H-1 Series Industrial High Sensitivity Turbidity Meter (4-wire type)
HU-200TB-H

Overview

This instrument consists of the HU-200TB-H converter and the SS-120-H high sensitivity turbidity detector.
It uses a 90-degree light absorption-scattering method that has very little stray light to accurately measure a range of turbidity from low to medium (10 degrees), with measurement values of 2 degrees or less displayed to 3 decimal places. Formazin, Kaolin or Polystyrene Latex (PSL) can be selected as the standard turbidity agent.
The SS-120A detector uses an LED light source (red) and two transmittance/scattered light detectors to cancel out fluctuations in light intensity, providing stable measurement of turbidity.
Options include liquid and solid span bottles that can be used as a substitute for standard solutions druing span calibration. An automatic electric cleaner can be installed to wash dirt from the inner surfae of cells.

Measurement target

Turbidity in solutions

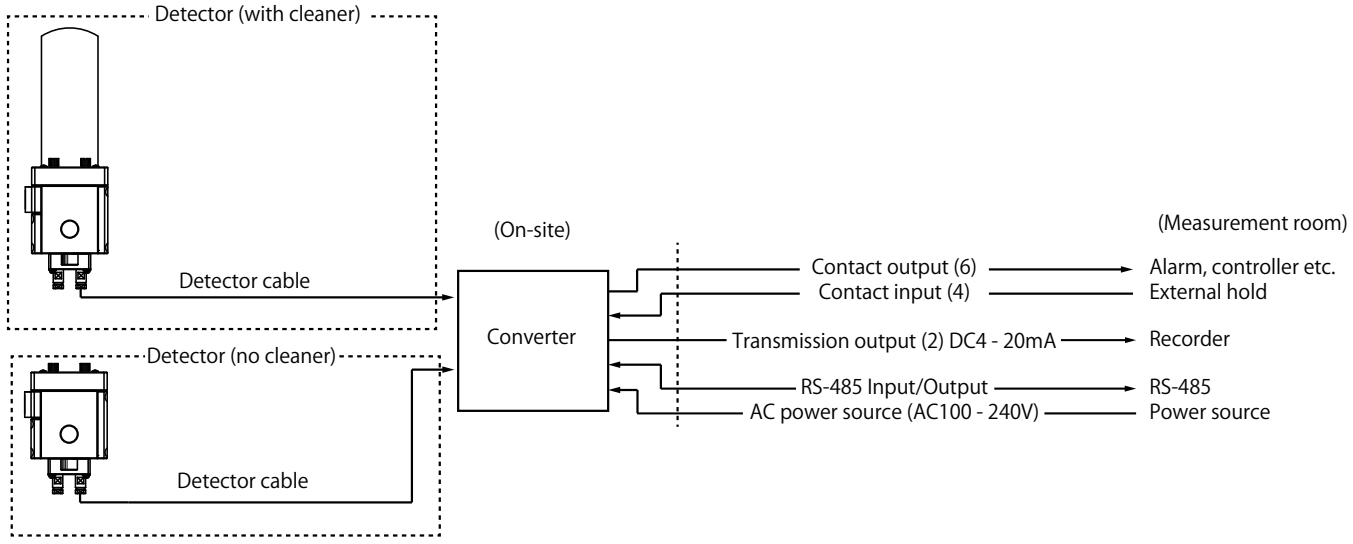
Measuring principle

90-degree light absorption-scattering method

Uses

Control and monitoring of drain water processing and production processes.

System Configuration



HU-200TB-H Turbidity Meter (Overview -1)

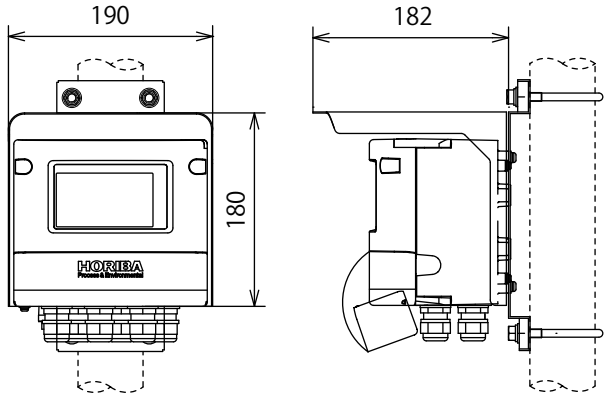
Features

Features of the Converter
- Aluminum die cast
- Ample wiring space and terminal block that prevents drop-off of screws
- Outdoor installation type (splash-proof construction equivalent to IP65)

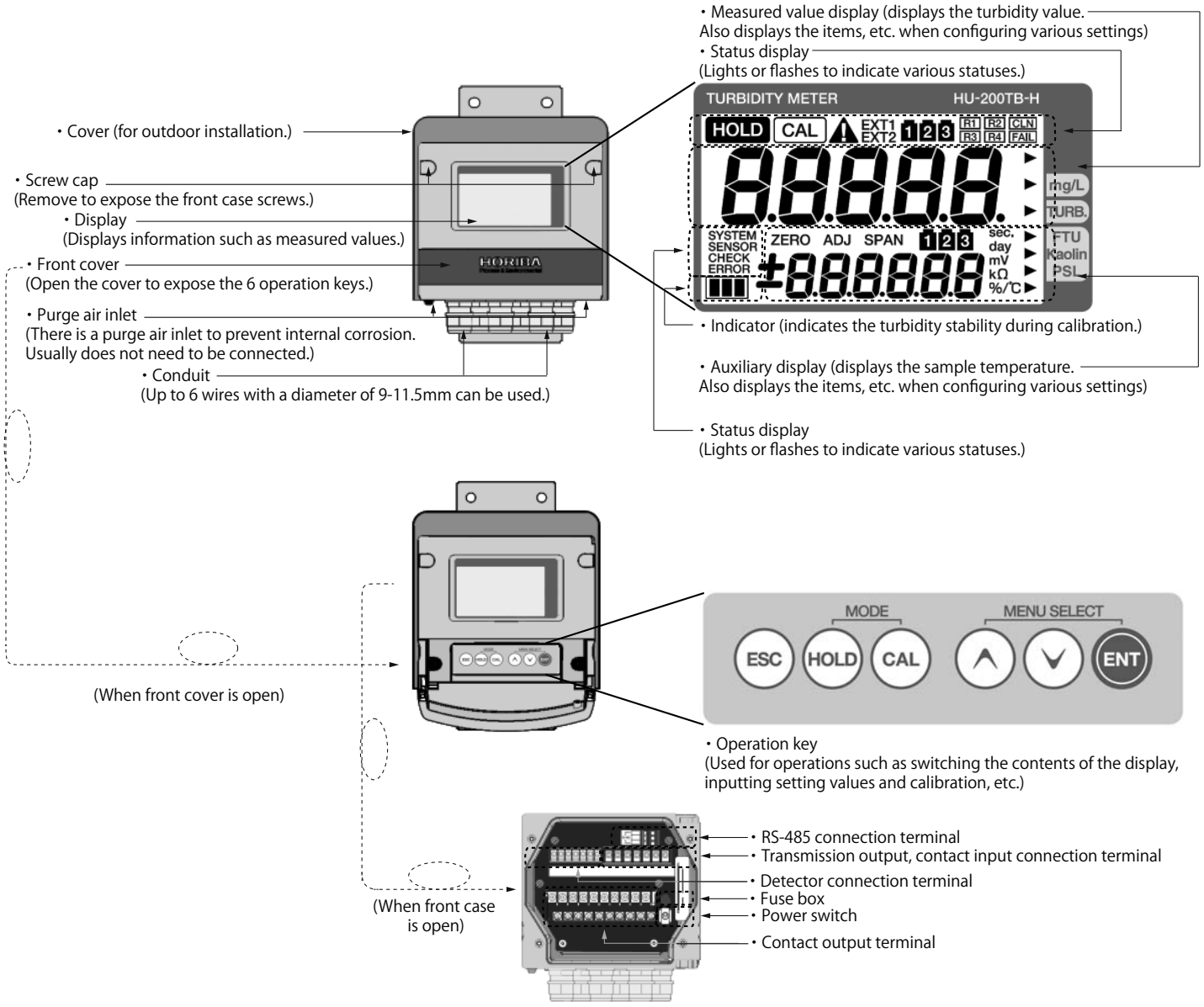
- Easy to read display (150% larger than conventional HORIBA display)
- All operations can be performed from front screen keys.
- Full range of self-diagnosis capabilities
- Free range settings for transmission output
- Automatic range switching and external range switching for current range
- Pre-installed sequence software for automatic calibration
- Calibration history memory
- Unique data calling of the detector allows measurement without instrumental error
- User-friendly key sheet

Features of the Detector
- Light source fluctuation canceled by red LED light source and 2 detectors
- Long-life LED light source
- 90-degree light absorption-scattering method with very little stray light is applied
- Surrounding light canceled by flashing light source
- Low-drift electronic circuits utilized
- Equipped with CPU memory for saving calibration data

External dimensions



Names of Parts/Configuration



HU-200TB-H Turbidity Meter (Overview -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 35VA.

Contact output

- Six contact outputs are included. The contact capacity is less than AC 250 V and 3A or DC 30V and 3 A.

Transmission output

- Two transmission outputs are 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 .
- Transmission output 2 can be externally or automatically switched between a maximum of four measurement ranges.

Turbidity detector

- One turbidity detector can be used.
- An optional cleaner can be installed.

Measuring principle

An LED light source is used. While the light source flashes, the two detectors detect transmitted light and scattered light. While Light Source L1 flashes, D1 detects transmitted light and D2 detects scattered light. Flashing the light sources and extracting the difference between the lit and unlit signal cancels out influences from light in the surrounding area.
The obtained signals are defined as follows.

Signal	Type	Light source	Detector
T	Transmitted light	L1	D1
S	Scattered light	L1	D2

S/T is calculated from the obtained signals.
This S/T value cancels out light source fluctuations, detector fluctuations, and light attenuation caused by local impurities.

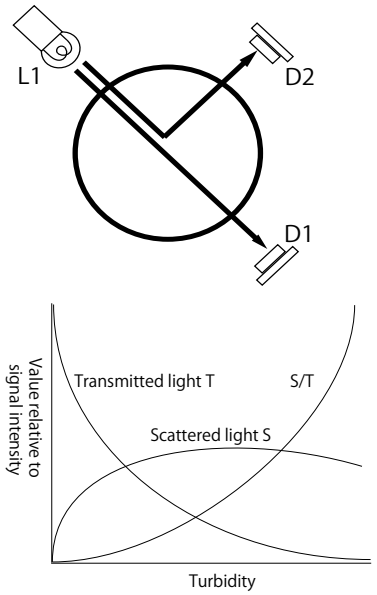


Fig.1

Calibration

The following is an overview of calibration methods to maintain accuracy.

- Zero calibration
  Zero calibration is an operation that makes the clear water value zero. The following calibration methods are recommended according to the level of turbidity.
  If measuring water with low turbidity, such as tap water or pool water, it is difficult to store and calibrate zero water due to turbidity caused by air bubbles and deposits on the walls. Therefore, the recommended method is to perform zero calibration with a continuous flow of zero water filtered with an ultra filter.
  Continuously run zero water and check that the indication has stabilized, then perform zero calibration when the turbidity value is at its lowest.

- Caution -
  - Zero calibration cannot be performed with air inside the cell.
  - Take care to ensure that air bubbles do not form when running zero water.
  - Impurities in the pipeline may cause turbidity to increase.
  - If a sample has a high salinity, filtered water with the same salinity may need to be used as zero water.

- Span calibration
  A standard turbidity agent needs to be selected before span calibration. Conventional standard turbidity agents are refined Kaolin powder and Formazin. Polystyrene Latex (PSL) is used for tap water.

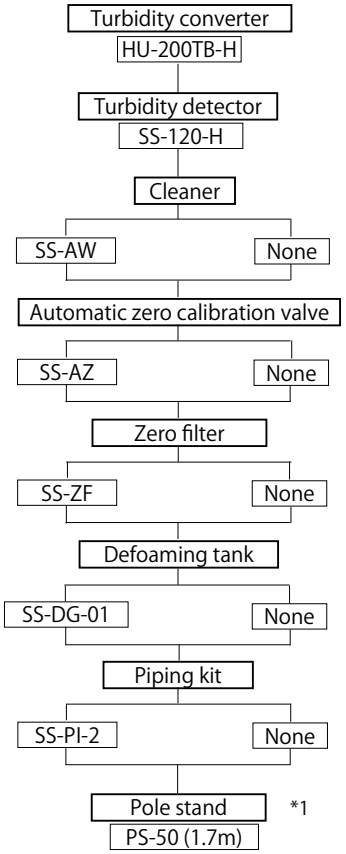
Purchase these standard turbidity agents commercially or use HORIBA supplementary goods. Optional span liquid is also available as a substitute for span calibration liquid. Using the span liquid mates it possible to obtain an alternative signal to standard liquid simply by placing the span liquid into the liquid span bottle and shaking it firmly before attaching it. However, it is not possible to perform span calibration simply by placing liquid with a known turbidity in the liquid span bottle and using the known turbidity value for calibration.
If using the liquid span bottle, first calibrate the turbidity meter with a standard turbidity agent before attaching the liquid span bottle. Verify the measured value displayed at this time and perform operations according to this value in subsequent span calibrations.
The liquid in the liquid span bottle consists of refined Kaolin and small amounts of a dispersant (sodium pyrophosphate) and a sterilizing agent (hydrogen peroxide).
Attach the liquid span bottle in the zero water. The value of the liquid span bottle needs to be re-verified every year, as it is not constant.
Pour 5 degree or higher Kaolin liquid into the liquid span bottle. If a low turbidity liquid is used, the turbidity changes over time because particles become attached to the wall surface.
Use a standard liquid with a turbidity of 2 degrees or higher for turbidity span calibrations. A wide margin of error may occur if the standard liquid is near the zero point.

- Caution -
  - Attach the span calibration bottle in the zero water. Calibration is not possible in air.
  - The proper turbidity for the span calibration liquid solution is 0.3-0.9x the measurement range.
  - Before span calibration, thoroughly clean the inside of the cell and rinse with clean water.

HU-200TB-H Turbidity Meter (Combination -1)

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

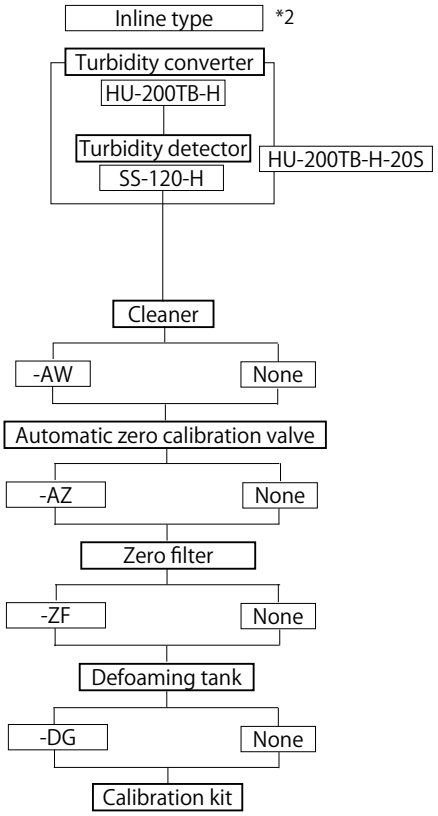
Combination -1



*1: Pole stand for mounting the converter, detector, zero filter and defoaming tank.
The instrument cannot be shipped with the products installed.

HU-200TB-H Turbidity Meter (Combination -2)

Combination 2 (Stand type)



*2: Turbidity detector (SS-120-H), piping is provided.
Attached to the stand before shipping.

■ Stand Type Code Table

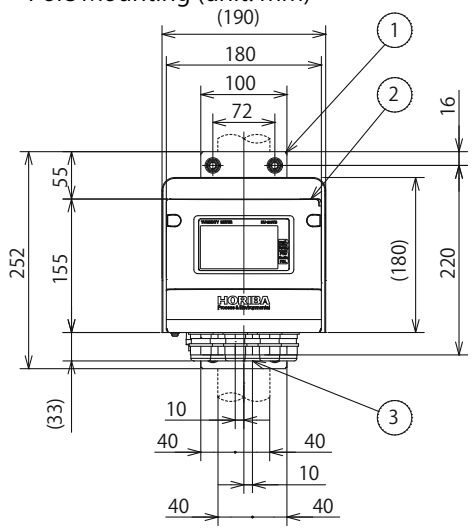
Inline type

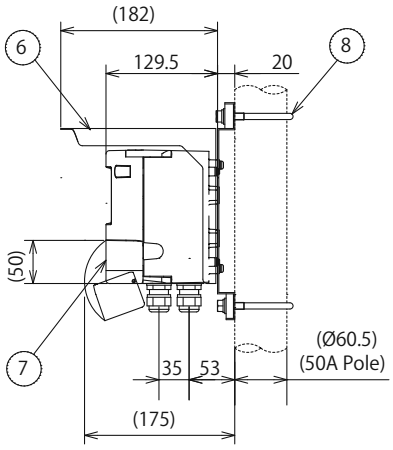
Model	Cleaner	Automatic zero Calibration valve	Zero filter	Defoaming tank	Notation	Special notes	Specifications
HU-200TB-H-20S	-AW						Cleaner included
	-0						Cleaner not included
		-AZ					With automatic zero calibration valve
		-N3					No automatic zero calibration valve
			-ZF				Zero filter included
			-N4				Zero filter not included
				-DG			With defoaming tank
				-N5			No defoaming tank
					-		Japanese notations and manual
					-E		English notations and manual
						-	No special specifications
						-X6	Special notes included

HU-200TB-H Turbidity Meter (External dimensions -1)

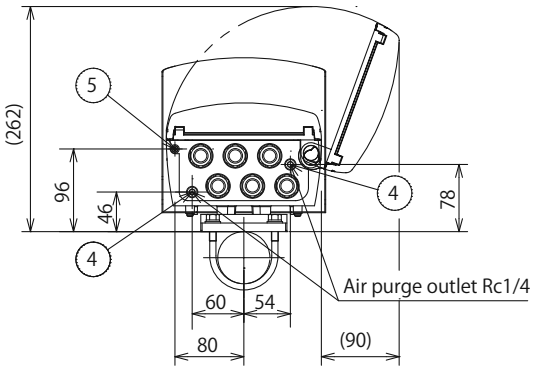
Converter

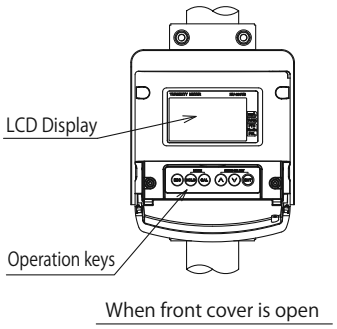
- Pole Mounting (unit: mm) -





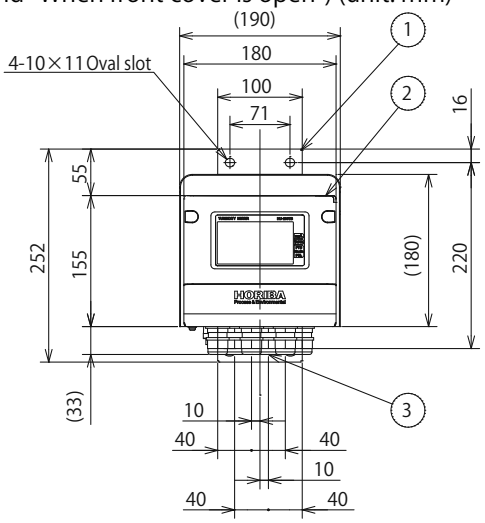
NO.	PARTS NAME	NOTES
1	Bracket	SUS304
2	Case	ADC12
3	Conduit (Cable gland)	Screw size G1/2 O.D Ø7～Ø12Cable
4	Plug	SUS304
5	Earth terminal	SUS304 M4
6	Cover	SUS304
7	Front cover	ADC12
8	U-Bolt	SUS304 50A M8

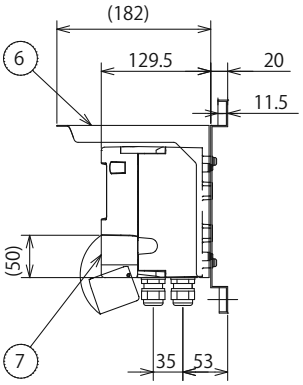


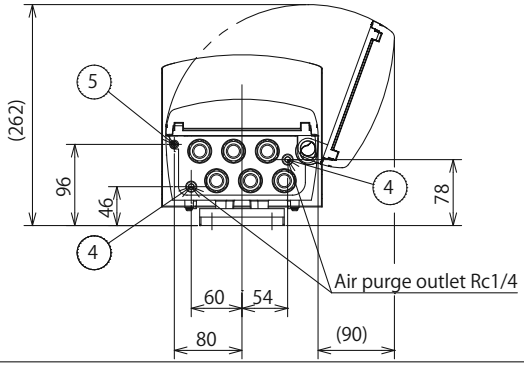


When front cover is open

- Wall mounting (common part name and "When front cover is open") (unit: mm) -

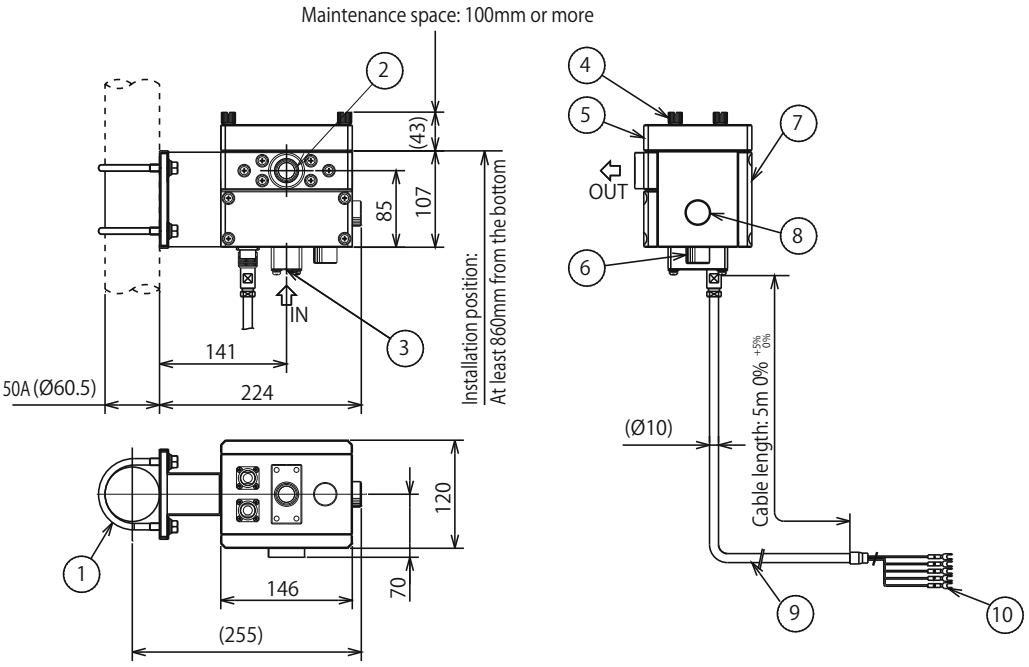






HU-200TB-H Turbidity Meter (External dimensions -2)

Turbidity Detector (SS-120-H)



NO.	PARTS NAME	NOTES
1	U-bolt	SUS304 50A M8
2	Sample outlet	Rc3/4
3	Sample inlet	Rc3/4
4	Knurled thumb screw	SUS304 M6
5	Cover	PVC
6	Holder	Desiccant holder
7	Sensor	SS-120-H
8	Window cover for checking	PVC
9	Cable	PVC
10	Y terminal	For M3

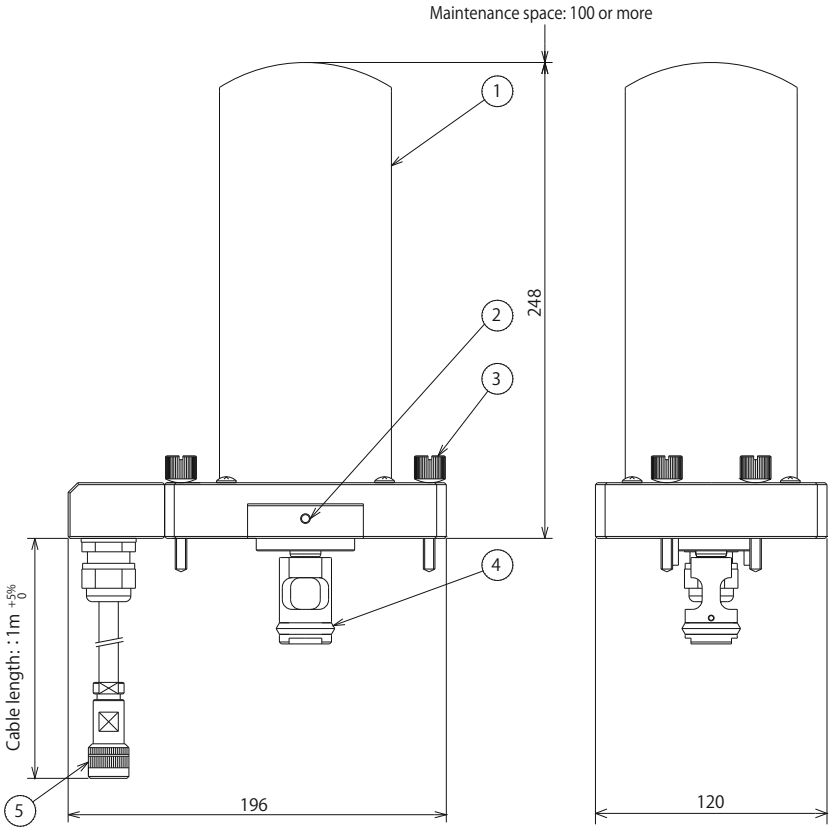
Caution
1. Install in a measured liquid line that does not contain air bubbles.
2. Avoid installing in an area with large amounts of vibration.

Specifications

Measuring principle	2 light sources, 90-degree transmission-scattering method
Light source	Red LED 660nm
Detector	Silicone photo diode
Detection window	Internal diameter Φ30, hard glass tube
Data transfer	RS-485 (communication with converter)
Measured liquid temperature	0 - 45℃ (no freezing)
Measured liquid pressure	0 - 0.3MPa
Material of wetted part	PVC, SUS316, FKM, silicone
Cable length	5m (standard)
Installation	Screw hole diameter Rc3/4
Power source	DC12V supply from converter HU-200TB
External dimensions	131(W) x 450(H) x 224(D)
Mass Approx.	2.5kg

HU-200TB-H Turbidity Meter (External dimensions -3)

Cleaner (SS-AW)



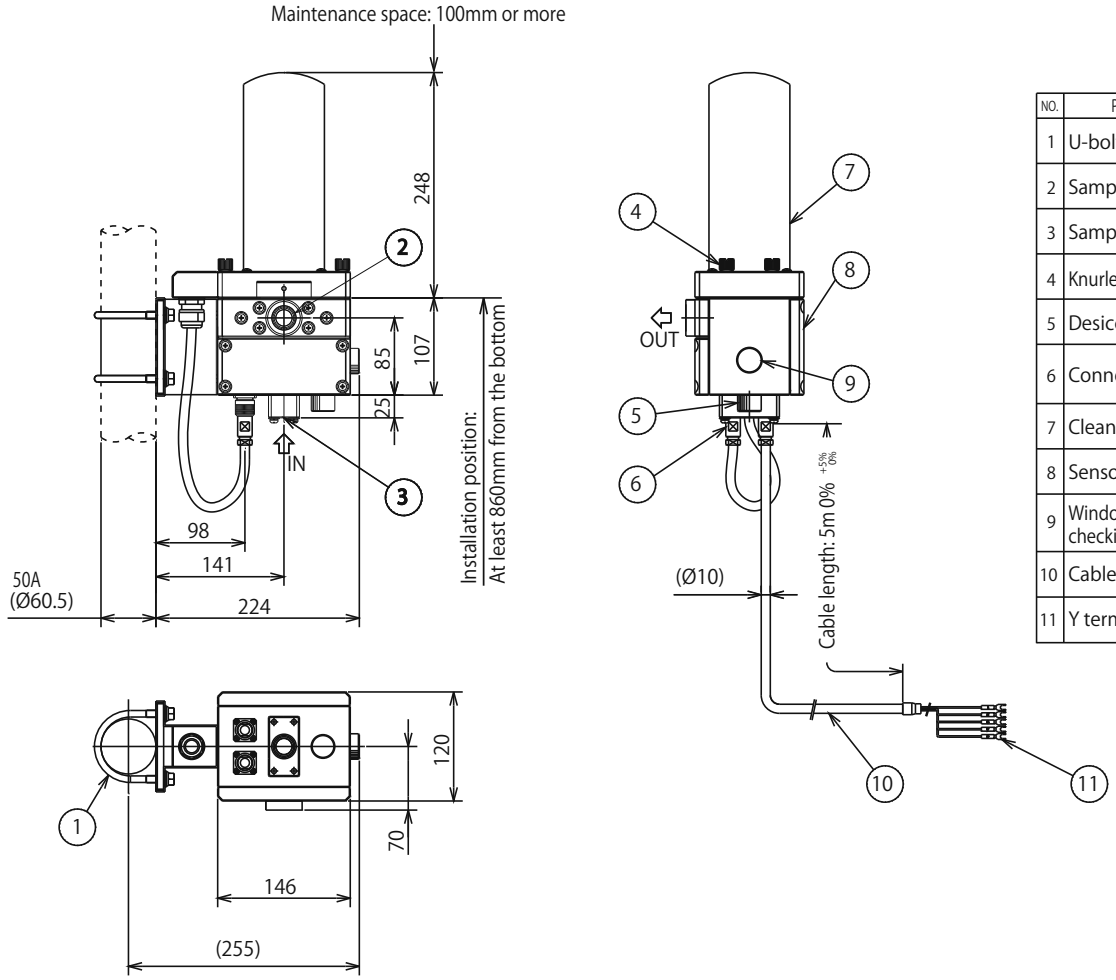
NO.	PARTS NAME	NOTES
1	Automatic cleaner cover	SUS304
2	Pressure releasing hole	
3	Knurled thumb screw	SUS303 M6
4	Wiper	Q
5	Connector	Waterproof Connector

Specifications

Cleaning method	Electric wiper
Power supply	DC 12V 4W supply from HU-200TB-H converter
Cleaning operation	Repeated piston motion throughout cleaning time Pistons enter standby at highest point after cleaning time has elapsed
Cleaning directives	Operation by directives via communication from the converter
Conditions:	
Temperature range	5 - 45°C (no freezing)
Pressure range	0～0.3MPa
Material of wetted part	SUS316, Q, PTFE
Mass	Approx. 2.5kg
Protection class	IP65 equivalent (IEC 60529, JIS C0920)

The cleaning time differs depending on the sample water pressure.
If there is no sample water pressure and the outlet side is exposed to the atmosphere, the cleaning time is approximately 30 seconds.

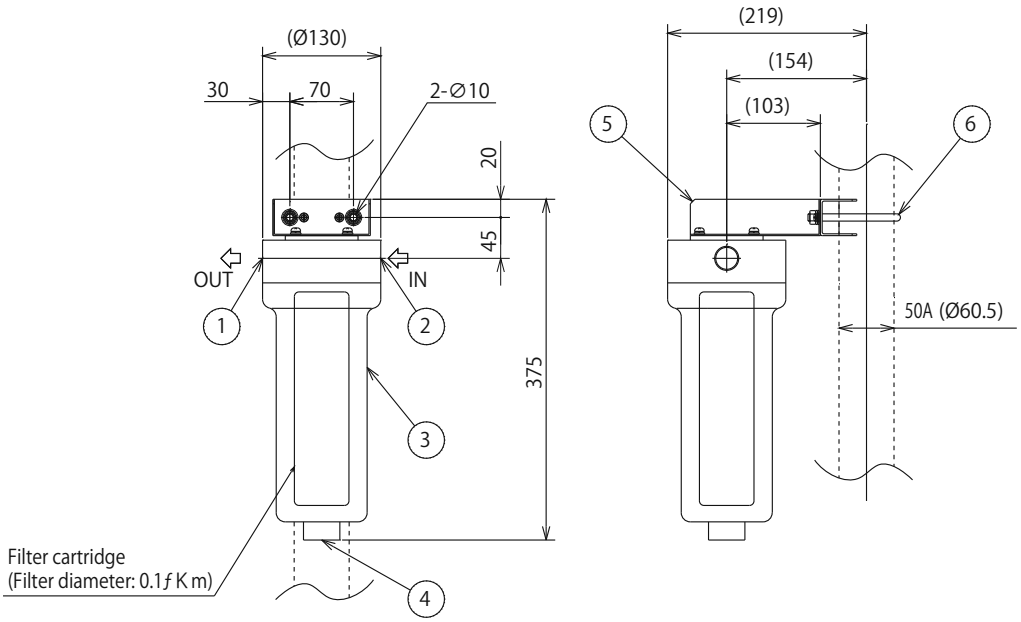
- Combination with turbidity detector (SS-120-H) -



NO.	PARTS NAME	NOTES
1	U-bolt	SUS304 50A M8
2	Sample outlet	PVC Rc3/4
3	Sample inlet	SUS316 Rc3/4
4	Knurled thumb screw	SUS303 M6
5	Desiccant holder	PVC
6	Connector	Waterproof Connector
7	Cleaning unit	SS-AW
8	Sensor	SS-120-H
9	Window cover for checking	PVC
10	Cable	PVC
11	Y terminal	For M3

HU-200TB-H Turbidity Meter (External dimensions -4)

Zero filter (SS-ZF)

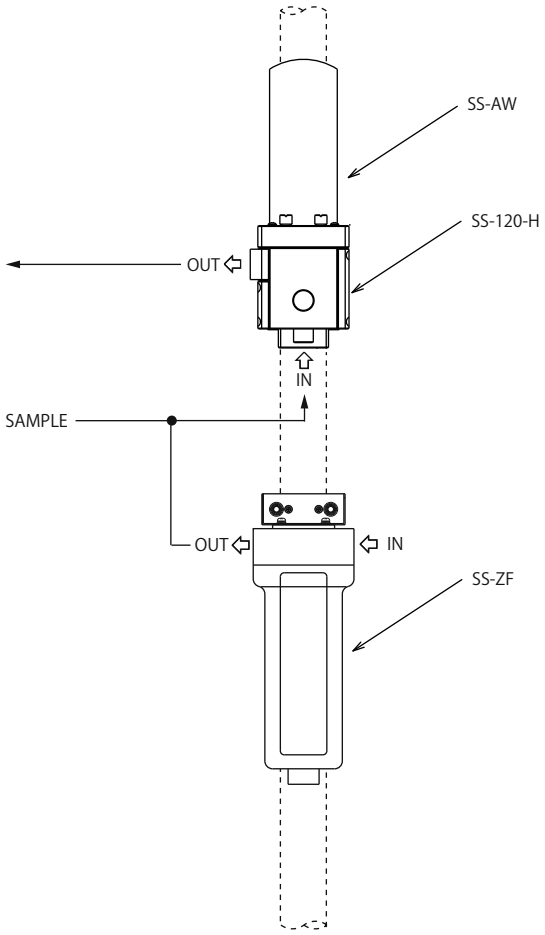


NO.	PARTS NAME	NOTES
1	Zero water outlet	PP Rc3/4
2	Zero water inlet	PP Rc3/4
3	Filter housing	PP, AS
4	Drain screw	PVC
5	Filter rack	SUS304
6	U−bolt	SUS304 50A M8

Specifications
Conditions

Temperature	0 - 45℃ (no freezing)
Pressure	0.5 MPa or less
Flow rate	6L/min
Mass	Approx. 2.5kg
Material of wetted part	Polypropylene, AS resin PVC, EPDM, polyurethane

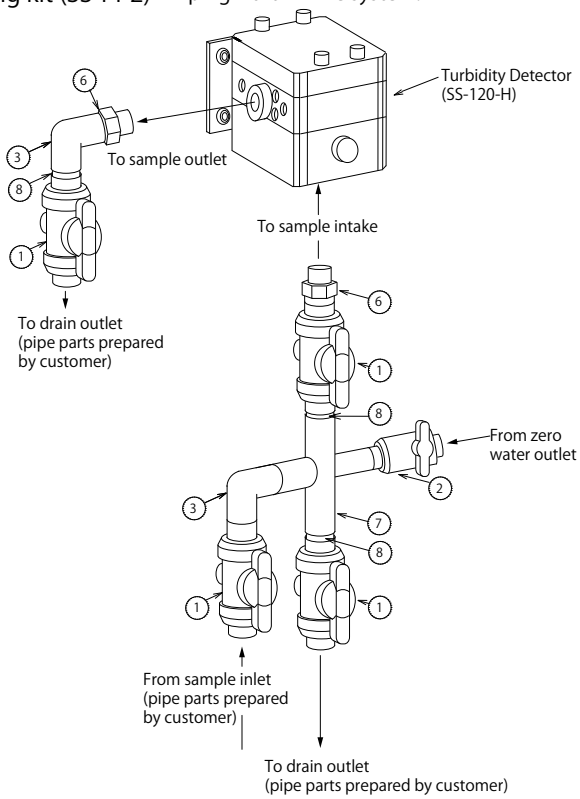
- Combination of turbidity detector (SS-120-H), cleaner (SS-AW) and zero filter (SS-ZF) -



HU-200TB-H Turbidity Meter (External dimensions -5)

Piping kit (SS-PI-2)

- Piping kit (SS-PI-2) - Piping kit for inline system.



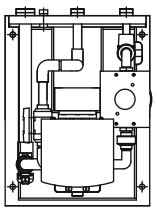
No.	Name	Description	Quantity
1	Ball valve	Nominal diameter: 16A TS socket type	4
2	Ball valve	Nominal diameter: 13A TS socket type	1
3	Elbow	Nominal diameter: 16A Material: PVC	2
6	Pipe socket	Rc3/4 Nominal pipe diameter: 16A Material: PVC	2
7	Tee	Nominal diameter: 16A TS socket type Nominal pipe diameter: 13A Material: PVC	1
8	Pipe	VP 16A (0.5m) Material: PVC	2

HU-200TB-H Turbidity Meter (External dimensions -6)

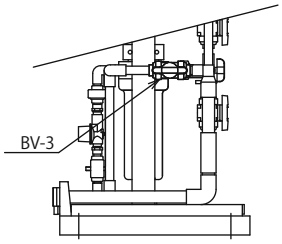
Stand Type (Inline Type)

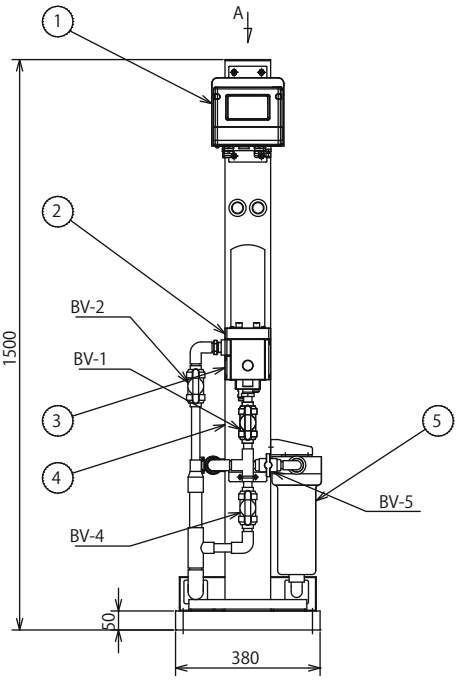
- The converter (HU-200TB-H), detector (SS-120-H) and piping of this instrument type are attached to the stand.
- An optional automatic cleaner (SS-AW), automatic zero calibration valve (SS-AZ), zero filter (SS-ZF) and defoaming tank (SS-DG-01) can be installed.

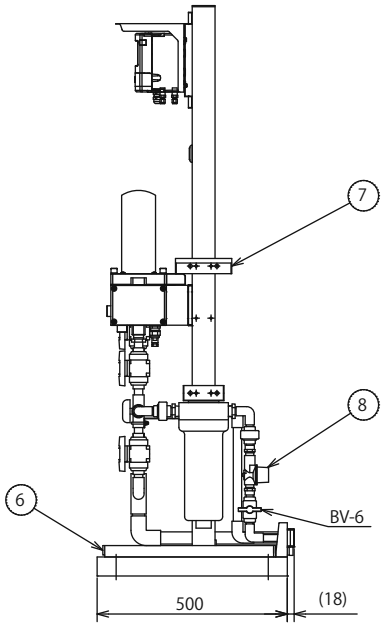
- This sampling flow system measures while applying sample pressure to the detector (SS-120-H)
- The following exterior figure shows an installation of the automatic cleaner (SS-AW) and zero filter (SS-ZF).



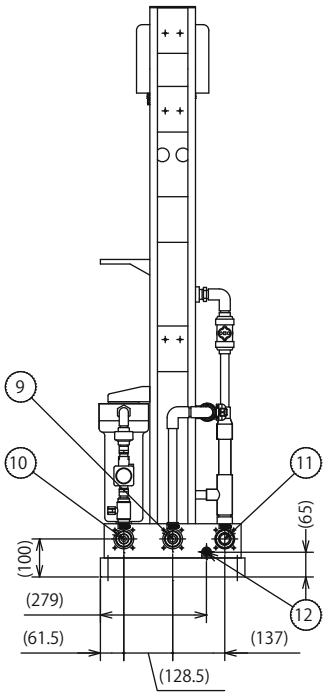
A Arrow view

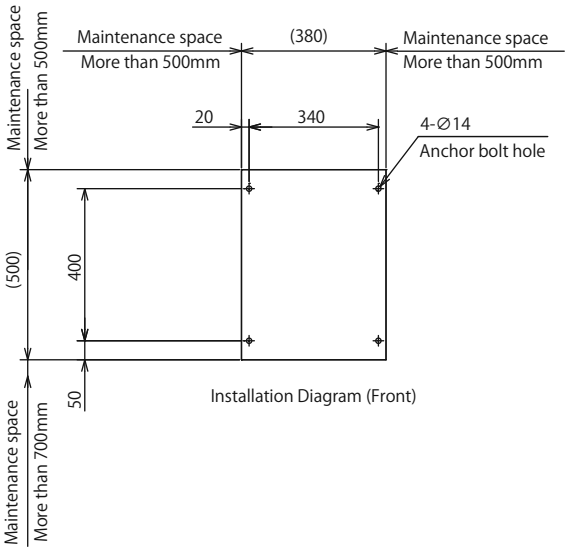






NO.	PARTS NAME	NOTES
1	Converter	HU-200TB-H
2	Cleaning unit	SS-AW
3	Sensor	SS-120-H
4	Stand	SUS304
5	Filter housing	PP,AS,PC
6	Tray	PVC
7	Cleaning unit stand	SUS304
8	Pressure reducing valve	
9	Sample inlet	PVC Rc 3/4
10	Zero water inlet	PVC Rc 3/4
11	Sample outlet	PVC Rc 1
12	Outlet for tray	PVC Rc 1/4





Installation Diagram (Front)

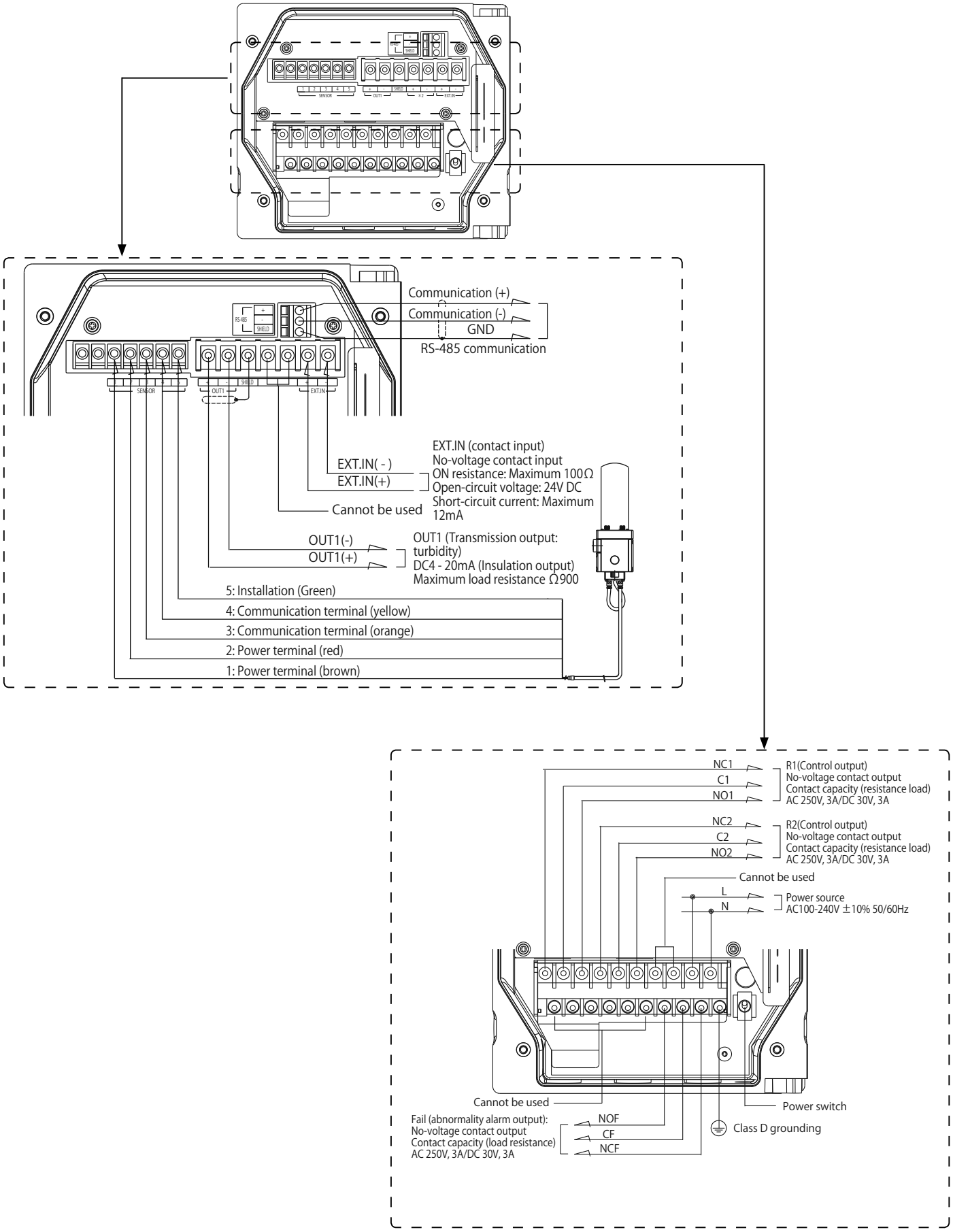
Caution
1. Install in a measured liquid line that does not contain air bubbles.
2. Avoid installing in an area with large amounts of vibration.
3. Do not operate the cleaner when the inlet and outlet sides are closed.

Annotation
・When using tap water, directly supplying tap water from the water supply is prohibited by the Water Supply Act.
Insulate from the general supply pipe using equipment such as a tank unit for cleaning sensors.
・Use a heat-insulated pipe if there is a risk that the tap water will freeze.

HU-200TB-H Turbidity Indication Converter (external connection diagram)

Converter + Turbidity detector

・The following section describes the wiring between the HU-200TB-H converter and turbidity detector (SS-120-H).



HU-200TB-H Turbidity Meter (Specifications -1)

Converter Specifications -1-

- The following section describes the specifications for the HU-200TB-H converter.
- Details on accessory products for the turbidity detector (SS-120-H) etc. are available in each external dimensions diagram. See the diagrams for details.

Product name	Industrial turbidity meter		
Model	HU-200TB-H		
Turbidity detector model	SS-120-H		
Measurable range	Kaolin		0-10.00 degrees (display range: 0-11.00 degrees)
	Formazin		0-10.00 degrees (display range: 0-11.00 degrees)
	PSL		0-10.00 degrees (display range: 0-11.00 degrees)
Transmission output setting range	Kaolin		Ranges from 0-0.1 degree to 0-11 degrees can be set as desired.
	Formazin		Ranges from 0-0.1 degree to 0-11 degrees can be set as desired.
	PSL		Ranges from 0-0.1 degree to 0-11 degrees can be set as desired.
Display resolution	0.001 degree (0-2 degree range)		Switch between fixed range (decimal point) and auto range
	0.01 degrees (0-10 degree range)		
Performance	Repeatability		The larger of within ± 2% or ± 0.04 degrees of the read value (depending on the span calibration tool)
	Linearity		The deviation from the mid-range point of the span calibration values is the larger of within ± 2% or ± 0.04 degrees of the calibration value
Transmission output	Number of output points		2
	Output type		DC4-20mA input/output insulation type
	Load resistance		Maximum 900 Ω
	Repeatability		Within ± 0.02mA (output only)
	Linearity		Within ± 0.08mA (output only)
	Error output		Burnout capability included (3.8mA or 21mA)
	Hold capability		Select a setting from last value hold, arbitrary value hold or calibration value output
Contact output	Number of output points		6
	Output type		No-voltage contact output
	R1, R2	Contact type	Relay contact, SPDT (1a)
		Contact capacity	AC250V 3A, DC30V 3A (resistance load)
		Contact capability	Select from upper limit alarm, lower limit alarm, transmission output hold cleaning output and automatic calibration output (closed at alarm operation, opened usually, opened at power-off)
		Description of alarm	・Setting range: Turbidity: within measurable range ・Delay time: 0-600 seconds
	R3	Contact type	Relay contact, SPDT (1a)
		Contact capacity	DC30V 1A (resistance load)
		Contact capability	Select from upper limit alarm, lower limit alarm, transmission output hold cleaning output and automatic calibration output (closed at alarm operation, opened usually, opened at power-off)
		Description of alarm	・Setting range: Turbidity within measurable range ・Delay time: 0-600 seconds
	FAIL	Contact type	Relay contact, SPDT (1c)
		Contact capacity	AC250V 3A, DC30V 3A (resistance load)
		Contact capability	Error warning (closed normally, opened at error, opened at power-off)
		Description of alarm	- Outside setting range, self-check, calibration error warning settings can be set - Delay time: 0 - 600 seconds
	RNG1 RNG2	Contact type	Relay contact, SPDT (1a)
		Contact capacity	DC30V 1A (resistance load)
		Contact capability	Output status of transmission output range
Contact input	Number of input points		4
	Contact type		No-voltage a contact for open collector
	Conditions		ON resistance: Maximum 100 Ω Open-circuit voltage: DC24V Short-circuit current: Maximum DC 12mA
	Contact capability	EXT1	Cleaning directives/transmission hold can be switched
		EXT2	Zero calibration directives/transmission hold can be switched
		EXT3, EXT4	Maximum 4 range switching directive for transmission output
Communication capability	Method		RS-485
	Signal type		2 wire type, input/output insulation type (transmission output not insulated)
Calibration	Calibration method		Zero calibration: by filtered clean water
			Automatic zero calibration: Switch to filtered clean water and automatically calibrate (option)
			Span calibration: Turbidity adjustment by factor entry
	Compatible standard substances		Kaolin, Formazin, PSL

HU-200TB-H Turbidity Meter (Specifications -2)

Converter Specifications -2-

Cleaning function (optional)	Cleaning method			Electric wiper type (cleaning operation performed by communication with the converter)	
	Settings	Cleaning frequency		0.1-168.0 hours	
		Cleaning time		20-600 seconds	
		Hold time		60-600 seconds	
	Timer accuracy			Monthly error margin less than 2 minutes	
Self-check	Sensor check error			CPU errors, ADC errors, memory errors	
Operating temperature range	-20 - 55℃ (no freezing)				
Operating humidity range	Relative humidity of 5-90% (no condensation)				
Storage temperature	-25 - 65℃				
Power source	Power supply voltage range			AC100-240V 50/60Hz	
	Power consumption			35VA (max)	
	Other			Contains time lag fuse (250V, 1A)	
				Contains power switch for maintenance	
Applicable standards	CE marking			EMC directives (2004/108/EC) EN61326-1:2006	
				Low voltage directives (2006/95/EC) EN61010-1:2001	
		EMC	Immunity Industrial location	Electrostatic discharge	IEC61000-4-2
				Electromagnetic radiation radio frequency field	IEC61000-4-3
				Electrical fast transient/burst	IEC61000-4-4
				Surge	IEC61000-4-5 (*1)
				Conduction obstruction induced by radio frequency	IEC61000-4-6
				Voltage dip, short time blackout and voltage variation	IEC610000-4-11
			Emissions ClassA	Radiation obstruction	CISPR 11 CLASSA
				Noise terminal voltage	CISPR 11 CLASSA
		Low voltage		Pollution degree 2	
	FCC rules			Part 15 CLASS A	
Structure	Installation			Outdoor installation type	
	Installation method			50A pole or wall mounting	
	Protection class			IP65	
	Material of case			Aluminum alloy (modified epoxy melamine resin painting)	
	Material of mounting brackets			SUS304	
	Material of cover			SUS304 (modified epoxy melamine resin painting)	
	Material of display window			Polycarbonate	
	Display element			Reflective monochrome LCD	
External dimensions	180 (W) x 155 (H) x 115 (D) (not including mounting brackets)				
Mass	Main unit: approx. 3.5kg, cover and mounting brackets: approx. 1kg				

*1 If the sensor cable, transmission cable and/or contact input cable are extended to longer than 30m, the surge test in the EMC directives of the CE marking is not applied.

*2 Although an arrester (firing potential 400 V) is installed for transmission output, contact input and communication, install the optimum surge absorber for conditions such as the surrounding environment, instrument installation conditions and externally connected equipment

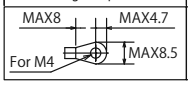
HU-200TB-H Turbidity Meter (Specifications -3)

Power Source

- The power source of this equipment is a free power source with a rated voltage of AC100-240 V.
- Check the voltage of the power source, as operating at a voltage outside the rated range causes malfunction. Also, check that the range of fluctuations in supply voltage does not exceed ± 10%.
- This instrument has a power switch.

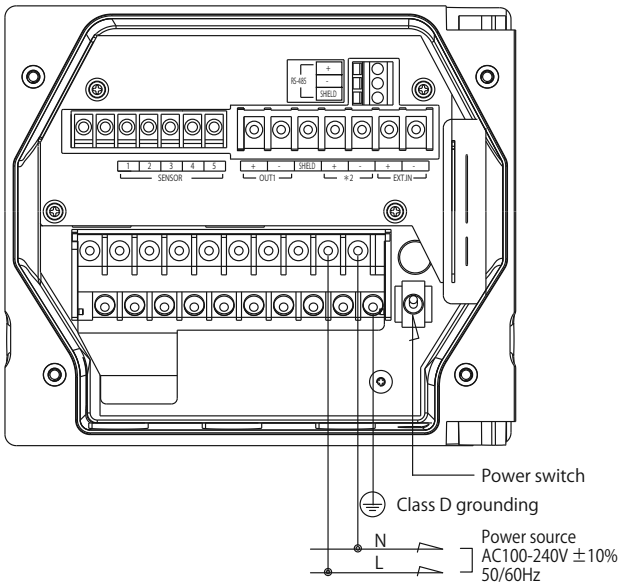
Main Specifications
- The power supply terminal screws are M4 screws.
- The wire size is 0.75-5.5 mm^2 (AWG18-10).

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	5.5mm ²/MAX (AWG10)	1.2～1.8 N·m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).

- Install the power switch near the instrument and ensure that the power source can be turned on and off.
- Install arresters if there is a risk of thunder damage.
- For safety reasons, be sure to ground the earth terminal (class D grounding).
- Ground separately from electrical equipment such as the motor.



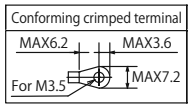
Main Specifications	
Rated Voltage	AC100 - 240V 50/60Hz
Power consumption	Maximum 35VA
Terminal screw	M4
Applicable wiring	0.75-5.5mm²(AWG18-10)

Transmission output

- Two transmission outputs are 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).
- If desired, a full-scale transmission output range can be set, as long as it is within the full scale setting range of the measured values. Also, a burnout can be set (transmission output: 3.8mA or 21mA). It is possible to set whether to temporarily hold the output value at the last value or a preset value when holding the transmission output during an external signal.

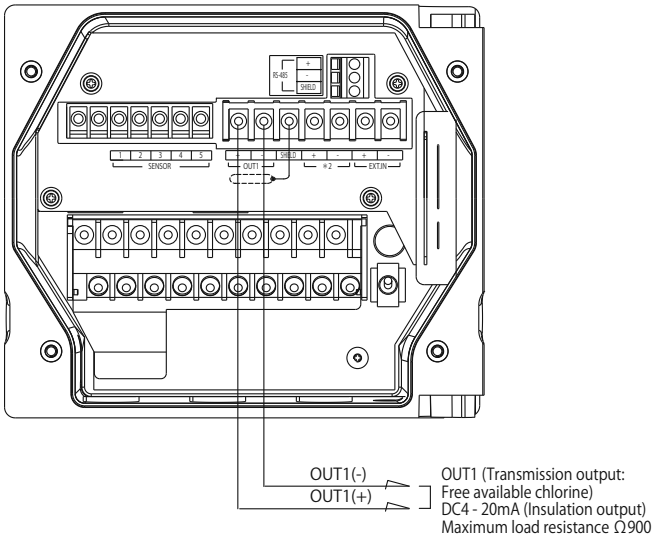
Main Specifications
- The transmission output terminal screws are M3.5 screws.
- The wire size is 2mm2 (AWG14) max.

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	2mm ²/MAX (AWG14)	0.8～1.2 N·m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).

- Use a shielded cable for the transmission output cable.
- 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	900Ω
Terminal screw	M3.5
Applicable wiring	2mm²(AWG14)

HU-200TB-H Turbidity Meter (Specifications -4)

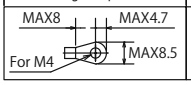
Contact output

- Three contact outputs are included of which one is fail (abnormality alarm output).
- Can be selected from four types, "Upper/lower limit operation ON/OFF control -(AL)", "During maintenance (HOLD)", "During cleaning (CLn)" or "None (non)".

Main Specifications
- The contact capacity is less than AC 250 V and 3A or DC 30V and 3 A.
- The terminal screws are M4 screws.

The wire size is 0.75 - maximum 5.5 mm^2 (AWG18-10).

Terminal Block Specifications

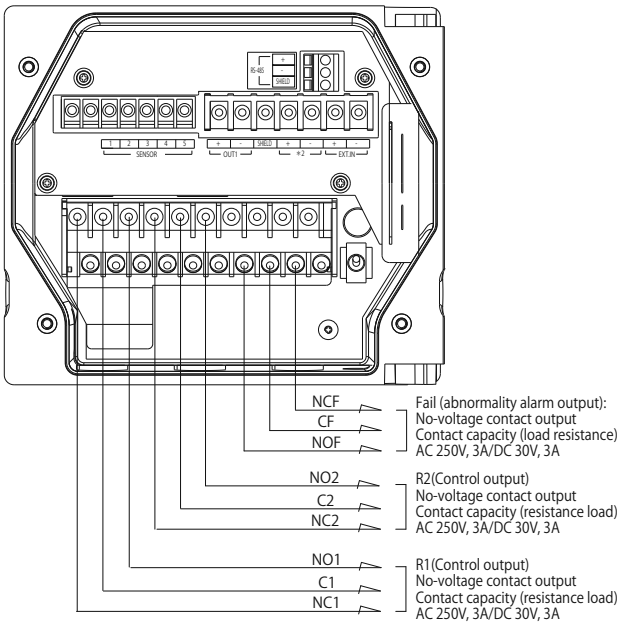
Conforming crimped terminal	Wire size	Screw tightening torque
	5.5mm ²/MAX (AWG10)	1.2～1.8 N・m

*Note:
The screws on the terminal block have a fall prevention structure. When installing the terminal block, turn the screws until they lift (upward screw structure).

- Use a varistor or noise killer if noise occurs in the load.
- The NO and NC arrangement is reversed only in the case of fail output. For normal (non-fail) output, the CF-NOF contact is open and the CF-NCF contact is shorted. The C-NOF contact is shorted when the power is off.

! • 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 R1-R2 C-NC contact is shorted when the power source of this instrument is off.



Main Specifications	
Contact capacity	Less than 250V 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	M4
Applicable wiring	0.75-5.5mm²(AWG18-10)

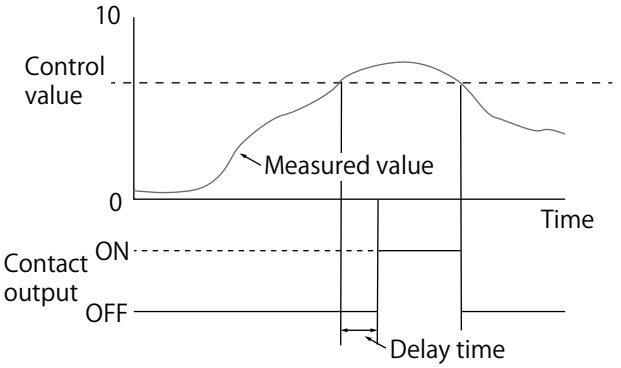
Types of contact (alarm) output		
non		No contact (alarm) output settings.
AL	Upper limit operation	Performs ON/OFF control of the upper limit.
	Lower limit operation	Performs ON/OFF control of the lower limit.
HOLD		Contact is output in the hold mode (when a user checks menu, the setting menu and the calibration menu are on)
		• Setting menu: Menu used for setting/changing parameters related to measurements • Calibration menu: Menu used for zero calibration and span calibration • User check menu: Menu used for checking the output status or measurement values, etc., and for returning settings to the initial values
CLn		Contact is output for a few seconds during and after detector cleaner operation.

FAIL	When an error code (E-80/81/82/83/90/91/92) is issued, the contact is output.

- Upper limit operation, lower limit operation

The control method, controlled values, control range and delay time can be set.

Control method: Select whether to control the upper limit operation or lower limit operation.
Controlled values: Value that is the standard for operating the contact (alarm) output. Enter this value.
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.



Example: When the control method is upper limit operation, controlled value is 8.00 and delay time is set.
The contact (alarm) is made when the pH exceeds pH8.00, and the contact (alarm) is broken when the pH decreases under pH8.00.

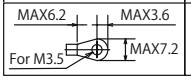
HU-200TB-H Turbidity Meter (Specifications -5)

Contact input

- One contact input is included.
  The cleaner can be operated by an external signal.

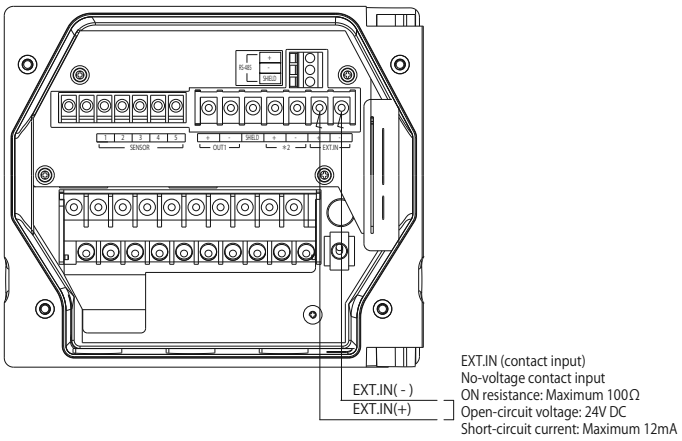
Main Specifications
- The terminal screws are M3.5 screws.
- The wire size is 0.14 - 2.5mm^2 (AWG26-14).

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	2mm^2/MAX (AWG14)	0.8～1.2 N·m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).

- Use a twist pair shielded cable.
  - Install arresters on the output side and receiving instrument side of the instrument if there is a risk of thunder damage.
- Set the resistance of the contact input to 100 Ω or less.



Main Specifications	
Input resistance	100 Ω or less
Terminal screw	M3.5
Applicable wiring	0.14-2.5mm2 (AWG26-14)

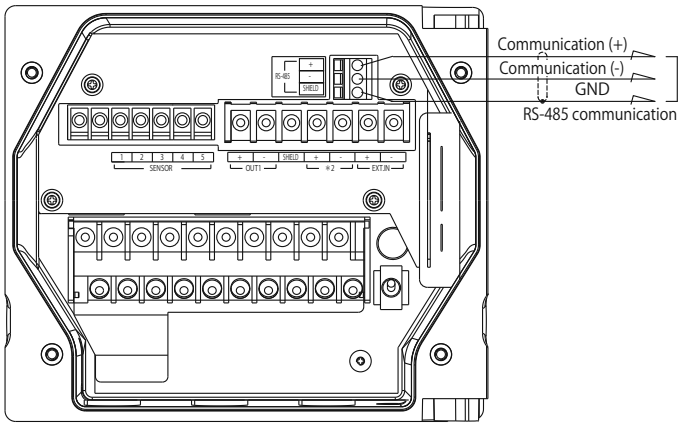
RS-485

- This instrument includes the RS-485 communication terminal. Connect the wiring before using.
- The wire size is 0.14-2.5 mm^2 (AWG26-14).
- Use a twist pair shielded cable for the communication output cable.
- Up to 32 terminals can be connected including the host computer. Set an address.
- The maximum length of the communication cable is 500 m.
- Provide termination resistance (Rt: 120 Ω) for the instrument that is the terminal of the RS-485 communication line.

Terminal Block Specifications

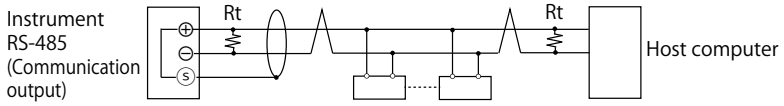
Conforming crimped terminal	Wire size	Screw tightening torque
	0.14～2.5mm^2 (AWG26～14) Single wire or strand wires	0.5～0.6 N·m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).



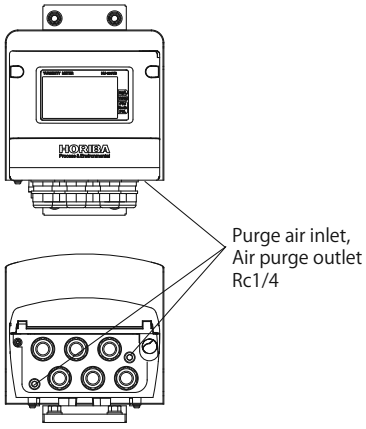
RS-485 communication conditions	Baud rate	19200bps
	Character length	8 bit
	Parity	non
	Stop bit	1 bit

Example of external communication connection



Air Purge

- There is a purge air inlet to prevent internal corrosion. If using in an environment with corrosive gas, instrumentation air is constantly passed through the instrument, preventing the corrosive gas from entering the instrument.



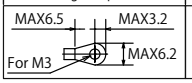
HU-200TB-H Turbidity Meter (Specifications -6)

Detector

- One turbidity detector can be used.
  The cleaner (option) can be operated by an external signal.

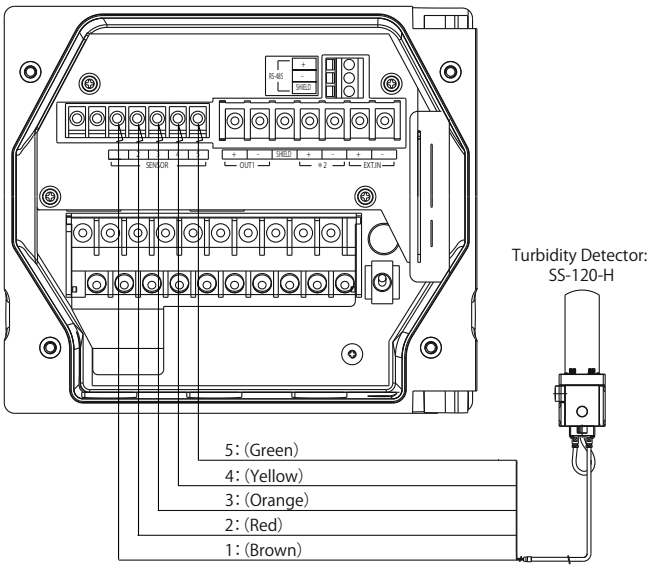
Main Specifications
- The terminal screws are M3 screws.
- The wire size is 1.25mm^2 (AWG16). (The detector cable is a specialized cable. Use a relay box and specialized wire (relay cable) to extend this cable.)

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	1.25mm ^{2}/MAX (AWG16)	0.8N・m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).

- Do not allow the detector cable terminal and terminal block to come into contact with liquids such as water or soil them with finger marks or oil from hands. This decreases insulation. A decrease in insulation causes indication to become unstable. Be sure to keep dry and clean. If soiled, wipe with alcohol etc. and dry well.
- Do not wire the detector cable or relay cable near equipment that supplies induction to parts such as the motor or the power cable of this equipment.



Detector	1: Power terminal (+12V)
	2: Power terminal (0V)
	3: Communication terminal (+)
	4: Communication terminal (-)
	5: Grounding

Detector Specifications

Product name	Industrial-use turbidity detector
Model	SS-120-H
Measuring principle	2 light recourses, 90-degree transmission-scattering method
Light source	Red LED 660 nm
Detector	Silicon photo diode
Detection window	Inside diameter Φ 30 Hard glass tube
Data transfer	RS-485 (communication with converter)
Measured liquid temperature	0 - 45℃ (no freezing)
Measured liquid pressure	0 - 0.3 MPa
Material of wetted part	PVC, SUS316, FKM, silicone
Cable length	Standard provided cable: 5 m
Installation	Screw hole diameter: Rc3/4
Power source	DC12V supply from HU-200TB-H converter
External dimensions	131 (W) × 450 (H) × 224 (D)
Mass	Main unit approx. 3.5kg, cleaner 2.5kg

Cleaner Specifications

Product name	Automatic cleaner
Cleaning method	Electric wiper
Power source	DC 12V 4W supply from HU-200TB-H converter
Cleaning operation	Repeated piston motion throughout cleaning time
	Pistons enter standby at highest point after cleaning time has elapsed
Cleaning directives	Operation by directives via communication from the converter

The cleaning time differs depending on the sample water pressure. If there is no sample water pressure and the outlet side is exposed to the atmosphere, the cleaning time is approximately 30 seconds.

HU-200TB-H Turbidity Meter (Installation Method -1)

Installation environment

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

Converter

- Well ventilated area
- Ambient temperature is above -20℃ and below 55℃
- An area with no direct sunlight
- An area where there is no direct high radiation heat
- An area where the relative humidity is less than 90%
- 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

Detector

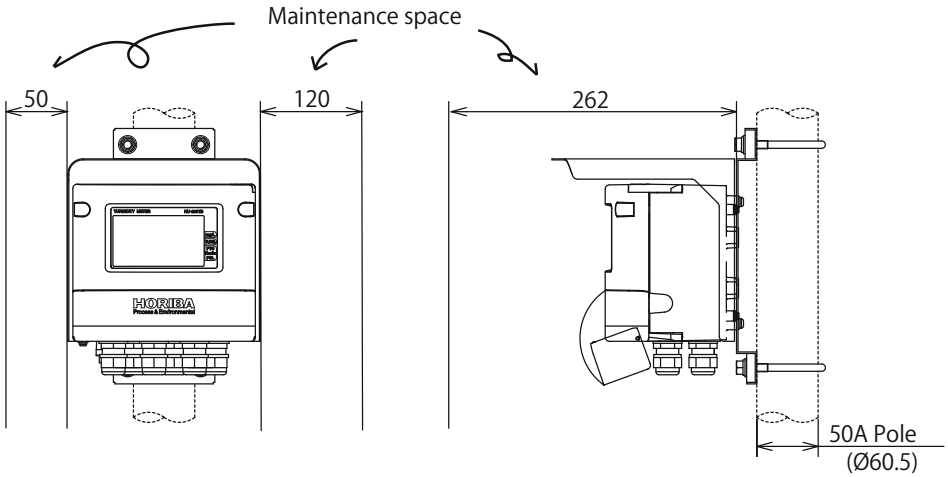
・Easy to access location for inspection and maintenance
・Location that will not be adversely affected if water is spilled
・Location where zero water utilities can be obtained
・The measured liquid is not affected by the material of wetted part of the detector.
・Automatic cleaner and converter can be connected using a 5m cable.

Converter Installation

This instrument can be mounted on a pole (50A) or wall.

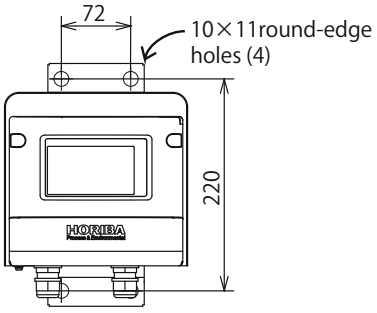
- Pole Mounting -

Ensure there is sufficient space around the instrument for maintenance.



- Wall mounting -

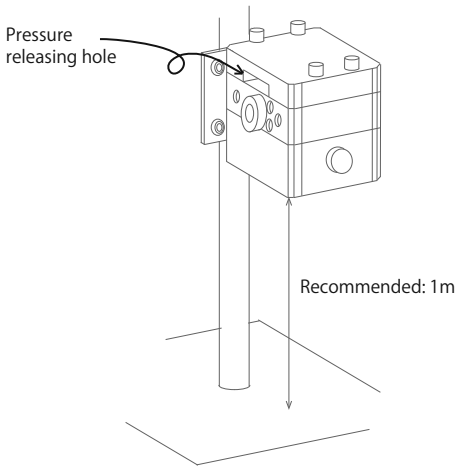
Ensure there is sufficient space around the instrument for maintenance. (The same amount of maintenance space as for pole mounting is required.)



HU-200TB-H Turbidity Meter (Installation Method -2)

Detector Installation

Mount to a 2 inch (50 A) pole using the supplied U-bolt.
(Wall mounting can also be used)
Installing the detector (SS-120-H) at a height of approximately 1 m makes operation easier.
Mount the (optional) stand for temporarily placing the (optional) cleaner when it is removed at the top of the same pole.
Small droplets will fall from the pressure releasing hole of the cleaner.
Guide these to a suitable place (drain, etc.) using a tube.

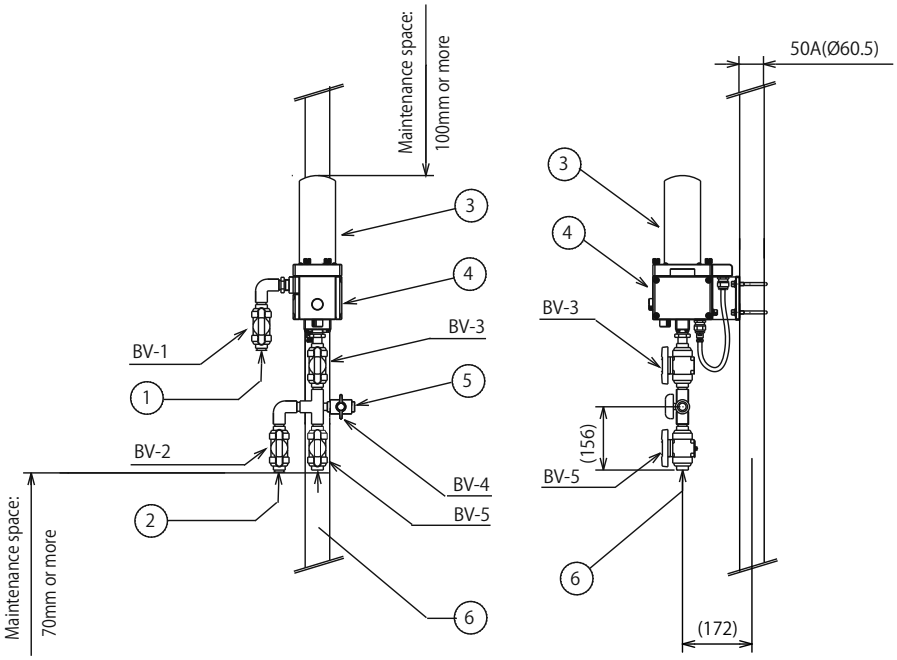


Other installations 1

Inline type -1-

This is a sample installation of the detector SS-120-HA with SS-AW cleaner and piping kit (SS-PI-2).

- Use the pole stand at more than 1500mm.
- Piping to the sample inlet (valve BV-1-) and other piping related parts are to be prepared by the customer.
- Piping to the zero water inlet (valve BV-4-) and other piping related parts are to be prepared by the customer.
- Piping from the measured liquid/zero water drain (valve BV-5-) and other piping related parts are to be prepared by the customer.
- Piping from the sample outlet (valve BV-2-) and other piping related parts are to be prepared by the customer.



NO.	PARTS NAME	NOTES
1	Sample outlet	
2	Sample inlet	
3	Cleaning unit	SS-AW
4	Sensor	SS-120-H
5	Zero water inlet	
6	Measured liquid/Zero water drain	
7	Zero water inlet	

NO.	PARTS NAME	NOTES
BV-1	For measured liquid/zero water outlet	Prefab joint PVC TS 16A
BV-2	For sample inlet	
BV-3	For measured liquid/zero water inlet	
BV-4	For zero water inlet	Compact ball valve PVC TS 13A
BV-5	For measured liquid/zero water drain	Prefab joint PVC TS 16A

Specifications

Conditions: Temperature range	5 - 45°C (no freezing)
Pressure range	0 - 0.3MPa
Material of wetted part:	Glass (Pyrex), PVC FKM, EPDM, SUS316, Q
Mass:	Approx. 16kg
Protection class:	IP65 equivalent (IEC 60529, JIS C0920)

Caution
1. Install in a measured liquid line that does not contain air bubbles.
2. Avoid installing in an area with large amounts of vibration.
3. Do not operate the cleaner when the inlet and outlet sides are closed.

Annotation:
When using tap water, directly supplying tap water from the water supply is prohibited by the Water Supply Act.
Insulate from the general supply pipe using equipment such as a tank unit for cleaning sensors.
Use a heat-insulated pipe if there is a risk that the tap water will freeze.

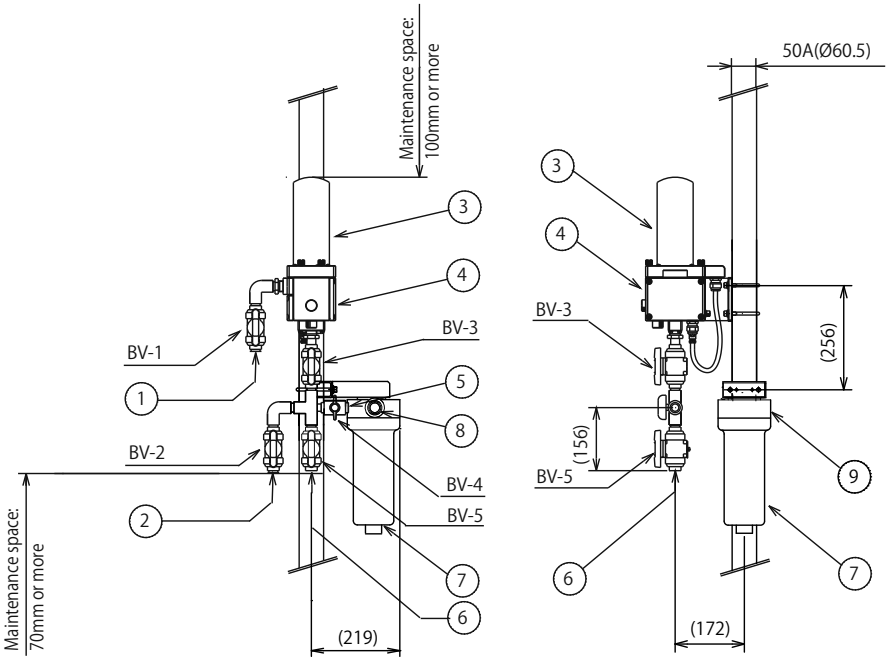
HU-200TB-H Turbidity Meter (Installation Method -3)

Other installations 2

Inline type -2-

This is a sample installation of the detector (SS-120-H (with SS-AW cleaner), zero filter (SS-ZF) and piping kit (SS-PI-2).

- Use the pole stand at more than 1500mm.
- Piping to the sample inlet (valve BV-1-) and other piping related parts are to be prepared by the customer.
- Piping from the water supply to the zero filter (SS-ZF) and parts such as valves are to be prepared by the customer.
- Piping from the zero filter (SS-ZF) to the valve (BV-4) and other piping related parts are to be prepared by the customer.
- Piping from the measured liquid/zero water drain (valve BV-5-) and other piping related parts are to be prepared by the customer.
- Piping from the sample outlet (valve BV-2-) and other piping related parts are to be prepared by the customer.



NO.	PARTS NAME	NOTES
1	Sample outlet	
2	Sample inlet	
3	Cleaning unit	SS-AW
4	Sensor	SS-120-H
5	Zero water inlet	
6	Measured liquid/ Zero water drain	
7	Filter	SS-ZF
8	Zero water outlet	
9	Tap water (zero water) inlet	

NO.	PARTS NAME	NOTES
BV-1	For measured liquid/zero water outlet	Prefab joint PVC TS 16A
BV-2	For sample inlet	
BV-3	For measured liquid/zero water inlet	
BV-4	For zero water inlet	
BV-5	For measured liquid/zero water drain	Compact ball valve PVC TS 13A

Specifications

Conditions: Temperature range	5 - 45°C (no freezing)
Pressure range	0 - 0.3MPa
Material of wetted part:	Glass (Pyrex), PVC FKM, EPDM, SUS316, Q
Mass:	Approx. 16kg
Protection class:	IP65 equivalent (IEC 60529, JIS C0920)

Caution
1. Install in a measured liquid line that does not contain air bubbles.
2. Avoid installing in an area with large amounts of vibration.
3. Do not operate the cleaner when the inlet and outlet sides are closed.

Annotation:
When using tap water, directly supplying tap water from the water supply is prohibited by the Water Supply Act.
Insulate from the general supply pipe using equipment such as a tank unit for cleaning sensors.
Use a heat-insulated pipe if there is a risk that the tap water will freeze.

HU-200TB-H Turbidity Meter (Connection Method 1)

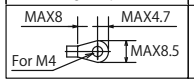
Power Source

- The power source of this equipment is a free power source with a rated voltage of AC100-240 V.
- Check the voltage of the power source, as operating at a voltage outside the rated range causes malfunction. Also, check that the range of fluctuations in supply voltage does not exceed ± 10%.
- This instrument has a power switch.

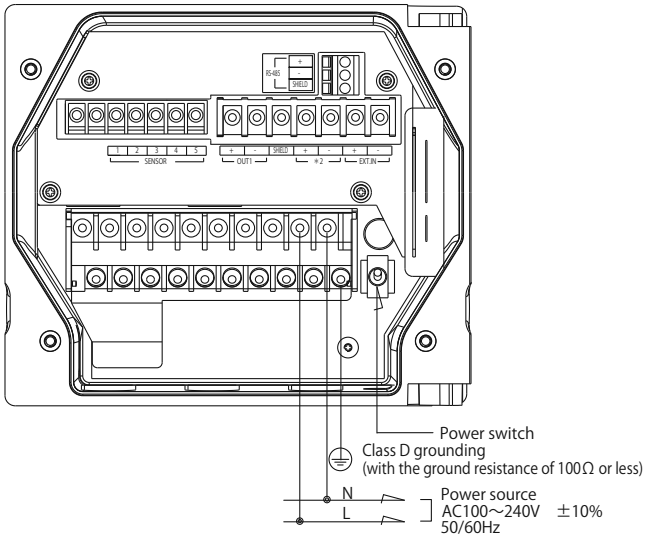
Main Specifications
- The power supply terminal screws are M4 screws.
- The wire size is 0.75-5.5 mm^2 (AWG18-10).

- Install the power switch near the instrument and ensure that the power source can be turned on and off.
- Install arresters if there is a risk of thunder damage.
- For safety reasons, be sure to ground the earth terminal (class D grounding).
- Ground separately from electrical equipment such as the motor.

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	5.5mm ²/MAX (AWG10)	1.2～1.8 N·m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).



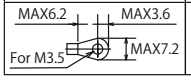
Transmission output

- 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).
- If desired, a full-scale transmission output range can be set, as long as it is within the full scale setting range of the measured values. Also, a burnout can be set (transmission output: 3.8mA or 21mA). It is possible to set whether to temporarily hold the output value at the last value or a preset value when holding the transmission output during an external signal.

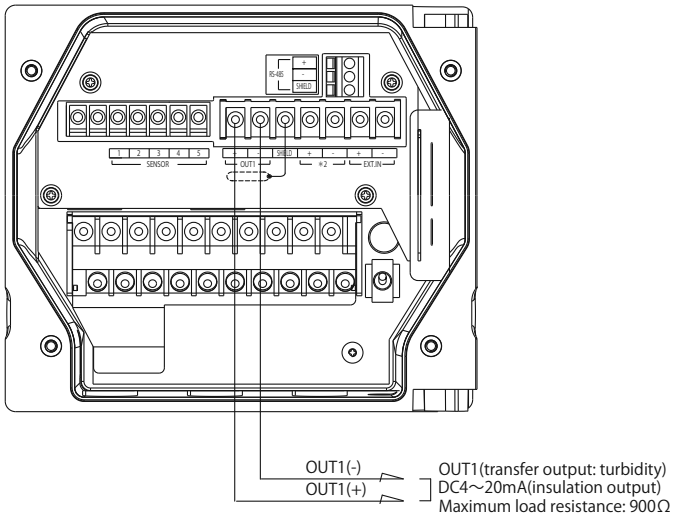
Main Specifications
- The transmission output terminal screws are M3.5 screws.
- The wire size is 2mm^2 (AWG14) max.

- Use a shielded cable for the transmission output cable.
- 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.

Terminal Block Specifications

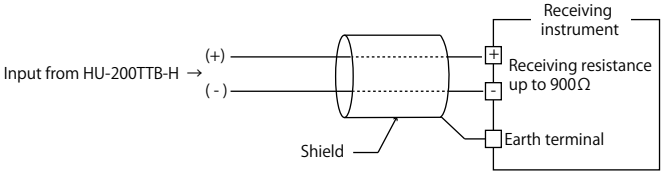
Conforming crimped terminal	Wire size	Screw tightening torque
	2mm ²/MAX (AWG14)	0.8～1.2 N·m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).

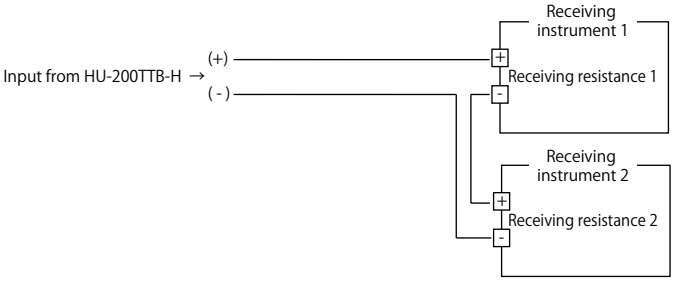


Receiver side

- Ground the shielded cable on the receiving instrument side.



- When making multiple connections to the receiving instrument
  Connect to the series as shown in the figure on the right.
  The total resistance for the connected receiving instrument is 900 Ω .



HU-200TB-H Turbidity Meter (Connection Method -2)

Contact output

- Three contact outputs are included of which one is fail (abnormality alarm output).
- Can be selected from four types, "Upper/lower limit operation ON/OFF control -(AL)", "During maintenance (HOLD)", "During cleaning (CLn)" or "None (non)".

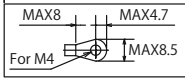
Main Specifications
- The contact capacity is less than AC 250 V and 3A or DC 30V and 3 A.
- The terminal screws are M4 screws.
- The wire size is 0.75 - maximum 5.5 mm^2 (AWG18-10).

- Use a varistor or noise killer if noise occurs in the load.
- The NO and NC arrangement is reversed only in the case of fail output. For normal (non-fail) output, the CF-NOF contact is open and the CF-NCF contact is shorted. The C-NOF contact is shorted when the power is off.

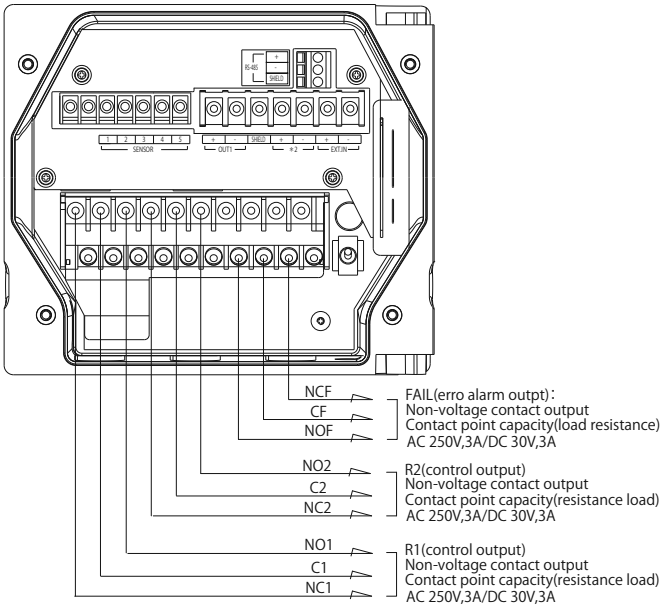
! • If connecting a load higher than the contact capacity or an inductive load (such as a motor or pump), be sure to connect the load through a power relay with a rating higher than that of the load.

! • Take care when connecting a load, as the R1-R2 C-NC contact is shorted when the power source of this instrument is off.

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	5.5mm ²/MAX (AWG10)	1.2～1.8 N・m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).



Contact input

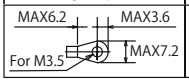
- One contact input is included.
  The cleaner can be operated by an external signal.

Main Specifications
- The terminal screws are M3.5 screws.

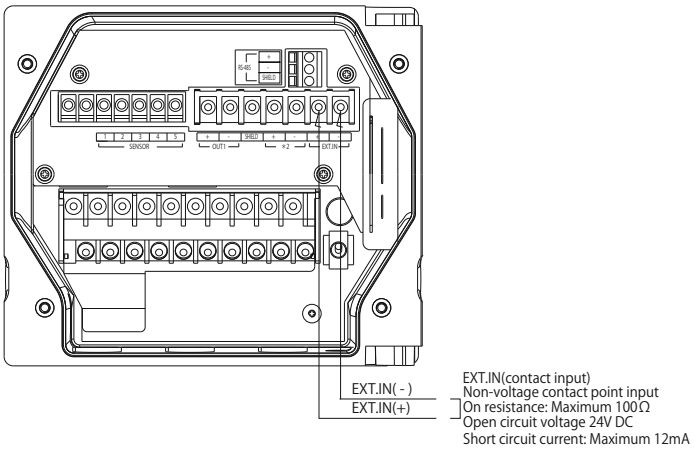
The wire size is 0.14 - maximum 2.5mm^2 (AWG26-14).

- Use a twist pair shielded cable.
  - Install arresters on the output side and receiving instrument side of the instrument if there is a risk of thunder damage.
- Set the resistance of the contact input to a maximum of less than 100 Ω.

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	2mm ²/MAX (AWG14)	0.8～1.2 N・m

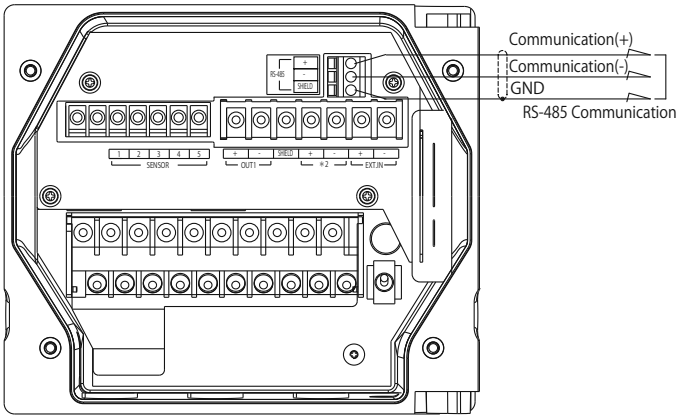
*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).



HU-200TB-H Turbidity Meter (Connection Method -3)

RS-485

- This instrument includes the RS-485 communication terminal. Connect the wiring before using.
- The wire size is 0.14-2.5 mm2 (AWG26-14).
- Use a twist pair shielded cable for the communication output cable.
- Up to 32 terminals can be connected including the host computer. Set an address.
- The maximum cable length of the communication cable is 500 m.
- Provide termination resistance (Rt: 120 Ω) for the instrument that is the terminus of the RS-485 communication line.

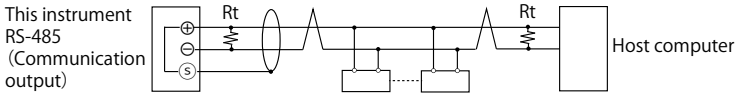


Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	0.14～2.5mm² (AWG26～14) Single wire or strand wires	0.5～0.6 N・m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).

Example of external communication connection



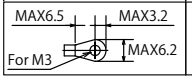
Detector

- One turbidity detector can be used.
  The cleaner (option) can be operated by an external signal.

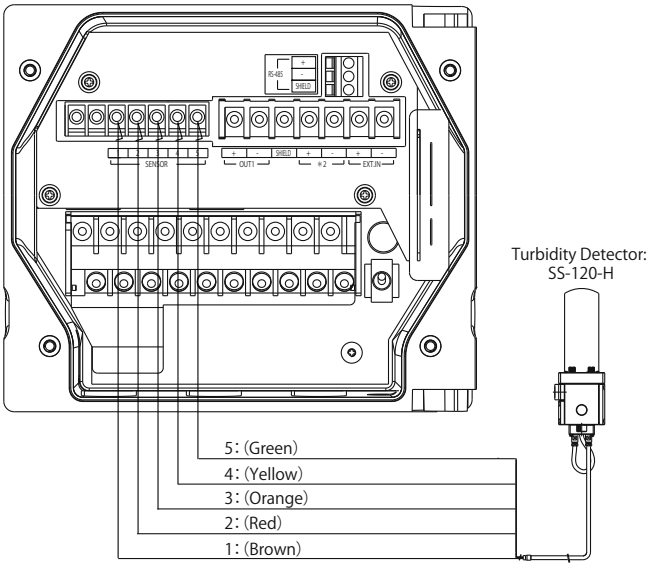
Main Specifications
- The terminal screws are M3 screws.
- The wire size is 1.25mm^2 (AWG16) max. (The detector cable is a specialized cable. Use a relay box and specialized wire (relay cable) to extend this cable.)

- Do not allow the detector cable terminal and terminal block to come into contact with liquids such as water or soil them with finger marks or oil from hands. This decreases insulation. A decrease in insulation causes indication to become unstable. Be sure to keep dry and clean. If soiled, wipe with alcohol etc. and dry well.
- Do not wire the detector cable or relay cable near equipment that supplies induction to parts such as the motor or the power cable of this equipment.

Terminal Block Specifications

Conforming crimped terminal	Wire size	Screw tightening torque
	1.25mm ²/MAX (AWG16)	0.8N・m

*Note:
The screws on the terminal block have a fall prevention structure.
When installing the terminal block, turn the screws until they lift (upward screw structure).



Detector	1: Power terminal (+12V)
	2: Power terminal (0V)
	3: Communication terminal (+)
	4: Communication terminal (-)
	5: Grounding