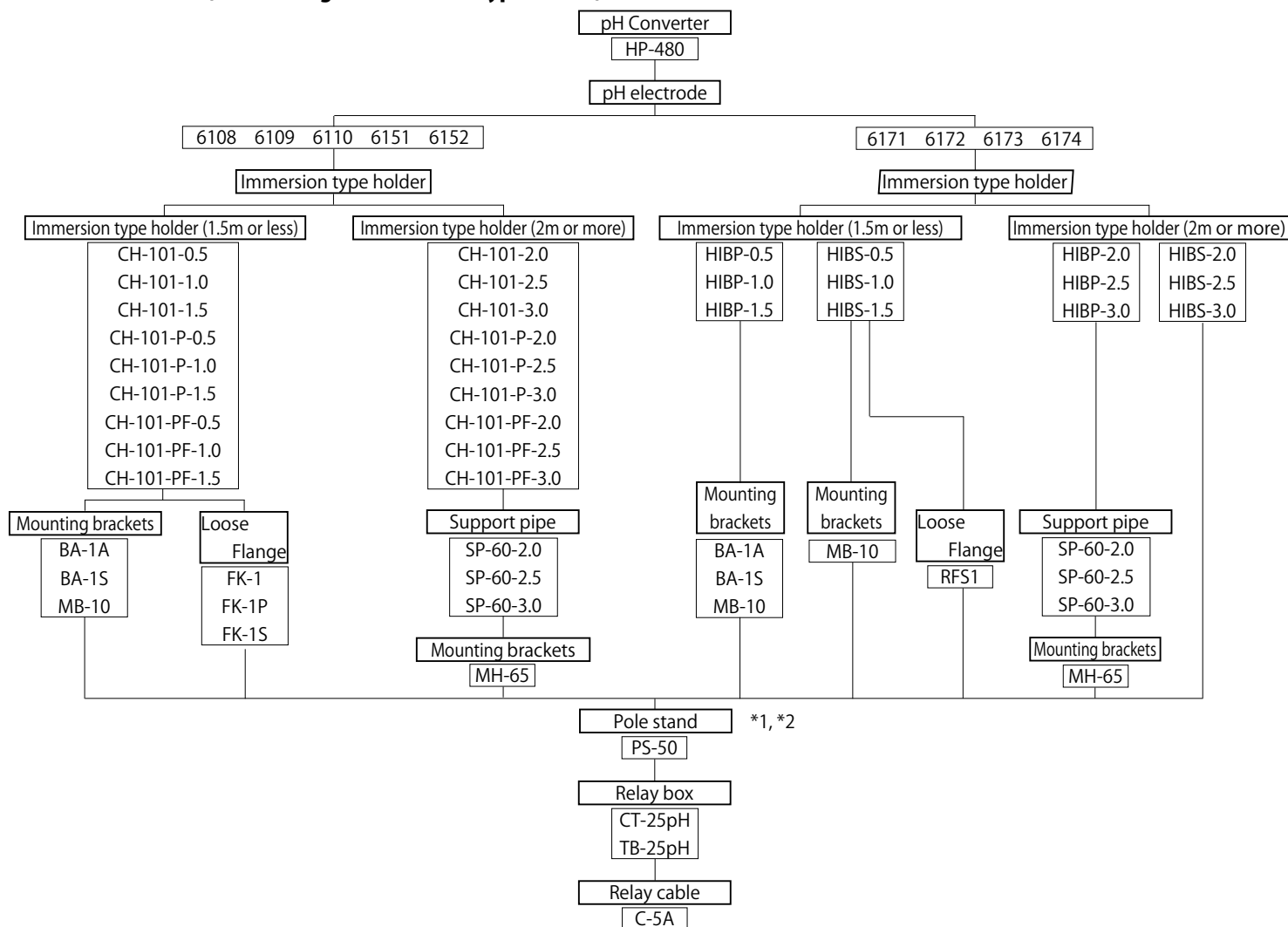
When the potential difference between the two electrodes is approximately 0mV the pH is 7, when the potential difference is approximately 180mV the pH is 4, and when the potential difference is approximately -180mV the pH is 10.



HP-480 pH Indication Converter (combination -1)

Below are combinations suitable for the specifications of products such as the converter, electrodes and holder. Refer to the section on each product for detailed specifications.

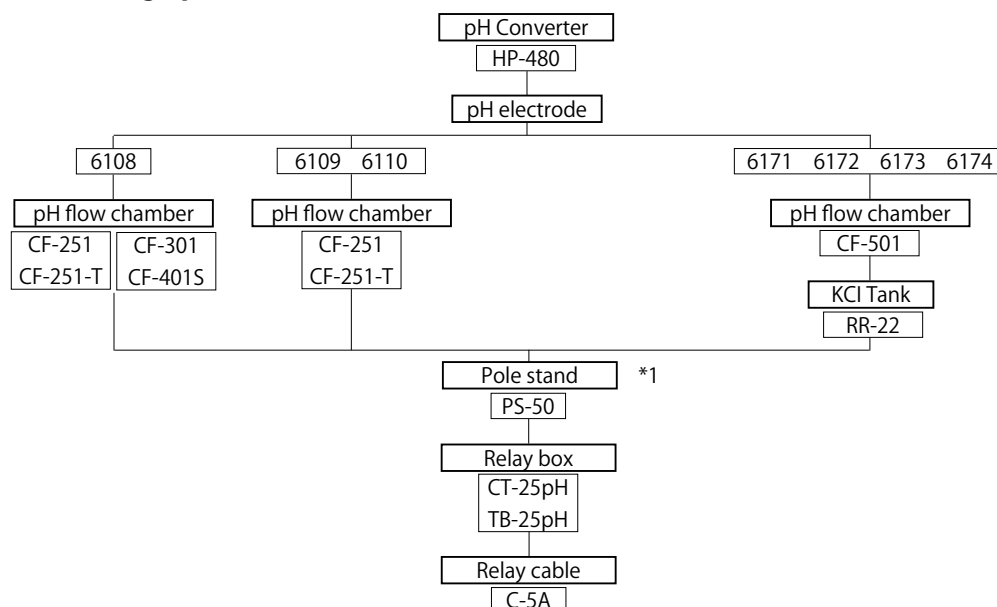
■ Combination 1 (When using an immersion type holder)



*1: Pole stand for mounting the relay box (CT-25pH).

*2: Pole stand for mounting the mounting brackets (MB-10, MH-65) and relay box (CT-25pH).

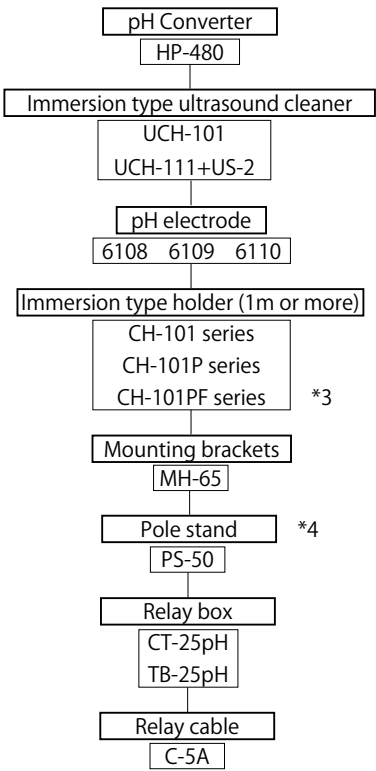
■ Combination 2 (When using a pH flow chamber)



*1: Pole stand for mounting the relay box (CT-25pH).

HP-480 pH Indication Converter (combination -2)

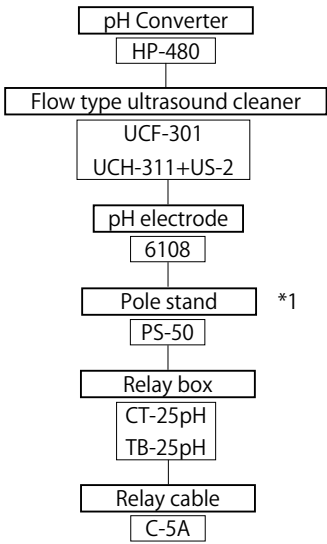
■ Combination 3 (When using an immersion type cleaner)



*3: Contact HORIBA when the CH-101PF series is selected. (Special specifications are required.)

*4: Pole stand for mounting the mounting brackets (MH-65) and relay box (CT-25pH).

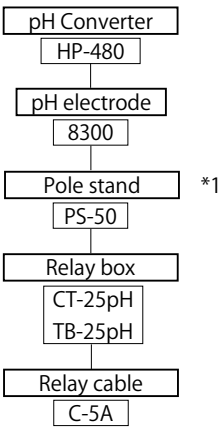
■ Combination 4 (When using a flow type cleaner)



*1: Pole stand for mounting the relay box (CT-25pH).

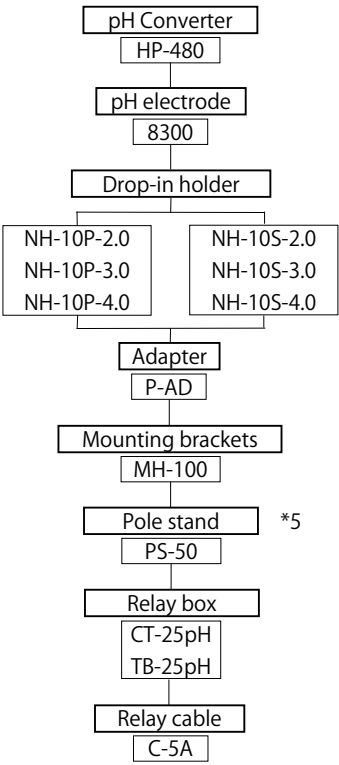
HP-480 pH Indication Converter (combination -3)

■ **Combination 5 (When using in suspension)**



*1: Pole stand for mounting the relay box (CT-25pH).

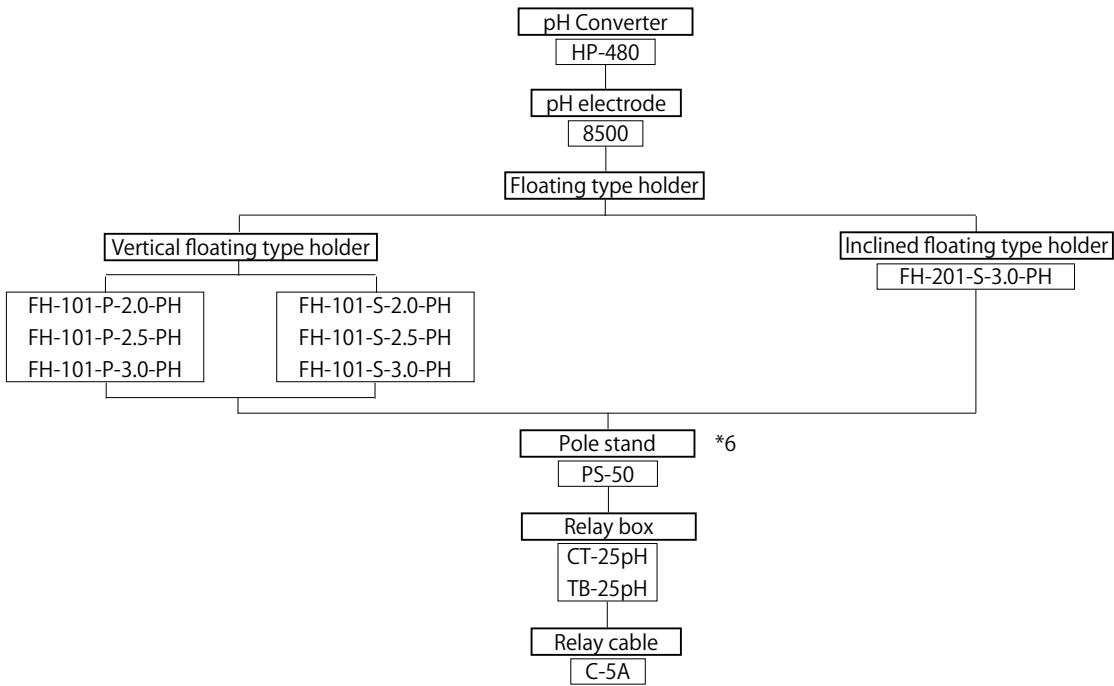
■ **Combination 6 (When using a drop-in type holder)**



*5: Pole stand for mounting the mounting brackets (MH-100) and relay box (CT-25pH).

HP-480 pH Indication Converter (combination -4)

■ Combination 7 (When using a floating type holder)

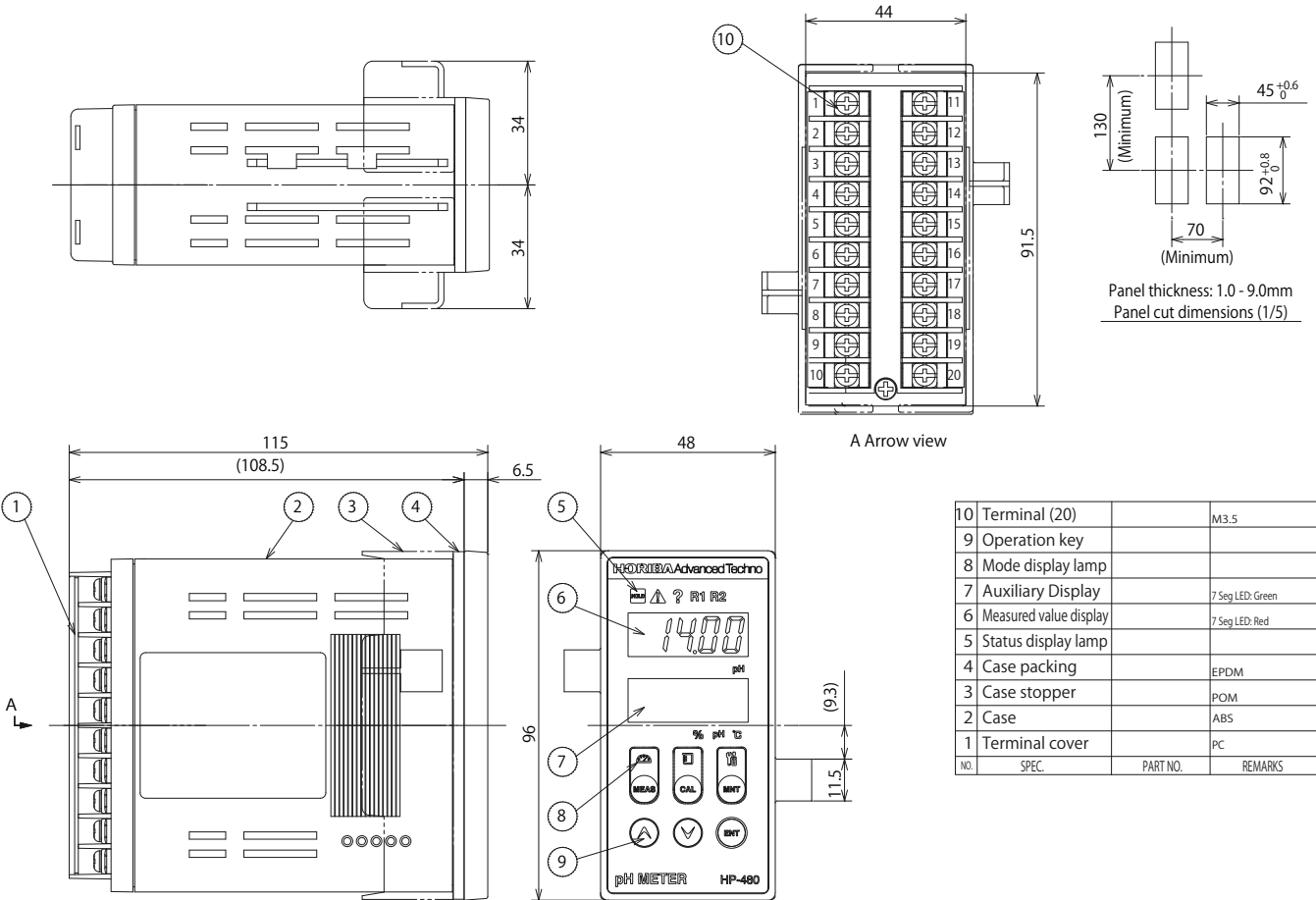


*6: Holder stand for mounting the vertical floating type holder (FH-101 series) and relay box (CT-25pH).

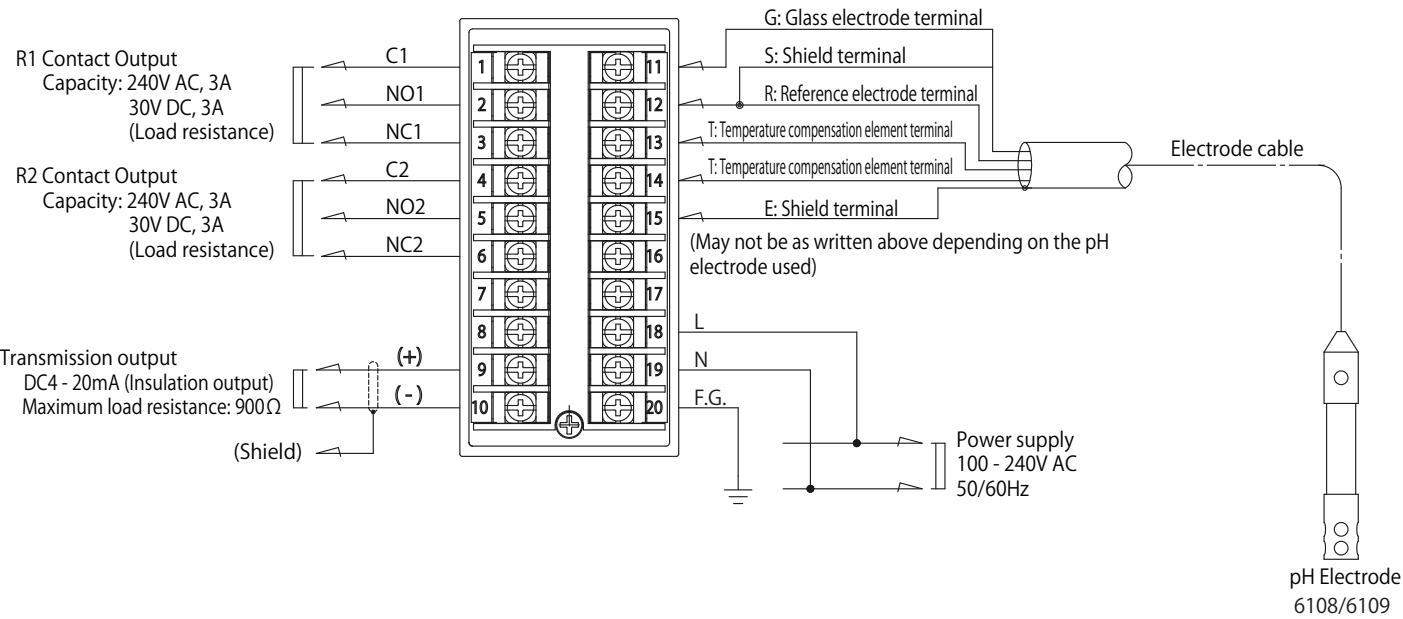
HP-480 pH Indication Converter (specification-1)

Product name	Industrial pH Meter		
Model Name	HP-480		
Measurable range	pH	0 - 14	
	Temperature (°C)	0 - 100	
Resolution	pH	0.01pH	
	Temperature	1°C (Selection display)	
Repeatability	Within ± 0.05pH (equivalent input)		
Linearity	Within ± 0.05pH (equivalent input)		
Transmission output	4-20 mA DC input/output insulation type		
	Maximum load resistance	900Ω	
	Transmission output range	Desired setting can be configured within the measurable range	
Contact output	Number of output points	2	
Contact output (R1, R2)	Contact type	Relay contact, SPDT (1c)	
	Contact capacity	240 V AC 3A, 30 V DC 3A (resistance load)	
	Contact capability	Selection settings from upper and lower limit operations (ON/OFF control), error warning or during maintenance	
Calibration function	Two-point automatic calibration or manual calibration		
	Two-point automatic calibration	Automatic potential stability judgment Types of standard solutions: pH 2, 4, 7, 9, 10 (JIS) Combination of standard solutions: pH7 and two other solutions	
	Manual calibration	Difference of more than 2pH over the desired	
	Temperature calibration	1	
Transmission output hold capability	Select a setting from last value hold, arbitrary value hold or continuous (However, the setting is last value hold in maintenance mode)		
Self-diagnosis capabilities	Calibration error	Asymmetric potential error, sensitivity abnormality, response speed abnormality, standard solution abnormality	
	Electrode diagnosis	Short circuit or wire breakage in temperature sensor	
	Outside measurable range		
	Converter error		
Temperature compensation element	With compensation "500 Ω (25°C), 6.8k Ω (25°C), 1k Ω (0°C), 10k Ω (25°C), 350 Ω (25°C)" No compensation setting selections		
Temperature compensation range	0 - 100°C		
Ambient temperature	-5 - 45°C		
Relative humidity	20 - 85°C (no condensation)		
Storage temperature	-25 - 65°C		
Power source	Rated voltage 100 - 240V AC 50/60Hz 10VA (max)		
Structure	Indoor installation with panel installation		
	Panel case	ABS	
	Terminal section	PBT	
	Panel section	Splash-proof construction	
Protective construction	Panel section	IP65 (IEC60529, JIS C0920)	
	Rear case	IP20	
	Terminal section	IP00	
	Class II instrument (IEC61010-1)		
	Pollution degree (IEC61010-1)		
Applicable standards	CE marking	EMC directives (2004/108/EC)	Interface at immunity (industrial environment) Noise increase: ≤± 0.2pH
		EN61326-1:2006	
		Low voltage directives (2006/95/EC)	
		EN61010-1:2001	
	FCC rules	FCC Part 15	
External dimensions	48 (W) × 96 (H) × 115 (D)		
	Case depth: Approx. 105mm (when mounted on the panel)		
Mass	Approx. 400g		

HP-480 pH Indication Converter
(external dimensions)



HP-480 pH Indication Converter
(external connection diagram)



HP-480 pH Indication Converter (specification-2)

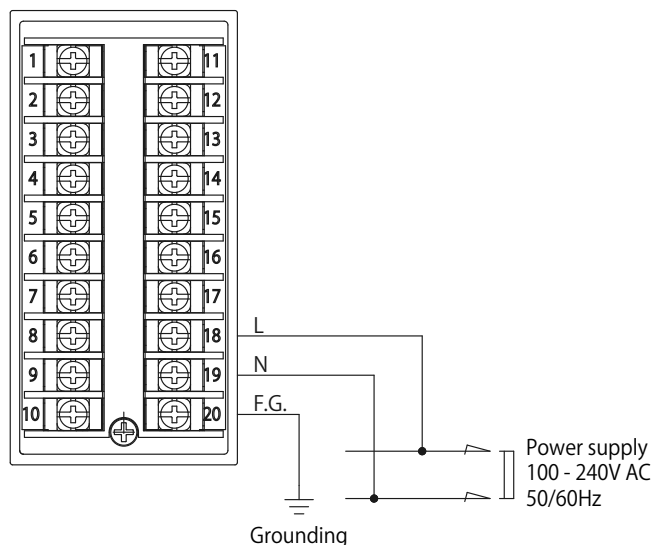
Power Source

- The instrument power source is a free power source with a rated voltage of AC100-240 V, 50/60Hz. The maximum output is 10VA.
- The terminal screws are M3.5 screws.
- The wire size is 2mm² (AWG14) max.
- This instrument does not have a power switch. Install a power switch or circuit breaker near the instrument and ensure that the power source can be turned on and off.

! Check the voltage of the power source, as operating at a voltage outside the rated range causes malfunction. Also, thoroughly check that the range of fluctuations in supply voltage is within $\pm 10\%$ of the rated voltage range.

! For safety reasons, be sure to ground the earth terminal. (The ground resistance may become 100 Ω or less for safety.) Ground separately from electrical equipment such as the motor.

Main Specifications	
Rated Voltage	100 - 240V AC
Power consumption	Maximum 10VA
Terminal screw	M3.5
Applicable wiring	2mm ² (AWG14)

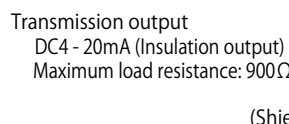


Transmission output

- One transmission output is included.
A DC 4 - 20 mA signal compatible with the measurement range is output.
- Receiving resistance on the receiving instrument side is a maximum of 900 Ω .
Select a receiving instrument whose input suits that of this instrument (recorder, meter relay).

! Install arresters on the output side and receiving instrument side of the instrument if there is a risk that it will be struck by lightning.

Main Specifications	
Transmission output	4 - 20mA DC
Maximum load resistance	900 Ω
Terminal screw	M3.5
Applicable wiring	2mm ² (AWG14)



pH electrode

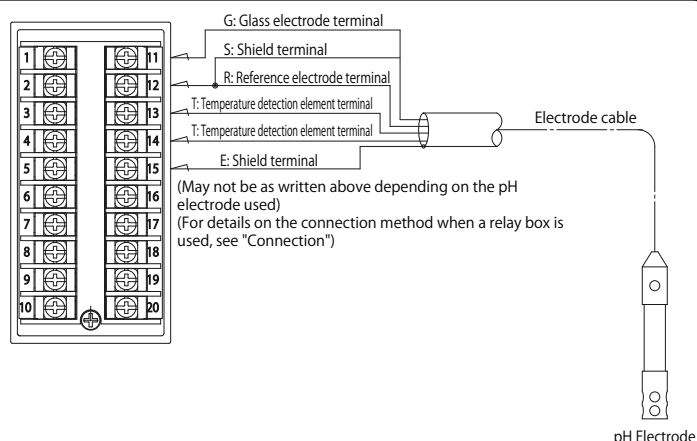
- One pH electrode can be used.

! Precautions for the electrode cable
The pH electrode cable is a high-insulation cable. Take the following precautions when handling.

! Be sure not to decrease the insulation by allowing the cable terminal and terminal block to come into contact with liquids such as water, soil them with finger marks or oil from hands or otherwise allow the insulation to decrease. A decrease in insulation causes indication to become unstable. Be sure to keep dry and clean. If soiled, wipe with alcohol etc. and dry thoroughly.

! Ensure a sufficient amount of electrode cable to allow inspection and replacement of the electrode and calibration of the standard solution.

! Do not wire the electrode cable or relay cable near equipment that supplies induction to parts such as the motor or the power cable of this equipment.



Type of pH electrode terminal		pH electrode
G terminal	Glass electrode terminal	6108, 6109, 6110, 6151, 6152
S terminal	Shield terminal	6171, 6172, 6173, 6174
R terminal	Reference electrode terminal	8300, 8500
T, T terminal	Temperature compensation element terminal	
E terminal	Shield terminal	6108, 6109, 6110, 6151, 6152
SE terminal	Liquid contact terminal	6171, 6172, 6173, 6174

HP-480 pH Indication Converter (specification-3)

Contact output

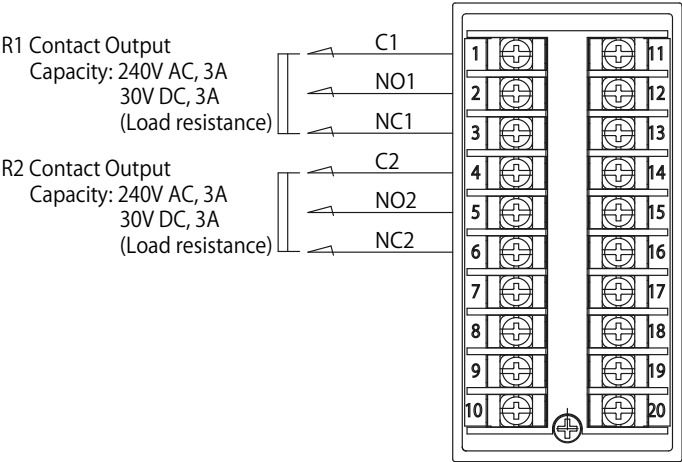
- Two contact outputs are included.
- Can be selected from "Upper/lower limit operation (ON/OFF control)", "Error warning (Error or FAIL)", "During maintenance (HOLD)" or "None".
- The contact capacity is less than AC 240V and 3A or DC 30V and 3 A.
- The terminal screws are M3.5 screws.
- The wire size is 2mm² (AWG14) max.
- Use a varistor or noise killer if noise occurs in the load.

! If connecting a load higher than the contact capacity or an inductive load (such as a motor or pump), be sure to connect the load through a power relay with a rating higher than that of the load.

! Take care when connecting a load, as the C-NC contact is shorted when the power source of this instrument is off.

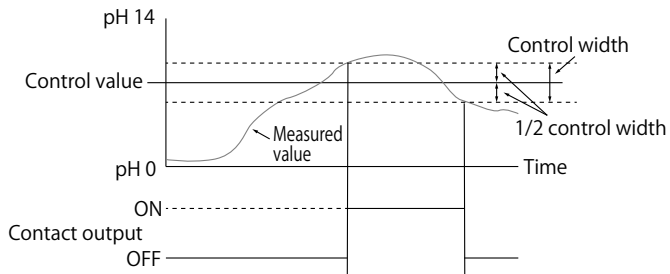
Main Specifications	
Contact capacity	Less than 240V AC, 3A or less than 30V DC, 3A
Type of Contact Output	Upper/lower limit operation, error warning (Error or FAIL), during maintenance, none
Terminal screw	M3.5
Applicable wiring	2mm ² (AWG14)

Types of contact (alarm) output		
No output		No contact (alarm) output settings.
Upper limit operation		Performs ON/OFF control of the upper limit.
Lower limit operation		Performs ON/OFF control of the lower limit.
Error warning	Error	When an error code (E-23/E-24) is issued, the contact is output. However, a contact cannot be output as an error during calibration.
	FAIL	When an error code (E-21/E-22/E-90/E-91/E-92) is issued, the contact is output. However, a contact cannot be output as an error during calibration.
During maintenance (Hold)		A contact is output when the mode is switched to maintenance mode (mode for configuring various settings such as measurement conditions and calibration).



- Upper limit operation, lower limit operation
- The control method, controlled values, type of control range (d.dif, S.dif), control range and delay time can be set.

- Control method: Select whether to control by the upper limit operation or by lower limit operation.
- Controlled values: Value that is the standard for operating the contact (alarm) output. Enter this value.
- Type of control range: It is necessary to select the type of control range in order actually operate the contact (alarm) output. Select one of the two following types.
- d.dif: Configures the settings centered on the controlled value so that the upper limit side and lower limit side are at the same width.
 - S.dif: Configures the settings based on the controlled value so that the upper limit side and lower limit side are at a different width.
- Delay time: The operation and cancellation of the contact (alarm) output operation can be delayed for a fixed length of time. None of the operations are performed if the values that perform or cancel the operation fall below the controlled values during the delay time.



E.g.:When the control method is upper limit operation, controlled value is pH8, type of control range is d.dif and control range is 0.5
The contact (alarm) is made when the pH increases over pH8.25, and the contact (alarm) is broken when the pH decreases under pH7.75.

HP-480 pH Indication Converter (installation method -1)

Installation environment

Install following the conditions below to ensure the instrument is installed in stable conditions.

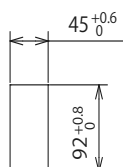
- Well ventilated area
- Ambient temperature is above -5° C and below 45° C
- An area with no direct sunlight
- An area where there is no direct high radiation heat
- An area where the relative humidity of the surroundings is above 20% and less than 85%
- An area where the instrument will not be splashed with water or chemicals
- An area where there is little mechanical vibration
- An area where maintenance and wiring work can be done
- An area where there is no dust or corrosive gas
- An area where there is little effect from electromagnetic fields
- At an elevation less than 2000m
- Where the range of fluctuations in supply voltage is within 10% of the rated voltage
- An area that fulfills category II over-voltage (suitable for electrical equipment that supplies power from fixed equipment such as a panel board, etc.)

Cut Dimensions, etc.

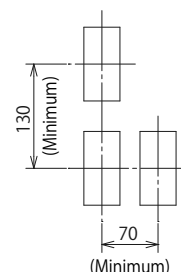
The installation method for this instrument is installation onto the control board (panel mount).

The panel thickness is 1.0 - 9.0mm.

Make a panel cut to the dimensions shown in the figure below.

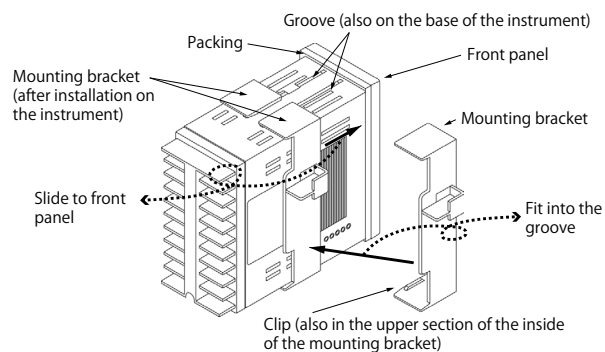


Ensure that the space between the side panel cut is more than 70mm in the crosswise direction and more than 130mm in the longitudinal direction.



Installation to the panel

Fit the panel between the front panel of the instrument unit and the mounting bracket (provided) and fix it in place.

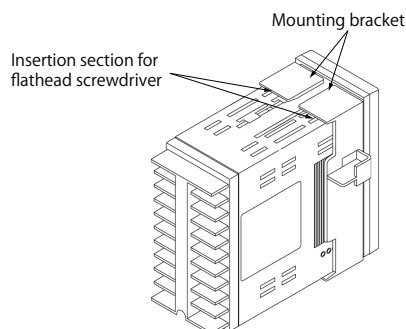


Removal from the panel

Disconnect the cables from the terminal block in advance.

Remove one mounting bracket at a time, and remove the instrument unit from the panel.

Insert a flathead screwdriver etc. in the gap between the mounting bracket and instrument unit on one side, and disconnect the clips.



! After completing wiring of the terminal block, be sure to install the terminal cover.

Diagram illustrating the wiring for a 20-pin connector. The connector has two rows of 10 pins each, numbered 1 through 20. The wiring connections are as follows:

- Pin 10 is connected to a ground symbol.
- Pin 11 is connected to the L (Line) wire.
- Pin 12 is connected to the N (Neutral) wire.
- Pin 13 is connected to the F.G. (Field Ground) wire.
- Pin 14 is connected to the L (Line) wire.
- Pin 15 is connected to the N (Neutral) wire.
- Pin 16 is connected to the F.G. (Field Ground) wire.
- Pin 17 is connected to the L (Line) wire.
- Pin 18 is connected to the N (Neutral) wire.
- Pin 19 is connected to the F.G. (Field Ground) wire.
- Pin 20 is connected to the L (Line) wire.

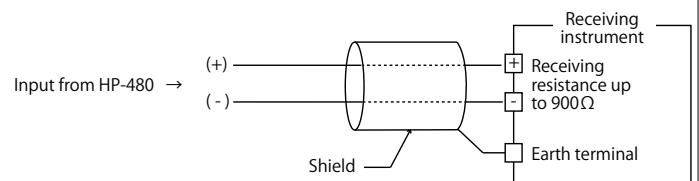
The power supply is labeled: Power supply 100 - 240V AC 50/60Hz. The ground connection is labeled: Grounding.

! Install arresters on the output side and receiving instrument side of the instrument if there is a risk that it will be struck by lightning.

Transmission output
DC4 - 20mA (Insulation output)
Maximum load resistance: 900Ω

(+)
(-)
(Shield)

- Ground the shielded cable on the receiving instrument side.



-
- Input from HP-480 →
- (+) ———— + Receiving instrument 1
- (-) ———— - Receiving resistance 1
- Receiving instrument 2
- Receiving resistance 2

HP-480 pH Indication Converter (wiring method 2)

Contact output

- Two contact outputs are included.
- Can be selected from "Upper/lower limit operation (ON/OFF control)", "Error warning (Error or FAIL)", "During maintenance (HOLD)" or "None".
- The contact capacity is less than AC 240V and 3A or DC 30V and 3 A.
- The terminal screws are M3.5 screws.
- The wire size is 2mm² (AWG14) max.
- Use a varistor or noise killer if noise occurs in the load.

! If connecting a load higher than the contact capacity or an inductive load (such as a motor or pump), be sure to connect the load through a power relay with a rating higher than that of the load.

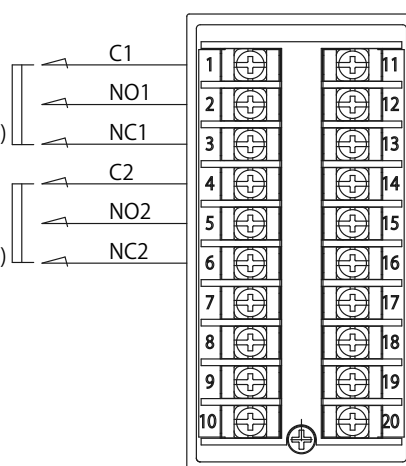
! Take care when connecting a load, as the C-NC contact is shorted when the power source of this instrument is off.

- Follow the diagram on the right and connect the contact outputs.

Main Specifications	
Contact capacity	Less than 240V AC, 3A or less than 30V DC, 3A
Type of Contact Output	Upper/lower limit operation, error warning (Error or FAIL), during maintenance, none
Terminal screw	M3.5
Applicable wiring	2mm ² (AWG14)

R1 Contact Output
Capacity: 240V AC, 3A
30V DC, 3A
(Load resistance)

R2 Contact Output
Capacity: 240V AC, 3A
30V DC, 3A
(Load resistance)



pH electrode

- One pH electrode can be used.

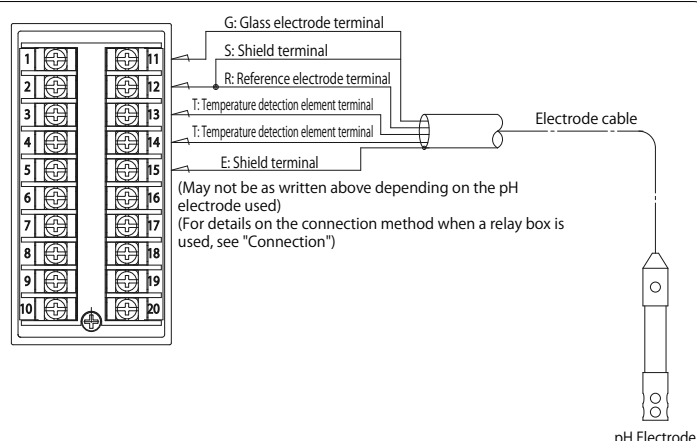
! Precautions for the electrode cable

The pH electrode cable is a high-insulation cable. Take the following precautions when handling.

! Be sure not to decrease the insulation by allowing the cable terminal and terminal block to come into contact with liquids such as water, soil them with finger marks or oil from hands or otherwise allow the insulation to decrease. A decrease in insulation causes indication to become unstable. Be sure to keep dry and clean. If soiled, wipe with alcohol etc. and dry thoroughly.

! Ensure a sufficient amount of electrode cable to allow inspection and replacement of the electrode and calibration of the standard solution.

! Do not wire the electrode cable or relay cable near equipment that supplies induction to parts such as the motor or the power cable of this equipment.



Temperature compensated electrode

This instrument can be used with the following 5 types of temperature compensated electrode.

Resistance value at 25° C: 350 Ω , 500 Ω , 6.8 k Ω , 10 k Ω

Resistance value at 0° C: 1k Ω

Check the type of side temperature resistor used by the electrode, and set the temperature compensation on the instrument to an appropriate value. However, the initial temperature compensation setting for this instrument is 1kΩ.

Extending the electrode cable

When extending the electrode cable, be sure to use the HORIBA

- extension cable for electrode cables (C-5A)
- Dedicated relay box (CT-25pH/TB-25pH).

The maximum extension distance from the instrument unit to the electrode is 50m.

Storing the dedicated relay cable in a conduit pipe is recommended to prevent issues such as static electricity caused by induction or vibration. In this case, run the wiring near the instrument through a flexible tube.

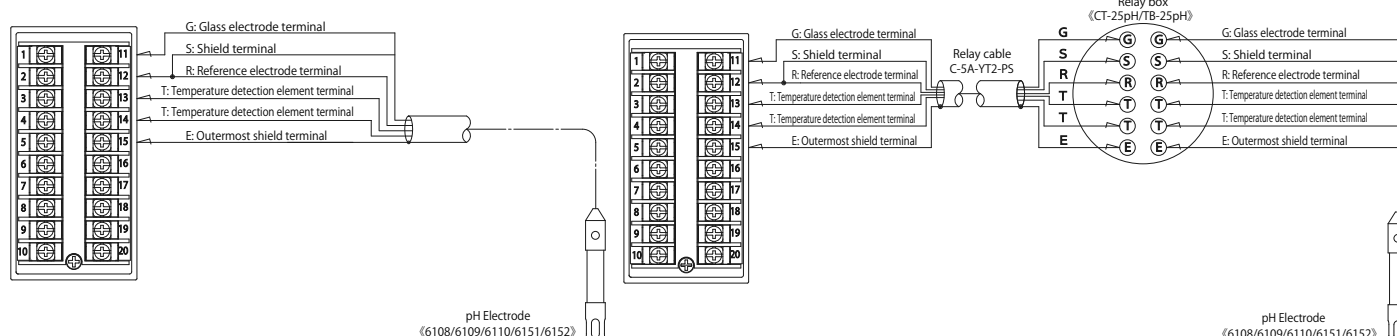
Type of pH electrode terminal		pH electrode
G terminal	Glass electrode terminal	6108, 6109, 6110, 6151, 6152
S terminal	Shield terminal	6171, 6172, 6173, 6174
R terminal	Reference electrode terminal	8300, 8500
T, T terminal	Temperature detection element terminal	
E terminal	Shield terminal	6108, 6109, 6110, 6151, 6152
SE terminal	Liquid contact terminal	6171, 6172, 6173, 6174

HP-480 pH Indication Converter (wiring method 3)

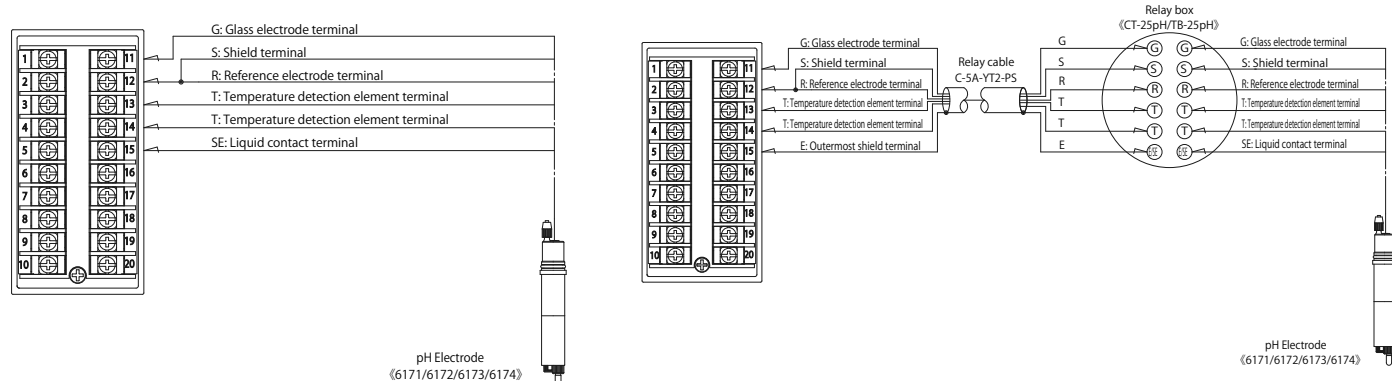
pH electrode 2

- The connection methods differ depend on the pH electrodes used.
Connect as shown below.

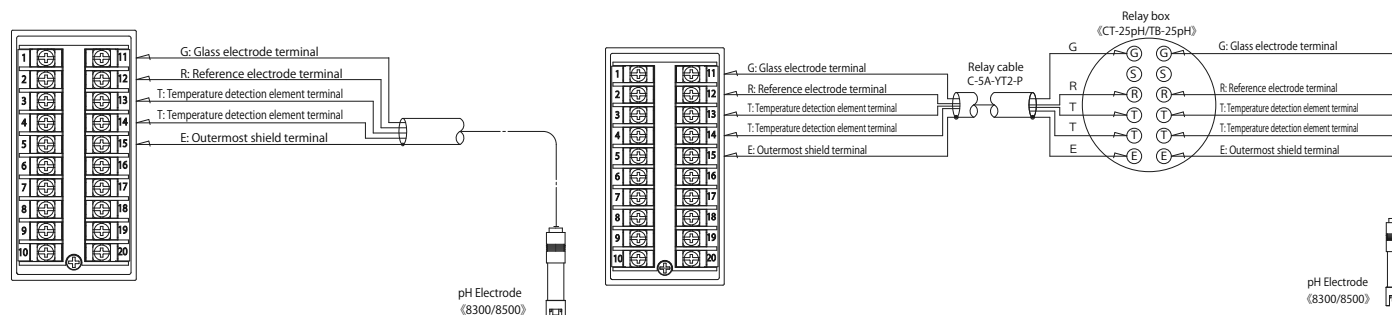
pH Electrode (6108, 6109, 6110, 6151, 6152) Connection Method



pH Electrode (6171, 6172, 6173, 6174) Connection Method



pH Electrode (8300, 8500) Connection Method



HP-480 pH meter (Accessory)

The following section contains specifications and other information on items other than the converter such as the pH electrode, holder and installation bracket.

pH electrode

- Select the pH electrode according to the characteristics of the sample to be measured, installation location and other conditions, and whether various types of cleaners are used, etc.
- Electrical conductivity above 10mS/m (100 μ S/cm) is required for pH measurement.

pH Electrode Overview

pH electrode	Measurable range	Sample temperature (*1)	Sample pressure (*1)	Cleaner	Overview
6108	pH 0 - 14	-10 - 100°C	0-0.6 MPa	Compatible	Tough, difficult to break type. The tip section of the electrode is dome-shaped for easy cleaning.
6109	pH 0 - 14	-10 - 80°C	0 - 0.03 MPa	Compatible	Tough, difficult to break type. Uses a fixed sleeve (sample drop section). Ideal for use with highly viscous samples. (*2)
6110	pH 0 - 14	0 - 60°C	0 - 0.03 MPa	Compatible	
6151	pH 0 - 14	-10 - 60°C	0 - 0.2 MPa	Not compatible	Hydrofluoric acid resistant pH electrode. Life span of approximately 1 month in pH 3-4, 25°C temperature and 1000ppm hydrofluoric acid. (*3)
6152	pH 0 - 14	-10 - 60°C	0 - 0.2 MPa	Not compatible	Alkali resistant pH electrode. 3 months at pH 13, 60°C temperature. (*3)
6171	pH 0 - 14	-10 - 60°C	0 - 0.03 MPa	Not compatible	Hydrofluoric acid resistant pH electrode. pH electrode, reference electrode has a replaceable tip. Approximately 1 month in pH 3-4, 25°C temperature and 1000ppm hydrofluoric acid. (*3)
6172	pH 0 - 14	-10 - 60°C	0 - 0.03 MPa	Not compatible	Alkali resistant pH electrode. pH electrode, reference electrode has a replaceable tip. 3 months at pH 13, 60°C temperature. (*3)
6173	pH 0 - 14	-10 - 60°C	0 - 0.03 MPa	Not compatible	Oil resistant pH electrode. pH electrode, reference electrode has a replaceable tip. Compatible with oil refining processes or samples for boiler circulating water that contain oil. (*4)
6174	pH 0 - 14	-10 - 100°C	0 - 0.03 MPa	Not compatible	pH electrode, reference electrode has a replaceable tip.
8300	pH 0 - 14	0 - 50°C	0 - 0.2 MPa	Not compatible	KCl no-supply type immersion pH electrode.
8500 (*5)	pH 0 - 14	0 - 50°C	0 - 0.2 MPa	Not compatible	KCl no-supply type immersion pH electrode.

*1: Differs depending on the specifications of the holder, etc.

*2: Does not necessarily support all high viscosity samples.

*3: The indicated life spans are just a guide. They are not guaranteed values.

*4: Does not necessarily support all oils and samples containing oil.

*5: pH electrode for vertical floating type holders and inclined floating type holders.

Accessories (pH electrode 1)

pH electrode

pH electrode (6108)



Model		6108-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 100°C (no freezing)
	Pressure	0 - 0.6 MPa
Reference electrode	Sample drop section	Multi-pore ceramic
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	CH-101/CH-101-P/CH-101-PF
	pH flow chamber	CF-251/CF-251-T/CF-301/CF-401
	Immersion type cleaner	UCH-101, UCH-111
	pH flow cleaner	UCF-301, UCH-311

pH electrode (6109)



Model		6109-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 80°C (no freezing)
	Pressure	0 - 0.03 MPa
Reference electrode	Sample drop section	Glass sleeve
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	CH-101/CH-101-P/CH-101-PF
	pH flow chamber	CF-251/CF-251-T
	Immersion type cleaner	UCH-101, UCH-111
	pH flow cleaner	None

pH electrode (6110)

Model		6110-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	0 - 60°C (no freezing)
	Pressure	0 - 0.03 MPa
Reference electrode	Sample drop section	Multi-pore ceramic
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	CH-101/CH-101-P/CH-101-PF
	pH flow chamber	CF-251/CF-251-T
	Immersion type cleaner	UCH-101, UCH-111
	pH flow cleaner	None

Accessories (pH electrode 2)

pH electrode

pH electrode (6151)



Model		6151-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 60°C (no freezing)
	Pressure	0 - 0.2 MPa
Reference electrode	Sample drop section	Multi-pore ceramic
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	CH-101/CH-101-P/CH-101-PF
	pH flow chamber	CF-251/CF-251-T/CF-301
	Immersion type cleaner	None
	pH flow cleaner	None

pH electrode (6152)

Model		6152-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 60°C (no freezing)
	Pressure	0 - 0.2 MPa
Reference electrode	Sample drop section	Multi-pore ceramic
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	CH-101/CH-101-P/CH-101-PF
	pH flow chamber	CF-251/CF-251-T/CF-301
	Immersion type cleaner	None
	pH flow cleaner	None

pH electrode (6171)



Model		6171-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 60°C (no freezing)
	Pressure	0 - 0.03 MPa
Reference electrode	Sample drop section	Glass sleeve
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	HIBP/HIBS
	pH flow chamber	CF-501
	Immersion type cleaner	Supports special specification
	pH flow cleaner	Supports special specification

pH electrode (6172)



Model		6172-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 60°C (no freezing)
	Pressure	0 - 0.03 MPa
Reference electrode	Sample drop section	Glass sleeve
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	HIBP/HIBS
	pH flow chamber	CF-501
	Immersion type cleaner	Supports special specification
	pH flow cleaner	Supports special specification

Accessories (pH electrode 2)

pH electrode

pH electrode (6173)

Model		6173-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 60°C (no freezing)
	Pressure	0 - 0.03 MPa
Reference electrode	Sample drop section	Glass sleeve
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	HIBP/HIBS
	pH flow chamber	CF-501
	Immersion type cleaner	None
	pH flow cleaner	None

pH electrode (6174)

Model		6174-50B
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	-10 - 100°C (no freezing)
	Pressure	0 - 0.03 MPa
Reference electrode	Sample drop section	Glass sleeve
	Internal liquid	3.3 mol KCl (refilling type)
Cable length		Standard 5m (+5%)
Combination	Immersion type holder	HIBP/HIBS
	pH flow chamber	CF-501
	Immersion type cleaner	None
	pH flow cleaner	None

pH electrode (8300)



Model		8300
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	0 - 50°C (no freezing)
	Pressure	0 - 0.2 MPa
Reference electrode	Sample drop section	Multi-pore ceramic
	Internal liquid	No-supply type
Cable length		Standard 5m (+5%), 10m (+5%)
Usable holder		NH-10P/NH-10S (For drop-in)
Usable cleaner		JH-11A (For drop-in)

pH electrode (8500)

Model		8500
Measurement method		Glass electrode method
Measurable range		pH 0 -14
Sample water conditions	Temperature range	0 - 50°C (no freezing)
	Pressure	0 - 0.2 MPa
Reference electrode	Sample drop section	Multi-pore ceramic
	Internal liquid	No-supply type
Cable length		Standard 10m (+5%)
Usable holder		FH-101-P, FH-101S, FH-201-S (Floating type)
Usable cleaner		None

Accessories (immersion type holder)

Immersion type holder

Immersion type holder (CH-101 series)



Model		CH-101	CH-101P	CH-101PF
Holder material		PP	PVC	PVDF
Conditions	Temperature	-5 - 80°C	-5 - 50°C	-5 - 100°C
	Pressure	Atmospheric pressure		
	Flow velocity	Less than 2m/sec		
Holder length (m)		0.5, 1.0, 1.5, 2.0, 2.5, 3.0		
Combination	pH electrode	6108, 6109, 6110	6108, 6109, 6110, 6151, 6152	6108
		(There are cases when combinations cannot be made based on the sample characteristics and usage conditions, etc.)		
	Mounting brackets	BA-1A, BA-1S, MB-10 (The combination above is limited to when an immersion type holder up to 1.5m is used. When using an immersion type holder of 2m or more, use a combination of the support type (SP-60) + mounting bracket (MH-65).)		
	Loose Flange	FK-1, FK-1P, FK-1S (The combination above is limited to when an immersion type holder up to 1.5m is used.)		-
	Cleaner	UCH-101 (There are cases that cannot be used due to the sample characteristics, etc.)		

Immersion type holder (HIB series)

Model		HIBP	HIBS
Holder material		PP	SUS316
Temperature		-5 - 80°C	-5 - 100°C
Pressure		Atmospheric pressure	
Flow velocity		Less than 2m/sec	
Holder length (m)		0.5, 1.0, 1.5, 2.0, 2.5, 3.0	
Combination	pH electrode	6171, 6172, 6173, 6174 (There are cases where this combination cannot be used due to the sample characteristics, etc.)	
	Mounting brackets	MB-10 (The combination above is limited to when an immersion type holder up to 1.5m is used. When using an HIBP immersion type holder of 2m or more, use a combination of the support type (SP-60) + mounting bracket (MH-65). Contact HORIBA to use a HIBP immersion type holder of 2m or more. Special specifications are required.)	
	Loose Flange	-	RFS1 (The combination above is limited to when an immersion type holder up to 1.5m is used.)
	Cleaner	Supports special specification	

Accessories (pH flow chamber)

pH flow chamber

pH flow chamber (CF-251 series)

Model		CF-251	CF-251P	CF-251S
Holder material		PP	PVC	SUS316
Ambient temperature		-5 - 60℃	-5 - 50℃	-5 - 60℃
Conditions	Temperature	-5 - 80℃	-5 - 50℃	-5 - 100℃
		(No freezing)		
	Pressure	Atmospheric pressure		
	Flow rate	0.3-10L/min		
Connector diameter		JIS 10K 25A FF flange		
Combination	pH electrode	6108, 6109 6110	6108, 6109 6110	6108
		(There are cases that cannot be used due to the sample characteristics, etc.)		

pH flow chamber (CF-251-T series)

Model		CF-251-T	CF-251P-T	CF-251S-T
Holder material		PP	PVC	SUS316
Ambient temperature		-5 - 60℃	-5 - 50℃	-5 - 60℃
Conditions	Temperature	-5 - 80℃	-5 - 50℃	-5 - 100℃
		(No freezing)		
	Pressure	Atmospheric pressure		
	Flow rate	0.3-10L/min		
Connector diameter		JIS 10K 25A FF flange		
Combination	pH electrode	6108, 6109 6110	6108, 6109 6110	6108
		(There are cases that cannot be used due to the sample characteristics, etc.)		

pH flow chamber (CF-301 series)



Model		CF-301	CF-301P	CF-301S
pH flow chamber material		PP	PVC	SUS316
Ambient temperature		-5 - 60°C	-5 - 50°C	-5 - 60°C
Conditions	Temperature	-5 - 80°C	-5 - 50°C	-5 - 100°C
		(No freezing)		
	Pressure	-5 - 40°C : 0.30MPa 40 - 60°C : 0.22MPa 60 - 80°C : 0.15MPa	-5 - 40°C : 0.30MPa 40 - 50°C : 0.15MPa	-5 - 40°C : 0.30MPa 40 - 60°C : 0.25MPa 60 - 80°C : 0.20MPa 80 - 100°C : 0.15MPa
	Flow rate	0.3-10L/min		
Measurement liquid connection diameter		JIS 10K 25A FF flange		
Pressurized opening in holder		Rc 1/8		
Combination	pH electrode	6108		

pH flow chamber (CF-401S)



Model		CF-401S
pH flow chamber material		SUS316
Ambient temperature		-5 - 60°C
Conditions	Temperature	-5 - 100°C
		(No freezing)
	Pressure	-5 - 40°C : 0.60MPa 40 - 60°C : 0.46MPa 60 - 90°C : 0.26MPa 90 - 100°C : 0.20MPa
	Flow rate	0.5-10L/min
Connector diameter		JIS 10K 25A FF flange
Pressurized opening in holder		Rc 1/8
Combination	pH electrode	6108

pH flow chamber (CF-501 series)



Model		CF-501	CF-501P	CF-501S
Holder material		PP	PVC	SUS316
Ambient temperature		-5 - 60°C	-5 - 50°C	-5 - 60°C
Conditions	Temperature	-5 - 80°C	-5 - 60°C	-5 - 100°C
		(No freezing)		
	Pressure	Atmospheric pressure		
	Flow rate	0.3-10L/min		
Measurement liquid connection diameter		JIS 10K 25A FF flange		
Combination	pH electrode	6174	6171, 6172 6173, 6174	6174
		(There are cases that cannot be used due to the sample characteristics, etc.)		

Accessories (Mounting brackets, support pipe, loose flange)

Mounting brackets

Mounting brackets (BA-1A)



Model	BA-1A	
Material	ABS resin	
Installation method	Anchor installation	
Combination	Immersion holder	CH-101/CH-101-P/CH-101-PF (An immersion type holder with a holder length of up to 1.5m can be used.)

Mounting brackets (BA-1S)

Model	BA-1S	
Material	SUS304	
Installation method	Anchor installation	
Combination	Immersion holder	CH-101/CH-101-P/CH-101-PF (An immersion type holder with a holder length of up to 1.5m can be used.)

Mounting brackets (MB-10)

Model	MB-10	
Material	SUS304, SCS13	
Installation method	Pole Mounting (50A)	
Combination	Immersion holder	CH-101/CH-101-P/CH-101-PF HIBP/HIBS (An immersion type holder with a holder length of up to 1.5m can be used.)

Mounting brackets (MH-65)

Model	MH-65	
Material	SUS304	
Installation method	Pole Mounting (50A) Use when securing a support pipe (SP-60) or cleaner to the pole stand.	
Combination	Immersion holder	CH-101/CH-101-P/CH-101-PF HIBP/HIBS (Use together with an immersion holder that has a holder length greater than 2m and support pipe (SP-60).)
	Cleaner	UCH-101, UCH-111

Mounting brackets (MH-100)

Model	MH-100	
Material	SUS304	
Installation method	Pole Mounting (50A) Use when securing to the pole stand.	
Combination	Drop-in holder	NH-10P, HN-100S

Support pipe

Support pipe (SP-60)

Model	SP-60	
Material	SUS304, PVC	
Compatible holder lengths (m)	1.0, 1.5, 2.0, 2.5, 3.0	
Combination	Immersion type holder	CH-101, CH-101P, CH-101PF HIBP
	Mounting brackets	MH-65

If the flow speed is high even with a holder length less than 1.5m, a support pipe may be required.

Loose flange

Loose flange (FK-1 series)



Model	FK-1 FK-1P FK-1S			
Material	Flange	PP	PVC	SUS316
	Nuts	PP	PVC	SUS304
	Washer	PP	PVC	PP
	Packing	FKM	FKM	FKM
Flange standards	JIS 10K 50A FF, etc.			
Combination	CH-101, CH-101-P There are cases that cannot be used due to the sample characteristics.			

Use with a holder length less than 1.5m. If the flow speed is high even with a holder length less than 1.5m, it may not be usable. In that case, it is recommended that a support pipe is used.

Loose flange (RFS1)

Model	RFS1	
Material	SUS316	
Flange standards	JIS 10K 50A FF, etc.	
Combination	HIBP/HIBS There are cases that cannot be used due to the sample characteristics.	

Use with a holder length less than 1.5m. If the flow speed is high even with a holder length less than 1.5m, it may not be usable. In that case, it is recommended that a support pipe is used.

Accessories
(Pole stand, relay box, Relay cable, etc.)

Pole stand

Pole stand (PS-50)

Model	PS-60
Material	SUS316

Relay box

Relay box (CT-25pH)



Model	CT-25pH
Material	ABS

It has a rainproof structure, but should not be used in humid conditions.

Relay box (TB-25pH)

Model		TB-25pH
Material		PPO
Installation Conditions	Temperature	-5 - 40°C (no freezing)

Splash-proof construction. Use this relay box in humid conditions. However, the desiccant inside the relay box needs to be replaced periodically (between 6 months to 1 year).

Relay cable

Relay cable, etc. (C-5A)

Model	C-5A
Maximum extension	Up to 50m However, this includes the pH electrode lead cable.

Terminal processed cable cord	
C-5A-Y-T2-P	For pH electrode 8300, 8500
C-5A-Y-T2-PS	For pH electrode 6108, 6109, 6110, 6151, 6152
C-5A-Y-T2-PSE	For pH electrode 6171, 6172, 6173, 6174

Accessories (cleaner-1)

Cleaner

Depending on the characteristics of the sample to be measured, installing a cleaner may increase the maintenance frequency of electrodes. An ultrasound cleaner can be installed to this instrument. Also, cleaners whose installation methods can be used with immersion type and flow type electrodes are available.

■ Comparison of cleaning effects according to sample characteristics

Type	Target	Ultrasound cleaner
Slime	Food, paper, pulp, algae	○
Microbes	Bacteria (activated sludge), slag	◎
Oil	Tar, heavy oil	×
	Light oil	○
	Fatty acids, amines	×
Suspended solids	Earth and sand	◎
	Fine metal powder	○
	Clay, lime	○
Scale	Sediment clumps, neutralizing processing, calcium carbonate	○

Cleaners are comparatively effective on the types of sample characteristics described above. However, the effectiveness of cleaning differs according to various conditions and cannot be guaranteed.

◎ : Good ○ : Possible × : Not possible

Immersion type ultrasound cleaner

Immersion type ultrasound cleaner (UCH-101)



Model	UCH-101 (Integrated ultrasound oscillator)
Power source voltage	100 - 240V AC, 50/60Hz
Allowable voltage fluctuation range	90-100% of power source voltage
Power consumption	10 VA
Cleaning method	Continuous ultrasound emission method
Control method	Burst method through oscillation timing control
Ambient temperature	-5 - 50°C
Ambient humidity	5-90% relative humidity (no condensation)
Measured liquid temperature (*1)	-5 - 80°C (no freezing)
Flow velocity of measured liquid	Less than 2m/sec
Measured liquid pressure	Atmospheric pressure
Usable holder length	0.5, 1.0, 1.5, 2.0, 2.5, 3.0
Mass	Approx. 4.0kg (if immersion holder length is 1m)
Combined pH electrodes (*1)	6108, 6109, 6110
Combined immersion holder (*1)	CH-101, CH-101P, CH-101PF
Installable mounting bracket	MH-65

*1: The usage temperature range varies depending on the combined pH electrode and immersion holder. Check the specified temperatures of each product.

Immersion type ultrasound cleaner (UCH-111)

Model	UCH-111 (Separate installation type ultrasound oscillator)
Power source voltage	100 - 240V AC, 50/60Hz
Allowable voltage fluctuation range	90-100% of power source voltage
Power consumption	10 VA
Cleaning method	Continuous ultrasound emission method
Control method	Burst method through oscillation timing control
Ambient temperature	-5 - 50°C
Ambient humidity	5-90% relative humidity (no condensation)
Measured liquid temperature (*1)	-5 - 80°C (no freezing)
Flow velocity of measured liquid	Less than 2m/sec
Measured liquid pressure	Atmospheric pressure
Usable holder length	0.5, 1.0, 1.5, 2.0, 2.5, 3.0
Mass	Approx. 2.5kg (if immersion holder length is 1m)
Ultrasound oscillator	US-2
Combined pH electrodes (*1)	6108, 6109, 6110
Combined immersion holder (*1)	CH-101, CH-101P, CH-101PF
Installable mounting bracket	MH-65

*1: The usage temperature range varies depending on the combined pH electrode and immersion holder. Check the specified temperatures of each product.

Accessories (cleaner-2)

Flow type ultrasound cleaner

Flow type ultrasound cleaner (UCF-301)



Model		UCF-301 (Integrated ultrasound oscillator)	
Ambient temperature		-5 - 50℃	
Ambient humidity		5-90% relative humidity (no condensation)	
Conditions	Temperature (*1)	-5 - 80℃ (no freezing)	
	Pressure	-5 - 40℃ : 0.30MPa 40 - 60℃ : 0.22MPa 60 - 80℃ : 0.15MPa	
	Flow rate	0.3-10L/min	
Power source voltage		100 - 240V AC, 50/60Hz	
Power consumption		10 VA	
Cleaning method		Continuous ultrasound emission method	
Control method		Burst method through oscillation timing control	
Measurement liquid connector diameter		JIS 10K 25A FF flange	
Pressurized opening in holder		Rc1/8	
Mass		Approx. 7.0kg	
Combined pH electrodes		6108	
*1: The usage temperature range varies depending on the combined electrode and holder. Check the specified temperatures of each product.			

Flow type ultrasound cleaner (UCF-311)

Model		UCF-311 (Separate installation type ultrasound oscillator)
Ambient temperature		-5 - 50℃
Ambient humidity		5-90% relative humidity (no condensation)
Conditions	Temperature (*1)	-5 - 80℃ (no freezing)
	Pressure	-5 - 40℃ : 0.30MPa 40 - 60℃ : 0.22MPa 60 - 80℃ : 0.15MPa
	Flow rate	0.3-10L/min
Power source voltage		100 - 240V AC, 50/60Hz
Power consumption		10 VA
Cleaning method		Continuous ultrasound emission method
Control method		Burst method through oscillation timing control
Measurement liquid connector diameter		JIS 10K 25A FF flange
Pressurized opening in holder		Rc1/8
Mass		Oscillator: Approx. 2.0kg Cleaning unit: Approx. 3.0kg
Ultrasound oscillator		US-2
Combined pH electrodes		6108
*1: The usage temperature range varies depending on the combined electrode and holder. Check the specified temperatures of each product.		

Flow type ultrasound cleaner

Ultrasound oscillator (US-2)

Model	US-2
Ambient temperature	-5 - 50°C
Ambient humidity	5-90% relative humidity (no condensation)
Oscillation frequency	Approx. 70 kHz
Power source voltage	AC100-240V 50/60Hz
Allowable voltage fluctuation range	90-100% of power source voltage
Power consumption	10 VA
Cleaning method	Continuous ultrasound emission method
Control method	Burst method through oscillation timing control
Mass	Approx. 2.0kg
Protection class	IP54 (IEC60529, JIS C0920) (Category 2)
Material	AC4C
Surface	Epoxy glue degeneration melamine resin painting (Mansell 10PB5/1)

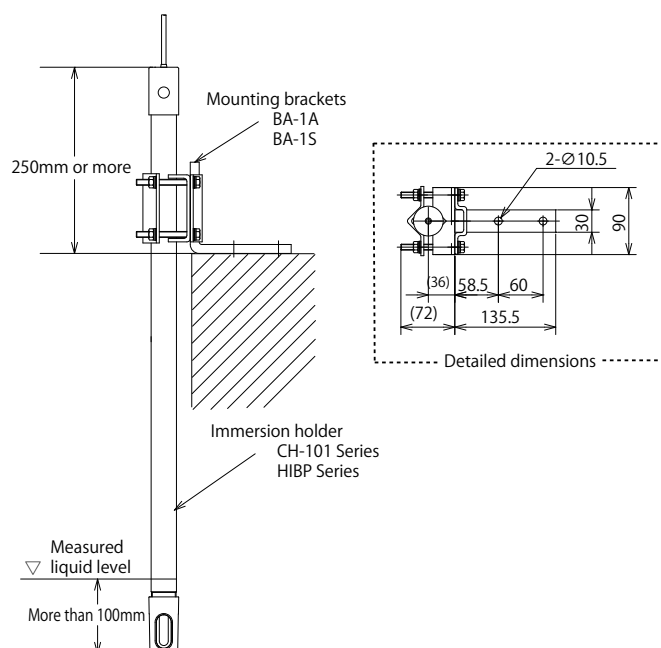
HP-480 pH meter accessory (installation method -1)

Installation

The following section contains details on installation (installation method) of the immersion holder.

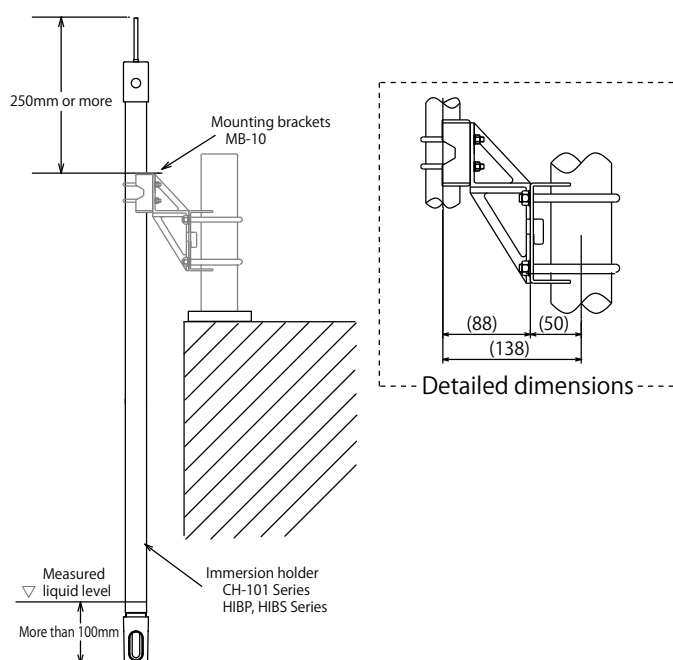
Immersion type holder + mounting brackets 1

- The installation method of the immersion holder (CH-101 series and HIBP series) and BA-1A or BA-1S.
- A (resin) immersion type holder up to 1.5m can be installed.
- Secure BA-1A or BA-1S mounting brackets with two $\Phi 10$ bolts.
- If installing an immersion type holder, install with 250mm or more on the slab.
- If installing an immersion type holder, install it so that 100mm or more of the bottom of the immersion type holder will be submerged in the sample water.



Immersion type holder + mounting brackets 2

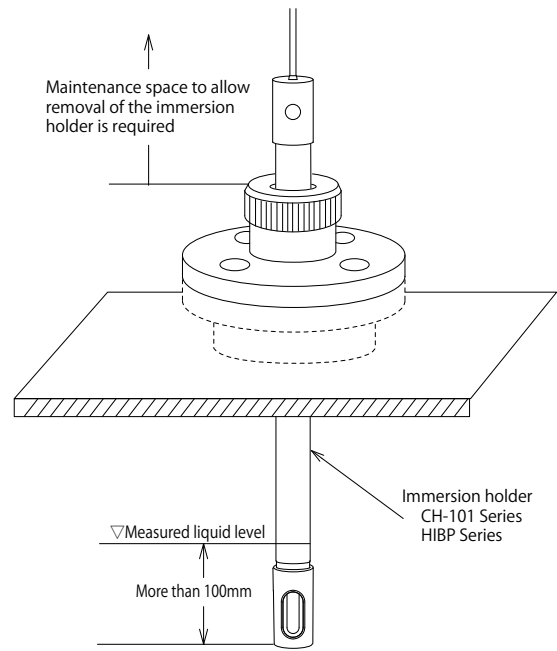
- The installation method of the immersion holder (CH-101 series and HIBP, HIBS series) and MB-10.
- An immersion type holder up to 1.5m can be installed.
- Secure the MB-10 mounting brackets to the 50A pole.
- If installing an immersion holder to the MB-10, install the immersion holder of the MB-10 with approximately the upper 250mm of the U-bolt.
- If installing an immersion type holder, install it so that 100mm or more of the bottom of the immersion type holder will be submerged in the sample water.



HP-480 pH meter accessory (installation method -2)

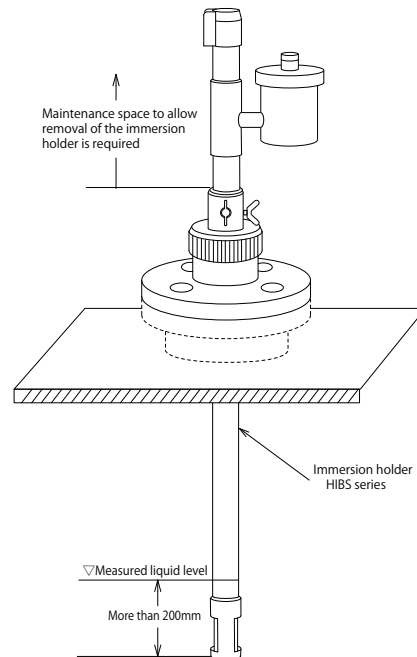
Immersion holder + loose flange 1

- The installation method of the immersion holder (CH-101 series and HIBP series) and FK-1 series.
- A (resin) immersion type holder up to 1.5m can be installed.
- The standard size of the FK-1 series is JIS 10K 50A FF. If installing a special specification loose flange, check the size before installation.
- If installing an immersion type holder to the FK-1 series, install so that the holder is more than 200mm from the upper part of the loose flange cap nut.
- If installing an immersion type holder, install it so that 100mm or more of the bottom of the immersion type holder will be submerged in the sample water.



Immersion holder + loose flange 2

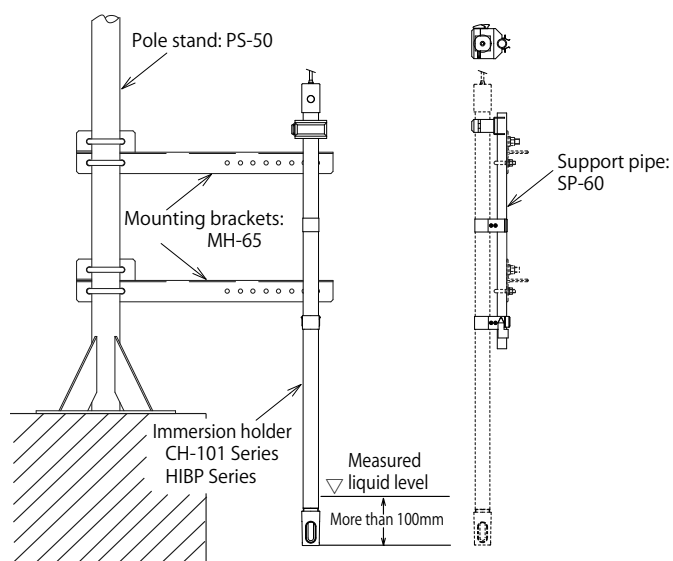
- The installation method of the immersion holder (HIBP series) and RFS1 series.
- An immersion type holder up to 1.5m can be installed.
- The standard size of the RFS1 is 10K 50A FF. If installing a special specification loose flange, check the size before installation.
- If installing an immersion type holder to the RFS1, install so that the holder is more than 200mm from the upper part of the loose flange cap nut.
- If installing an immersion type holder, install it so that 200mm or more of the bottom of the immersion type holder will be submerged in the sample water.



HP-480 pH meter accessory (installation method -3)

Immersion holder + support pipe + mounting brackets

- The installation method of the immersion holder (CH-101 series and HIBP series) support pile (SP-60) and mounting bracket (MH-65).
- This combination is used when the immersion holder to be installed is over 2m. (When using an immersion holder that is less than 2m, it is necessary to install in this combination if the flow speed is fast.)
- If installing an immersion type holder, install it so that 100mm or more of the bottom of the immersion type holder will be submerged in the sample water.



HP-480 pH meter ph flow chamber (installation method -4)

Installation Environment (common for pH flow chambers)

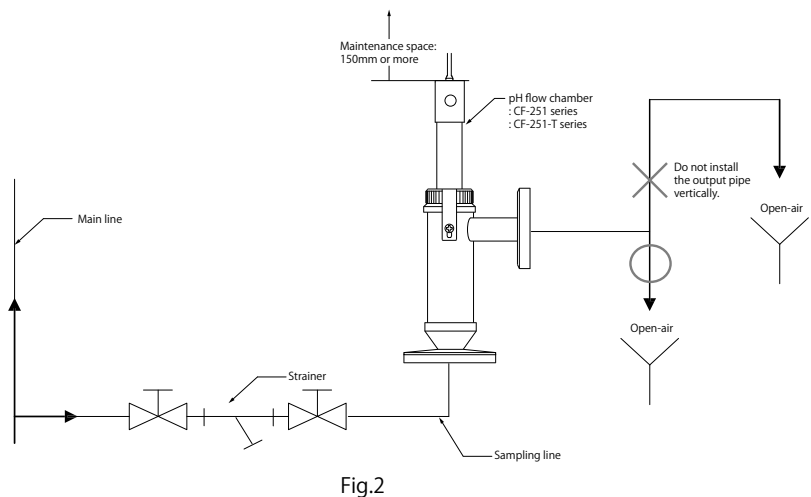
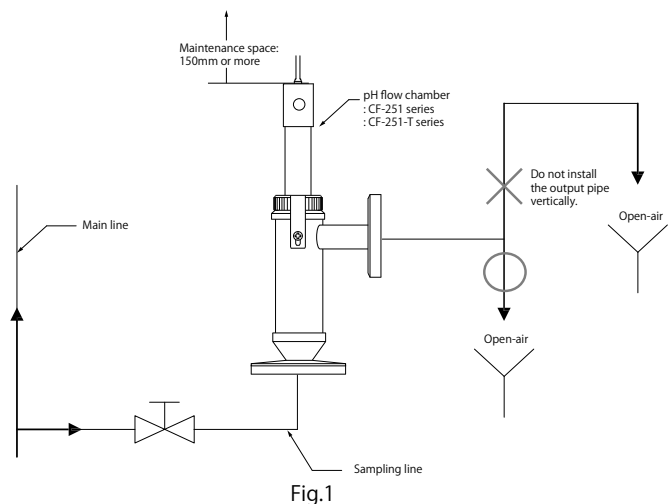
Install following the conditions below to ensure the instrument is installed in stable conditions.

- Install in an area where operations such as maintenance can be performed easily.
- Allow maintenance space over the holder cap, upper section of the KCl tank lid and upper section of the pressurized holder. Also, allow space to enable removal of the electrode cable for maintenance, etc.
- Do not install in locations where there is substantial vibration or a lot of dust.
- Install so that the measured liquid does not drain away from the pH flow chamber leaving the electrode exposed to the air even if the flow of measured liquid stops.
- Do not install in locations where corrosive liquid may be splashed or where corrosive gas may be in the atmosphere.
- Avoid installing in areas where the surface or ambient temperature will exceed 50°C, such as beside heating elements.
- If air bubbles, slurry or solid matter that may damage the electrodes are contained in the measured liquid, remove these in advance.
- Do not mount the pH flow chamber on the main line. Always install a sampling line and mount on the sampling line (otherwise maintenance will not be possible without stopping the main line).

pH flow chamber 1

- Installation (plumbing) method for the pH flow chamber (CF-251 series and CF-251-T series).

- To install the pH flow chamber, install a sampling line to the main line and mount so that the measured liquid flows in from the bottom of the pH flow chamber and out from the side.
- Make the output plumbing from the pH flow chamber as short as possible, and always expose it to open-air once.
- Do not install the output pipe vertically. Otherwise, back pressure occurs inside the pH flow chamber, reverse leak of the measured liquid occurs in the electrode, and measurement cannot be made accurately. (Electrodes in which reverse leak has occurred can no longer be used.)
- Always install a valve on the inflow side. See [Fig.1].
- If the flow rate of the measured liquid is too fast, capitation, etc. may occur, or changes in the indication values may occur due to increased pressure in the electrode supply route due to the flow rate. However, if the flow rate is too low, delays occur in the response rate of the indication values. In this case, adjust the flow rate in accordance with the measurement fluid.
- In cases where there is a lot of floating matter in the measured liquid, attach a strainer to the inflow side of the holder. See [Fig.2].



HP-480 pH meter ph flow chamber (installation method -5)

pH flow chamber 2

- Installation (plumbing) method for the pH flow chamber CF-301.
- To install the pH flow chamber, install a bypass line to the main line and mount so that the measured liquid flows in from the bottom of the pH flow chamber and out from the side.
- Always install valves on the inflow and outflow sides. If the flow rate of the measured liquid is too fast, capitation, etc. may occur, or changes in the indication values may occur due to increased pressure in the electrode supply route due to the flow rate. However, if the flow rate is too low, delays occur in the response rate of the indication values. In this case, adjust the flow rate in accordance with the measurement fluid.
- In cases where there is a lot of floating matter in the measured liquid, attach a strainer to the inflow side of the holder. See [Fig.3]

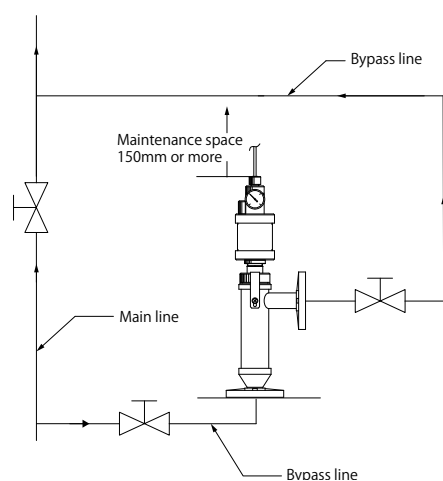


Fig.1

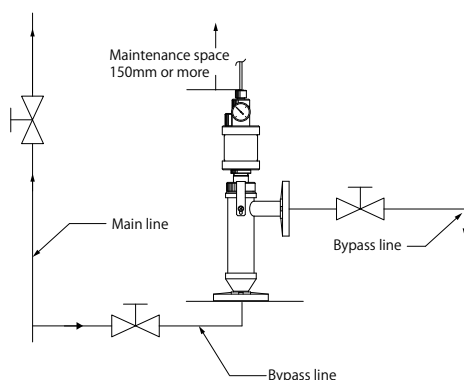


Fig.2

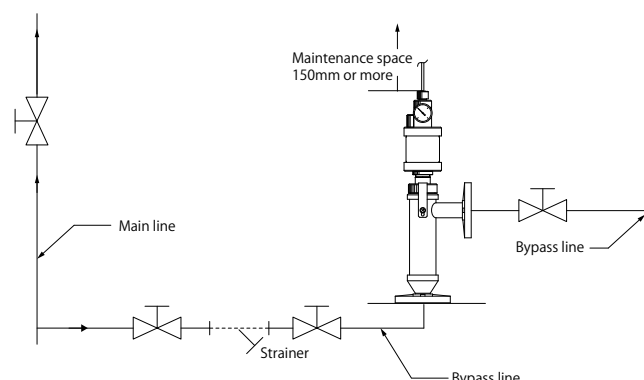


Fig.3

Pressurization Method

- There are two types of pressurization.

Manual pressurization

- Prepare a union joint (screw diameter: Rc1/8) and air pump. (Available from HORIBA as an option)
- Pressurize to 0.03 - 0.05 MPa above the sample pressure. However, do not pressurize above the specifications. (See temperature and pressure relationship chart)
- Check the pressure regularly. Air pressure reduces over time.

When using instrumentation air

- To pressurize using instrumentation air, install a union joint. See [Fig.4]
- Remove the pressurized holder for maintenance. Construct using a flexible pipe.
- Install a regulator (with filter) near the pressurized holder, and connect between the pressurized holder with a tube ($\Phi 4 \times \Phi 6$). See [Fig.4]
- Caution -
- The Rc1/8 screw of the pressurized opening is made of a resin base, and overtightening will damage the screw section.
- The pressurized holder may be removed for maintenance work, etc. therefore be sure to allow space around the air pipes when fixing in place.

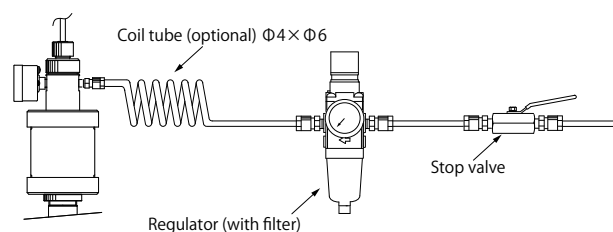
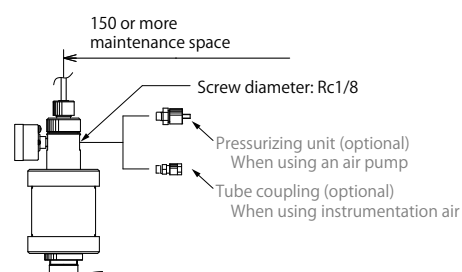
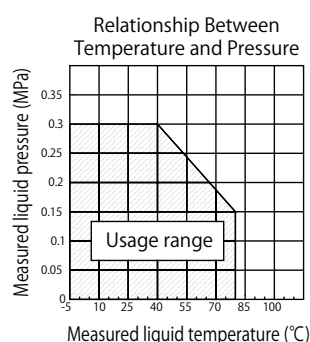


Fig.4



May not be as indicated in the table on the left depending on the material of the selected holder. Check the specifications.

HP-480 pH meter ph flow chamber (installation method -6)

pH flow chamber 3

- Installation (plumbing) method for the pH flow chamber CF-401.

- Install in an area where operations such as maintenance can be performed easily.
- Leave at least 20cm of maintenance space above the pressurized holder. Also, allow space to enable removal of the electrode cable for maintenance, etc.
- Do not install in locations where there is substantial vibration or a lot of dust.
- Install so that the measured liquid does not drain away from the pH flow chamber leaving the electrode exposed to the air even if the flow of measured liquid stops.
- Do not install in locations where corrosive liquid may be splashed or where corrosive gas may be in the atmosphere.
- Avoid installing in areas where the surface or ambient temperature will exceed 50°C, such as beside heating elements.

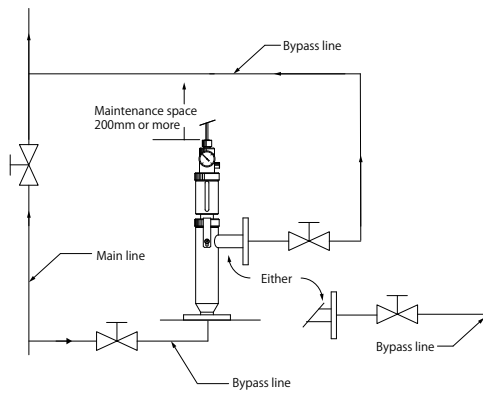


Fig.1

- If air bubbles, slurry or solid matter that may damage the electrodes are contained in the measured liquid, remove these in advance.
- Do not mount the pH flow chamber on the main line. Always install a bypass line before installation. (Otherwise maintenance cannot be performed without stopping the main line.) To install the pH flow chamber, install a bypass line to the main line and mount so that the measured liquid flows in from the bottom of the pH flow chamber and out from the side. Always install valves on the inflow and outflow sides. See [Fig.1]
- If the flow rate of the measured liquid is too fast, capitation, etc. may occur, or changes in the indication values may occur due to increased pressure in the electrode supply route due to the flow rate. However, if the flow rate is too low, delays occur in the response rate of the indication values. In this case, adjust the flow rate in accordance with the measurement fluid.
- In cases where there is a lot of floating matter in the measured liquid, attach a strainer to the inflow side of the holder. See [Fig.2]

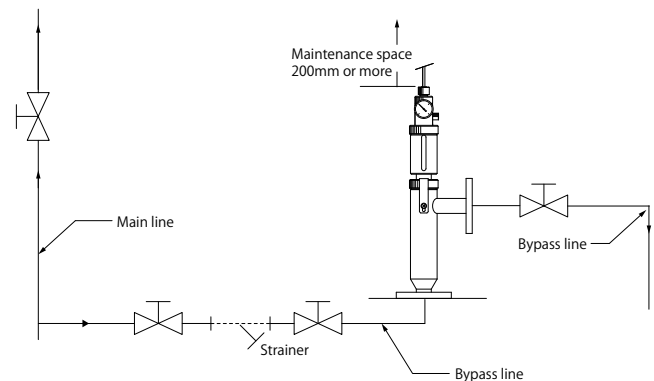


Fig.2

Pressurization Method

- There are two types of pressurization.

Manual pressurization

- Prepare a union joint (screw diameter: Rc1/8) and air pump. (Available from HORIBA as an option)
- Pressurize to 0.03 - 0.05 MPa above the sample pressure. However, do not pressurize above the specifications. (See temperature and pressure relationship chart)
- Check the pressure regularly. Air pressure reduces over time.

When using instrumentation air

- To pressurize using instrumentation air, install a union joint. See [Fig.4]
- Remove the pressurized holder for maintenance. Construct using a flexible pipe.
- Install a regulator (with filter) near the pressurized holder, and connect between the pressurized holder with a tube ($\Phi 4 \times \Phi 6$). See [Fig.3]
- Caution -
- The Rc1/8 screw of the pressurized opening is made of a resin base, and overtightening will damage the screw section.
- The pressurized holder may be removed for maintenance work, etc. therefore be sure to allow space around the air pipes when fixing in place.

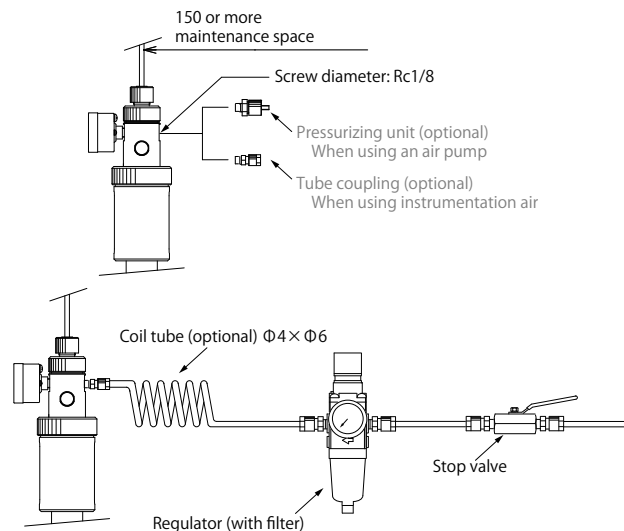
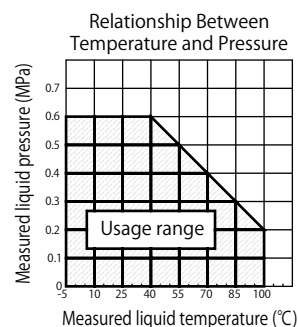


Fig.3



HP-480 pH meter ph flow chamber (installation method -7)

pH flow chamber 4

- Installation (plumbing) method for the pH flow chamber CF-501.
- Install in an area where operations such as maintenance can be performed easily.
- Leave at least 15 cm of maintenance space above the CF-501. Also, allow space to enable removal of the electrode cable for maintenance, etc.
- Do not install in locations where there is substantial vibration or a lot of dust.
- Install so that the measured liquid does not drain away from the pH flow chamber leaving the electrode exposed to the air even if the flow of measured liquid stops.
- Do not install in locations where corrosive liquid may be splashed or where corrosive gas may be in the atmosphere.
- Avoid installing in areas where the surface or ambient temperature will exceed 50°C, such as beside heating elements.
- If air bubbles, slurry or solid matter that may damage the electrodes are contained in the measured liquid, remove these in advance.
- Do not mount the pH flow chamber on the main line. Always install a sampling line before installation. (Otherwise maintenance cannot be performed without stopping the main line.)
- When a CKI tank is used, install so that the base of the KCI tank is higher than the top of the plastic body sensor (tip of the tube coupling).

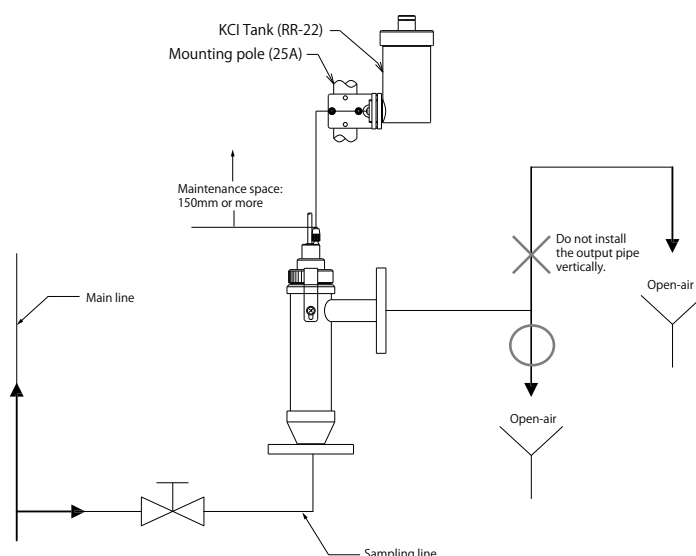


Fig.1

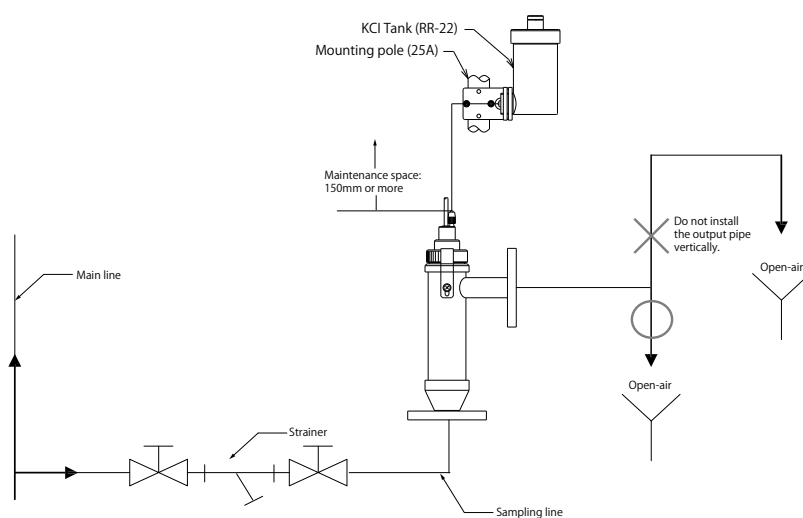


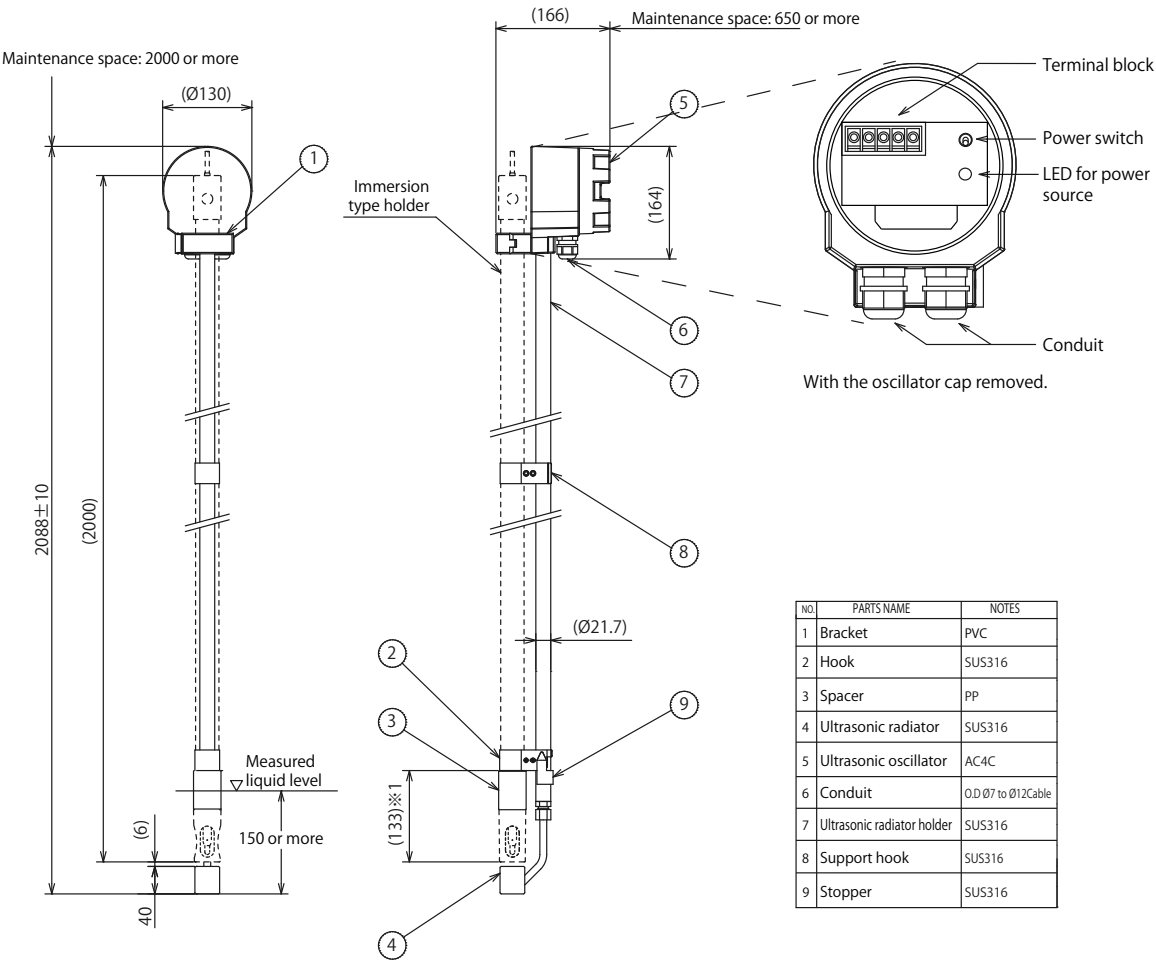
Fig.2

HP-480 pH meter Cleaner
(installation method -8.1)

Installation environment

- Install following the conditions below to ensure the instrument is installed in stable conditions.
- Install in an area where operations such as maintenance can be performed easily.
 - Install so that the electrode is always submerged in the measured liquid regardless of fluctuations in the level of the measured liquid.
(for immersion type ultrasound cleaner)
 - Avoid installing in areas with corrosive fluids or gases.
 - Avoid installing in areas where the surface or ambient temperature will exceed 50°C , such as beside heating elements.

Exterior of the immersion type ultrasound cleaner (UCH-101)



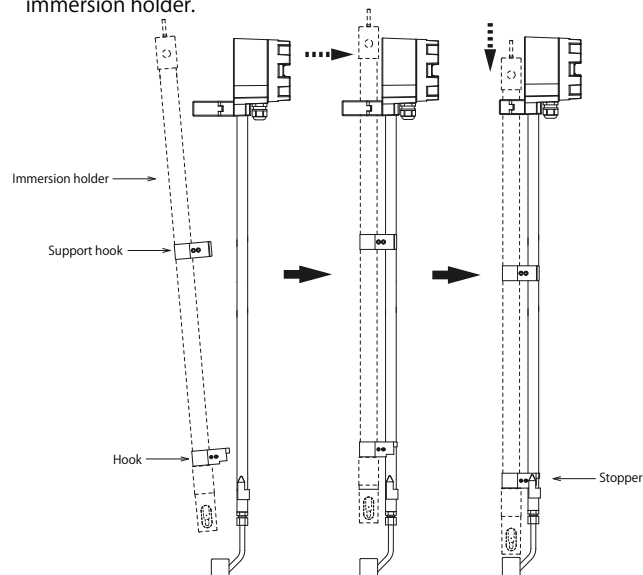
HP-480 pH meter Cleaner (installation method -8.2)

Installation and removal of the immersion type ultrasound cleaner (UCH-101)

- The UCH-101 immersion type ultrasound cleaner and immersion holder can be installed and removed according to the following points.

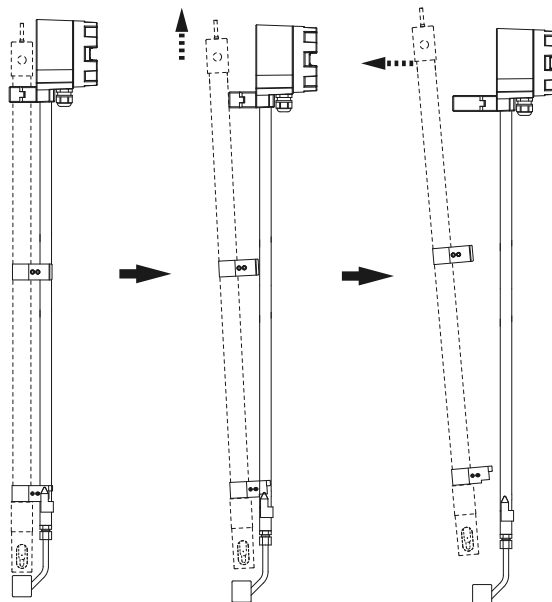
Installation

- Fit the hook and support hook attached to the immersion holder onto the immersion holder.
- Align the hook with the immersion holder and gently lower.
- When the hook catches on the stopper, close the fixture of the immersion holder.



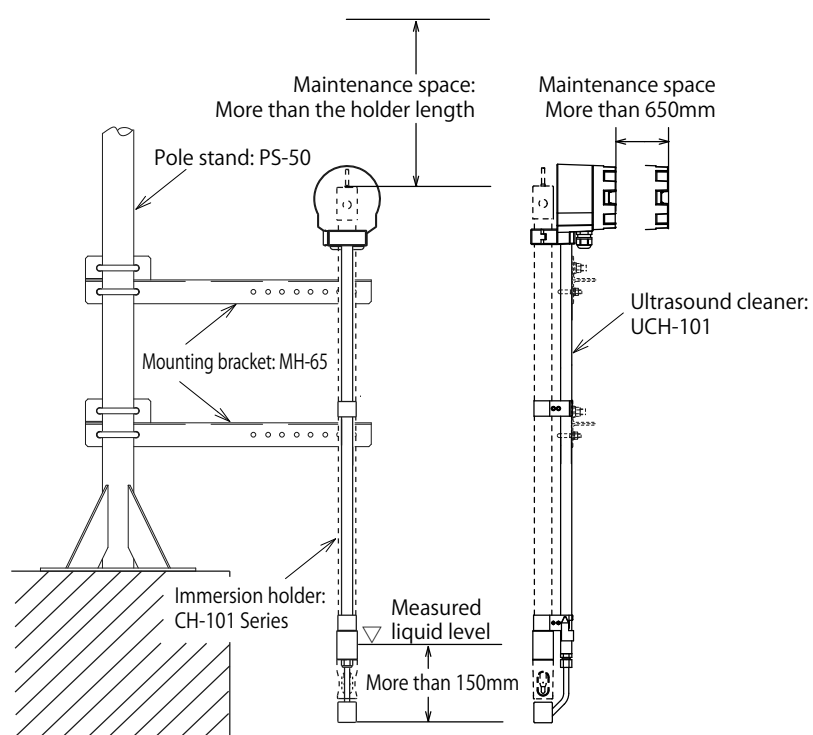
Removal

- Open the fixture of the immersion holder.
- Lift the immersion holder directly upward.
- Remove the hook and support hook from the oscillator holder.



Installation of the immersion type ultrasound cleaner (UCH-101)

- Install the UCH-101 immersion type ultrasound cleaner according to the following points.
- Install in an area where operations such as maintenance can be performed easily.
- Install so that the electrode is always submerged in the measured liquid regardless of fluctuations in the level of the measured liquid.
- Avoid installing in areas with corrosive fluids or gases.
- Avoid installing in areas where the surface or ambient temperature will exceed 50°C, such as beside heating elements.



HP-480 pH meter Cleaner (installation method -8.3)

Connection of the immersion type ultrasound cleaner (UCH-101)

- Connect the UCH-101 immersion type ultrasound cleaner according to the following points.

Caution - Electric Shock

- To prevent electric shock, always be sure to ground (class D grounding) protective grounding terminals.
- After completing work, always be sure to attach the oscillator cap to prevent electric shock.
- The conduit cable diameter is Φ 7- Φ 12. Pass the cable through the conduit and connect to the oscillator.
- Remove the oscillator cap in order to connect wiring.
- After completing wiring work, always be sure to attach the oscillator cap.

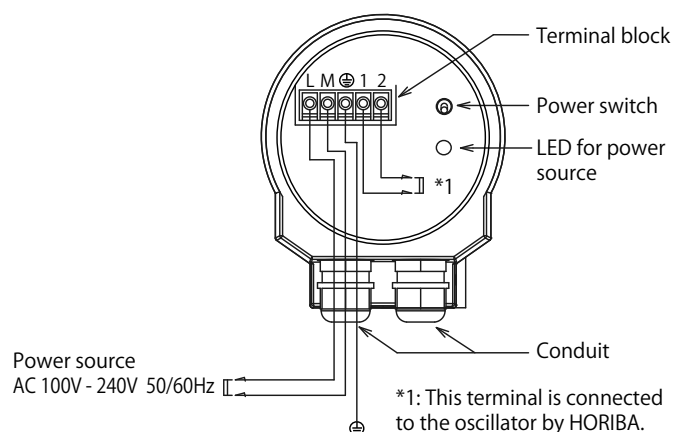
Power source wiring

- For safety, do not turn the power supply "ON" until starting operation. Do not use a power supply other than that of the rated voltage. Using the wrong power supply will damage the circuit boards.
- Draw the cables into the oscillator, and connect to the "L, N" terminals in the terminal block.
- Allow some slack in the cables in the oscillator.

Wiring for Protective Grounding

Caution - Electric Shock

- To prevent electric shock, always be sure to ground (class D grounding) protective grounding terminals.
- To prevent electric shocks, always ground the terminals of the terminal block.

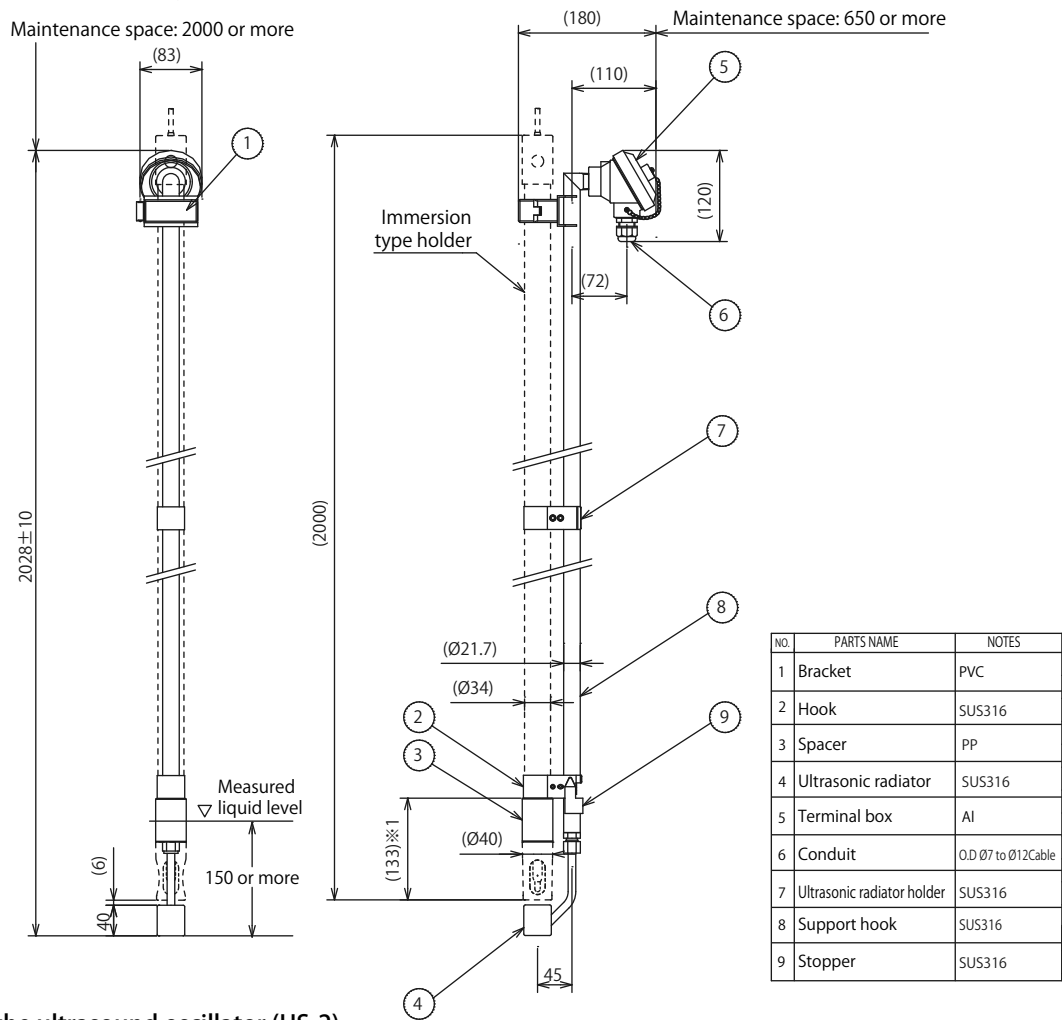


HP-480 pH meter Cleaner
(installation method -9.1)

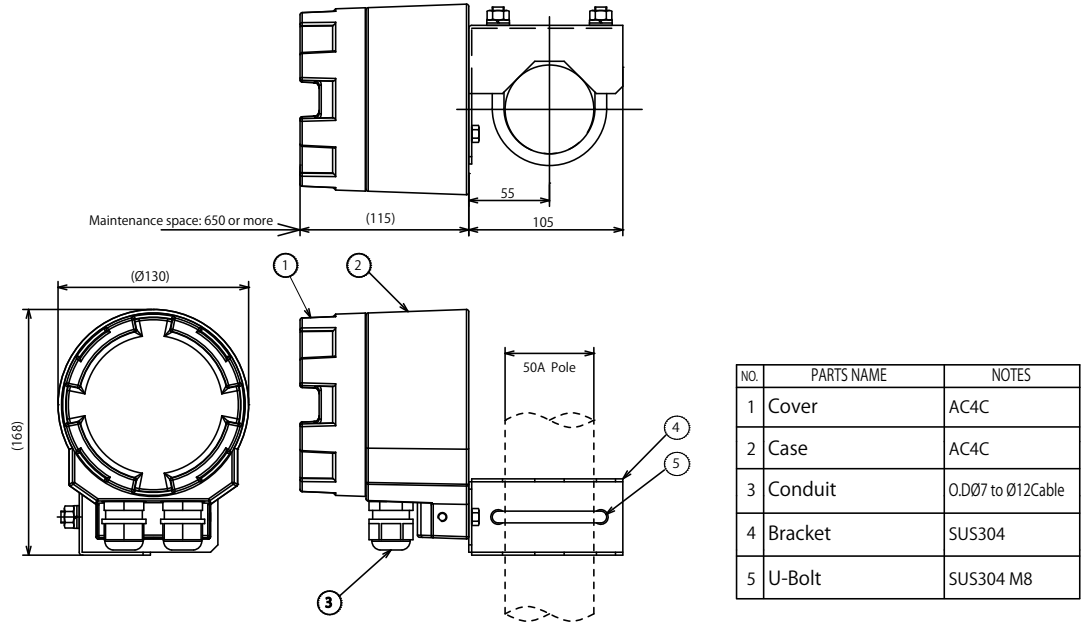
Installation environment

- Install following the conditions below to ensure the instrument is installed in stable conditions.
- Install in an area where operations such as maintenance can be performed easily.
 - Install so that the electrode is always submerged in the measured liquid regardless of fluctuations in the level of the measured liquid.
(for immersion type ultrasound cleaner)
 - Avoid installing in areas with corrosive fluids or gases.
 - Avoid installing in areas where the surface or ambient temperature will exceed 50°C , such as beside heating elements.

Exterior of the immersion type ultrasound cleaner (UCH-111)



Exterior of the ultrasound oscillator (US-2)



HP-480 pH meter Cleaner (installation method -9.2)

Installation and removal of the immersion type ultrasound cleaner (UCH-111)

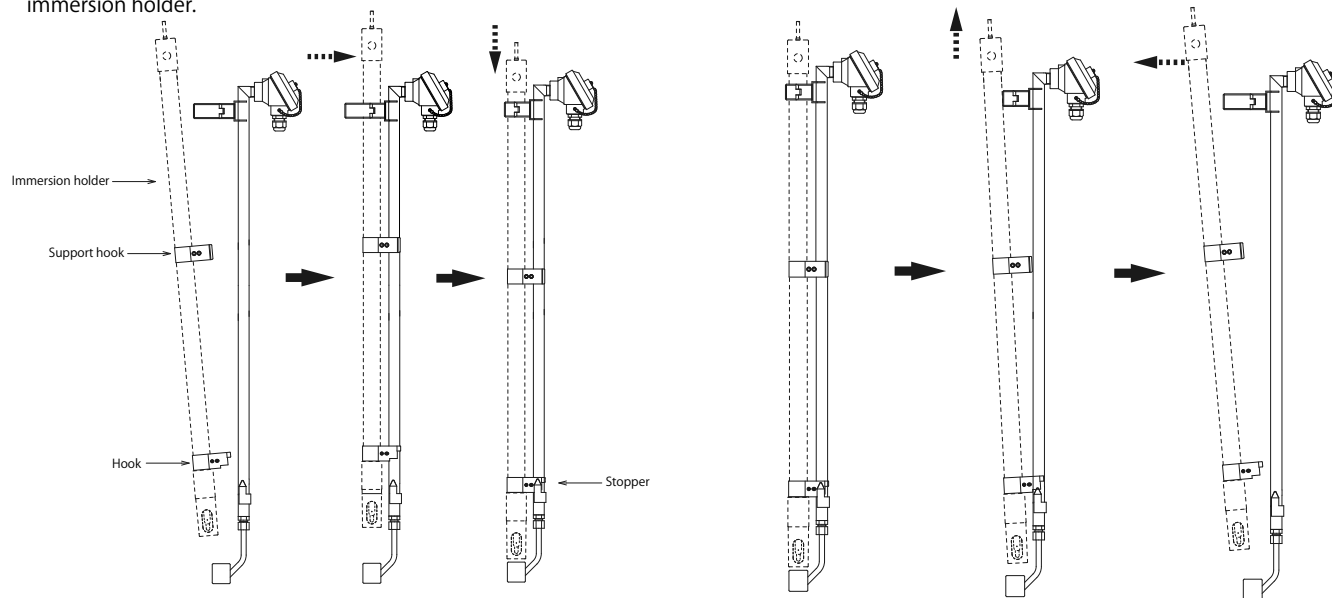
- The UCH-111 immersion type ultrasound cleaner and immersion holder can be installed and removed according to the following points.

Installation

1. Fit the hook and support hook attached to the immersion holder onto the immersion holder.
2. Align the hook with the immersion holder and gently lower.
3. When the hook catches on the stopper, close the fixture of the immersion holder.

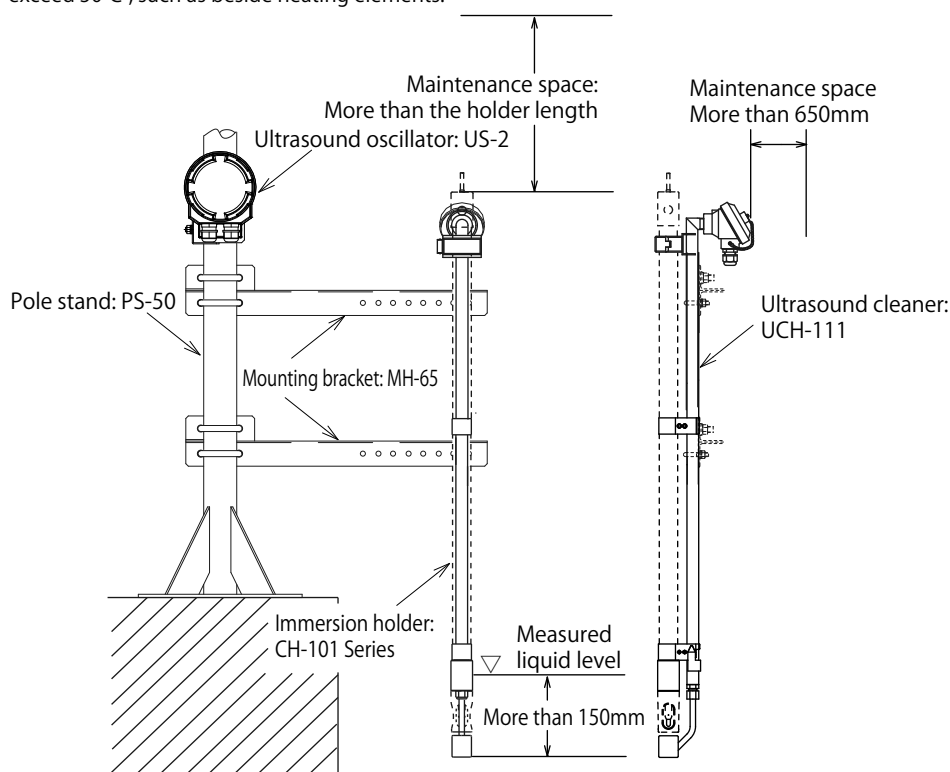
Removal

1. Open the fixture of the immersion holder.
2. Lift the immersion holder directly upward.
3. Remove the hook and support hook from the oscillator holder.



Installation of the immersion type ultrasound cleaner (UCH-111)

- Install the UCH-111 immersion type ultrasound cleaner according to the following points.
- Install in an area where operations such as maintenance can be performed easily.
- Install so that the electrode is always submerged in the measured liquid regardless of fluctuations in the level of the measured liquid.
- Avoid installing in areas with corrosive fluids or gases.
- Avoid installing in areas where the surface or ambient temperature will exceed 50°C, such as beside heating elements.



HP-480 pH meter Cleaner (installation method -9.3)

Connection of the immersion type ultrasound cleaner (UCH-111)

- Connect the UCH-111 immersion type ultrasound cleaner and US-2 ultrasound cleaner according to the following points.

Caution - Electric Shock

- To prevent electric shock, always be sure to ground (class D grounding) protective grounding terminals.
- After completing work, always be sure to attach the oscillator cap to prevent electric shock.
- The conduit cable diameter is $\Phi 7$ - $\Phi 12$. Pass the cable through the conduit and connect to the oscillator.

Oscillator (US-2)

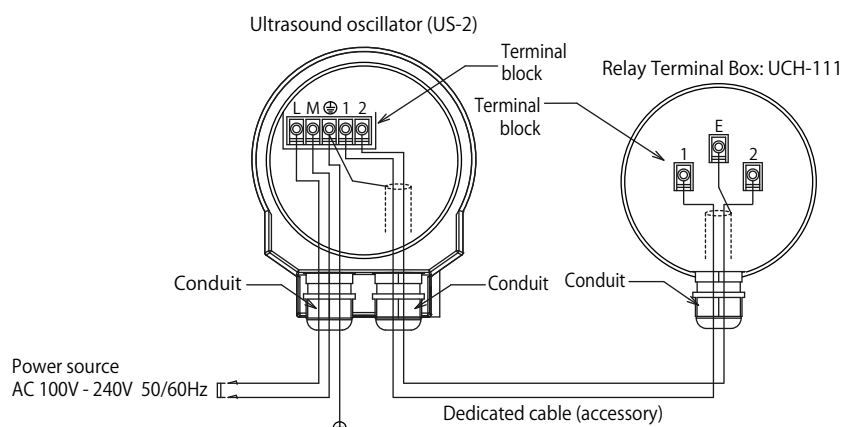
- Pass the cable through the conduit and connect to the oscillator.
- Remove the oscillator cap when connecting wiring.
- Refer to the previous section for details on wiring connection work.
- After completing wiring work, always be sure to attach the oscillator cap.

Power source wiring

- For safety, do not turn the power supply "ON" until starting operation.
- Do not use a power supply other than that of the rated voltage. Using the wrong power supply will damage the circuit boards.
- Draw the cables into the oscillator, and connect to the "L, N" terminals in the terminal block.
- Allow some slack in the cables in the oscillator.

Relay Terminal Box (UCH-111)

- Pass the cable through the conduit and connect to the relay box.
- Remove the relay box cap when connecting wiring.
- Refer to the previous section for details on wiring connection work.
- After completing wiring work, always be sure to attach the relay box cap.



HP-480 pH meter Cleaner

(installation method -10.1)

- Installation environment
- Install in an area where operations such as maintenance can be performed easily.
 - Leave at least 15 cm of maintenance space above the pressurized holder. Also, allow space to enable removal of the electrode cable.
 - Do not install in locations where there is substantial vibration or a lot of dust.
 - Install so that the measured liquid does not drain out of the line leaving the electrode exposed to the air even if the flow of measured liquid stops.
 - Avoid installing in areas with corrosive liquids or gases.
 - Avoid installing in areas where the surface or ambient temperature will exceed 50°C , such as beside heating elements.
 - If air bubbles, slurry or solid matter that may damage the electrodes are contained in the measured liquid, remove these in advance.
 - Do not mount the pH flow chamber on the main line. Always install a bypass line or sampling line before installation. (Otherwise maintenance cannot be performed without stopping the main line.)

Exterior of the flow type ultrasound cleaner (UCF-301)

NO.	PARTS NAME	NOTES
1	Pressure gauge	Range:0 to 0.5MPa SUS304
2	KCl pouring port	PVC
3	KCl reservoir	PVC
4	Pressurizing holder	
5	Ultrasonic oscillator	AC4C
6	Conduit	O.D Ø7 to Ø12,cable
7	Cleaner mounting nut	SUS304
8	Locking plate	SUS304
9	Holder fixing nut	SUS304
10	Flow chamber	SUS316
11	Cable clamp	PPO
12	Holder cap	PPO
13	Air inlet	Rc1/8
14	Holder	PP
15	Handy pump joint(option)	C3604
16	Tube joint(option)	For φ6/φ4 tube PVDF

HP-480 pH meter Cleaner (installation method -10.2)

Flow type ultrasound cleaner (UCF-301) plumbing

To install the pH flow chamber, install a bypass line in the main line and mount so that the measured liquid flows in from the bottom of the pH flow chamber and out from the side.

Always install valves on the inflow and outflow sides. See [Fig.1]

- If the flow rate of the measured liquid is too fast, capitation, etc. may occur, or changes in the indication values may occur due to increased pressure in the electrode supply route due to the flow rate. However, if the flow rate is too low, delays occur in the indication values. In this case, adjust the flow rate in accordance with the measurement fluid.

- In cases where there is a lot of floating matter in the measured liquid, attach a strainer to the inflow side of the holder. See [Fig.2]

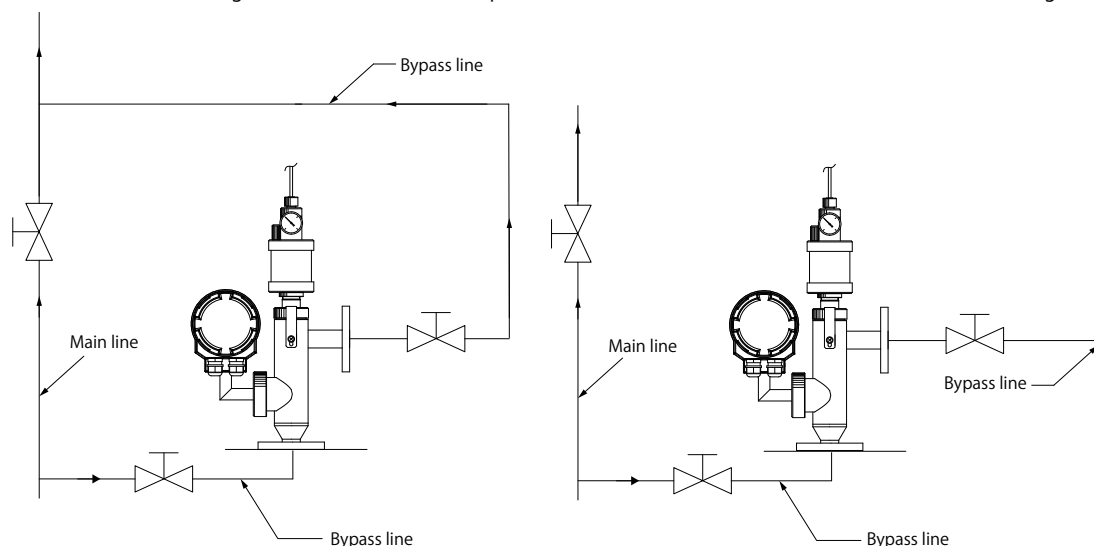


Fig.1

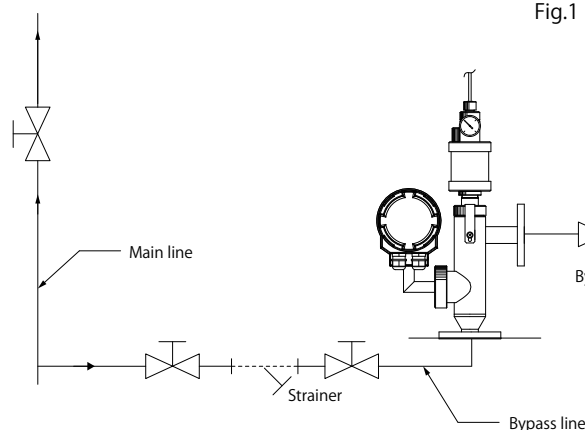


Fig.2

Pressurization Method

- There are two types of pressurization.

Manual pressurization

- Prepare a pressurizing unit (screw diameter: Rc1/8) and air pump. (Available from HORIBA as an option)
- Pressurize to 0.03 - 0.05 MPa above the sample pressure. However, do not pressurize above the specifications. (See temperature and pressure relationship chart)
- Check the pressure regularly. Air pressure reduces over time.

When using instrumentation air

- To pressurize using instrumentation air, install a tube coupling. See [Fig.3]
- Remove the pressurized holder for maintenance. Construct using a flexible pipe.
- Install a regulator (with filter) near the pressurized holder, and connect between the regulator and UCF-301 pressurized holder with a tube ($\Phi 4 \times \Phi 6$). See [Fig.4]
- Pressurize to 0.03 - 0.05 MPa above the sample pressure. However, do not pressurize above the specifications. (See temperature and pressure relationship chart)

- Caution -

- The Rc1/8 screw of the pressurized opening is made of a resin base, and overtightening will damage the screw section.
- The pressurized holder may be removed for maintenance work, etc. therefore be sure to allow space around the air pipes when fixing in place.

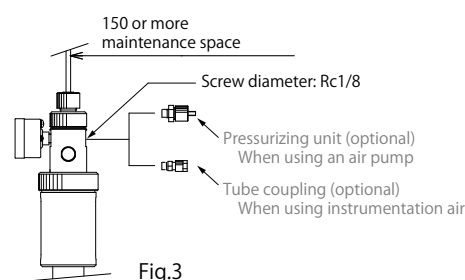


Fig.3

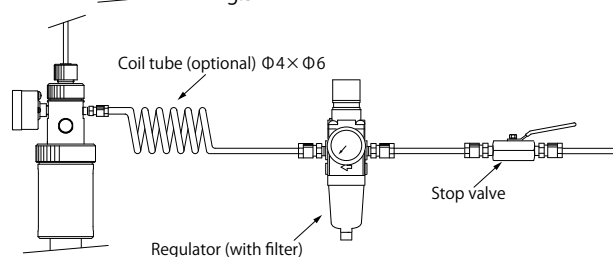


Fig.4

HP-480 pH meter Cleaner (installation method -10.3)

Connection of the flow type ultrasound cleaner (UCF-301)

- Connect the UCH-301 flow type ultrasound cleaner according to the following points.

Caution - Electric Shock

- To prevent electric shock, always be sure to ground (class D grounding) protective grounding terminals.
- After completing work, always be sure to attach the oscillator cap to prevent electric shock.
- The conduit cable diameter is $\Phi 7$ - $\Phi 12$. Pass the cable through the conduit and connect to the oscillator.
- Remove the oscillator cap in order to connect wiring.
- After completing wiring work, always be sure to attach the oscillator cap.

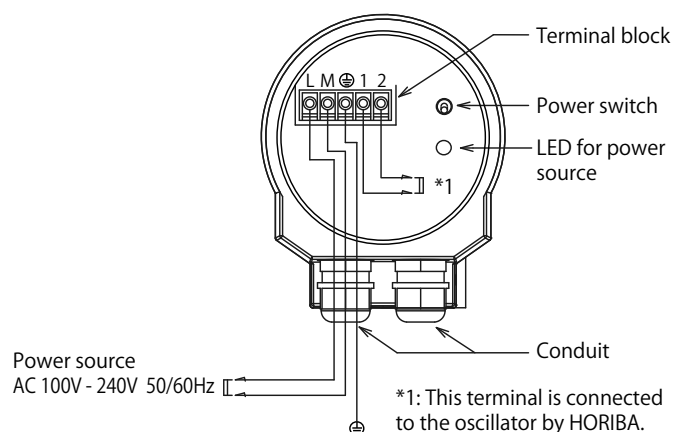
Power source wiring

- For safety, do not turn the power supply "ON" until starting operation. Do not use a power supply other than that of the rated voltage. Using the wrong power supply will damage the circuit boards.
- Draw the cables into the oscillator, and connect to the "L, N" terminals in the terminal block.
- Allow some slack in the cables in the oscillator.

Wiring for Protective Grounding

Caution - Electric Shock

- To prevent electric shock, always be sure to ground (class D grounding) protective grounding terminals.
- To prevent electric shocks, always ground the terminals of the terminal block.

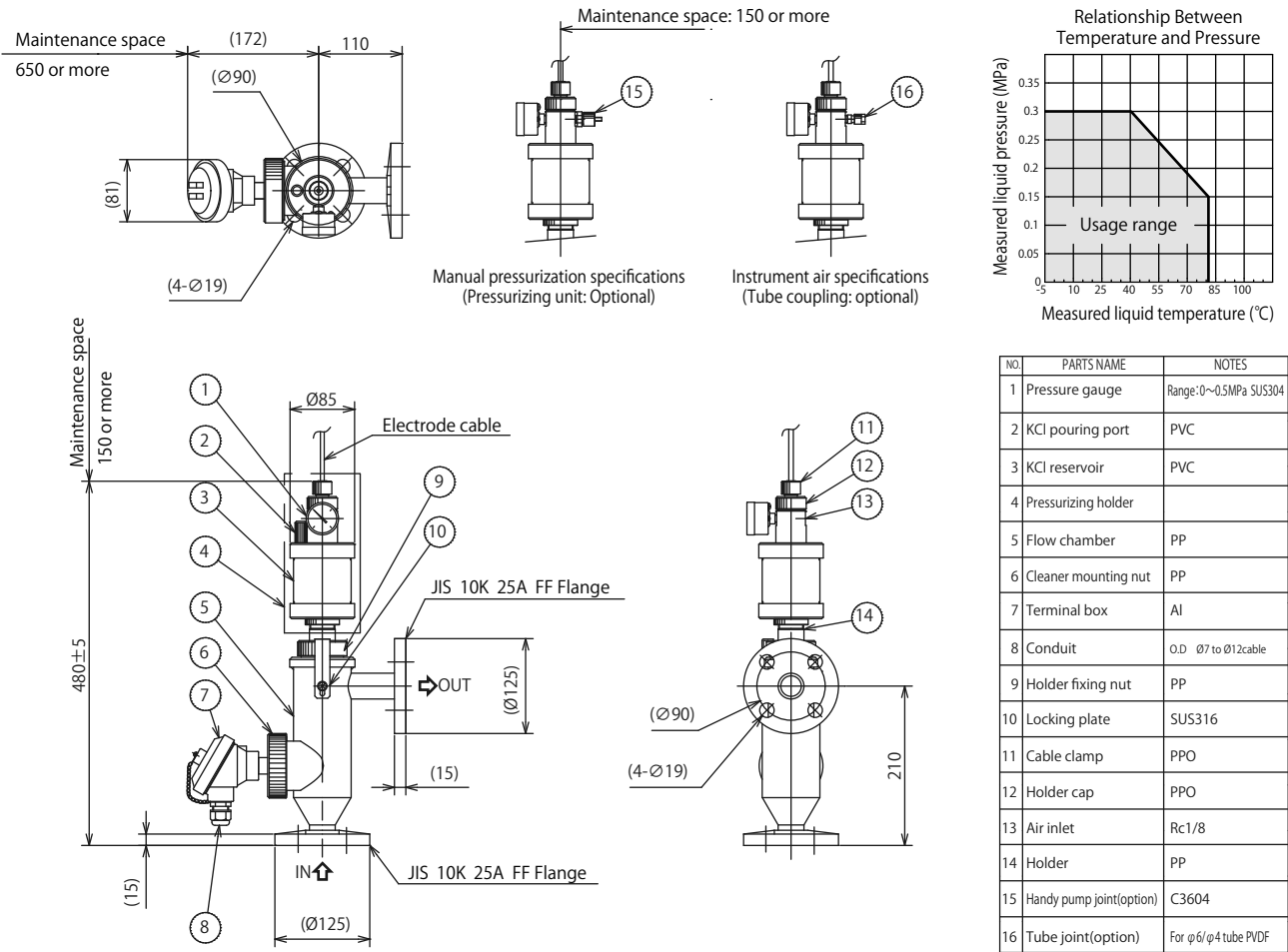


HP-480 pH meter Cleaner
(installation method -11.1)

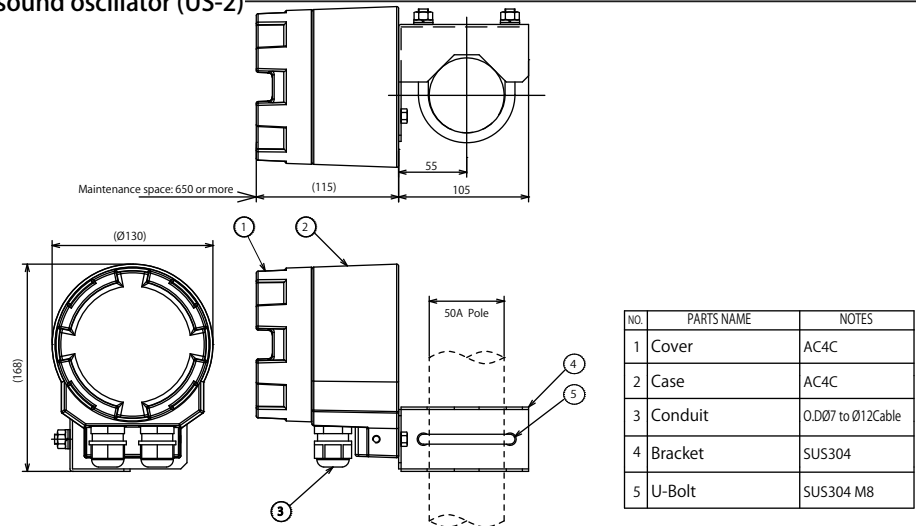
Installation environment

- Install in an area where operations such as maintenance can be performed easily.
- Leave at least 15 cm of maintenance space above the pressurized holder. Also, allow space to enable removal of the electrode cable.
- Do not install in locations where there is substantial vibration or a lot of dust.
- Install so that the measured liquid does not drain out of the line leaving the electrode exposed to the air even if the flow of measured liquid stops.
- Avoid installing in areas with corrosive liquids or gases.
- Avoid installing in areas where the surface or ambient temperature will exceed 50°C , such as beside heating elements.
- If air bubbles, slurry or solid matter that may damage the electrodes are contained in the measured liquid, remove these in advance.
- Do not mount the pH flow chamber on the main line. Always install a bypass line or sampling line before installation.
(Otherwise maintenance cannot be performed without stopping the main line.)

Exterior of the flow type ultrasound cleaner (UCF-311)



Exterior of the ultrasound oscillator (US-2)



HP-480 pH meter Cleaner (installation method -11.2)

Flow type ultrasound cleaner (UCF-311) plumbing

To install the pH flow chamber, install a bypass line in the main line and mount so that the measured liquid flows in from the bottom of the pH flow chamber and out from the side.

Always install valves on the inflow and outflow sides. See [Fig.1]

- If the flow rate of the measured liquid is too fast, capitation, etc. may occur, or changes in the indication values may occur due to increased pressure in the electrode supply route due to the flow rate. However, if the flow rate is too low, delays occur in the indication values. In this case, adjust the flow rate in accordance with the measurement fluid.

- In cases where there is a lot of floating matter in the measured liquid, attach a strainer to the inflow side of the holder. See [Fig.2]

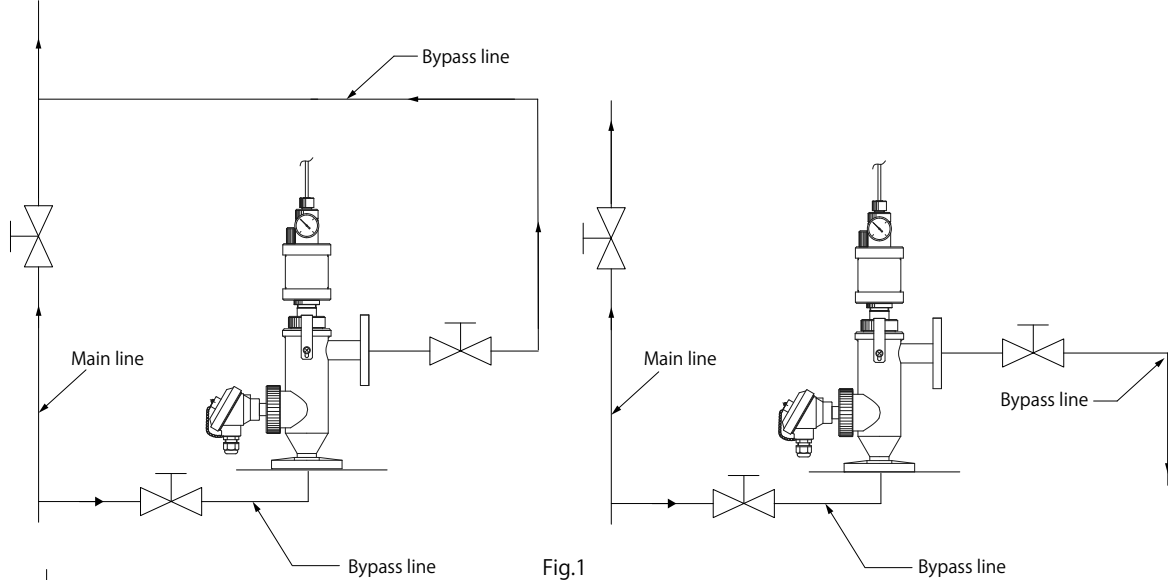


Fig.1

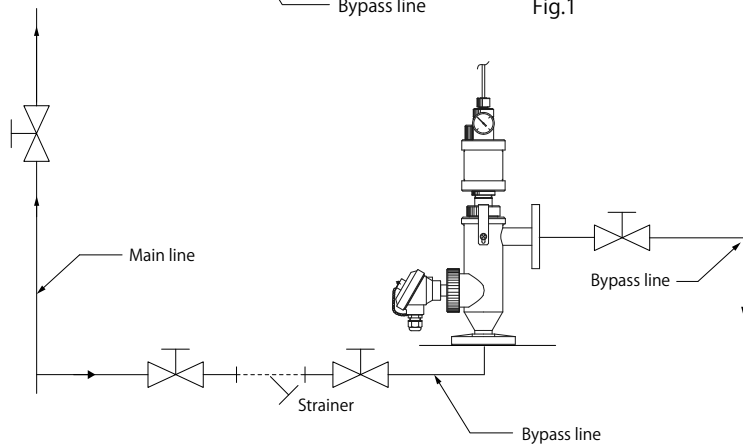


Fig.2

Pressurization Method

- There are two types of pressurization.

Manual pressurization

- Prepare a pressurizing unit (screw diameter: Rc1/8) and air pump. (Available from HORIBA as an option)
- Pressurize to 0.03 - 0.05 MPa above the sample pressure. However, do not pressurize above the specifications. (See temperature and pressure relationship chart)
- Check the pressure regularly. Air pressure reduces over time.

When using instrumentation air

- To pressurize using instrumentation air, install a tube coupling. See [Fig.3]
- Remove the pressurized holder for maintenance. Construct using a flexible pipe.
- Install a regulator (with filter) near the pressurized holder, and connect between the regulator and UCF-301 pressurized holder with a tube ($\Phi 4 \times \Phi 6$). See [Fig.4]
- Pressurize to 0.03 - 0.05 MPa above the sample pressure. However, do not pressurize above the specifications. (See temperature and pressure relationship chart)

- Caution -

- The Rc1/8 screw of the pressurized opening is made of a resin base, and overtightening will damage the screw section.
- The pressurized holder may be removed for maintenance work, etc. therefore be sure to allow space around the air pipes when fixing in place.

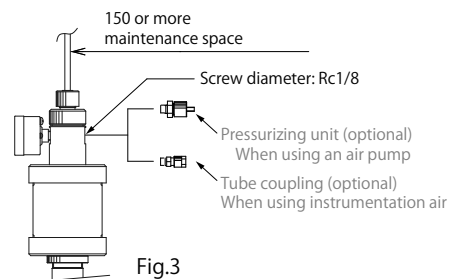


Fig.3

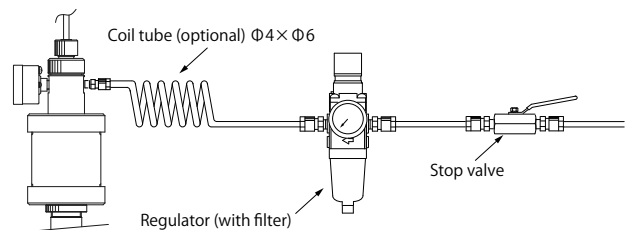


Fig.4

HP-480 pH meter Cleaner (installation method -11.3)

Connection of the flow type ultrasound cleaner (UCH-311)

- Connect the UCH-311 flow type ultrasound cleaner and US-2 ultrasound cleaner according to the following points.

Caution - Electric Shock

- To prevent electric shock, always be sure to ground (class D grounding) protective grounding terminals.
- After completing work, always be sure to attach the oscillator cap to prevent electric shock.
- The conduit cable diameter is $\Phi 7$ - $\Phi 12$. Pass the cable through the conduit and connect to the oscillator.

Oscillator (US-2)

- Pass the cable through the conduit and connect to the oscillator.
- Remove the oscillator cap when connecting wiring.
- Refer to the previous section for details on wiring connection work.
- After completing wiring work, always be sure to attach the oscillator cap.

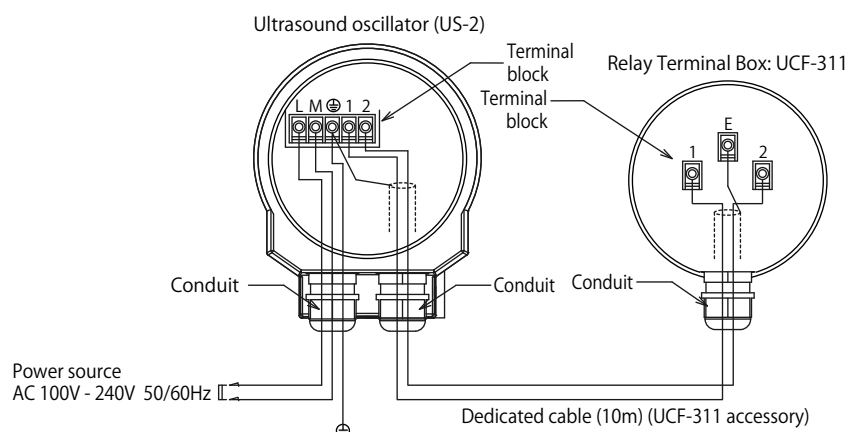
Power source wiring

- For safety, do not turn the power supply "ON" until starting operation.
- Do not use a power supply other than that of the rated voltage. Using the wrong power supply will damage the circuit boards.
- Draw the cables into the oscillator, and connect to the "L, N" terminals in the terminal block.
- Allow some slack in the cables in the oscillator.

Relay Terminal Box (UCF-311)

Pass the cable through the conduit and connect to the relay box.

- Remove the relay box cap when connecting wiring.
- Refer to the previous section for details on wiring connection work.
- After completing wiring work, always be sure to attach the relay box cap.



HP-480 pH meter floating type holder

(Installation method - 12.1)

Installation environment

- Install in an area where operations such as maintenance can be performed easily.
- Install so that the electrode is always submerged in the measured liquid regardless of fluctuations in the level of the measured liquid.
- Avoid installing in areas with corrosive fluids or gases.
- Avoid installing in areas where the surface or ambient temperature will exceed 50℃ , such as beside heating elements.

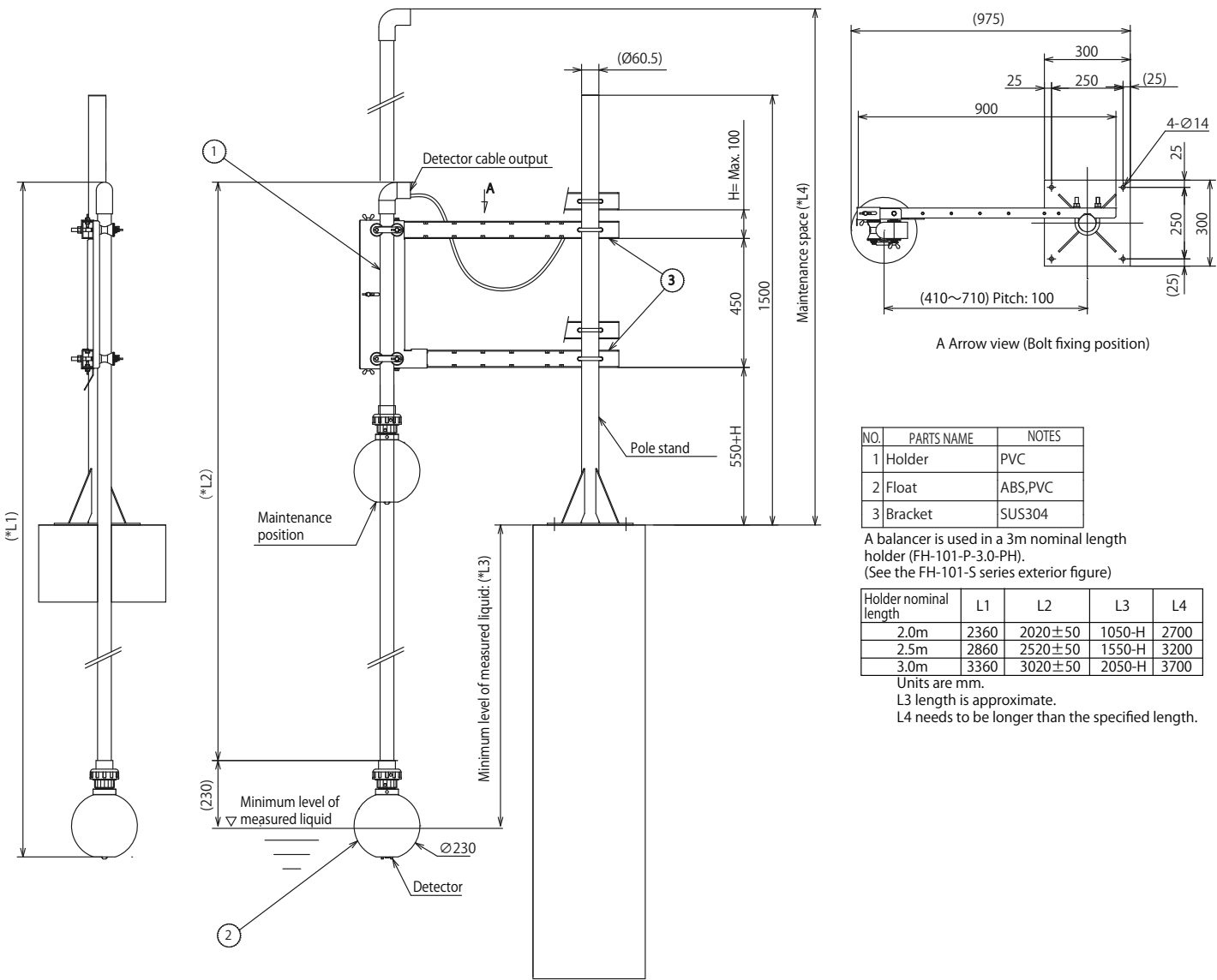
Assembly

- Details are written in the instruction manual.

Mounting

- Install a movable section for the sensor cable between the holder and converter in preparation for fluctuations in the level of measured liquid and maintenance work.
- When a balancer is installed, adjust the length of the wire so that the balancer is as the top position when the level of liquid is at the lowest.

Exterior of the vertical floating type holder (FH-101-P series)



NO.	PARTS NAME	NOTES
1	Holder	PVC
2	Float	ABS,PVC
3	Bracket	SUS304

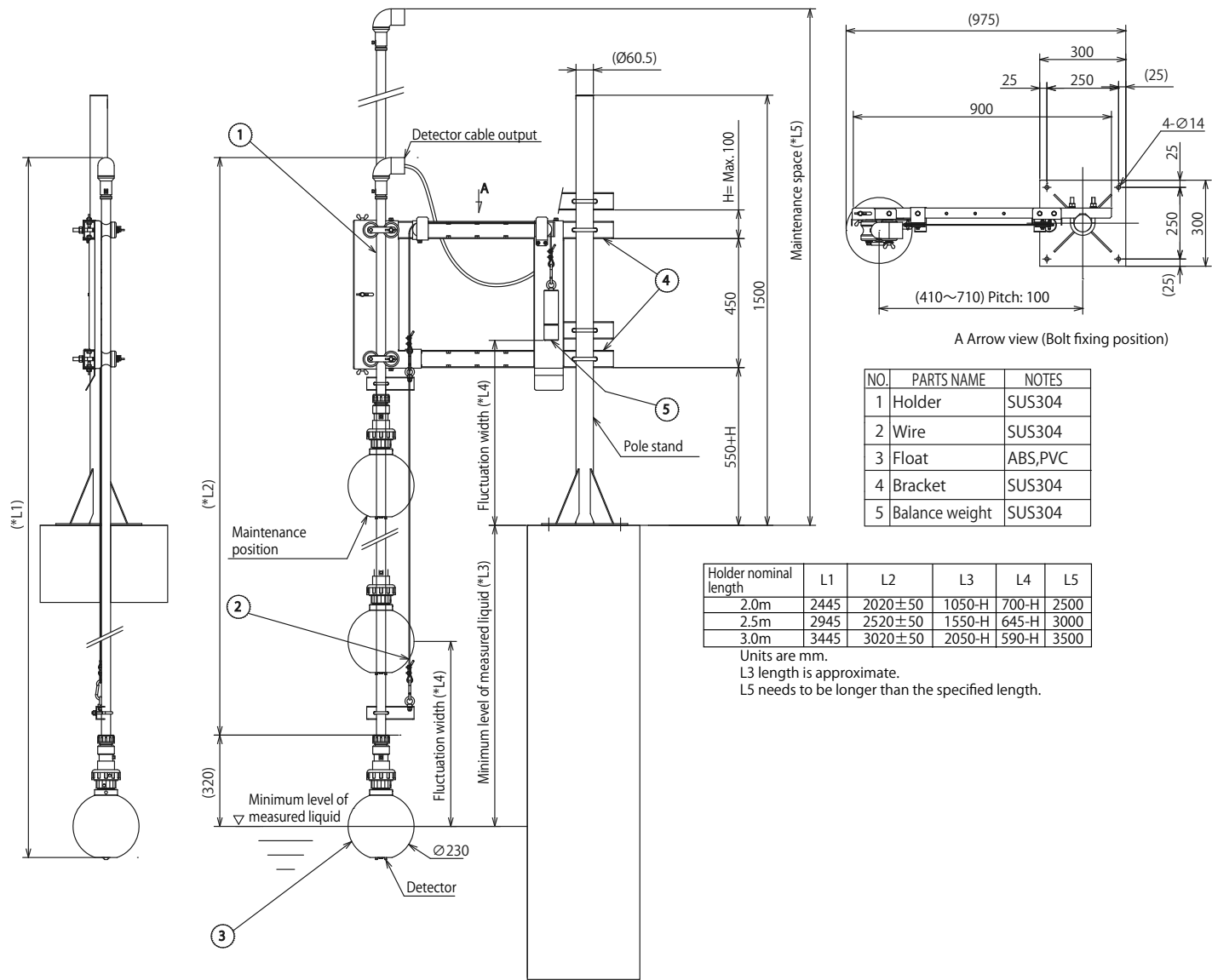
A balancer is used in a 3m nominal length holder (FH-101-P-3.0-PH).
(See the FH-101-S series exterior figure)

Holder nominal length	L1	L2	L3	L4
2.0m	2360	2020±50	1050-H	2700
2.5m	2860	2520±50	1550-H	3200
3.0m	3360	3020±50	2050-H	3700

Units are mm.
L3 length is approximate.
L4 needs to be longer than the specified length.

HP-480 pH meter floating type holder
(Installation method - 12.2)

Exterior of vertical floating type holder (FH-101-S series)



HP-480 pH meter floating type holder
(Installation method - 13.2)

Exterior of the inclined floating type holder (FH-201-P)

