

The contents of this Engineering Sheet are subject to change without prior notice, and without any subsequent liability to this company.

H-1 Series Dissolved Oxygen Converter (Four-Wire Type)

HD-200



■ Overview

- The HD-200 is designed to enable you to measure dissolved oxygen in the sample by connecting a DO (dissolved oxygen) sensor.

The measured value and various settings are displayed on the LCD readout. When used with our cleaning apparatus, the HD-200 enables you to control the cleaning apparatus.

It features a variety of self-diagnostic functions allowing you to detect a sensor error and a system error.

■ Measurement target

- Dissolved oxygen in sample water

■ Measuring principle

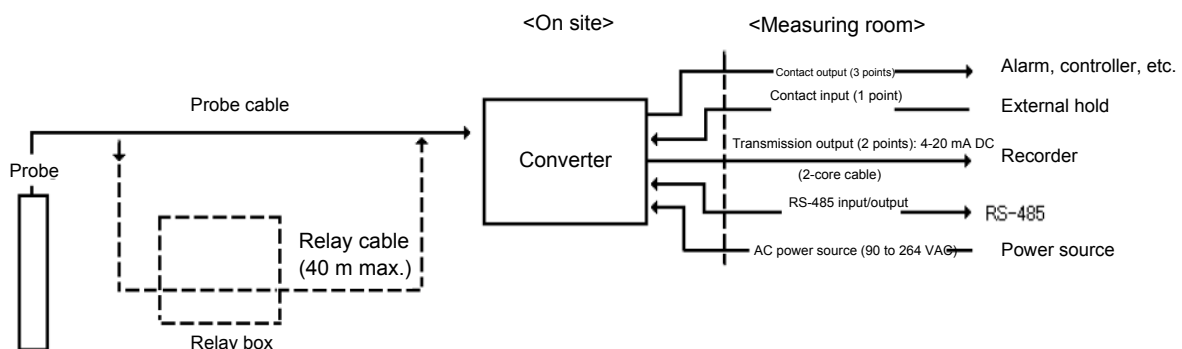
- Diaphragm type polarography

■ Intended use

- Dissolved oxygen in effluent treatment
- Dissolved oxygen in water tank for aquafarming and the like

■ System configuration diagram

Standard specification



* The relay box and the dedicated cable are used when the sensor lead of 10 m is insufficient.

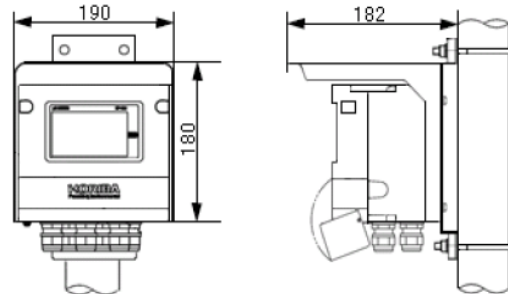
H-1 Series Dissolved Oxygen Converter

HD-200 Readout Converter

■ Features

- Outdoor installation type (splash-proof construction equivalent to IP65)
- Selectable simultaneous display of temperature
- All settings available with front keys
- Improved maintenance feature (self-diagnostic capability)
- Selectable transmission output range
- Backup of stored data
- Easy-to-read display (150% larger than former display)
- Improved operability of keys by using an emboss sheet

■ External Dimensions



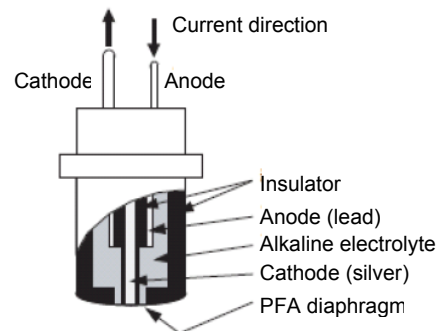
■ Sensor

The structure of the diaphragm type polarographic sensor is shown in the right figure. The sensor has an anode made of silver and a cathode consisting of carbon closely attached to the diaphragm in gas permeation film made of PFA (fluorine resin film). The dissolved oxygen in the sample water transmits through the PFA diaphragm and causes the following electrochemical reaction on the cathode surface:

Cathode reaction: $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$

Anode reaction: $Ag + Cl \rightarrow AgCl + e^-$

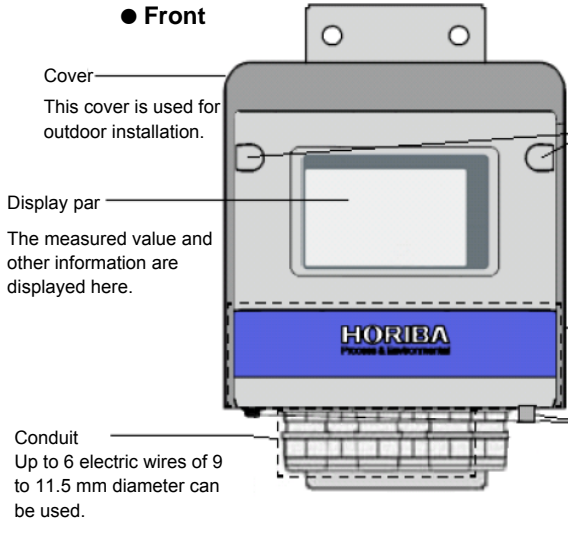
Voltage is applied between both poles by the converter. Electric current flows as a reaction with oxygen occurs. The magnitude of this electric current is in proportion to the partial pressure of oxygen in the sample water. The dissolved oxygen can be measured by detecting the electric current. The transmittance of oxygen that transmits through the diaphragm changes with temperature. The amount of air-saturated oxygen in water also changes with temperature. Therefore, corrective calculation is performed by detecting the temperature. If the flow rate of the sample water is low, concentration gradient occurs on the surface of the diaphragm. This requires giving a higher flow rate than the specified one.



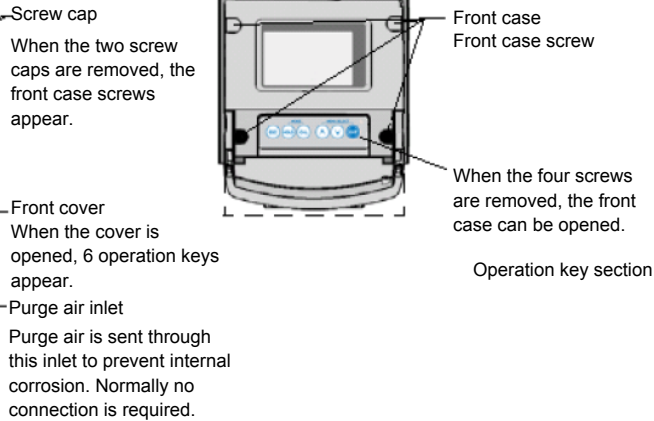
Configuration of diaphragm type sensor

■ Configurations

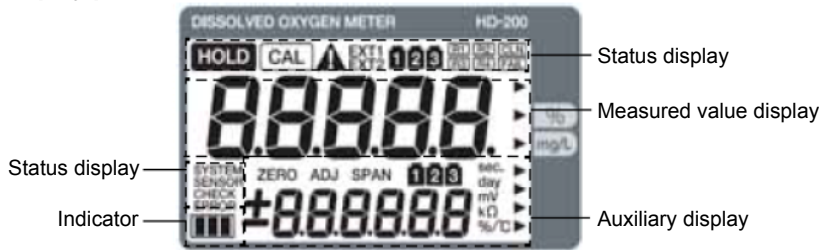
● Front



● With the front cover opened



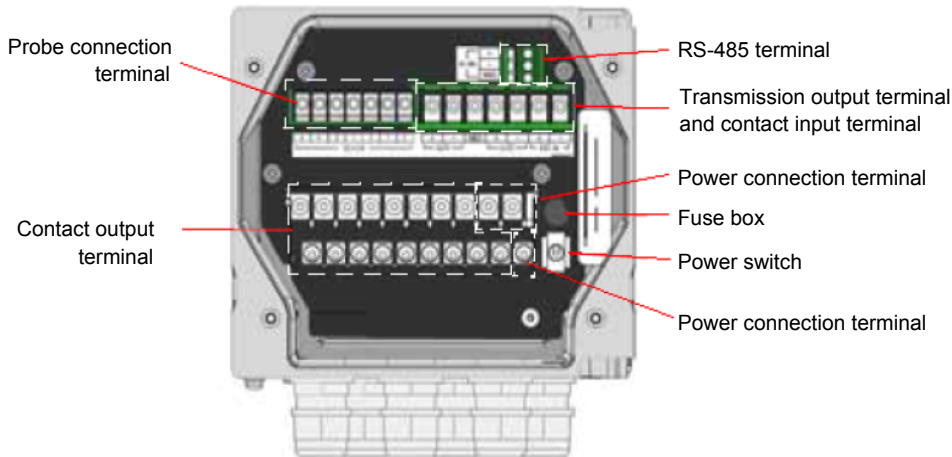
● Display part



● Operation keys

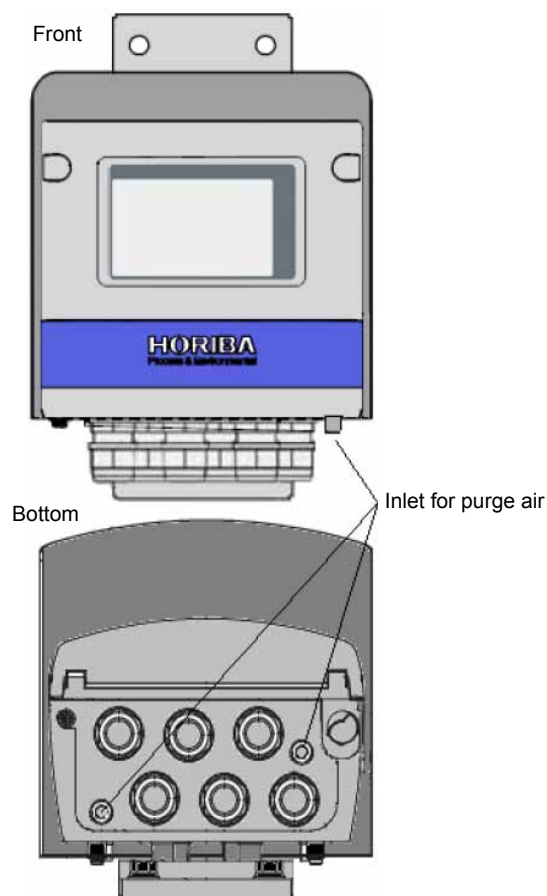


● Terminal block



■ Air purge

Air inlets for purge are provided to prevent internal corrosion. To use the HD-200 in an environment where corrosive gas is generated, prevent corrosive gas from entering the inside by constantly sending instrument air.



■ Amount of saturated dissolved oxygen

The dissolved oxygen in the sample water transmits through the PFA diaphragm and causes an electrochemical reaction on the surface of the cathode.

Voltage is applied between the cathode and the anode by the converter. Electric current flows when a reaction with oxygen occurs. The magnitude of this electric current is in proportion to the partial pressure of oxygen in the sample water. The dissolved oxygen can be measured by detecting the electric current.

The transmittance of oxygen that transmits through the diaphragm changes with temperature. The amount of air-saturated oxygen in the water also changes with temperature. Therefore, the temperature is detected to perform corrective calculation.

If the flow rate of the sample water is low, concentration gradient occurs on the surface of the diaphragm. This requires giving a higher flow rate than the specified one.

Table 1 Amount of saturated dissolved oxygen (mg/L) at salt concentration and temperature

Temperature (°C)	Salt:SALINITY(%)										
	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5.000
0	14.16	13.74	13.32	12.90	12.48	12.06	11.64	11.22	10.80	10.38	9.96
1	13.77	13.37	12.96	12.55	12.14	11.73	11.33	10.92	10.51	10.10	9.70
2	13.40	13.01	12.61	12.22	11.82	11.42	11.03	10.63	10.24	9.84	9.45
3	13.05	12.66	12.28	11.89	11.51	11.13	10.74	10.36	9.98	9.59	9.21
4	12.70	12.33	11.96	11.59	11.21	10.84	10.47	10.10	9.72	9.35	8.98
5	12.37	12.01	11.65	11.29	10.93	10.57	10.21	9.85	9.48	9.12	8.76
6	12.06	11.71	11.36	11.01	10.66	10.31	9.96	9.61	9.26	8.91	8.55
7	11.76	11.42	11.08	10.74	10.40	10.06	9.72	9.38	9.04	8.70	8.36
8	11.47	11.14	10.81	10.48	10.15	9.82	9.49	9.16	8.83	8.50	8.17
9	11.19	10.87	10.55	10.23	9.91	9.59	9.27	8.95	8.63	8.31	7.99
10	10.92	10.61	10.30	9.99	9.68	9.37	9.06	8.75	8.44	8.12	7.81
11	10.67	10.37	10.07	9.76	9.46	9.16	8.86	8.55	8.25	7.95	7.65
12	10.43	10.13	9.84	9.55	9.25	8.96	8.67	8.37	8.08	7.78	7.49
13	10.20	9.91	9.63	9.34	9.05	8.77	8.48	8.20	7.91	7.63	7.34
14	9.98	9.70	9.42	9.14	8.86	8.59	8.31	8.03	7.75	7.47	7.20
15	9.76	9.49	9.22	8.95	8.68	8.41	8.14	7.87	7.60	7.33	7.06
16	9.56	9.30	9.04	8.77	8.51	8.24	7.98	7.72	7.45	7.19	6.93
17	9.37	9.11	8.86	8.60	8.34	8.09	7.83	7.57	7.31	7.06	6.80
18	9.19	8.94	8.68	8.43	8.18	7.93	7.68	7.43	7.18	6.93	6.80
19	9.01	8.77	8.52	8.28	8.03	7.79	7.54	7.30	7.05	6.81	6.56
20	8.84	8.60	8.37	8.13	7.89	7.65	7.41	7.17	6.93	6.69	6.45
21	8.68	8.45	8.22	7.98	7.75	7.51	7.28	7.05	6.81	6.58	6.34
22	8.53	8.30	8.07	7.84	7.61	7.39	7.16	6.93	6.70	6.47	6.24
23	8.39	8.16	7.94	7.71	7.49	7.26	7.04	6.81	6.59	6.36	6.14
24	8.25	8.03	7.81	7.58	7.36	7.14	6.92	6.70	6.48	6.26	6.04
25	8.12	7.90	7.68	7.46	7.25	7.03	6.81	6.59	6.38	6.16	5.94
26	7.99	7.77	7.56	7.35	7.13	6.92	6.70	6.49	6.28	6.06	5.85
27	7.87	7.66	7.44	7.23	7.02	6.81	6.60	6.39	6.18	5.97	5.75
28	7.75	7.54	7.33	7.12	6.92	6.71	6.50	6.29	6.08	5.87	5.66
29	7.64	7.43	7.23	7.02	6.81	6.61	6.40	6.19	5.99	5.78	5.57
30	7.53	7.33	7.12	6.92	6.71	6.51	6.30	6.10	5.89	5.69	5.48
31	7.43	7.22	7.02	6.82	6.61	6.41	6.21	6.00	5.80	5.60	5.39
32	7.33	7.12	6.92	6.72	6.52	6.31	6.11	5.91	5.71	5.50	5.30
33	7.23	7.03	6.82	6.62	6.42	6.22	6.02	5.82	5.61	5.41	5.21
34	7.13	6.93	6.73	6.53	6.33	6.13	5.92	5.72	5.52	5.32	5.12
35	7.04	6.84	6.64	6.44	6.23	6.03	5.83	5.63	5.43	5.23	5.02
36	6.95	6.75	6.55	6.34	6.14	5.94	5.74	5.54	5.33	5.13	4.93
37	6.86	6.66	6.45	6.25	6.05	5.85	5.64	5.44	5.24	5.03	4.83
38	6.77	6.57	6.36	6.16	5.96	5.75	5.55	5.34	5.14	4.93	4.73
39	6.68	6.48	6.27	6.07	5.86	5.66	5.45	5.24	5.04	4.83	4.63
40	6.60	6.39	6.18	5.97	5.77	5.56	5.35	5.14	4.94	4.73	4.52

Power supply

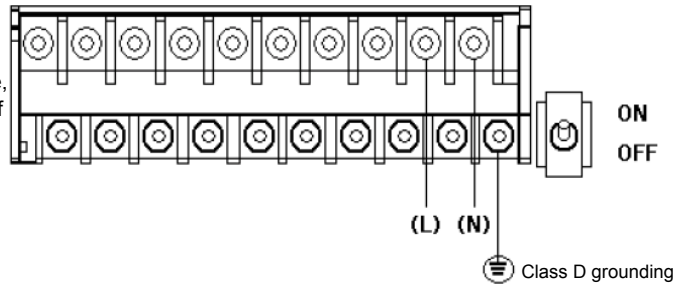
The HD-200 is provided with a power switch. It uses a free power source with rated voltage of 100 to 240 VAC. Operation outside the rated range can cause a fault. Therefore, check the power supply voltage. Also check that fluctuations of the power supply voltage fall within $\pm 10\%$.

Major specifications

- The terminal screw for the contact output is of M4.
- The applicable electric wire is of 0.75 to 5.5 mm² (AWG18 to 10).

Position the power switch near the HD-200 so that the power can be turned ON/OFF. If lightning might strike, install an arrester on the output side of the HD-200 and on the side of receiving instruments.

Be sure to ground the grounding terminal (class D grounding). Separate this grounding from any other grounding for electric equipment such as a motor.



Rated voltage	Voltage: 100 to 240 VAC
	Frequency: 50/60 Hz
Applicable electric wire	0.75 to 5.5 mm ² (AWG18 to 10).

Contact output

Three contact output points are provided as standard. Contact outputs such as transmission output hold and error alarm are available in addition to the upper and lower alarm contact outputs.

Major specifications

The contact capacity is 250 VAC, 3 A maximum or 30 VDC, 3 A maximum for resistance load.

- The terminal screw for the contact output is of M4.
- The applicable electric wire is of 0.75 to 5.5 mm² (AWG18 to 10).

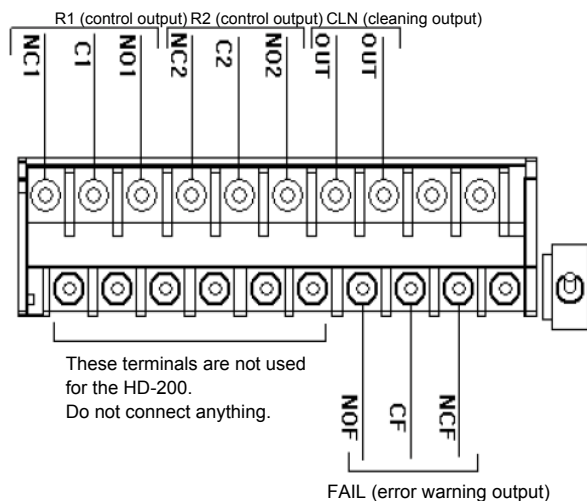
If noise is included in the load, use a varistor or a noise killer.

Only the CLN output involves voltage, allowing the connected power supply voltage to be output. The others are no-voltage contact outputs.

For only the FAIL output, the positions of NO and NOC are reversed. In the normal state (not FAIL), the CF-NOF contact is open and the CF-NFC contact is short-circuited. When the power is OFF, the C-NOF contact is short-circuited.

The blank terminals are internally connect to each other. Do not connect anything.

When a load larger than the contact capacity is connected or when an induction load (e.g. a motor or a pump) is used, be su to connect the load via a power relay larger than the load rating. When the HO-200 is OFF, the C-NC contact between R1 and R2 is short-circuited. Therefore, exercise care in connecting a load.

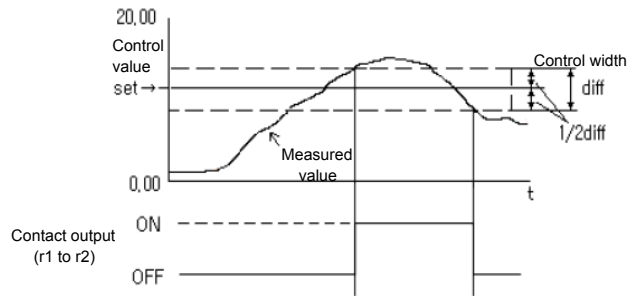


Contact Capacity:	250 VAC, 3A max. or 30 VDC, 3 A maximum
Applicable electric	0.75 to 5.5 mm ² (AWG18 to 10)
Kinds of alarms	Ctrl control output, alarm output Temperature alarm output, HOLD output FAIL output, Clu output

Ctrl: Control output

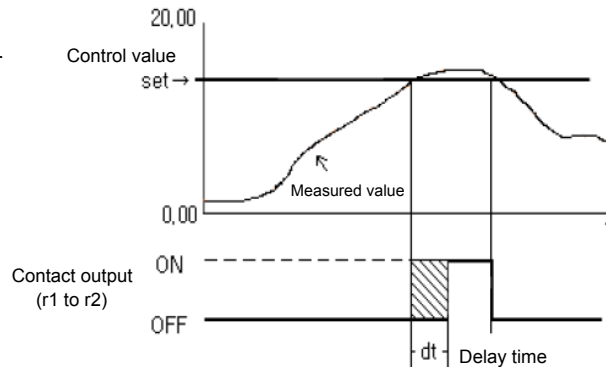
When the measured value is larger than (control value plus control width $\times 1/2$), the control output is turned ON. When the measured value is smaller than (control value minus control width $\times 1/2$), the control output is turned OFF

These are the upper-limit actions. For the lower-limit actions, reverse them.)

**"AL": Alarm output**

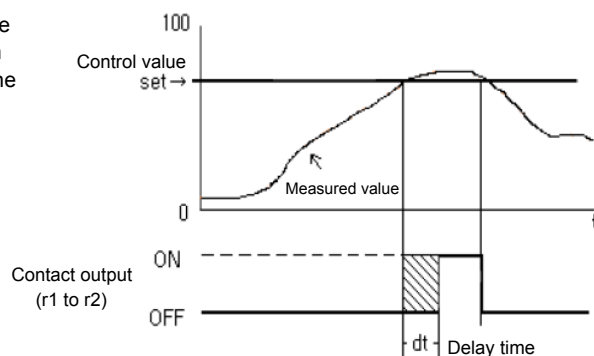
When the measured value is larger than the setting value, the output will be turned ON to trigger the alarm after the delay time. When the measured value becomes smaller than the setting value, the output is turned OFF and the alarm is canceled. The setting of output delay time (0 to 600 seconds) is also possible.

These are the upper-limit actions. For the lower-limit actions, reverse them.)

**"t": Temperature alarm output**

When the temperature value is larger than the setting value, the output will turn ON to issue an alarm after the delay time. When the temperature value becomes smaller than the setting value, the output is turned OFF and the alarm is canceled. The setting of output delay time (0 to 600 seconds) is also possible.

These are the upper-limit actions. For the lower-limit actions, reverse them.)

**HoLd: Output during hold mode**

When the measured value is held, the output will be turned ON after the delay time. Immediately after the hold mode has been canceled, the output is turned OFF. The setting of output delay time (0 to 600 seconds) is also possible.

FAIL: FAIL output

This output is turned ON when the full-scale value is exceeded or when a system error occurs. The alarm is triggered when a trouble occurs in the HD-200.

CLn: Cleaning output

The contact signal is output (ON) while the cleaner is operating, or for 5 seconds after the cleaner has stopped.

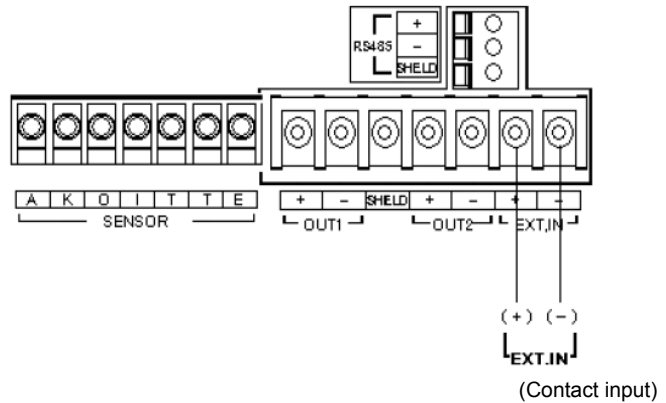
Contact input

The HD-200 is provided with contact input as standard.
The output value is held with an external signal.

Major specifications

- The terminal screws for the contact input is of M3.5.
- The applicable electric wire is of 2 mm² (AWG14) maximum.

For the transmission output cable, use a shielded cable.
When lightning might strike, install an arrester on the output side of the HD-200 and on the side of receiving instruments.
The resistor for the contact input shall be 100 Ω maximum.



Contact input resistance	100Ω/km max.
Applicable electric wire	2mm ² (AWG14) MAX

Transmission output

The HD-200 is provided with two transmission outputs (4 to 20 mA DC).

Transmission output 1 outputs the concentration of dissolved oxygen and transmission output 2 outputs the temperature. When both values fall within the respective full-scale ranges of measured values, arbitrary full-scale ranges may be set for the transmission output. The burnout setting (transmission output: 3.8 or 21 mA) is also possible. When the transmission output is held with an external signal, the HD-200 has a capability of allowing you to determine whether the output value is temporarily held at the immediately previous value or the preset value.

Example: Arbitrary setting of transmission output

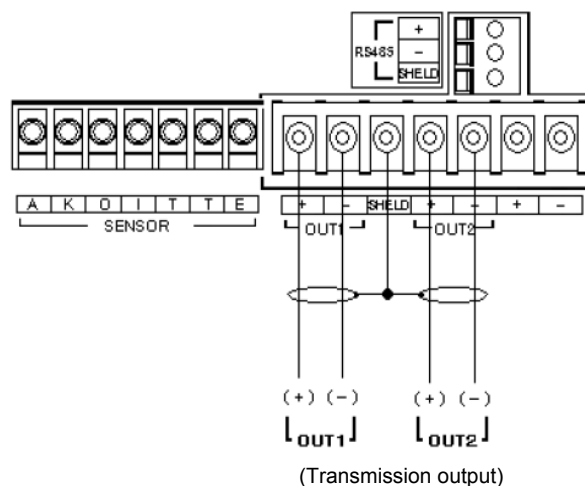
When the measurable full-scale range of dissolved oxygen concentrations is between 0 and 20 mg/L, the transmission output of 4 mA may be set to 5 mg/L and that of 20mA to 15 mg/L.

Example: Transmission output hold

When the held value is set to the directly previous value:
If an external signal is received when the measured value is 10 mg/L, the transmission output maintains the output value of 10 mg/L.

Major specifications

- The terminal screws for the contact input is of M3.5.
- The applicable electric wire is of 2 mm² (AWG14) maximum.



Maximum load resistance	900Ω
Applicable electric wire	2mm ² (AWG14) MAX

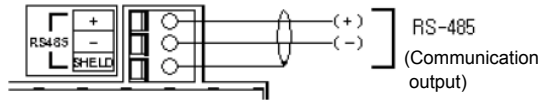
RS-485

The HD-200 has an RS-485 communication terminal. To use this terminal, connect the necessary wiring.

- The applicable electric wire is of 0.14 to 2.5 mm² (AWG26 to 14).
- For the communication output cable, use a twisted shielded pair.

A maximum of 32 units including the host computer may be connected. Specify their addresses.

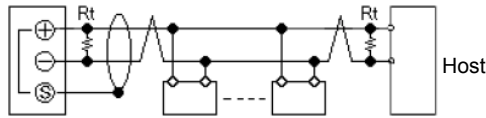
- The communication cable length is 500 m maximum.
- Use a terminating resistor (Rt: 120Ω) for any device at which the RS-485 communication line is terminated.



RS-485 communication	Baud rate	19200 bps
	Character length	8 bit
	Parity	non
	Stop bit	1 bit

Example of external connection for communication

HD-200 RS-485 (Communication output)

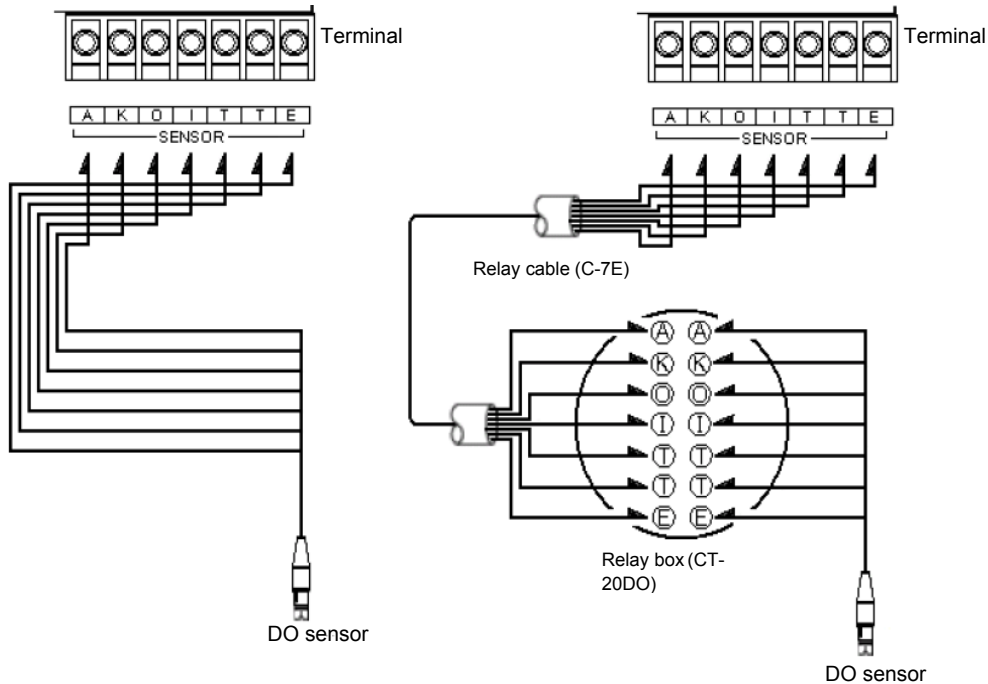


Sensor

The probe cable for the dissolve oxygen meter is of high insulation. In handling this cable, pay attention to the following points:

Keep the sensor cable and the relay cable away from any motor and other inductive device and their power cables.

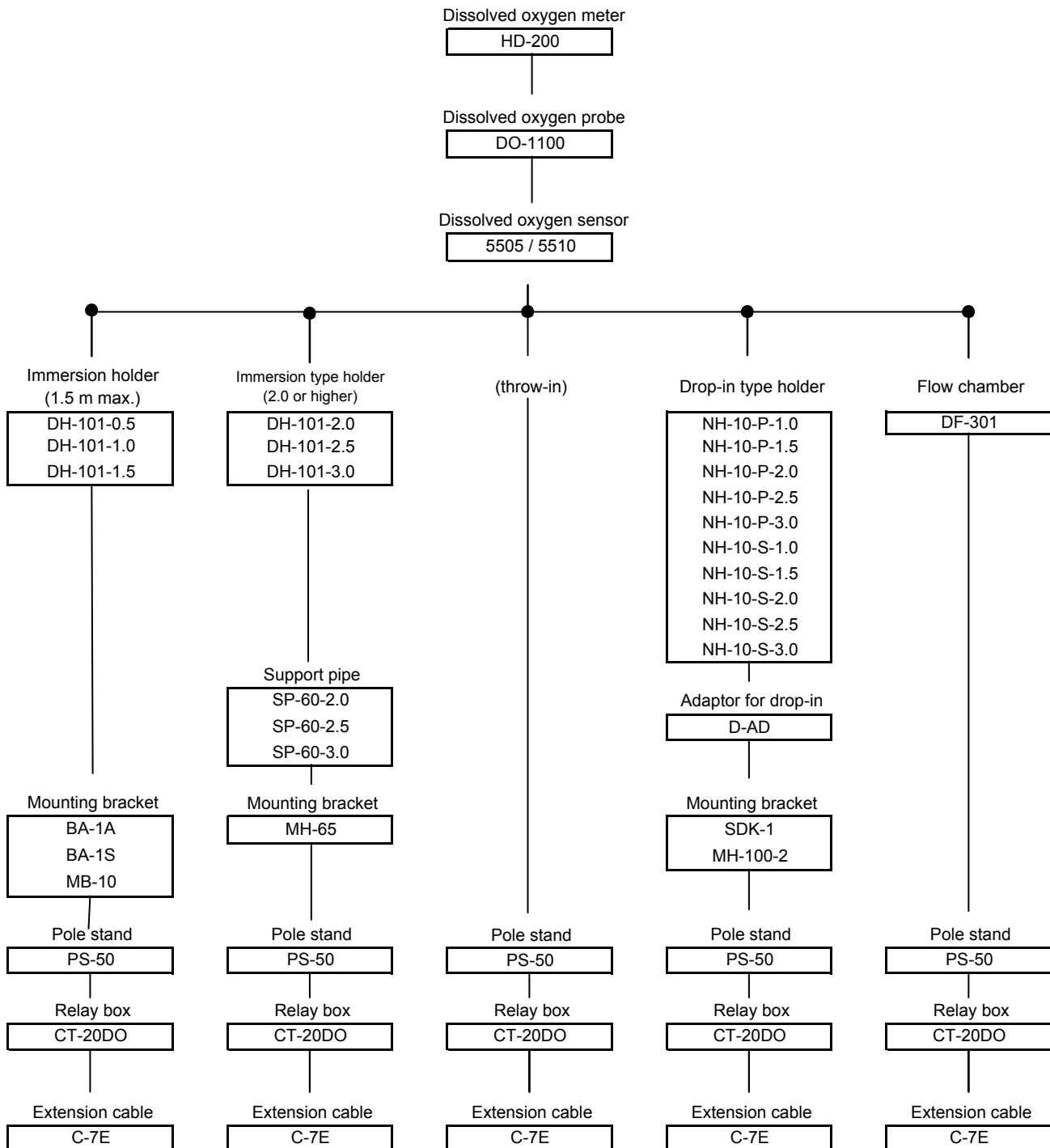
Dissolved oxygen sensor cable DO-1100	A: Anode terminal (sensor)
	K: Cathode terminal (sensor)
	O: External check terminal (self-diagnostics)
	I: Internal check terminal (self-diagnostics)
	T: Temperature compensation terminal (temperature sensor)
	E: Shielded terminal



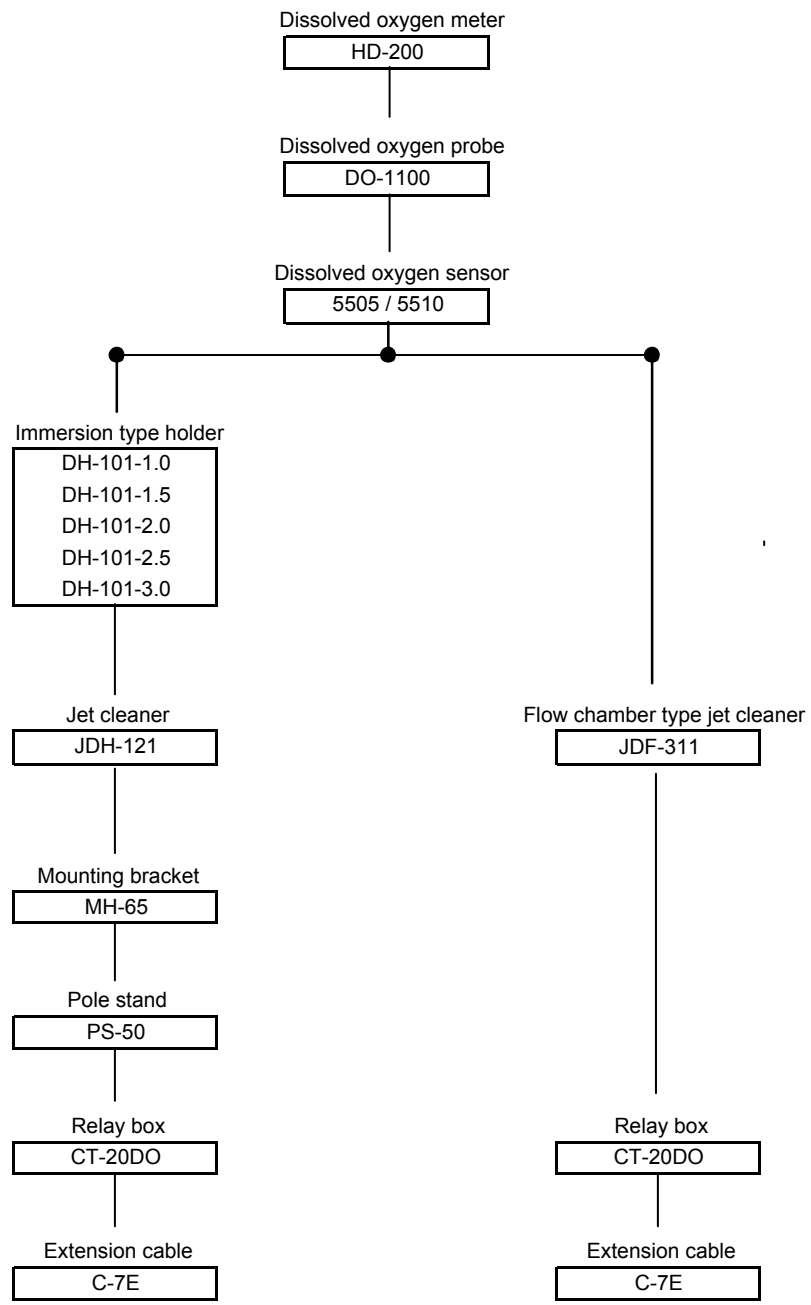
■ Combinations

The following diagram shows the possible combinations of converters, electrodes, holders, and others.
For the detailed specifications, see the items of each product.

When the immersion or flow-through type holder is used



When a cleaner is used



■ Specification 1

Product name	Dissolved oxygen meter for industrial use			
Model	HD-200			
Combination sensor	5505 and 5510 bipolar polarographic sensors			
Combination probe	DO-1100			
Measurable range	Dissolved oxygen concentration	0 to 20 mg/L (readout: 0 to 22 mg/L)		
	Saturation degree	0% to 200% (readout range: 0% to 200%)		
	Temperature	0°C to 50°C (readout range: 10°C to 110°C)		
Display resolution	Dissolved oxygen concentration	0.01mg/L		
	Saturation degree	0.10%		
	Temperature	0.1°C		
Performance	Dissolved oxygen concentration	Repeatability	Within ± 0.5 of full-scale value (with equivalent input)	
		Linearity	Within ± 0.5 of full-scale value (with equivalent input)	
	Temperature	Repeatability	$\pm 0.5^\circ\text{C}$ (with equivalent input)	
		Linearity	$\pm 0.5^\circ\text{C}$ (with equivalent input)	
Transmission output	Number of output points	2 (the negative terminals for transmission outputs are internally connected to each other and have the same electric potential).		
	Output type	4 to 20 mA DC, input/output insulation type		
	Load resistance	900 Ω max.		
	Repeatability	Within ± 0.02 mA (output only)		
	Linearity	Within ± 0.08 mA (output only)		
	Output range	Output 1	Dissolved oxygen concentration: Freely specifiable within the measurable range	
		Output 2	Temperature: Freely specifiable within a range between 0°C and 100°C	
	Error output	With burn-out capability (3.8 or 21 mA)		
	Hold capability	Select holding the previous value or an arbitrary value		
Output terminal	Number of output points	3		
	Output type	No-voltage contact output		
	Contact type	Relay contact, SPDT (1c)		
	Contact Capacity:	250 VAC 3 A; 30 VDC 3A (resistance load)		
	Contact function	RI,R2	Selectable from upper limit alarm, lower limit alarm, ON/OFF control, transmission output currently held, and cleaning output. (closed when alarm is issued; normally open; open when power is turned OFF)	
		FAIL	Error alarm (closed when normal; opened when an error occurs; opened when the power is turned OFF)	
	Description of alarm function	Description of output	Concentration and temperature of dissolved oxygen	
		Description of settings	<ul style="list-style-type: none"> •Setting range: Within measurable range •Delay time: 0 to 600 seconds 	
Description of control function	ON/OFF	<ul style="list-style-type: none"> •Setting range: 0.00 to 20.00 mg/L •Control width: 0.02 to 1.00 mg/L (± 0.01 to ± 0.50 mg/L) 		
Washing output	Number of output points	1		
	Output type	Voltage contact output (output of connected power supply voltage)		
	Contact type	Relay contact, SPST (1a)		
	Contact Capacity:	250 VAC 3 A; 30 VDC 3 A (resistance load)		
	Contact function	Actuation of solenoid valve for washing		
	Description of settings	Washing frequency	0.1 to 168.0 hours	
		Washing time	2 to 600 seconds	
		Hold time	2 to 600 seconds	
Timer accuracy	Within 2 minutes per month			
Description of washing	<ul style="list-style-type: none"> •Function as internal timer •Function as internal timer and function with external input •The internal timer is enabled only when external input is used. Cleaning start signal (the internal cleaning sequence is started by turning this signal ON for 2 seconds minimum) Select one of the above options:			
Contact input	Number of input points	1		
	Contact type	Open collector, no-voltage a-contact		
	Conditions	ON resistance: 100 Ω max. Open voltage: 24 VDC Short-circuit current: 12 mA DC		
	Contact function	External input for washing		
Communication function	Method	RS-485		
	Signal type	Two-wire, input/output insulated type (not insulated from transmission output)		
Temperature compensation	Applicable temperature element	Platinum resistor: 1 k Ω (0°C) (incorporated in the DO-1100 dedicated probe)		
	Temperature compensation range	0 to 50°C		
	Temperature calibration function	One-point calibration using comparison with reference thermometer		

■ Specification 2

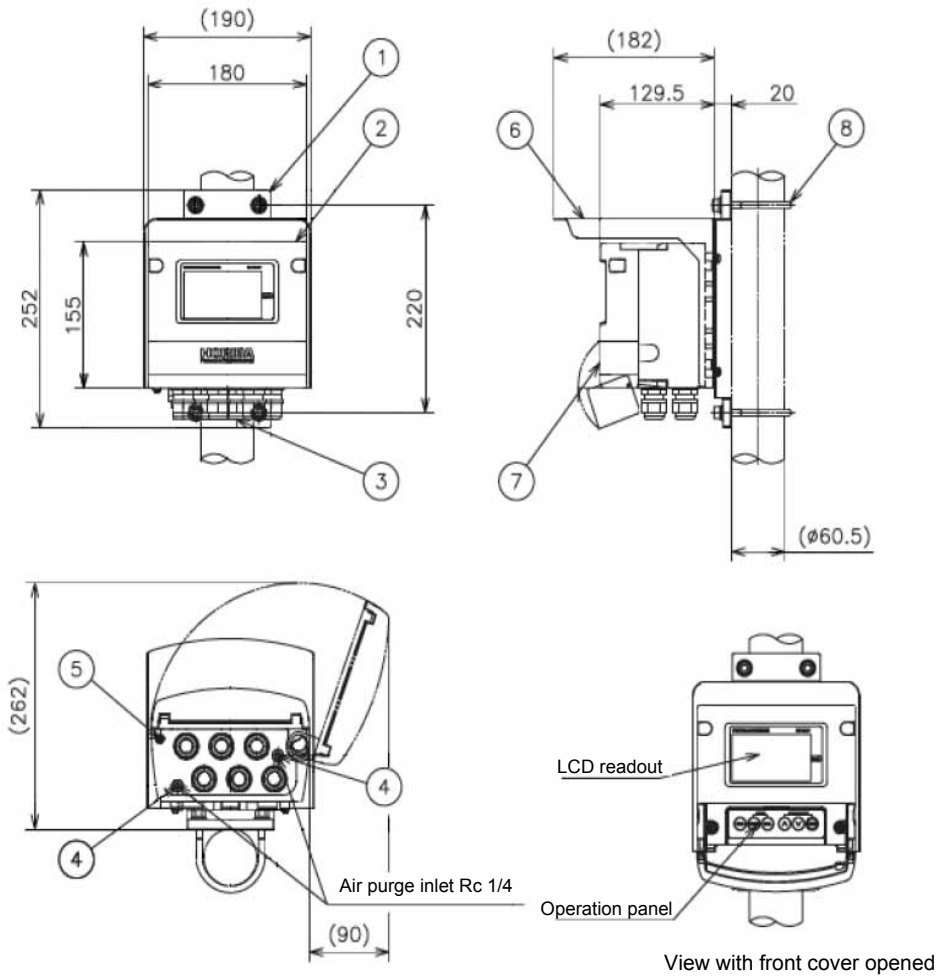
Calibration	Calibration method	Atmospheric calibration or saturated liquid calibration		
	Number of calibration points	Atmospheric calibration: 1 point (for zero calibration, electric zero calibration is performed in the equipment) Saturated liquid calibration: 2 points (zero calibration may be omitted)		
	Additional functions	Added function: Salt correction (0.0 to 5.0) Automatic detection of calibration error (zero and sensitivity) Calibration history (zero, sensitivity, and the number of days that have elapsed since last calibration)		
Self-diagnostics	Calibration errors	Zero calibration error, sensitivity error, and beyond the temperature calibration range		
	Sensor diagnostic error	Sensor error (damage to diaphragm) Disconnection of sensor (the sensor is disconnected or the seal ring is damaged) Temperature sensor is short-circuited or disconnected.		
	Converter error	CPU error, ADC error, and memory error		
Operating temperature range	-20°C to 55°C (without freeze)			
Operating humidity range	Relative humidity: 5% to 90% (without condensation)			
Storage temperature	-25 to 65°C			
Power Source	Power supply voltage range	AC90 to 264V 50/60Hz		
	Power consumption	15VA(max)		
	Others	With built-in time lag fuse (250 V, 1 A) With built-in power switch for maintenance		
Applicable standards	CE marking	EMC Directive (2000/108/EC)		
		Low Voltage Directive (2006/95/EC) EN61010-1: 2001		
	EMC	Immunity Industrial location	Electrostatic discharge	IEC61000-4-2
			Radiated radiofrequency electromagnetic field	IEC61000-4-3 (*1)
			Electric fast transient/burst	IEC61000-4-4
			Surge	IEC61000-4-5 (*2)
			Conducted interference induced by radiofrequency	IEC61000-4-6 (*1)
			Voltage dip, short-time power outage, and voltage fluctuation	IEC610000-4-11
	Emission ClassA	Radiated disturbance	CISPR 11 CLASSA	
		Noise terminal voltage	CISPR 11 CLASSA	
Low voltage	Contamination level 2			
FCC Rules	Part 15 CLASS A			
Structure	Installation	Outdoor installation type		
	Installation method	50 A pole or wall mounting		
	International protection code	IP65		
	Case material	Aluminum alloy (coated with epoxy modified melamine resin)		
	Mounting bracket material	SUS304		
	Hood material	SUS304 stainless steel (coated with epoxy modified melamine resin)		
	Readout window material	Polycarbonate		
	Readout element	Reflection type monochrome LCD		
External dimensions	180 (W) x 155 (H) x 115 (D) (excluding the mounting bracket)			
Weight	Body: Approx. 3.5 kg; hood and mounting bracket: Approx. 1 kg			

*1: The effect on readouts in the radiated radiofrequency electromagnetic field and conducted interference tests must be within the measured DO value \pm 0.4 mg/L as a criterion.

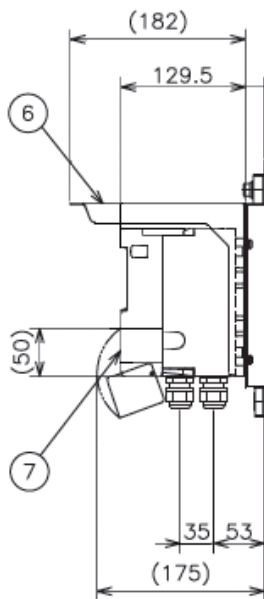
*2: When the sensor cable, transmission cable, or contact input cable is extended exceeding 30 m, the surge test in the EMC directive for CE marking is not applied.

Note: An arrester (sparkover voltage: 400 V) is implemented for transmission output, contact output, and communication. However, provide the most suitable surge absorption element on the connected line considering the ambient environment, the situation of equipment installed, and the externally connected equipment.

External dimensions (HD-200 Dissolved Oxygen Meter)



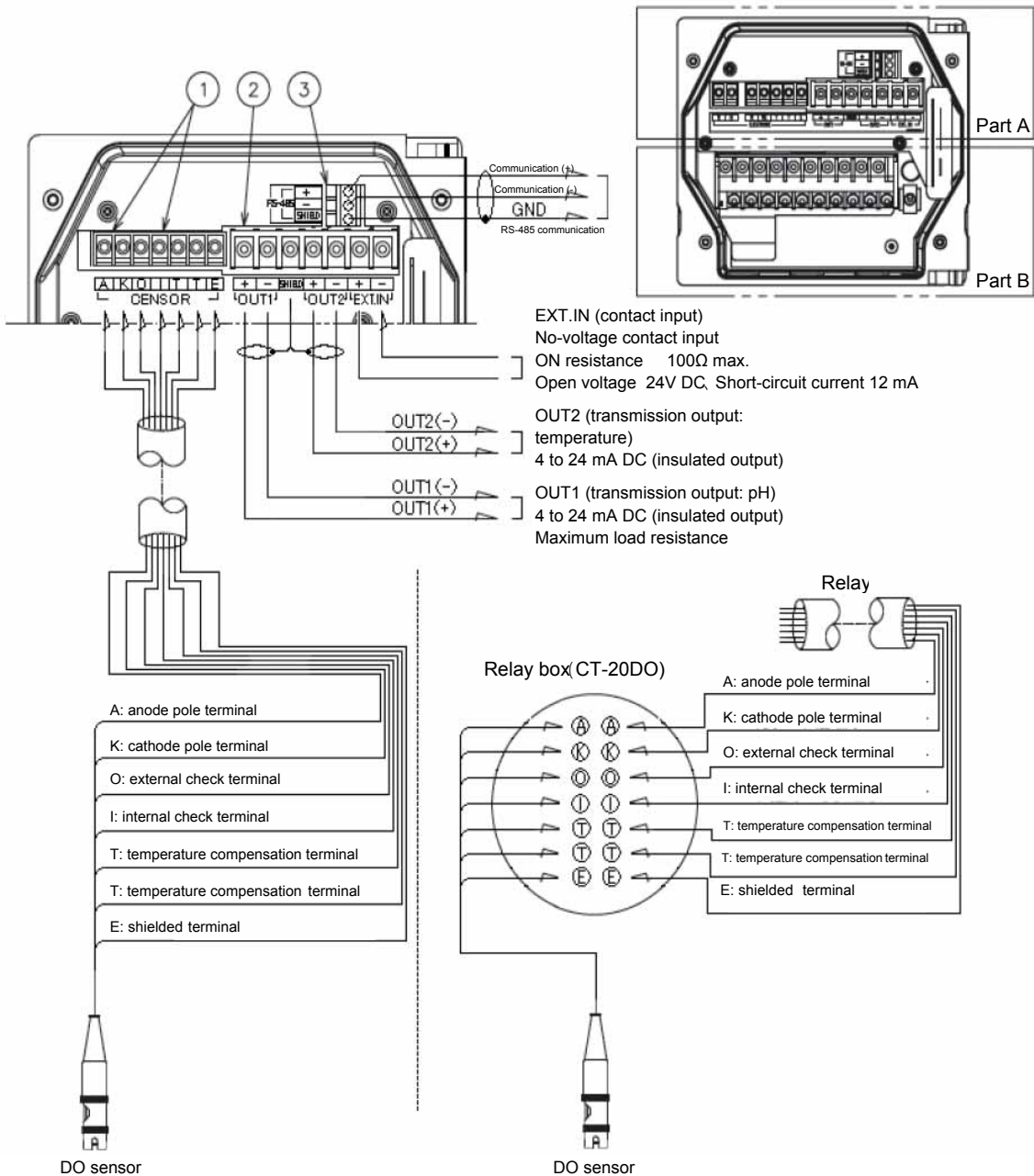
Drawing for external dimensions of HD-200 Dissolved Oxygen Meter (wall-mounted)
 (The other dimensions are as shown above.)



	PARTS	NOTES
(1)	Mounting plate	SUS304
(2)	Case	ADC12
(3)	Conduit	O.D ϕ 7 to ϕ 12 cable
(4)	Plug	SUS304
(5)	Earth	SUS304 M4
(6)	Cover	SUS304
(7)	Front cover	ADC12
(8)	U-bolt	SUS304 50A MB

Coated with epoxy modified melamine resin
 (Munsell 10PB/7/1)
 Approx. 4.1 kg
 IP65(IEC60529,JIS C0920)

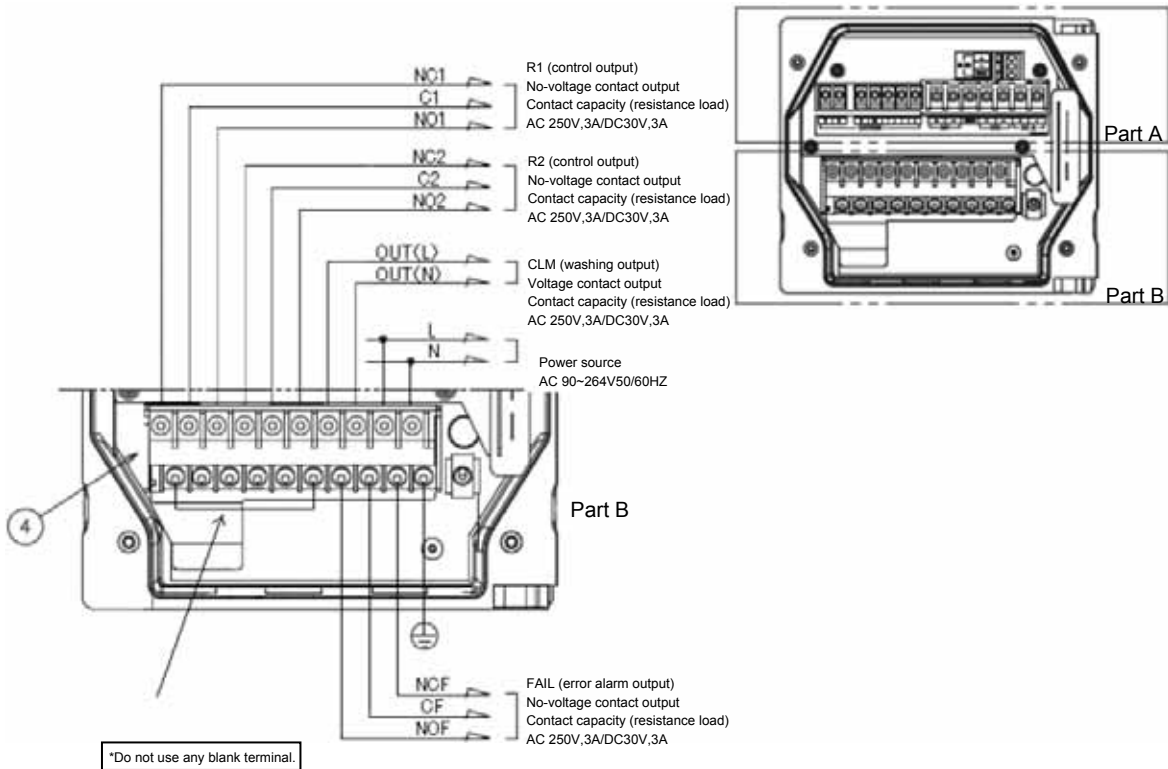
External connection diagram 1 (HD-200)



Terminal	Applicable crimp-type terminal	Applicable electric wire	Screw tightening torque
① M3	MAX6.5, MAX3.2 MAX6.2	1.25mm ² /MAX (AWG16)	0.8N·m
② M3.5	MAX6.2, MAX3.6 MAX7.2	2mm ² /MAX (AWG14)	0.8~1.2N·m
③ M3		0.14~2.5mm ² (AWG26~14) Single or stand wire	0.5~0.6N·m

Note: The screws on the terminal block are designed to be non-removable. To connect a cable to a terminal, turn the screw until it is floated.
:The negative terminals OUT1(-) and OUT2(1) are internally connected and have the same electric potential.

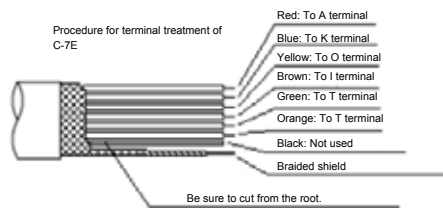
External connection diagram 2 (HD-200)



	Terminal screw	Applicable crimp-type terminal	Applicable electric wire	Screw tightening torque
④	M4		5.5mm ² /MAX (AWG1 0)	1.2~1.8N·m

Note: The screws on the terminal block are designed to be non-removable. To connect a cable to a terminal, turn the screw until it is floated.
 :The negative terminals OUT1(-) and OUT2(1) are internally connected and have the same electric potential.

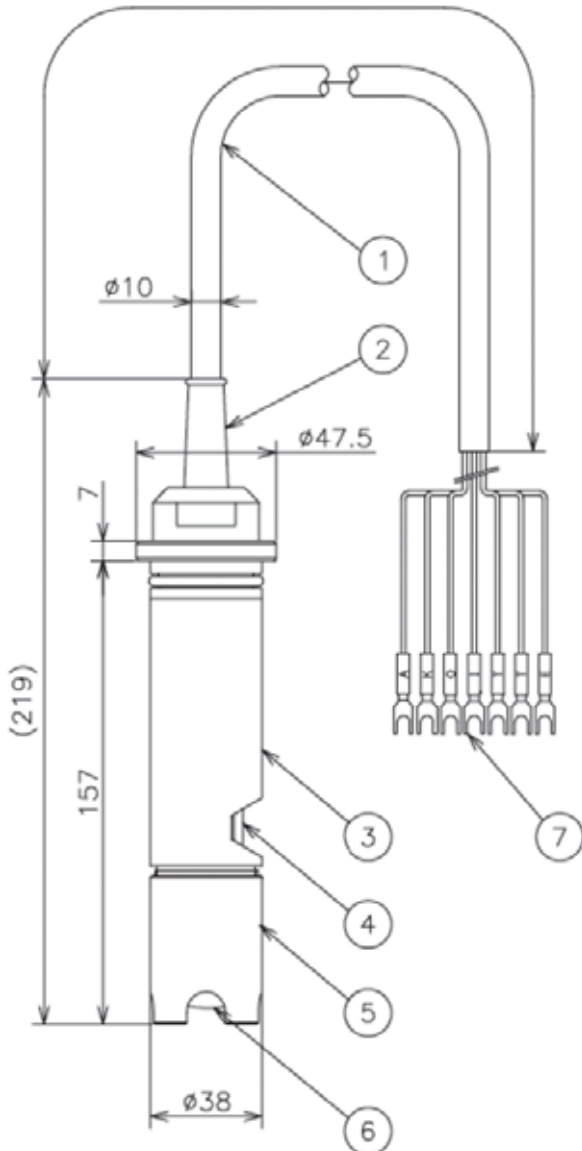
Relay cable termination method



Note: Be sure to strip the black cable up to the root of the transparent wii

■ Dissolve oxygen probe (DO-1100)

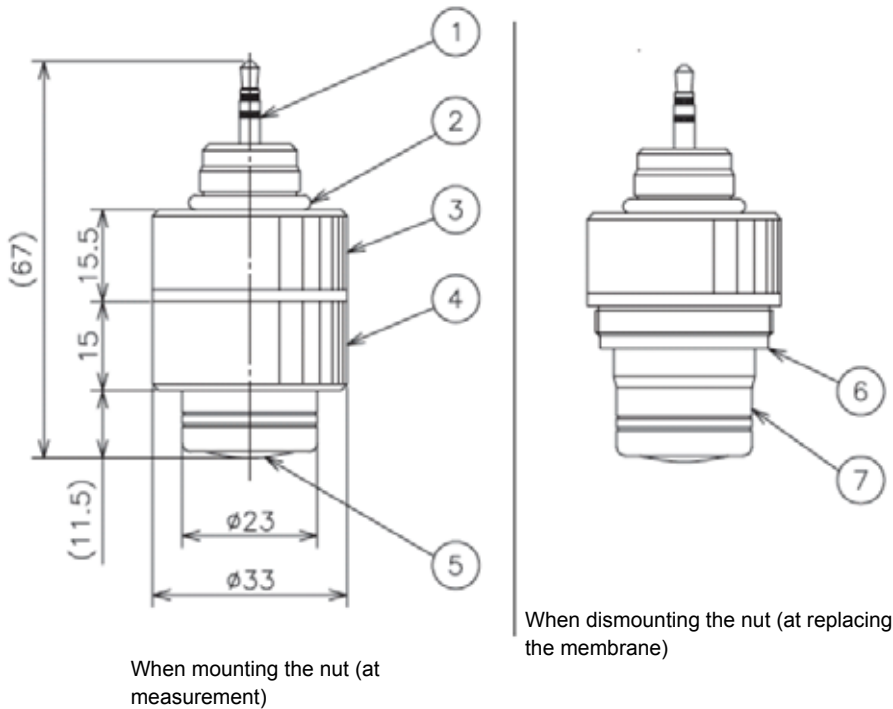
Cable length: 5m (standard)



Model	DO-1100
Measuring liquid pressure	0 to 0.5MPa
Wetted material	PPO, EPDM, Ti
Cable length	10m
Operating temperature range	0°C to 50°C (without freeze)
Storage temperature	-5 to 55°C
Drawing for external dimensions	12 mm dia. x 170 mm L excluding the cable
Weight	Approx. 1.5kg

	PARTS	NOTES
(1)	Cable	PVC
(2)	Cable cover	EPDM
(3)	Probe	PPO
(4)	Temperature sensor	Ti
(5)	Protective tube	PPO
(6)	DO sensor	5500 series
(7)	Terminal	

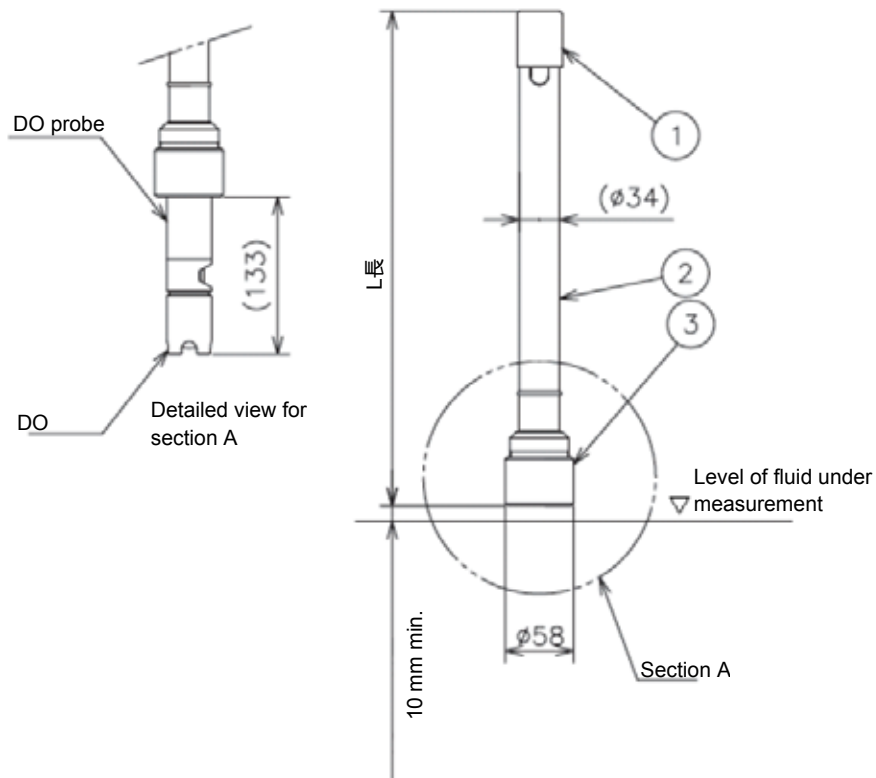
■ Dissolved oxygen sensor (5500 series)



Model		5505	5510
Measuring principle		Bipolar polarography	
Measurable range		0 to 20mg/L	
Material	Diaphragm pressure	50 μ m	100 μ m
	Diaphragm material	PFA	
	Pole material	C-Ag	
	Wetted material	PPO, PFA, EPDM	
	Internal fluid	LCL (neutral)	
Performance (at 25°C)	Response speed (90% response)	Within 120 seconds	Within 240 seconds
	Repeatability	\pm 0.1 mg/L	
Measuring conditions	Measuring liquid pressure	0 to 0.5MPa	
	Flow rate conditions	20cm/sec	10cm/sec
Operating temperature range		0 to 50°C	
Storage temperature		-5 to 55°C	
External dimensions (mm)		Φ 33 \times 66.5(L)	
Weight		Approx. 0.1kg	

	PARTS	NOTES
(1)	Plug	Plating Au
(2)	O-ring	EPDM
(3)	Sensor body	PPO
(4)	Hexagon cap nut	PPO
(5)	Response film	PFA(5505 : 50 μ m) PFA(5510 : 100 μ m)
(6)	Gasket	EPDM
(7)	Cap with film	PPO

■ Immersion type holder (DO-101 series): Specification and external dimensions

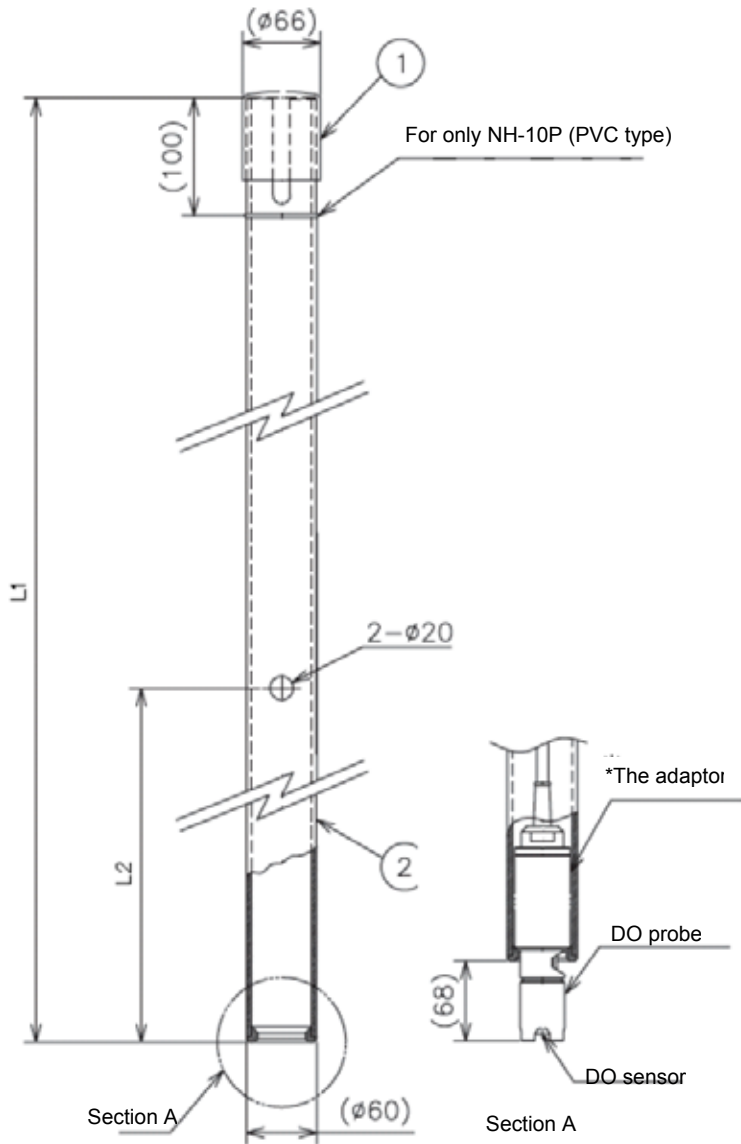


	PARTS	NOTES
(1)	Protective cap	PVC
(2)	Holder	PVC
(3)	Nut	PVC

Nominal length	L length (mm)
0.5m	418±10
1m	918±10
1.5m	1418±10
2m	1918±10
2.5m	2418±10
3m	2918±10

Model		DH-101	
Holder material		PVC	
Ambient Temperature		-5 to 50°C	
Conditions for measurement solution	Temperature	-5 to 50°C	
		For the actual operating temperature range, see the specifications for the electrodes to be combined.	
	Pressure	Atmospheric pressure	
	Flow rate	0.2 to 2m/sec	
Wetted material		PVC	
Holder length (m)		0.5, 1, 1.5, 2, 2.5, 3	
Weight (kg)	Holder length	0.5m	Approx. 0.28
		1m	Approx. 0.5
		1.5m	Approx. 0.72
		2m	Approx. 0.94
		2.5m	Approx. 1.16
		3m	Approx. 1.38

Drop-in type holder (NH-10 series): Specification and external dimensions



NH-10P

	PARTS	NOTES
(1)	Cap	PVC
(2)	Guide pipe	PVC

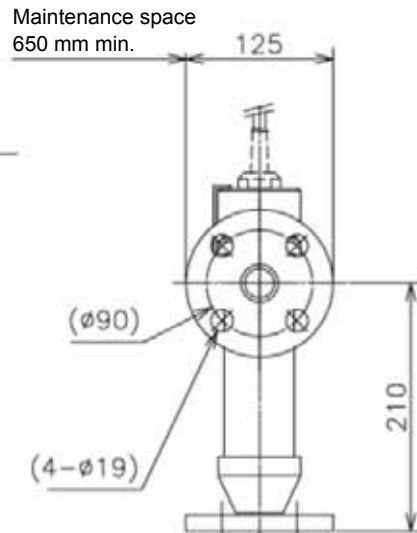
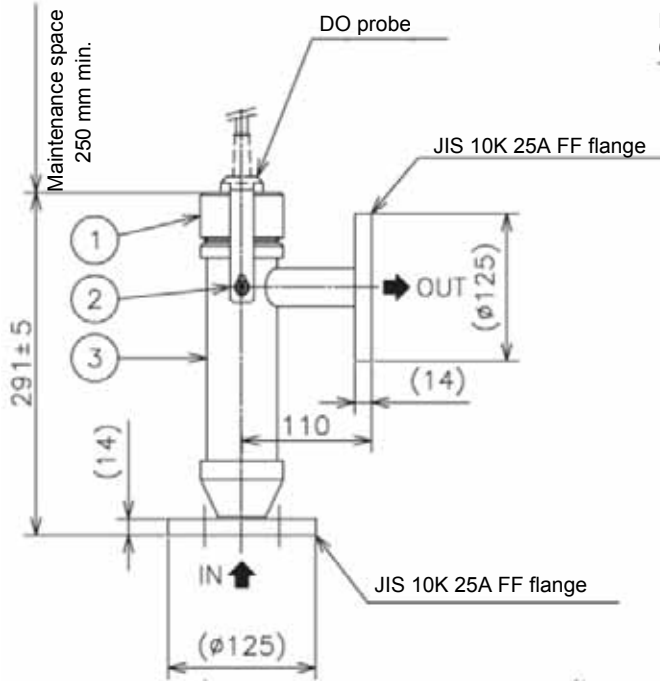
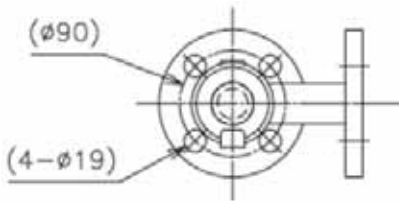
NH-10S

	PARTS	NOTES
(1)	Cap	PVC
(2)	Guide pipe	SUS316

Nominal length	L1 length (mm)	Length (mm)
1m	800±5	300±5
1.5m	1300±5	650±5
2m	1800±5	600±5
2.5m	2300±5	1100±5
3m	2800±5	1600±5

*The adaptor (D-AD) for drop-in is required.

Flow chamber (DF-301): Specifications and external dimensions



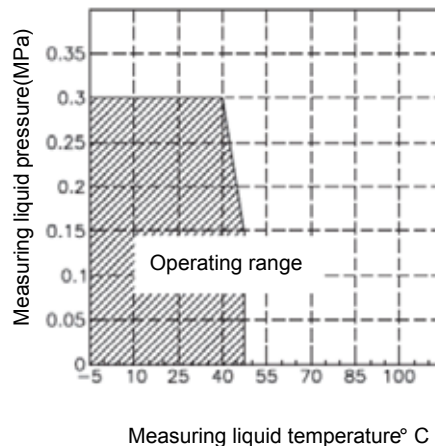
	PARTS	NOTES
(1)	Tightening nut	PVC
(2)	Locking plate	SUS304
(3)	Holder	PVC

Model	DF-301	
Ambient Temperature	-5 to 50°C	
Ambient Temperature	-5 to 60°C	
Conditions for measurement solution	Temperature	-5 to 50°C(*1)
	Pressure	-5 to 40°C:0.30MPa 40 to 50°C:0.15MPa
	Flow rate	0.3 to 20L/min
Wetted material	PVC,EPDM	
Connection	JIS 10K 25A FF flange	
Weight	Approx. 0.8kg	

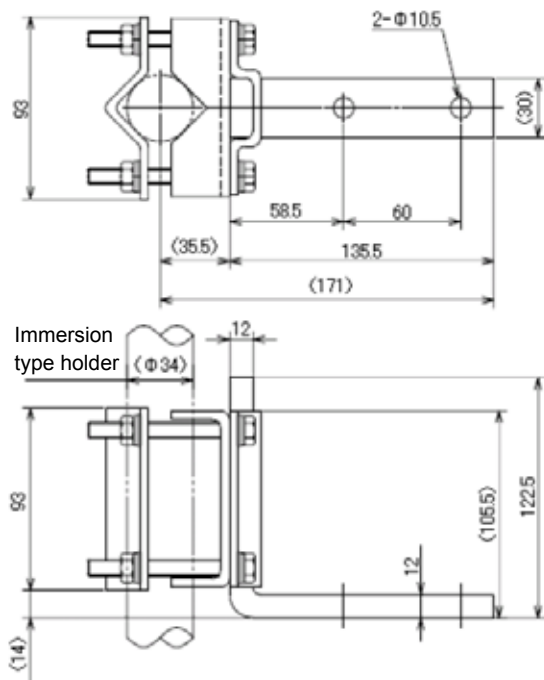
*1: For the actual operating temperature range, refer to the specification of the electrode to be combined.

This product comes with the holder, but no detector is provided.

Relation between temperature and pressure



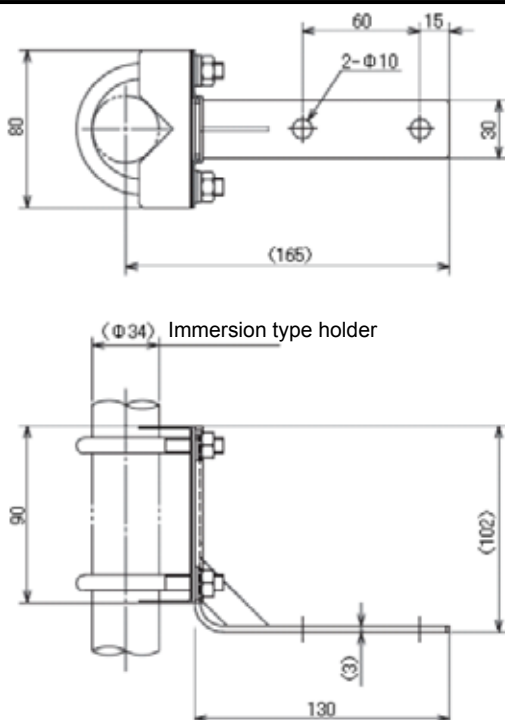
■ Mounting bracket (BA-1A): Specifications and external dimensions



Model	BA-1A
Material	ABS resin
Mounting	Anchoring

Applicable for immersion type resin-made holders of 1.5 m max.

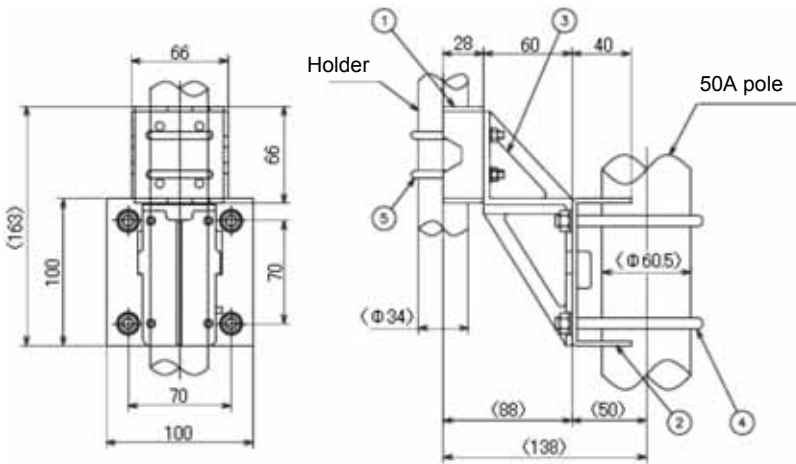
Mounting bracket (BA-1S): Specifications and external dimensions



Model	BA-1S
Material	SUS304
Mounting	Anchoring

Applicable for immersion type resin-made holders of 1.5 m max.

Mounting bracket (MB-10): Specifications and external dimensions

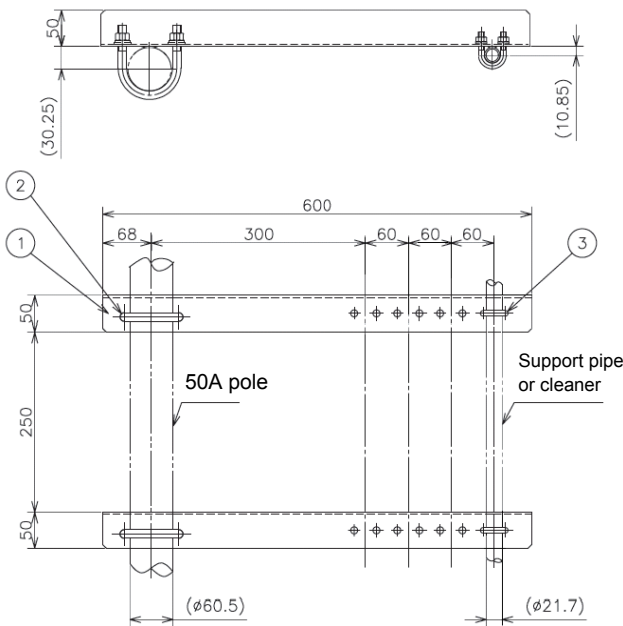


	PARTS	NOTES
(1)	Base 1	SUS304
(2)	Mounting plate	SCS13
(3)	Base 2	SUS304
(4)	U-bolt	SUS304

Mounting pipe: 50 A

*1. Wobbling or vibration, if any, may cause the immersion holder to fall off. Fasten four places with M5 screws.

Mounting bracket (MH-64): Specification and external dimensions

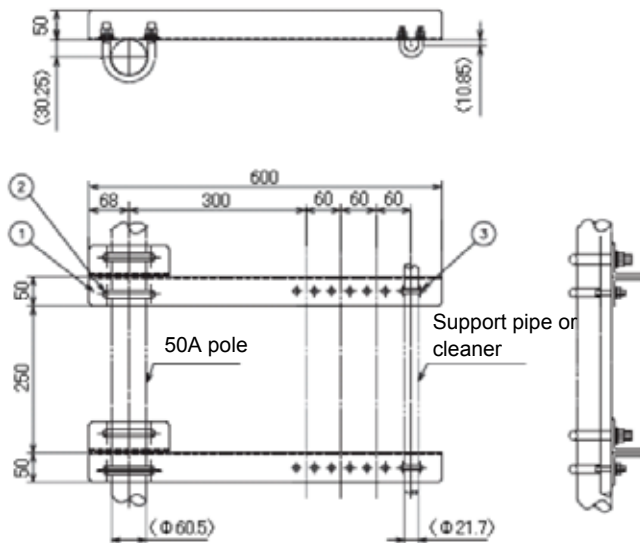


Model	MH-60
Material Arm	SUS304
U-bolt	SUS304
Mounting pipe	50A

This hardware is used to secure the support pipe (SP-60 series) to the pole stand.

	PARTS	NOTES
(1)	Arm	SUS304
(2)	U-bolt	SUS304 stainless steel (for 50A)
(3)	U-bolt	SUS304 stainless steel (for 15A)

■ Mounting bracket (MH-65): Specification and external dimensions

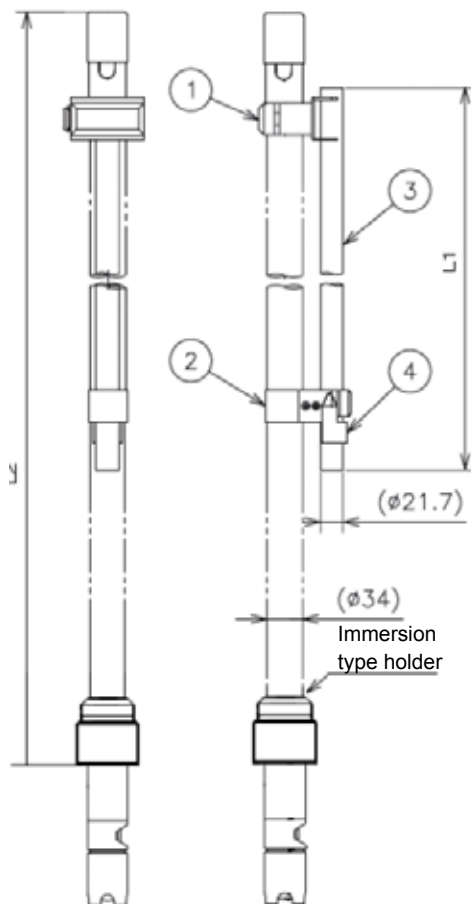


Model	MH-65
Material	SUS304
U-bolt	SUS304
Mounting pipe	50A

This hardware is used to secure the cleaner to the pole stand.

	PARTS	NOTES
(1)	Arm	SUS304
(2)	U-bolt	SUS304 stainless steel (for 50A)
(3)	U-bolt	SUS304 stainless steel (for 15A)

■ Supporting bracket (SP-60): Specifications and external dimensions



Model	SP-60
Material	SUS316
Applicable holder length	1,1.5,2,2.5,3
Applicable holder	DH-101 series CH-101 series

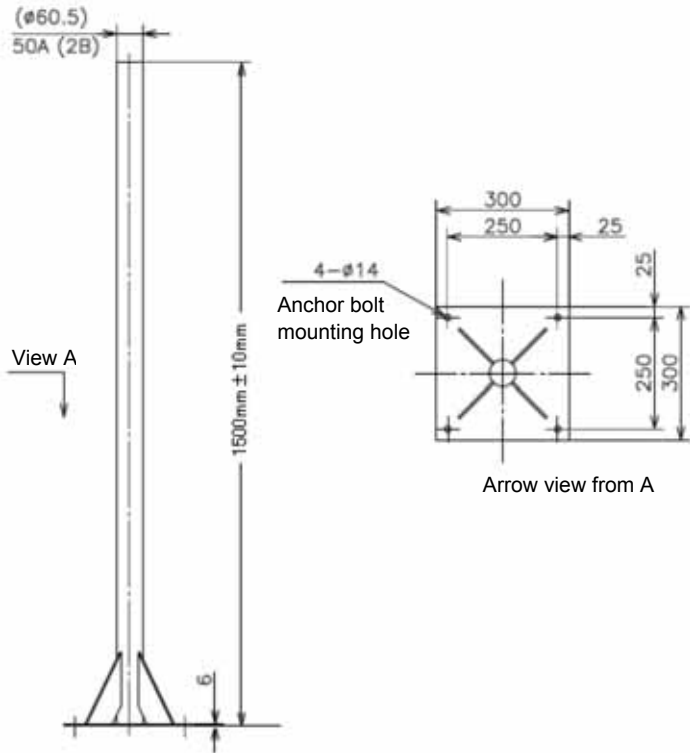
The support pipe may be required when the flow rate is fast even if the holder length is less than 1.5 m.

	PARTS	NOTES
(1)	Holder mounting bracket	PVC
(2)	Intermediate hook	SUS316
(3)	Hook	SUS316
(4)	Support pipe	SUS316
(5)	Stopper	SUS316

The intermediate hook is provided when the immersion type holder length is 1.5m or more.

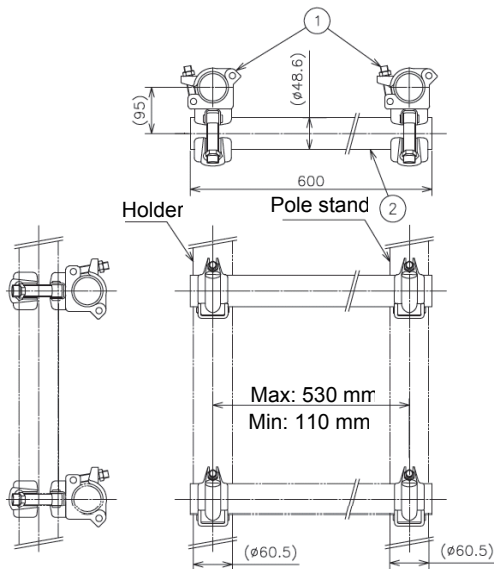
	Support pipe L1(mm)	Immersion type holder L2(mm)
For 1m	500±10	990±10
For 1.5m	1000±10	1490±10
For 2 m	1500±10	1990±10
For 2.5m	2000±10	2490±10
For 3m	2500±10	2990±10

■ Pole stand (PS-50): Specifications and external dimensions



Model	PS-50
Material	SUS304
Pipe diameter	50A

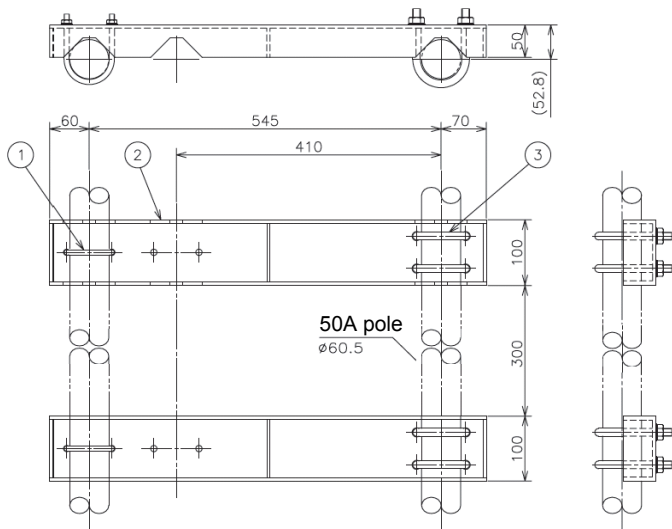
■ Mounting bracket (SDK-1): Specification and external dimensions



	PARTS	NOTES
(1)	Clamp	SPCC (zinc-plated)
(2)	Arm	SGPW 40A (zinc-plated copper pipe for tap water)

For any holder of 1.5 m maximum, use 1 set; for any holder exceeding 1.5 m, use 2 sets.
(This differs depending on the installation site and the flow rate condition.)

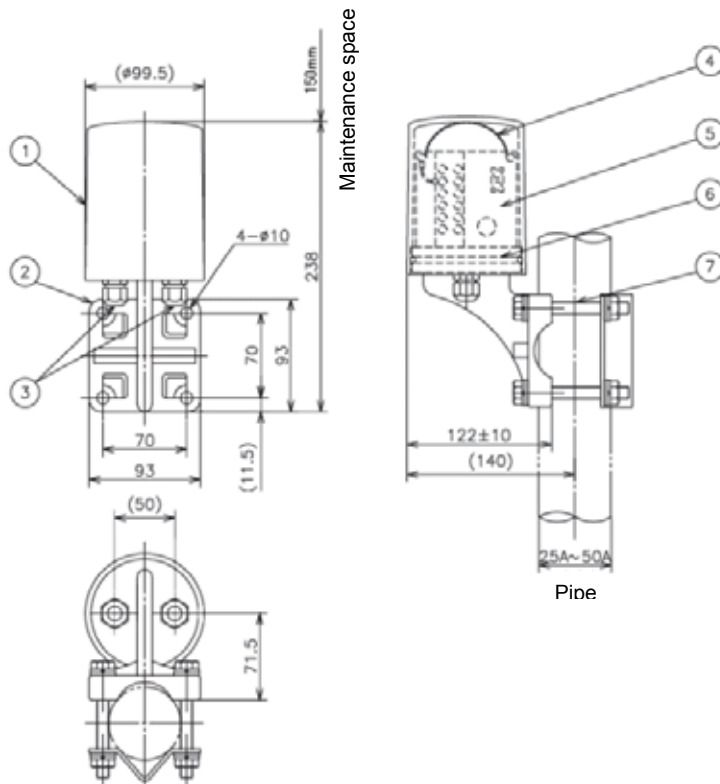
■ Mounting bracket (MH-100): Specification and external dimensions



	PARTS	NOTES
(1)	U-bolt	SUS304 M8
(2)	Mounting arm	SUS304
(3)	U-bolt	SUS304 M12

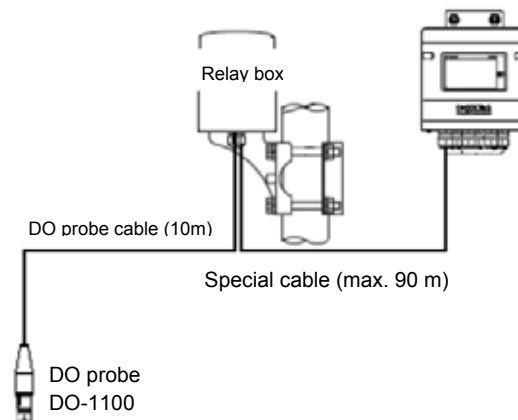
Changing the mounting position of the U-bolt allows you to set the distance between the holder and the 50A pole to 545 or 410 mm as illustrated.

■ Relay box (CT-20DO): Specification and external dimensions



	PARTS	NOTES
(1)	Cover	ABS
(2)	Bracket	ABS
(3)	Conduit	
(4)	Spring	SUS304
(5)	Terminal board	ABS
(6)	O-ring	NBR
(7)	Bolt (provided)	SUS304 M8

- If the distance between the sensor and the converter is longer than the probe cable length, be sure to use the relay box.
- For wiring, be sure to use the relay cable. Do not use the general cable or halfway splice the dedicated cable.
- The relay box is designed as rainproof.



Extension cable (C-7E)

- To extend the probe cable exceeding 10 m, use the extension cable.
- For wiring, be sure to use the dedicated cable. Do not use a general cable or connect to the standard cable halfway.
- To extend the standard cable, use the relay box.

Characteristics

Conductor resistance	63.2Ω/hm max.
Withstand voltage	Shall withstand 1000 VAC for 1 minute.
Insulation resistance	10000MΩ/hm
Rated temperature	90°C
Capacitance	150 PP/m max.

■ Installation (power source, transmission, etc.)

The description of the following installation (power source, transmission, etc.) assumes that the HD-200 is of the standard specification.

For the HD-200, the optionally available cleaner may be installed.

The installation of the HD-200 with the cleaner will be described in the section for the cleaner.

Carry out the installation of execution of work while paying attention to the following points:

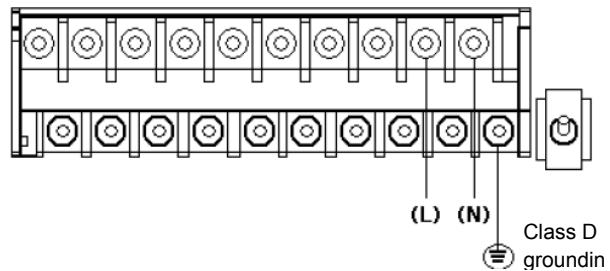
Power Source

- The HD-200 is provided with a power switch.
- Operation outside the rated range can cause a fault. Therefore, check the power supply voltage.
- Check that fluctuations of the power supply voltage fall within +/-10%.

Provide the power switch in a place near the HD-200 so that the power can be turned ON/OFF. If lightning might strike, install an arrester on the output side of the HD-200 and on the side of receiving instruments.

- Be sure to ground the grounding terminal (class D grounding).
- Separate this grounding from any other grounding for electric equipment such as a motor.

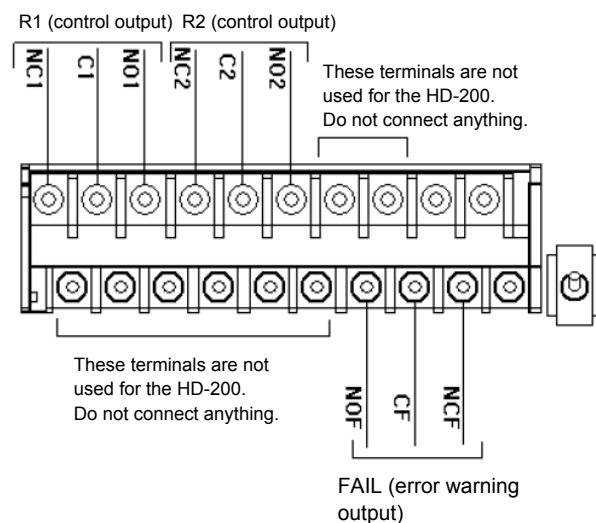
Supply power	Voltage: 100 to 240 VAC
	Frequency: 50/60 Hz
Terminal screw	M4
Applicable electric wire	0.75 to 5.5mm(AWG18 to 10)



Output terminal

- If noise is detected from the load, use a varistor or a noise killer.
 - For only the FAIL output, the positions of NO and NC are reversed.
- In the normal state (not FAIL), the CF-NOF contact is open and the CF-NFC contact is short-circuited. When the power is OFF, the C-NOF contact is short-circuited.
- The reserved terminals are connected internally. Do not connect anything.
 - To connect any load exceeding the contact capacity or any induction load (e.g., a motor or a pump), be sure to use a power relay exceeding the load rating.
 - When the HD-200 is OFF, the C-NC contact between R1 and R2 is short-circuited. Therefore, exercise care in connecting a load.

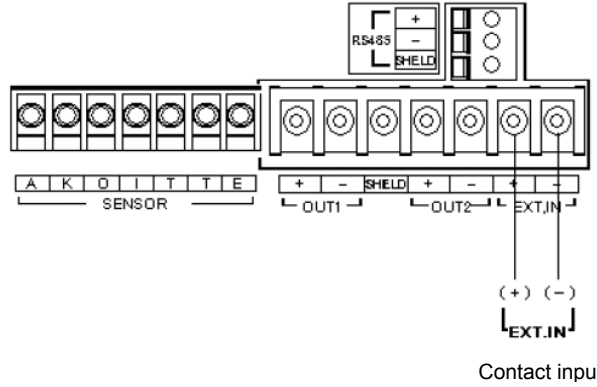
Contact Capacity:	250 VAC, 3A max. or 30 VDC, 3 A maximum
Terminal screw	M4
Applicable electric wire	0.75 to 5.5 mm ² (AWG18 to 10)



Contact input

- Use a shielded cable.
- If the HD-200 might be affected by lightning, install an arrestor on the output side of the HD-200 and the receiving instrument side.

Contact input resistance	100Ω/km max.
Terminal screw	M3.5
Applicable electric wire	0.75 to 5.5 mm ² (AWG18 to 10)

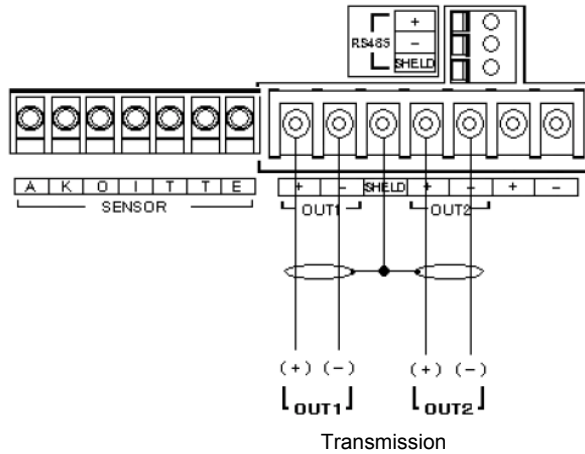


Contact input

Transmission output

- For the transmission output cable, use a shielded cable.
- If the HD-200 might be affected by lightning, install an arrestor on the output side of the HD-200 and the receiving instrument side.
- The negative terminal (OUT1) (-) and OUT2 (-) for the transmission output are internally connected and have the same electric potential.

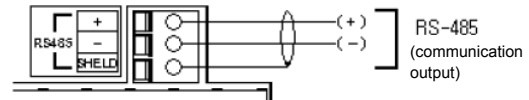
Maximum load resistance	900Ω
Terminal screw	M3.5
Applicable electric wire	2 mm ² (AWG14) max.



Transmission

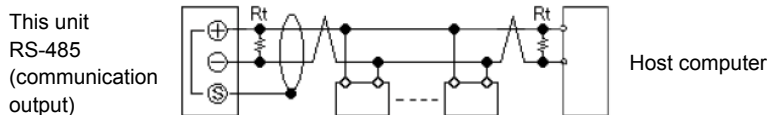
RS-485

- For the communication output cable, use a twisted shielded pair.
- The communication cable length is 500 m maximum.
- Use a terminating resistor (Rt: 120Ω) for any device at which the RS-485 communication line is terminated.
- A maximum of 32 units including the host computer may be connected. Specify their addresses.



RS-485 communication conditions	Baud rate	19200 bps
	Character length	8 bit
	Parity	non
	Stop bit	1 bit

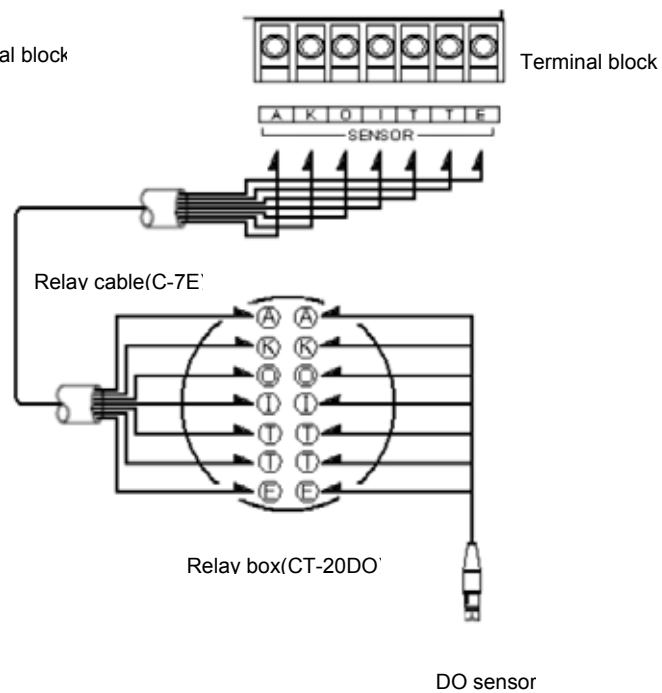
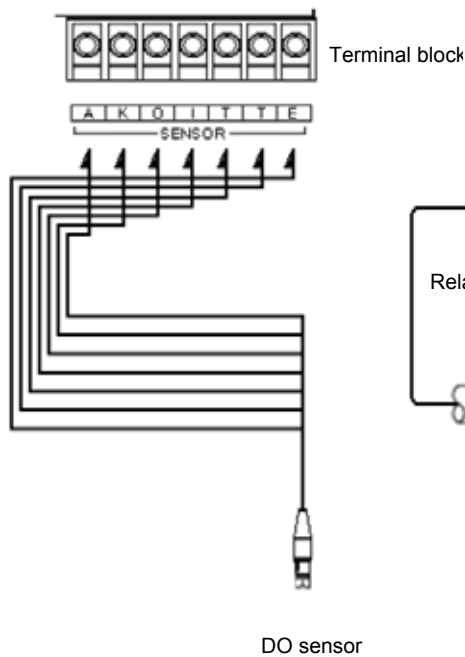
Example of external connection for communication



Probe cable

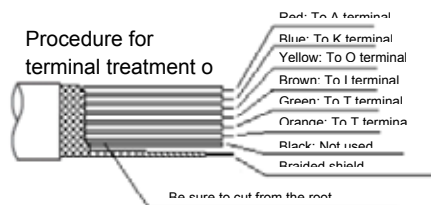
- The probe cable is of high insulation. Exercise care in handling the sensor cable.
- Do not wet any cable terminal or the terminal block with water or the like; also do not soil it with dirt, oil, or the like. The insulation will otherwise deteriorate.
- The decreased insulation causes instable readouts. Keep the cable dry and clean.
- If the electrode cable should be soiled, wipe it off with alcohol or the like and then well dry it.
- In wiring the probe cable, give a margin for zero calibration and the inspection and replacement of the sensor.
- In wiring the probe cable and the relay cable, keep them away from a motor and any other equipment that gives induction as well as their cables.

Probe cable DO-1100	A: Anode terminal (sensor)
	K: Cathode terminal (sensor)
	O: External check terminal (self-
	I: Internal check terminal (self-diagnostics)
	T: Temperature compensation terminal (temperature sensor)
E: Shielded terminal	



Extension of probe cable

- Be sure to use the dedicated relay cable and relay box when necessary.
 - Relay cable exclusively for probe cable (CT-20DO)
 - Dedicated relay box (CT-20DO)
- The maximum extendable distance between the HD-200 and the probe is 50 m.
- It is recommended that the dedicated relay cable be placed in a conduit in order to prevent static electricity from being generated by induction or vibration. In this case, the wiring near any instrument should be passed through a flexible tube.



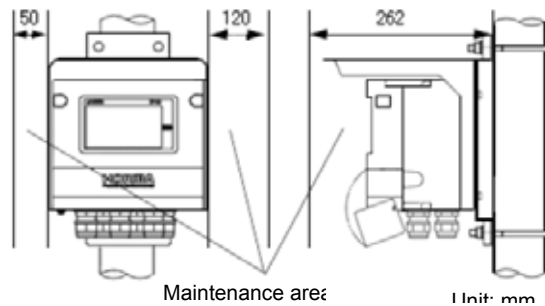
■ Installation (mounting)

The description of the following installation (mounting) assumes that the HD-200 is of the standard specification.

For the HD-200, the optionally available cleaner may be installed.

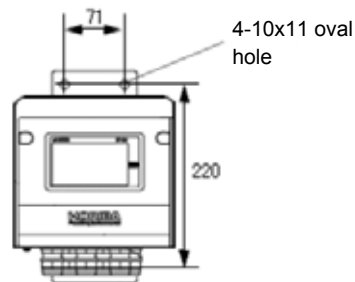
The installation of the HD-200 with the cleaner will be described in the section for the cleaner.

Main unit (as mounted on the pole)



- The body may be mounted on the pole or the wall.
- For pole mounting, use a 50A pole.
- In either case, mount the body considering maintenance space.

Body (to be wall-mounted)

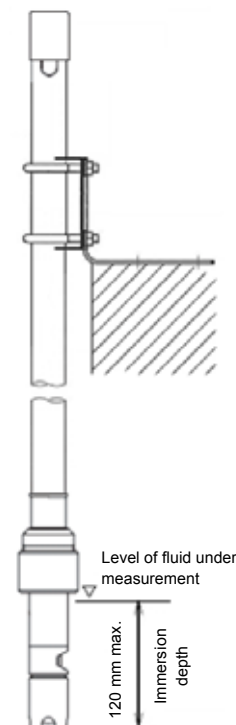


Immersion holder + mounting bracket (BA-1A or BA1S)

•The mounting bracket BA-1A or BA-1S should be secured with 2- Φ 10 bolts.

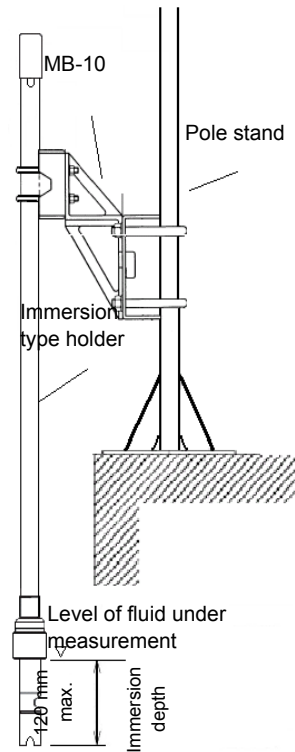
•In installing the immersion holder, ensure that its lower part is immersed 120mm minimum in the sample water.

•The mountable immersion type holder is limited to 1.5 m.



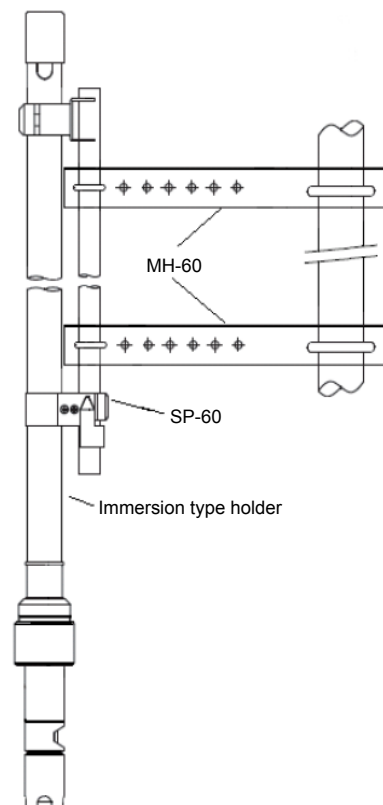
Immersion holder + mounting bracket (MB-10)

- The mounting bracket MB-10 should be secured to the 50A pole.
- In installing the immersion holder, ensure that its lower part is immersed 120mm minimum in the sample water.
- The mountable immersion type holder is limited to 1.5 m.

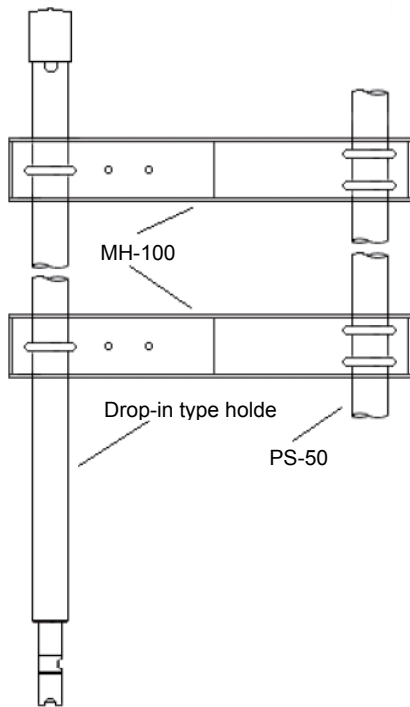


Immersion holder + support pipe (SP-60 series) + mounting bracket (MH-60)

- When an immersion holder of 1.5 m or longer is used, it is recommended that the immersion holder is secured using the support pipe.
- Before using the support pipe, check the length of the immersion holder. [The length enabling the use of an immersion holder (holder length) and a support pipe is predetermined.]
- The immersion holder must be secured to the support pipe when used.
- To use the support pipe, secure it with the mounting bracket (MH-60).
- Secure the MH-60 mounting hardware to the 50A pole.



Drop-in holder + mounting bracket (MH-100)

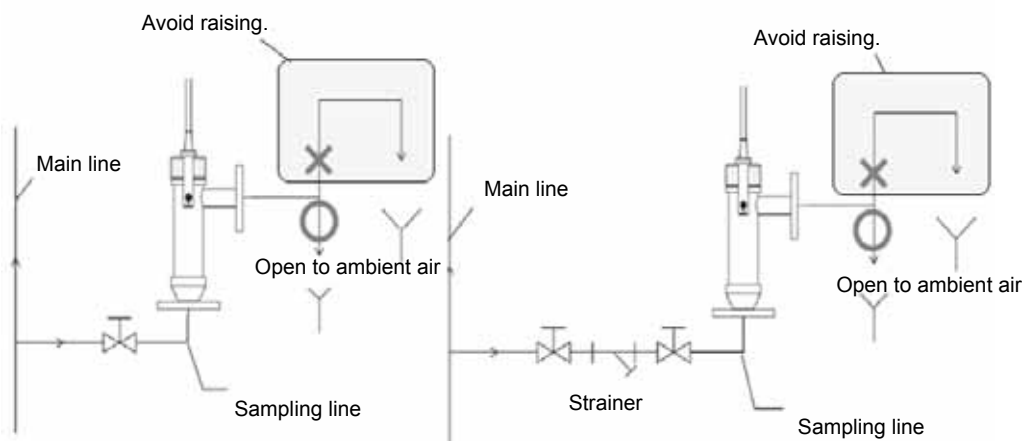


- When the drop-in type holder is used, it is recommended that the holder be secured by the mounting hardware (MH-100).
- Secure the MH-100 mounting hardware to the 50A pole.

Flow chamber

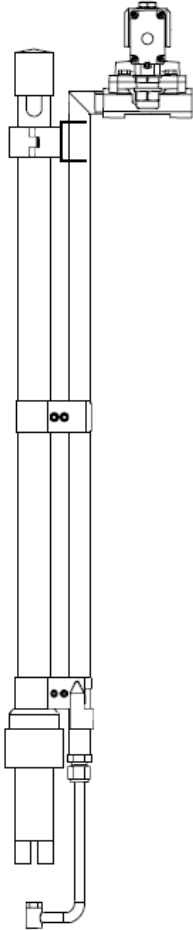
- The basic size of the DF-301 flowchamber is JIS 10K 25A FF. To install a special type of flowchamber, previously check its size.
- Make sure that the holder is installed upright.
- Install the Cleaner at a location where maintenance work can be easily performed.
- Secure a maintenance space of at least 25 cm in height above the tightening nut. Give a margin to the probe cable so that it can be disconnected and reconnected for maintenance or the like.
- Avoid installation in a location with severe vibration or a high dust level.
- Install the flow chamber so as to ensure that the sensor is not floated to air as the liquid under measurement in the holder is drained, even if the liquid stops.

- Avoid installation in a location where a corrosive solution is scattered or there is corrosive gas.
- Avoid installation in a location near a heating element with surface/ambient temperature of 50° C minimum.
- For any liquid under measurement containing bubbles, slurry, or a solid that may damage the sensor, previously remove them.
- Do not install the flow chamber on the main line. Be sure to provide a sample line to install the holder. (Unless the main line is stopped, the maintenance work cannot be done.)



Immersion type jet cleaner for H-1 series

JDH-121A



Overview

- This cleaner is designed to intermittently clean the response film with a jet flow of cleaning water or air. Since the cleaner has no timer, specify cleaning intervals and duration using the timer on the combined converter.

Objects

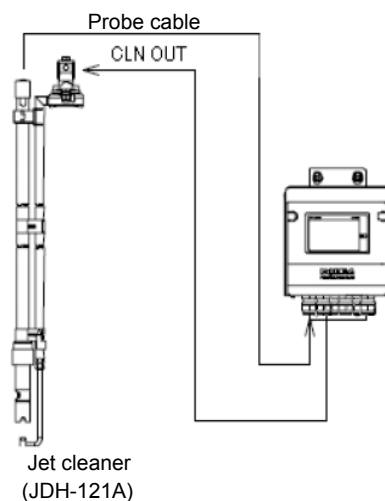
The jet wave cleaner is relatively effective for the following materials:

However, its effect differs with various conditions and is not guaranteed.

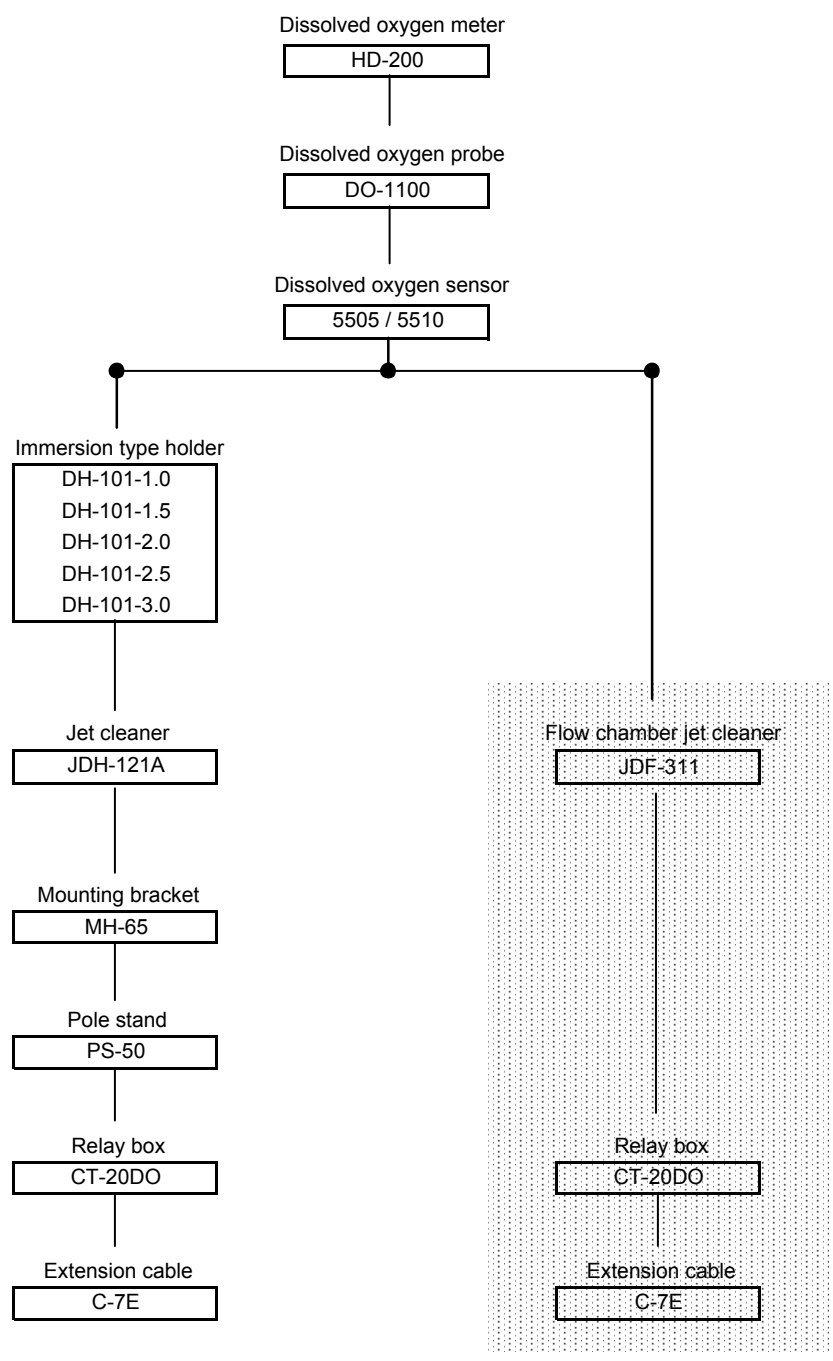
Properties Classification	Objects	
slime	food, paper, pulp, algae	
Microorganism	bacteria (activated sludge), slag	
Oily	tar, heavy oil	×
	light oil	
	fatty acid, amine	
suspended matters	earth and sands	
	metallic minute powder	
	clay, calcareous	
scale	coagulated deposit and neutralized effluent treatment CaCO ₃ , etc.	

⊙:Good ○:Acceptable ×:Not acceptable

System configuration



Possible combination (immersion type jet cleaner)



■ Specification (JDH-121A)

Product name	Immersion type jet cleaner (solenoid valve integrated type)
Model	JDH-121A
Supply Voltage (*1)	AC 100 to 240V 50/60Hz
Permissible Voltage Variation	90% to 110% of supply voltage
Power consumption	Max. 30VA
Cleaning Method	Intermittent water jet/air jet cleaning
Ambient Temperature	-5 to 50°C
Ambient Humidity	5% to 90% RH (No condensation)
Temperature of liquid under measurement (*2)	-5°C to 50°C (without freeze)
Measuring liquid pressure	Atmospheric pressure
Flow Velocity of Measured Liquid	2 m/sec max. (secure a flow rate of 20 cm/sec min.)
Cleaning pressure	Water 0.05 to 0.5 MPa (consumption: approx. 4 L/min) (0.05 to 0.2 MPa for DO)
	Air 0.05 to 0.2 MPa (consumption: approx. 90 L/min) (0.05 to 0.2 MPa for DO)
Bore diameter connected for cleaning	Rc1/2
Wetted material	SUS316 stainless steel and FKM (excluding the materials for the sensor and the immersion type holder)
Weight	Approx. 3.5kg (when immersion type holder is 1 m)
International protection code	IP54(IEC60529, JIS C0920)(Category 2)
Special Note	This product does not come with any probe, sensor, and immersion type holder

*1: Power supply voltage of 200 VAC is optionally available. For any other power supply voltage, contact us.

*2: The operating temperature range differs depending on the combined probe, sensor, and holder.

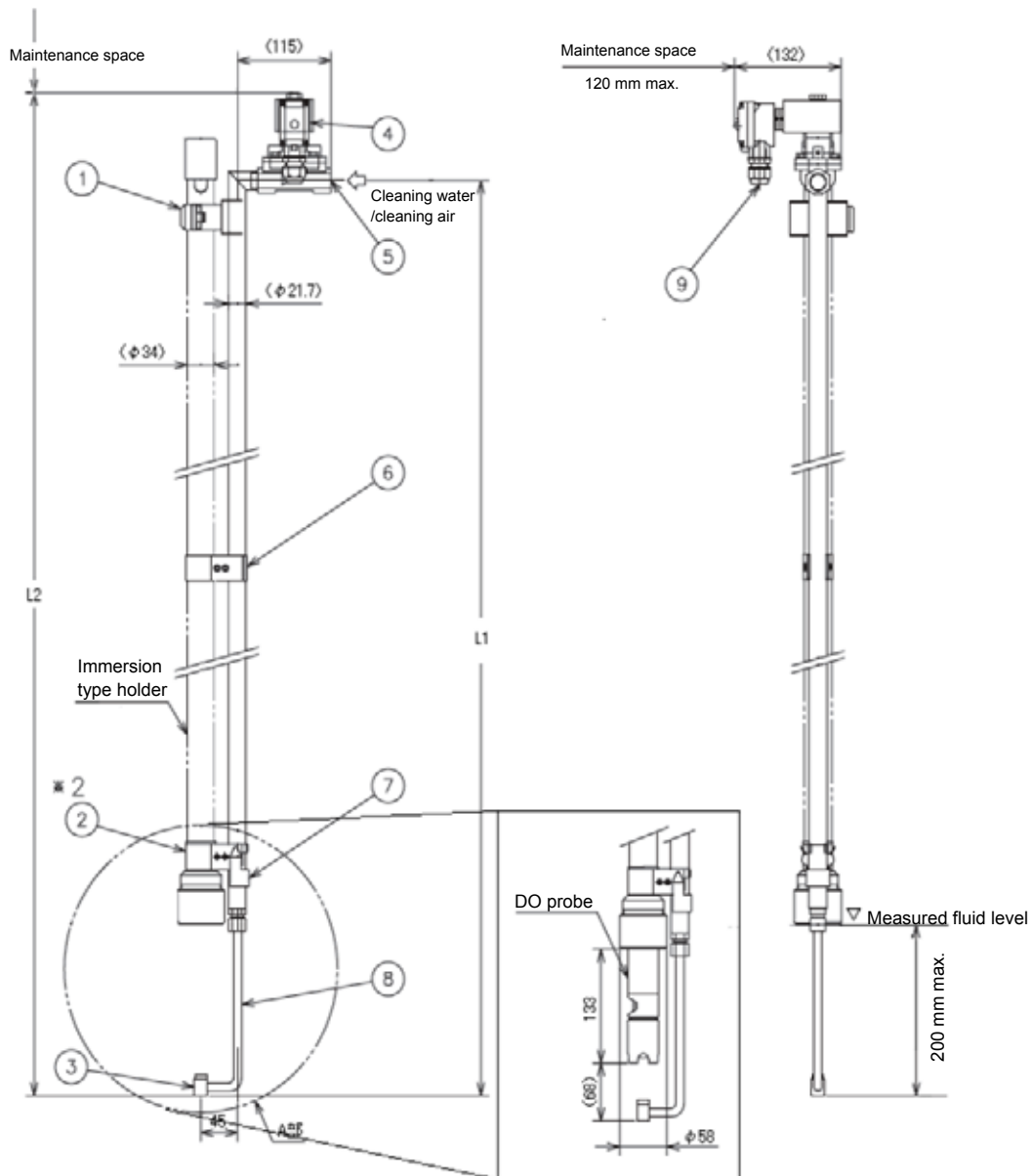
Refer to the temperature of each product in the specification.

*3: In using tap water for cleaning water, the water supply law prohibits supplying the tap water directly from waterworks.

Use a tap water pressurization system or the like to insulate the tap water from the common tap water pipe.

If cleaning water might be frozen, use thermally insulated piping.

External dimensions (JDH-121A)



The L1 and L2 lengths and tolerance of the JDH-121 immersion type jet cleaner are shown in the table below:

The L1 and L2 lengths are shown in the table below:

	PARTS	NOTES
(1)	Bracket for immersion type holder	PVC
(2)	Hook	SUS316
(3)	Nozzle	SUS316
(4)	Solenoid valve	
(5)	Cleaning water/air inlet	Rc1/2
(6)	Support hook	SUS316
(7)	Stopper	SUS316
(8)	Nozzle holder	SUS316
(9)	Conduit	O.D ϕ 7to ϕ 12cabel

Nominal length (m)	L1 length (mm)	L2 length (mm)	Maintenance space (mm)
1	1070 \pm 10	1179	900 min.
1.5	1570 \pm 10	1679	1400 min.
2	2070 \pm 10	2179	1900 min.
2.5	2570 \pm 10	2679	2400 min.
3	3070 \pm 10	3179	2900 min.

Provide a maintenance space above the jet cleaner.

•The support hook does not come with any cleaner of 1.5 m maximum.

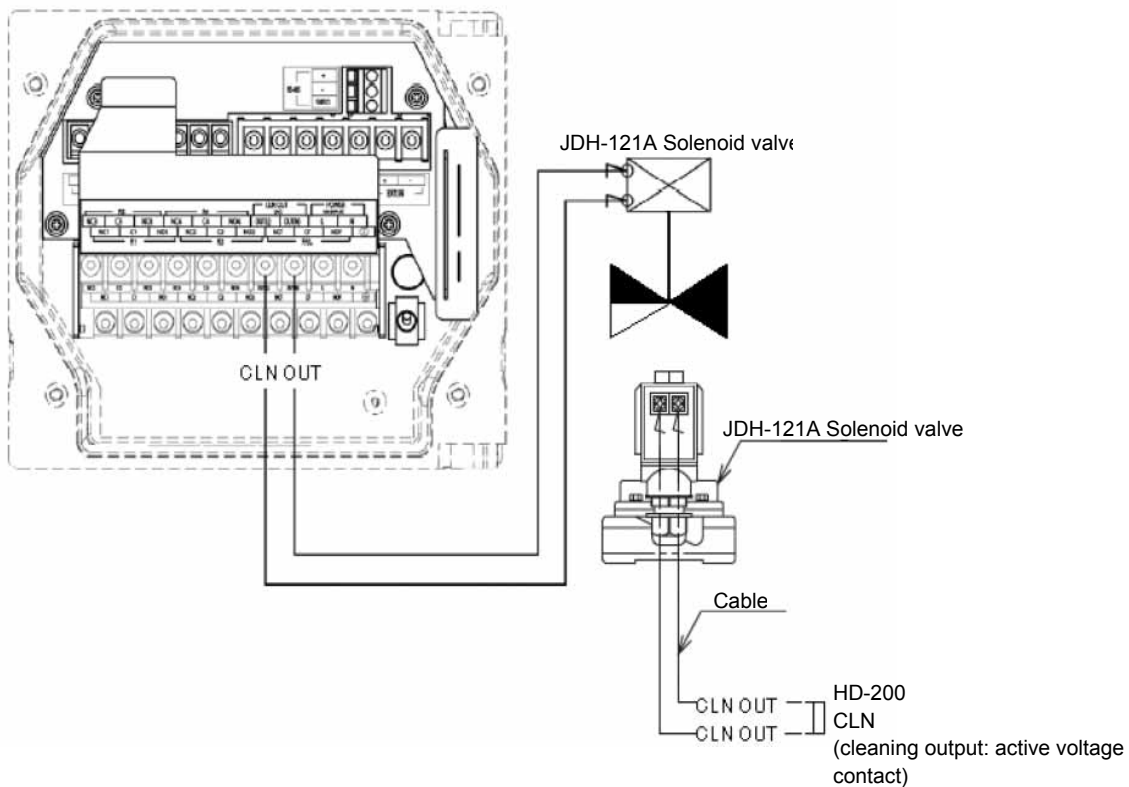
■ Installation (connections)

Carry out the installation of execution of work while paying attention to the following points:

Power Source

- Operation outside the rated range can cause a fault. Therefore, check the power supply voltage.
- Ensure that the power supply voltage for the solenoid valve is the same as that sent to the converter.
- Be sure to ground the grounding terminal (class D grounding).
- The applicable cable diameter for the wiring hole is 7 to 12 mm.

Supply power	Voltage: 100 VAC
	Frequency: 50/60 Hz
Applicable electric wire	Φ7 to Φ12
	0.75 mm ² min.

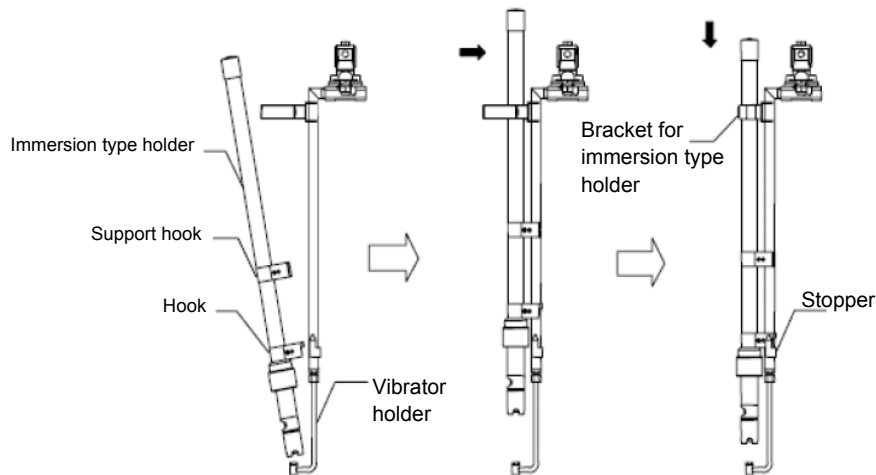


■ Installation (jet cleaner and immersion type holder)

Carry out installation and execution of work as illustrated below:

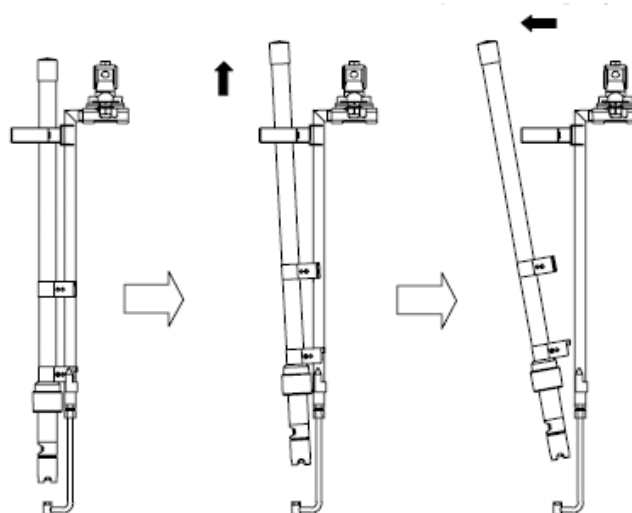
Installation

- Attach the hook to the immersion holder.
- Slowly move down the hook along the vibrator holder.
- Once the hook is caught by the stopper on the oscillator holder, fasten the immersion holder fixing hardware.



Removal

- Remove the immersion holder fixing hardware.
- Vertically pull up the immersion holder.
- Remove the hook and the support hook from the nozzle holder.



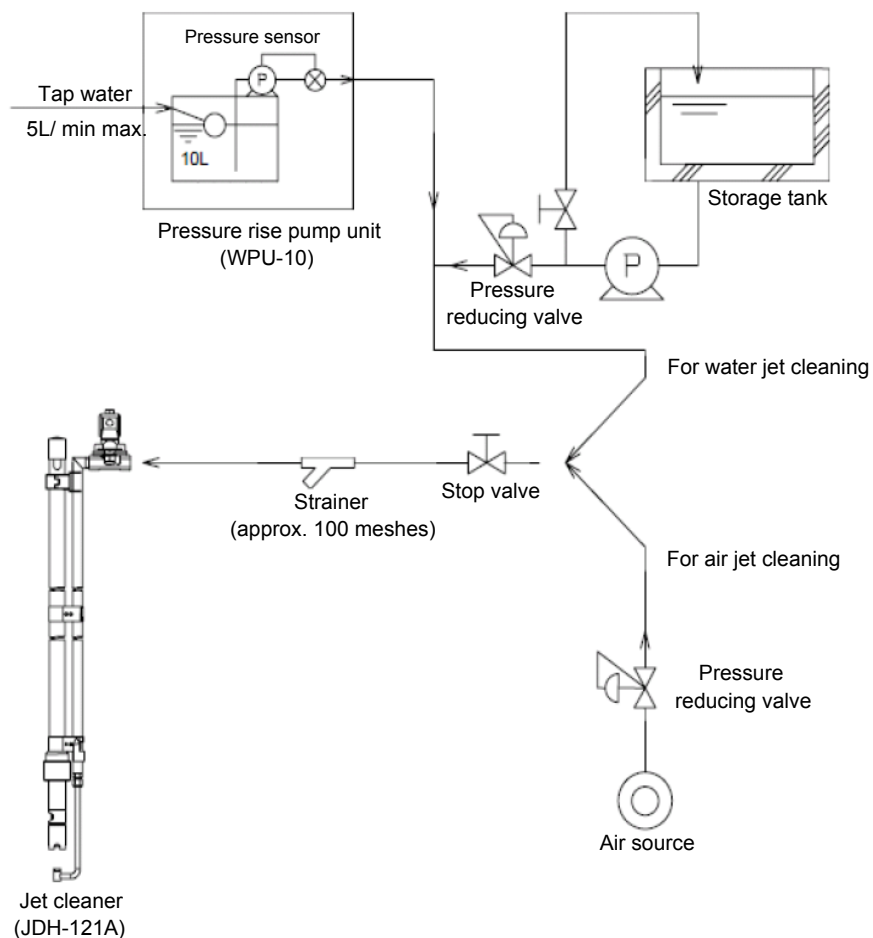
■ Installation (piping)

Be sure to following the following instructions for setup.

Piping

- Since the cleaner must be removed during maintenance, use flexible piping and give an allowance to its length.
- Before connecting the piping to the cleaner, be sure to flush off the piping with water.
- With the regulator, adjust the cleaning water to a specified pressure.

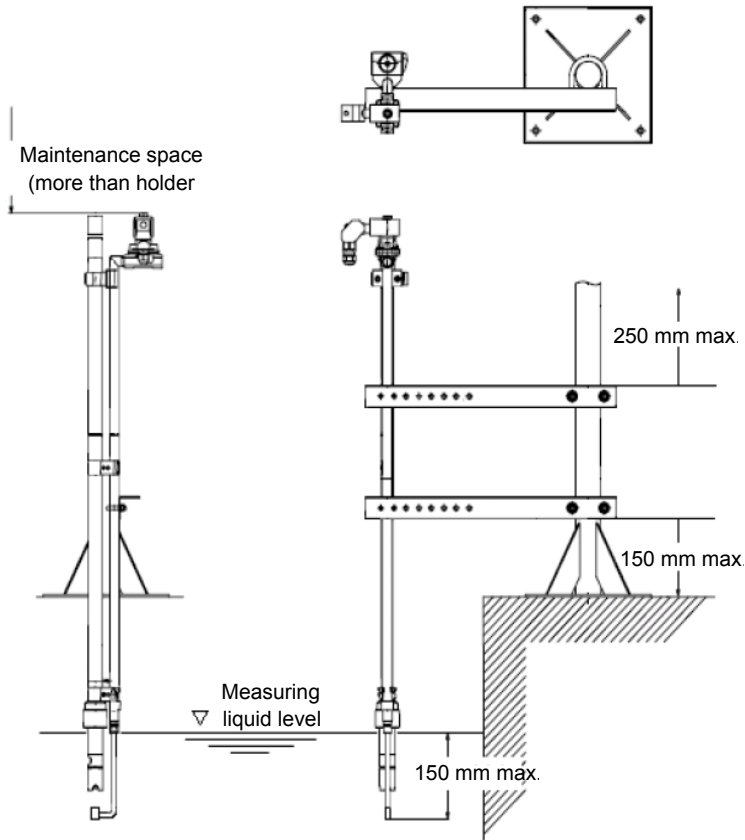
In using tap water for cleaning water, the water supply law prohibits supplying it directly from water works. Temporarily receive the tap water in a tank or the like and then pressurize it with a pump. However, if original water for industrial use (tertiary treatment water) is used, it may be connected directly. If tap water is distributed after passing through a tank located on the roof or the like, it may also be connected as it is insulated.



Installation

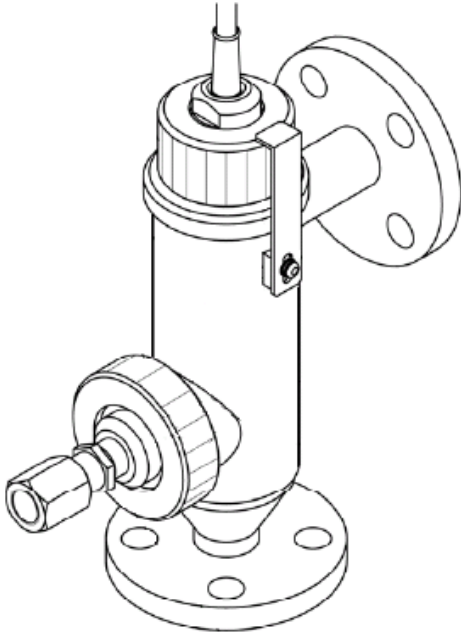
Installation environment

- Install the Cleaner at a location where maintenance work can be easily performed.
- Install the Cleaner at a height where an electrode is always immersed in measured liquid even if a measured liquid level changes.
- Avoid installing the Cleaner at a location exposed to corrosive fluid and gas. etc.
- Avoid installation in a location near a heating element or the like, where the surface and ambient temperatures reach 50 ° C or higher.



Flow chamber jet cleaner for H-1 series

JDF-311



Overview

- This cleaner is designed to intermittently clean the response film with a jet flow of cleaning water or air. Since the cleaner has no timer, specify cleaning intervals and duration using the timer on the combined converter.

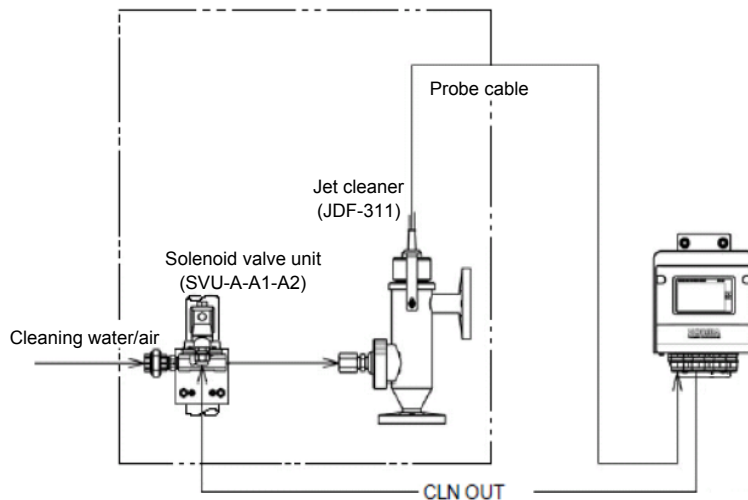
Objects

The Ultrasonic Cleaner is relatively effective to the following objects. However, its effect differs with various conditions and is not guaranteed.

Properties Classification	Objects	
slime	food, paper, pulp, algae	
Microorganism	bacteria (activated sludge), slag	
Oily	tar, heavy oil	×
	light oil	
	fatty acid, amine	
suspended matters	earth and sands	
	metallic minute powder	
	clay, calcareous	
scale	coagulated deposit and neutralized effluent treatment CaCO ₃ , etc.	

⊙:Good ○:Acceptable ×:Not acceptable

System configuration



Specification (JDF-311)

Product name		Flow chamber jet cleaner
Model		JDF-311
Ambient Temperature		-5 to 50°C
Ambient Humidity		5% to 90% RH (No condensation)
Conditions for measurement solution	Temperature (*1)	-5°C to 50°C (without freeze)
	Pressure	0 to 0.15MPa
	Flow rate	0.5 to 20L/min
Wetted material		PVC,EPDM
Cleaning pressure		Water: 0.05 to 0.2 MPa (*2)
		Air: 0.03 to 0.05 MPa
		*Adjust the cleaning pressure, in principle, at +0.05 to 0.15 MPa of the pressure of the liquid under measurement.
Connector for cleaning		Rc1/2
Bore Size of Measured Liquid Connection		JIS 10K 25A FF flange
Weight		Approx. 1.6kg
Special Note		This product does not come with any probe, sensor, and immersion type holder

*1: The operating temperature range differs depending on the combined probe, sensor, and holder. Refer to the temperature of each product in the specification.

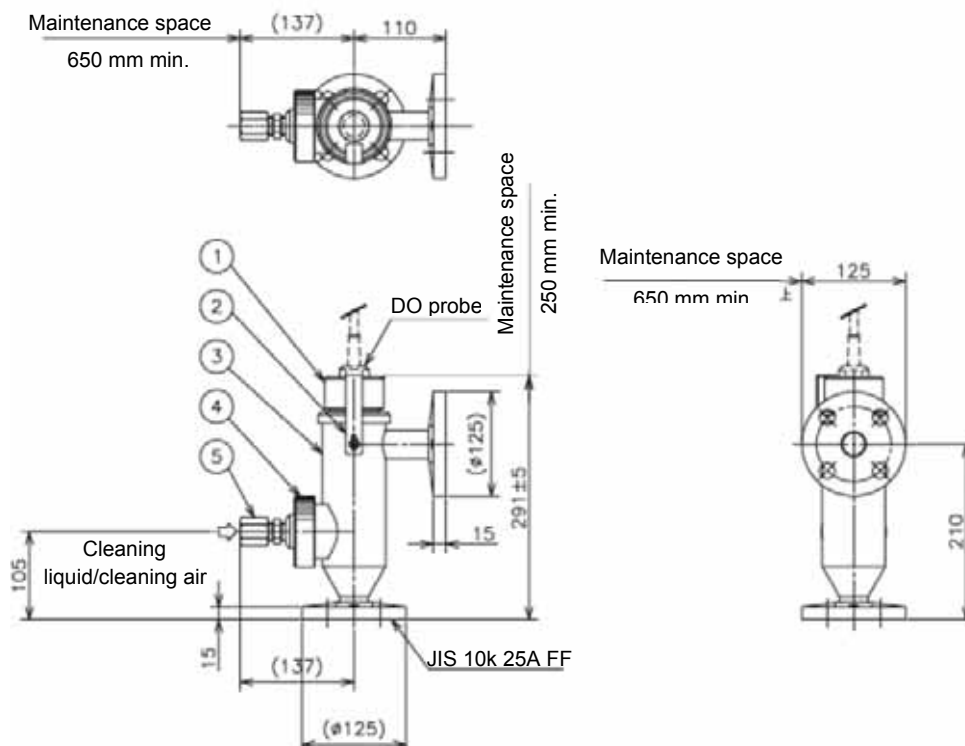
The liquid under measurement cannot be measured when frozen.

*2: In using tap water for cleaning water, the water supply law prohibits supplying the tap water directly from waterworks.

Use a tap water pressurization system or the like to insulate the tap water from the common tap water pipe.

If cleaning water might be frozen, use thermally insulated piping.

External dimensions (JDF-311)



	PARTS	NOTES
(1)	Tightening nut	PVC
(2)	Locking plate	SUS304
(3)	Holder	PVC
(4)	Nozzle mounting nut	PVC
(5)	Cleaning water/air inlet	Rc1/2

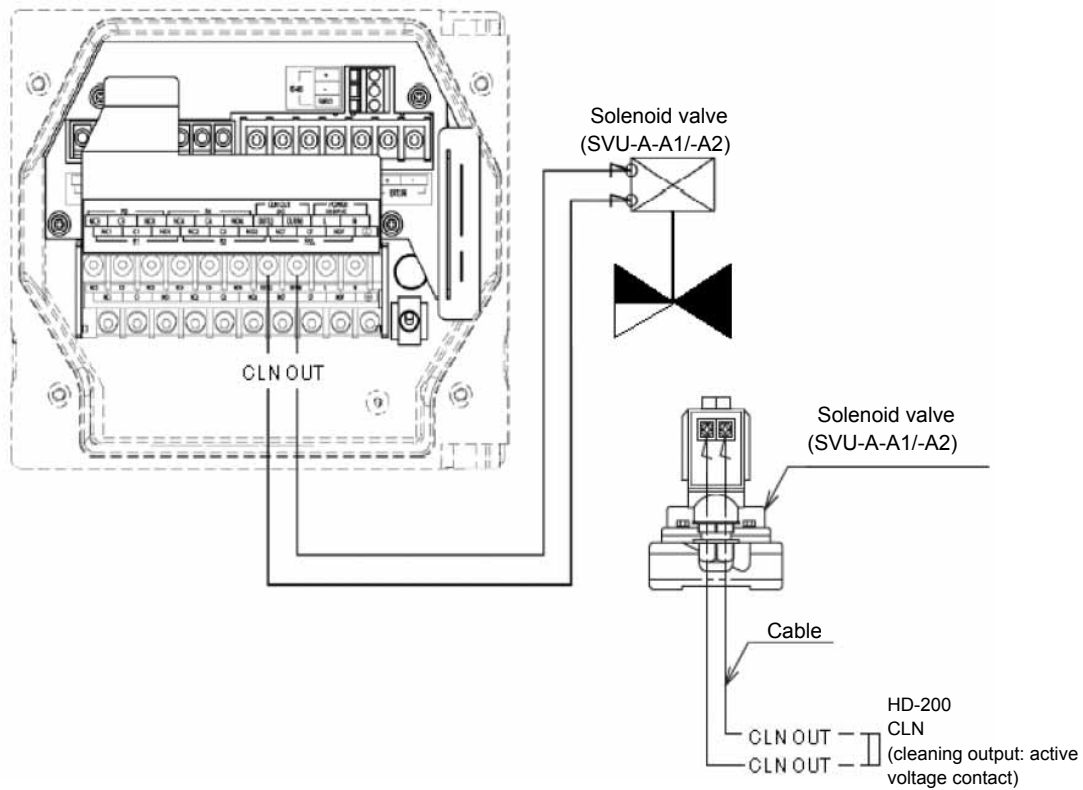
■ Installation (connections)

Carry out the installation of execution of work while paying attention to the following points:

Power Source

- Operation outside the rated range can cause a fault. Therefore, check the power supply voltage.
- Ensure that the power supply voltage for the solenoid valve is the same as that sent to the converter.
- Be sure to ground the grounding terminal (class D grounding).
- The applicable cable diameter for the wiring hole is 7 to 12 mm.

Supply power	Voltage: 100 VAC
	Frequency: 50/60 Hz
Applicable electric wire	Φ7 to Φ12
	0.75 mm ² min.



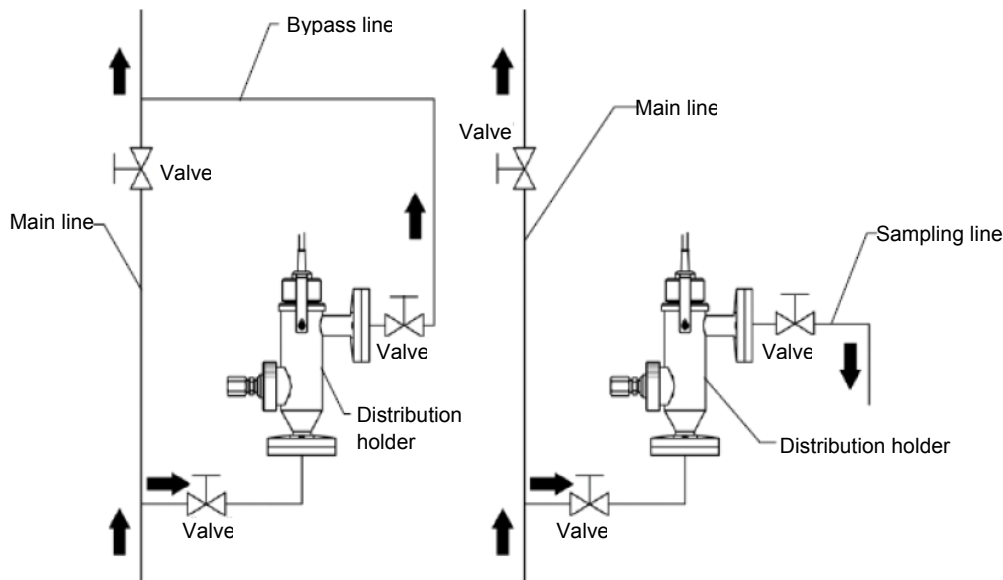
Installation (JDF-311)

Be sure to following the following instructions for setup.

Installation environment

- Install the JDF-311 in a location where maintenance and other services can be done with ease.
- Provide a maintenance space of 25 cm in height above the flow chamber. Give a margin to the electrode cable so that it can be removed.
- Avoid installation in a location exposed to severe vibrations or a high dust level.
- Install the holder so as to ensure that the sensor is not floated to air as the liquid under measurement in the line is drained, even if the liquid stops.
- Avoid installation in a location exposed to corrosive liquid or gas.

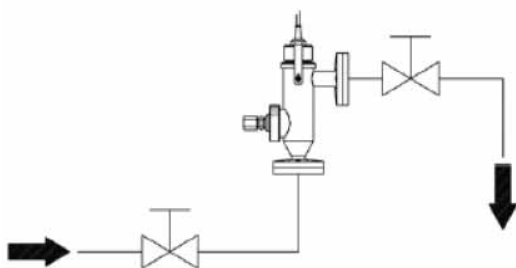
- Avoid installation in a location near a heating element or the like, where the surface and ambient temperatures reach 50 C or higher.
- For any liquid under measurement containing air bubbles, slurry, or any solid that may damage the electrode, previously remove them.
- Do not include the flowchamber in the main line. For installation, be sure to provide a bypass line or a sampling line. Unless the main line is stopped, the maintenance work cannot be done.)



Piping

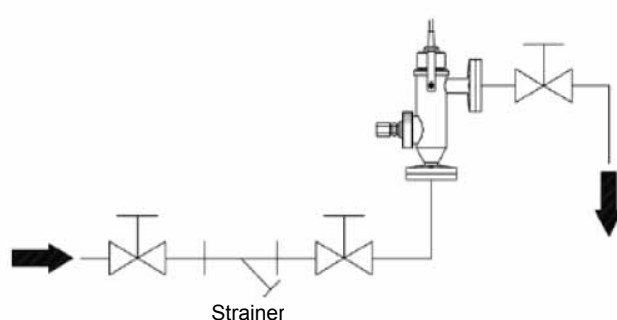
For installation of the flow chamber, provide a bypass line from the main line so that the measured liquid flows into the bottom side of the flow chamber and flows out of the lateral side of the flow chamber. Be sure to provide valves on the inflow and outflow sides respectively. See Fig. 1.

Fig. 1



If the flow rate of the liquid under measurement is too low, the readout will decrease. Control the flow rate in accordance with the conditions of the liquid under measurement. If there are many suspended solids in the liquid under measurement, provide a strainer at the influx side of the holder. See Fig. 2.

Fig. 2



■ Installation (JDF-311) (piping)

Be sure to following the following instructions for setup.

Piping

- Since the cleaner must be removed during maintenance, use flexible piping and give an allowance to its length.
- Before connecting the piping to the cleaner, be sure to flush off the piping with water.
- With the regulator, adjust the cleaning water to a specified pressure.

In using tap water for cleaning water, the water supply law prohibits supplying it directly from water works. Temporarily receive the tap water in a tank or the like and then pressurize it with a pump. However, if original water for industrial use (tertiary treatment water) is used, it may be connected directly. If tap water is distributed after passing through a tank located on the roof or the like, it may also be connected as it is insulated.

