

SPECIFICATION SHEET



pH Analyzer (4-wire system transmitter)
ORP Analyzer (4-wire system transmitter)

HBM-160
HBM-162

The HBM-160/HBM-162 is a field installation type pH/ORP analyzer (transmitter) that is housed in a robust, die-cast aluminum enclosure. The unit runs on a universal AC power supply with automatic voltage regulation (90~264VAC), is equipped with a digital display screen, and provides a number of practical functions.

Features

The unit features a dual transmission output (4~20mADC) for pH (ORP) and solution temperature. The output range for the pH (ORP) and solution temperature can be set to a value within the prescribed range. Note that the 2 output circuits share a common negative terminal.

The unit is equipped with an internal memory, which can store the data for up to 5 different pH standard solutions. The unit also features an electrode with a built-in temperature sensor that eliminates the hassle of inputting information such as the solution values and temperature during calibration. In addition, the stability judgment function allows for accurate, operator-error free calibrations using standard solutions. (HBM-160)

The transmitter judges the quality of electrode characteristics based on calibrations performed with standard solutions (HBM-160) or ORP check solutions (HBM-162).

Equipped with a function for detecting cracks in glass electrodes. (HBM-160)

In addition to compensating the temperature of the electromotive force applied to the glass electrode, the transmitter can also convert (compensate) the reference temperature for the pH value of a sample solution. When converting the reference temperature, the pH temperature coefficient of the sample can be



HBM-160

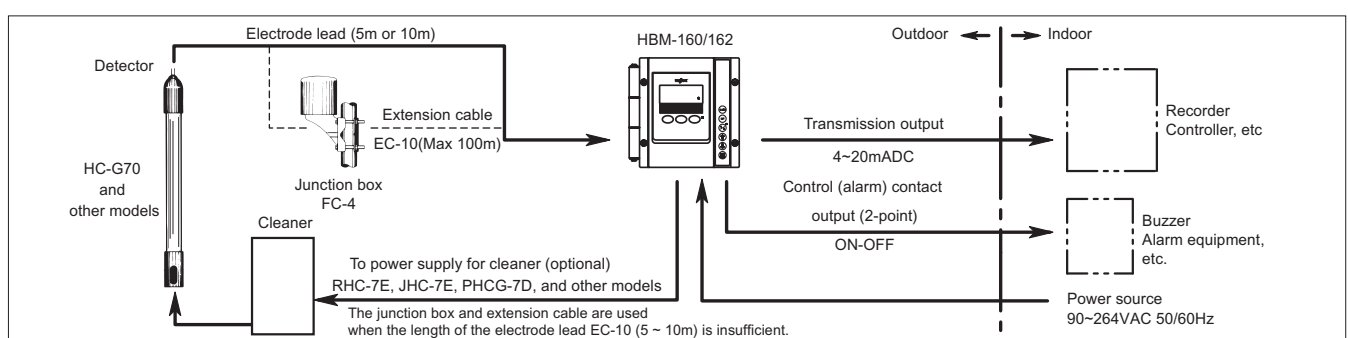
specified. Thanks to these features, the transmitter can also be used for the measurement control of boiler water and other similar liquids. There is also a function for manual temperature compensation. This function makes it possible to compensate the temperature for electrodes with a temperature compensation resistance that falls outside the specifications (1kΩ at 0°C, or 10kΩ at 25°C), as well as for electrodes that are not equipped with a temperature compensation resistor. (HBM-160)

In maintenance mode (ST-BY), the transmission output can be held at the value immediately before switching modes. The alarm contact output is disabled in this mode, ensuring that there are no disruptions to the control system.*1

The unit can also be configured to automatically switch back to measurement mode after a specified amount of time has passed. This feature is especially convenient for when you forget to disable maintenance mode.

In addition, when combined with a cleaner equipped with a built-in timer, the transmitter receives command signals from the cleaner. The forms of output operate as described above (*1).

Configuration



2-point alarm contact outputs are equipped as standard (form C contacts (transfer contacts)).

The output range can be set to a value that falls within the pH (ORP) measurement range.

[Optional features]

Ability to use together with cleaners that are not equipped with a timer function, such as the RHC-7E, JHC-7E, and PHCG-7D. (The transmitter is equipped with a power supply and built-in timer.)

4-point alarm contact outputs: 3 circuits with form A contacts (make contacts), and 1 circuit with contact c.

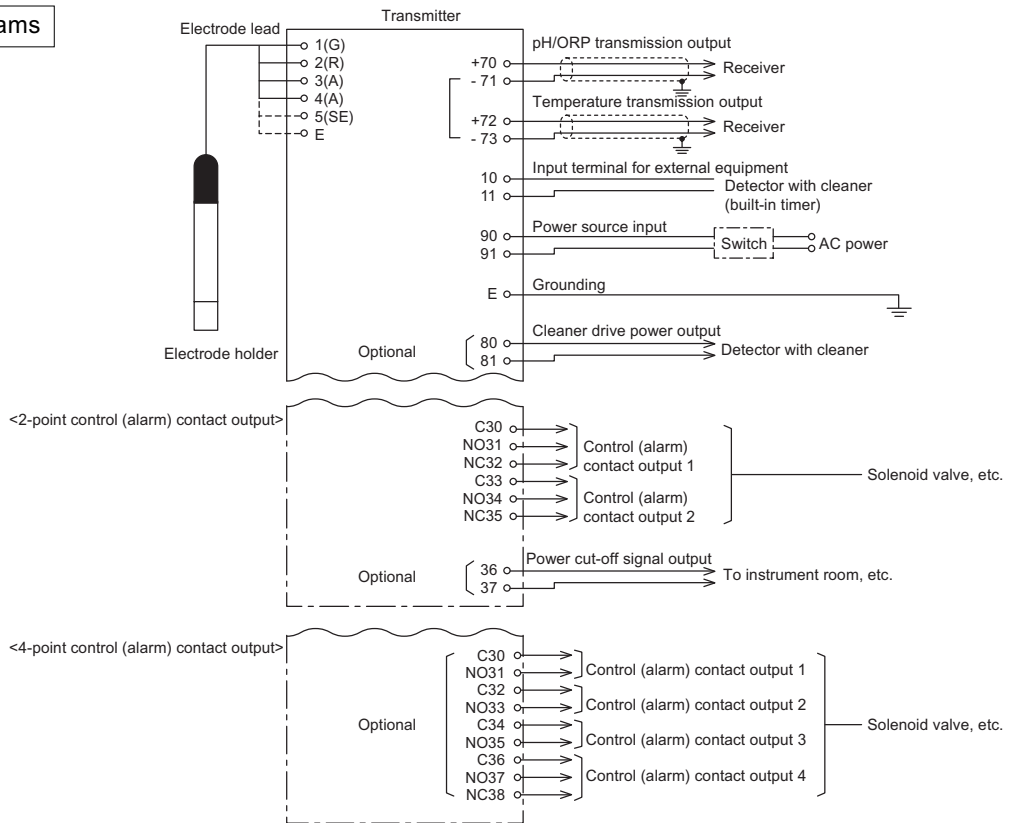
Ability to issue a power cut-off signal (closed contact) when a power failure occurs. (Cannot be used together with 4-point alarm contact outputs.)

Data transfer to a computer via a RS-232C interface (exclusive cable would be needed separately).

Standard Specifications

Product name		pH Analyzer	ORP Analyzer
Model		HBM-160	HBM-162
Measurement range		pH: -1.00~15.00pH (resolution: 0.01pH)	mV: -2000~+2000mV (resolution: 1mV)
		Temperature -5~100°C (resolution: 0.1°C)	
Transmission output range		Adjustable in 0.01pH steps, with minimum width of 2pH (within a range of -1.00~15.00 pH)	Adjustable in 10mV steps, with minimum width of 400mV (within a range of ±2000 mV)
		Temperature: Adjustable in 1°C steps, with minimum width of 10°C (range of -5~100°C)	
Performance (except detector)	Linearity	Within ±0.03pH	Within ±4mV
	Repeatability	Within ±0.02pH	Within ±3mV
Display		Digital LCD	
Transmission output	Isolated	4~20mADC	
	Max resistance	650W or less, pH and solution temperature (2 circuits share a common negative terminal)	650W or less, ORP and solution temperature (2 circuits share a common negative terminal)
Alarm contact output	Object	pH	ORP (mV)
	Number of circuits	2 circuits with form C contacts (Optional: 4 circuits. 3 circuits with form A contacts, 1 circuit with a form C contact.)	
	Contact capacity	250VAC, 3A or less. 30VDC, 3A or less (resistive load)	
	Sensitivity	Set to an unspecified value (2 circuits only)	
Power cut-off signal output (optional)		Provides a closed contact signal when a power failure occurs. Contact capacity: 250VAC, 3A or less (resistive load)	
Input terminal for external equipment		Transmission output is held and alarm contact outputs are reset by receiving this input signal (closing contact point). Then the power (100VAC) is output from the Power output terminal for cleaner (AC OUT 80 & 81) in the case of having optional power output for a cleaner.	
Processing		Microcomputer	
Ambient conditions		-20~55°C, 95% (RH) or less	
Power supply		90~264VAC 50/60Hz	
Power consumption		Approx. 10VA	
Construction		Outdoor installation, dust/jet-proof type (IP65 equivalent)	
Dimensions		181(W) x 180(H) x 95(D)mm	
Mounting		Mounted on 50A pipe (optional: mounted on wall or rack)	
Weight		Approx. 2kg	
Materials	Main unit	Die cast aluminum alloy	
	Window	Polyester resin	
Color		Metallic silver	
Cable entry		Cable gland for φ6~12 cable, 6 ports 6 G1/2 conduit threads can be connected when cable gland is removed.	
Supported equipment	Electrode holder	HC-G70, HC-7, HC-G80, HC-8 and other models	
	Electrode	GSS-304B/314B, 5600 and other models	PSS-304B/314B, 2600 and other models

Wiring diagrams

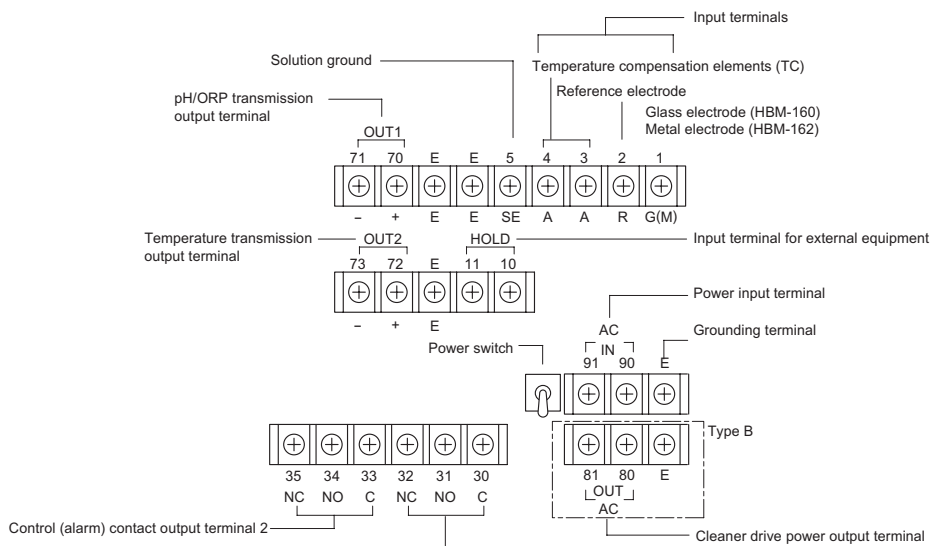


External terminals

There are 6 different patterns for connecting external terminals. The 6 patterns (A to F) are shown in the table below. The pattern used is determined by various factors, such as the number of control (alarm) contact output circuits, the availability of a power cut-off signal output terminal, and the availability of a cleaner drive power output terminal. etc.

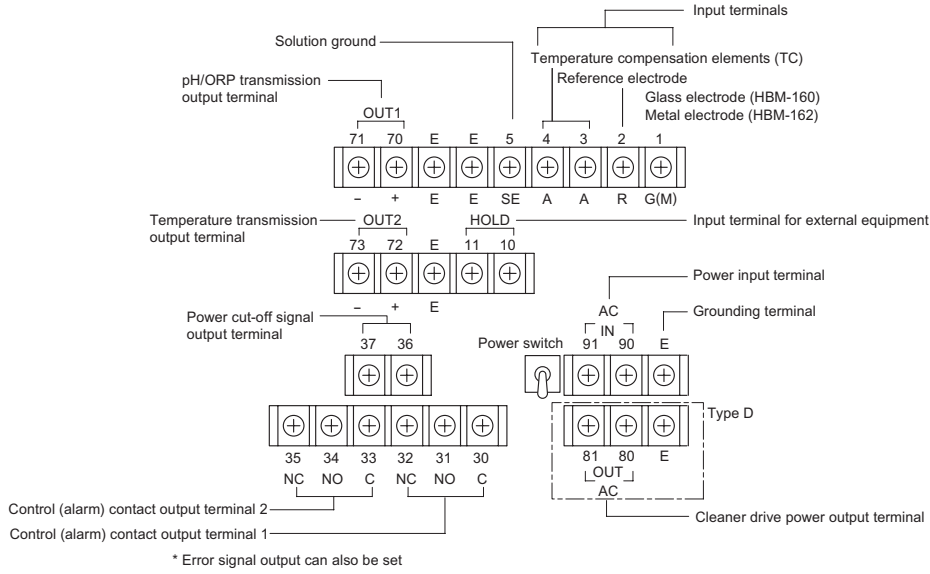
		2-point control (alarm) contact outputs type				4-point control (alarm) contact outputs type (optional)	
		A (standard)	B	C	D	E	F
Power cut-off signal output terminal	None (standard)	○	○			○	○
	Equipped			○	○		
Cleaner drive power output terminal	None (standard)	○		○		○	
	Equipped		○		○		○

Type A and B (2-point control (alarm) contact outputs, no power cut-off signal output terminal available.)

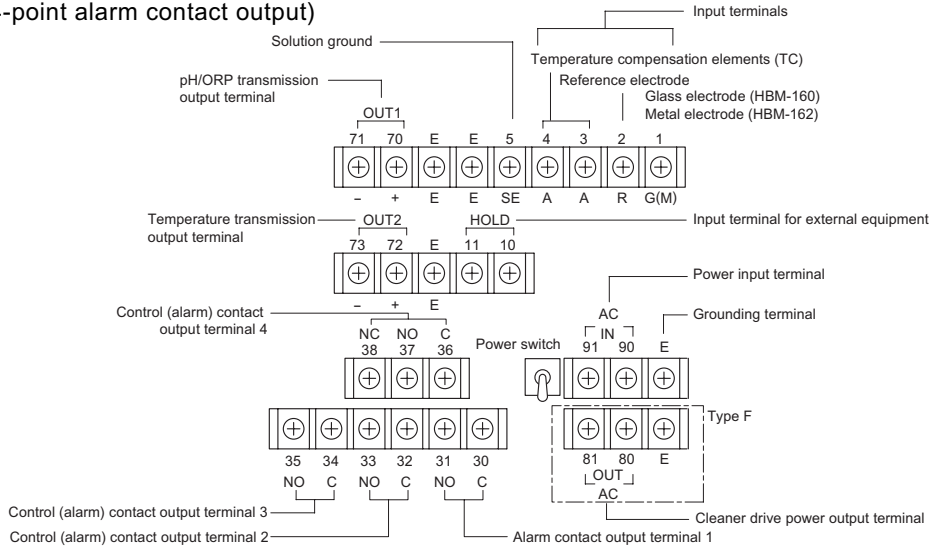


* Error signal output can also be set

Type C and D (2-point control (alarm) contact outputs, power cut-off signal output terminal available.)



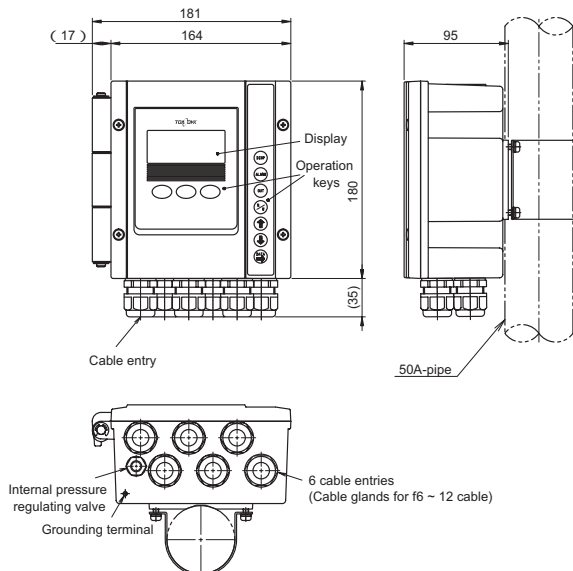
Type E and F (4-point alarm contact output)



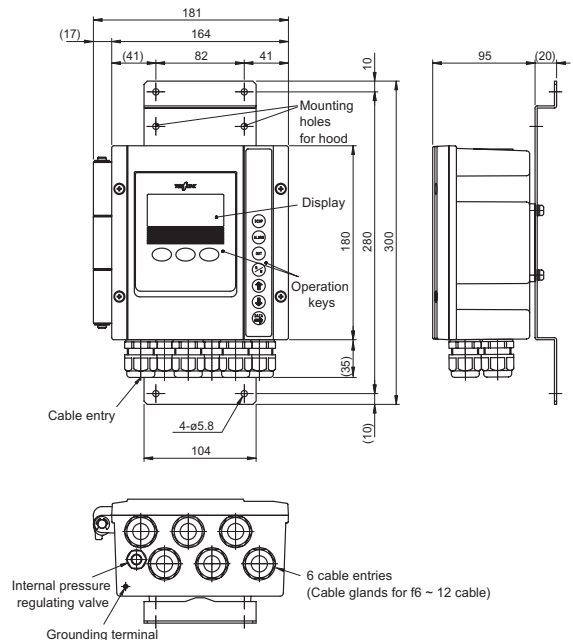
Dimensions

Unit : mm

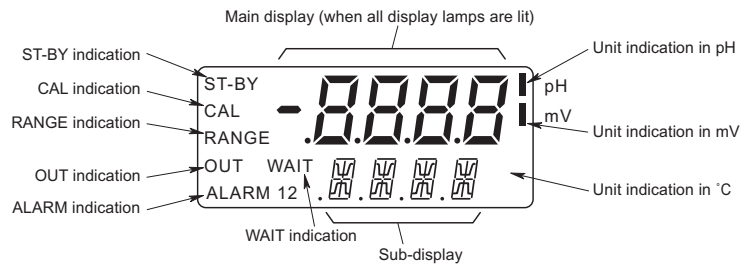
● Mounted on a pipe



● Mounted on a wall or rack



Display



Product code HBM-160 pH Analyzer

Code	Description
HBM160-3-	
A	pH-value transmission output range (4~20mADC)
B	0~14 pH
C	2~12 pH
D	4~14 pH
Y	4~10 pH
	Custom specifications *1
A	Solution temperature transmission output range (4~20mADC)
Y	0~50°C
	Custom specifications *2
0	Digital output (RS-232C interface)
1	None
	Equipped
A	High/low limits control (alarm) contact output
B	2-point alarm (high/low limits can be freely set)
	4-point alarm (high/low limits can be freely set)
0	Status signal (Maintenance/Cleaning/Instrument error) output function *3
1	None
	Equipped (status signals are sent from alarm contact output terminals)
0	Power cut-off signal contact output (contact closed when power is cut off)
1	None
	Equipped (only when 2-point alarm contact output is equipped)
0	Cleaner control output 100VAC *4
1	None
	Equipped (when used together with JHC, PHC-7E, or RHC-7EC, etc.)
A	Surface finish (coating) *5
B	Standard coating
	High performance coating
0	Arrester *6
1	None
	Included
A	Mounting bracket
B	50A pipe mount
	Wall or rack mount
	Cable entry *7
A	Cable gland for ø6~12 cable (standard)
B	Cable gland (conduit threads G1/2 when cable gland is removed)
C	NPT1/2 supplied with 3 adapters
0	Hood (sunshade)
1	None
2	Equipped (50A pipe mount) (Code No 7049930K)
	Equipped (wall mount) (Code No 69304500)
A	Markings
B	Japanese (standard)
	English
0	Official Approval
1	None
	Equipped (with identification tag/inspection certificate)

Custom spec. code;
 Numeric digit: 9
 Alphabet: Z

- *1. Specify the pH measurement output range in 0.1pH increments, with a minimum width of 2pH and a range of -1.00 ~ 15.00pH.
- *2. Specify the solution temperature output range in 1°C increments, with a minimum width of 10°C and a range of -5 ~ 100°C.
- *3. This function is assigned to the control (alarm) contact output terminals. When "Equipped" is specified, the control (alarm) contact output (high / low limits) or status signal (Maintenance / Cleaning / Instrument error) output can be selected.
- *4. The unit runs on a universal power supply with automatic voltage regulation, while the "E" series (JHC, BHC, RHC and PHC) with which it is used runs on a 100VAC power supply. Thus, when "Equipped" is specified, only 100VAC is supplied to the unit. To run the unit on a supply voltage greater than 100VAC, the ZP-30 step-down transformer is required.
- *5. Standard coating: Melamine primer and topcoat. Average film thickness: Greater than 30µm. Glossiness: G40. High performance coating: Epoxy primer and middle coat, polyurethane resin topcoat. Average film thickness: Greater than 100µm. Glossiness: G80.
- *6. A ceramic surge arrester (simplified) must be mounted on the power line and transmission line.
- *7. There are 6 cable entries with cable glands for ø6 ~ 12 cable (G1/2 conduit threads when the cable gland is removed). The NPT1/2 is supplied with 6 SUS316 adapters. After removing the cable glands, screw the required number of adapters into the cable entries. The standard cable glands should be left in the cable entries that are not used in order to seal them shut.

Note 1. This product is a pH transmitter that has square shape die-cast aluminum case, sheet key operation on the front panel and wire connection availability from front side. And it has various outputs like sample temperature transmission, contact outputs for adjustment and control output for the cleaner. And there are many useful functions like electrode crack detection (self-diagnosis and burn-out), pH shift, temperature shift, pH temperature compensation and others.

Note 2. Universal power source 90 ~ 264VAC, 50/60Hz.

Note 3. All alarm outputs are set to "OFF" as factory setting.

Note 4. GSS tip type replaceable pH electrode that has Pt 1k ohm temperature sensor can be combined.

Product code HBM-162 ORP Analyzer

HBM162-3-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
A	mV-value transmission output range (4~20mADC)									
B	-700~+700 mV									
C	-1000~+1000 mV									
Y	-2000~+2000 mV									
	Custom specifications *1 ¹									
A	Solution temperature transmission output range (4~20mADC)									
Y	0~50°C									
	Custom specifications *2									
0	Digital output (RS-232C interface)									
1	None									
	Equipped									
A	High/low limits control (alarm) contact output									
B	2-point alarm (high/low limits can be freely set)									
	4-point alarm (high/low limits can be freely set)									
0	Status signal (Maintenance/Cleaning/Instrument error) output function *3									
1	None									
	Equipped (status signals are sent from the alarm contact output terminals)									
0	Power cut-off signal output (contact closed when power is cut off)									
1	None									
	Equipped (only when 2-point alarm contact output is equipped)									
0	Cleaner control output 100VAC *4									
1	None									
	Equipped (when used together with JHC, PHC-7E, or RHC-7EC, etc.)									
A	Surface finish (coating) *5									
B	Standard coating									
	High performance coating									
0	Arrester *6									
1	None									
	Included									
A	Mounting bracket									
B	50A pipe mount									
	Wall or rack mount									
	Cable entry *7									
A	Cable gland for ø6~12 cable (standard)									
B	Cable gland (conduit threads G1/2 when cable gland is removed)									
C	NPT1/2 supplied with 3 adapters									
0	Hood (sunshade)									
1	None									
2	Equipped (50A pipe mount) (Code No 7049930K)									
	Equipped (wall mount) (Code No 69304500)									
	Markings									
A	Japanese (standard)									
B	English									

Custom spec. code;
Numeric digit: 9
Alphabet: Z

*1. Specify the mV measurement output range in 1mV increments, with a minimum width of 400mV and a range of -2000 ~ +2000mV.
 *2. Specify the solution temperature output range in 1°C increments, with a minimum width of 10°C and a range of -5 ~ 100°C.
 *3. This function is assigned to the control (alarm) contact output terminals. When "Equipped" is specified, the control (alarm) contact output (high / low limits) or status signal (Maintenance / Cleaning / Instrument error) output can be selected.
 *4. The unit runs on a universal power supply with automatic voltage regulation, while the "E" series (JHC, BHC, RHC and PHC) with which it is used runs on a 100VAC power supply. Thus, when "Equipped" is specified, only 100VAC voltage is supplied to the unit. To run the unit on a supply voltage greater than 100VAC, the ZP-30 step-down transformer is required.
 *5. Standard coating: Melamine primer and topcoat. Average film thickness: Greater than 30µm. Glossiness: G40. High performance coating: Epoxy primer and middle coat, polyurethane resin topcoat. Average film thickness: Greater than 100µm. Glossiness: G80.
 *6. A ceramic surge arrester (simplified) must be mounted on the power line and transmission line.
 *7. There are 6 cable entries with cable glands for ø6~12 cable (G1/2 conduit threads when the cable gland is removed). The NPT1/2 is supplied with 6 SUS316 adapters. After removing the cable glands, screw the required number of adapters into the cable entries. The standard cable glands should be left in the cable entries that are not used in order to seal them shut.

Note 1. This product is an ORP transmitter that has square shape die-cast aluminum case, sheet key operation on the front panel and wire connection availability from front side. And it has various outputs like sample temperature transmission, contact outputs for adjustment and control output for the cleaner. And there are many useful functions like memory failure detection, temperature sensor failure detection (self-diagnosis and burn-out), mV shift, temperature shift and others.

Note 2. Universal power source 90 ~ 264VAC, 50/60Hz.

Note 3. All alarm outputs are set to "OFF" as factory setting.

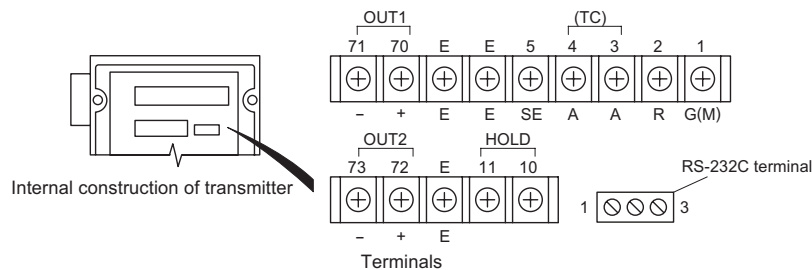
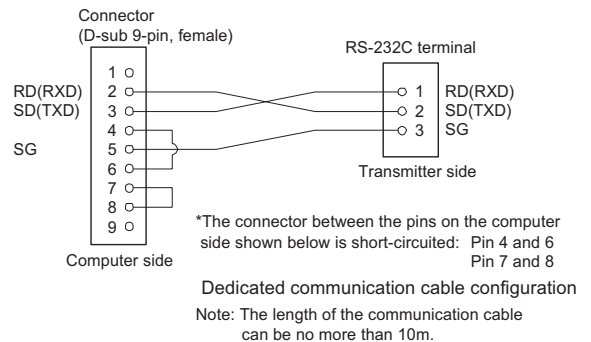
Note 4. GSS tip type replaceable pH electrode that has Pt 1k ohm temperature sensor can be combined.

Optional features

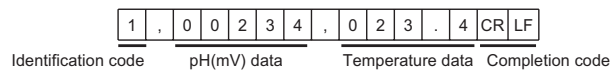
● RS-232C interface

When "Equipped" is selected for the RS-232C output setting, a RS-232C interface is added to the terminal area. This makes it possible to transfer measurement data to a computer.

Terminal block for RS-232C			
Terminal number	Signal code	Signal name	Input/output direction
1	RD (RXD)	Received data	Input
2	SD (SXD)	Transmitted data	Output
3	SG	Signal ground	—



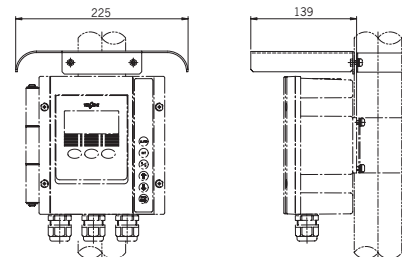
When a request is received from the computer, the transmitter sends out data in the following format.



● Hood

Recommended for when the instrument is installed outdoors at a location exposed to direct sunlight.

Material : SUS304
 Mounting : 50A pipe or wall
 Part number : 7049930K

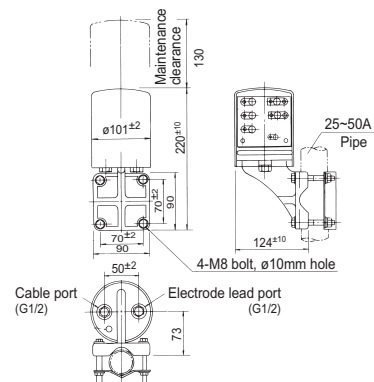


Related equipment

● Junction box

Junction box and Extension cable are required when the transmitter and electrode are installed away from each other and the standard electrode lead length (5m) is too short. Both of them are special high insulating shield structure.

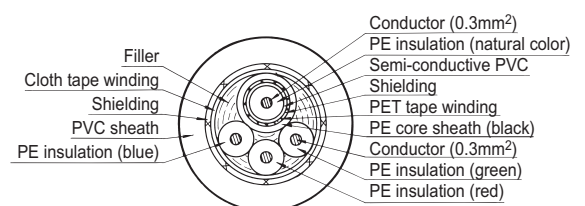
Model : FC-4
 Construction : Outdoor installation
 Weight : Approx. 0.9kg
 Case / base material : ABS resin
 Finish : Pearskin finish chromium plating
 Mounting : 25 ~ 50A pipe, wall or panel mount



● Extension cable

The extension cable is a special cable specifically manufactured for a pH/ORP analyzer. It connects the transmitter and junction box.

Model : EC-10
 Outside diameter : ø8
 Insulation : Polyethylene and PVC
 Sheath : PVC
 Insulation resistance : 10⁹MΩ or greater/100m. between core conductors
 Maximum cable length : 100m, no cable splicing.
 Standard length : 5m ~ 100m (5m unit step)
 Weight : Approx. 0.5kg/5m



Cross section of EC-10

Supported detectors

There are detectors for replaceable tip type electrodes and ones for conventional integrated type electrodes. Select suitable detectors for your application considering measurement condition at a site.

● Detectors for replaceable-tip electrodes

Classification	Application	Model	Wetted part material	pH electrode	ORP electrode	
KCl supply type	General process use (60°C or below)	HC-G70	PVC	GSS-314B (general use)	PSS-314B (Pt)	
	Immersion type	High temperature process (80°C or below)	HC-G70			PP
Flow-through type	General process use, pressurized type (60°C or below)	HC-G80P	PVC	GSS-314A (high alkali resistant)	ASS-314B (Au)	
	High temperature process, pressurized type (80°C or below)	HC-G82P	PP / SUS316			GSS-314F (hydrofluoric acid resistant)
KCl non-supply type	Effluent treatment (60°C or below)	HC-G70	PVC	GSS-304B (general use)	PSS-304B (Pt)	
	Immersion type	High temperature effluent treatment (80°C or below)	HC-G70			PP
		Effluent treatment, drop-in type	HC-G72			SUS316
Flow-through type	Effluent treatment (60°C or below)	HC-G95	PVC / SUS316	GSS-304F (hydrofluoric acid resistant)	ASS-304B (Au)	
	High temperature effluent treatment (80°C or below)	HC-G80	PVC			
		HC-G82	PP / SUS316			

● Detectors for integral (conventional) KCl supply type electrodes

Classification	Application	Model	Wetted part material	pH electrode	ORP electrode
Immersion type	General process use/effluent treatment (60°C or below)	HC-703C	PVC	5600 (general use) 5605 (hydrofluoric acid resistant)	2600 : Pt 2605 : M
	High temperature process (80°C or below)	HC-763	PP	5601	2601 : Pt
	High temperature process, chemical resistant	HC-703F	PVDF	5601	—
	High temperature process, organic solvent resistant	HC-703T	PFA / PTFE	5602	—
Flow-through type	General process use/effluent treatment, insertion type, pressurized type (80°C or below)	HC-880	PP	5610 (room temperature) 5611 (high temperature)	2610 : Pt
	General process use/effluent treatment, pressurized type, supplied with PP case	NHC-882	PP		
	General process use/effluent treatment, pressurized type, supplied with SUS case	NHC-883	PP / SUS316		
Micro flow rate type	For boiler and pure water	HC-64	Acrylic	MG511 4164 / 6149	—



DKK-TOA CORPORATION



CAUTION

Do not operate products before consulting instruction manual.

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