

## SUSPENDED SOLIDS ANALYZER

Model SSF-1600

The SSF-1600 is an analyzer used to conduct continuous optical measurements of the concentration of solids. It can measure the concentration of suspended solids (SS) in sewage, night soil, and industrial waste treatment plants, as well as the concentration of mixed liquor suspended solids (MLSS) in aeration tanks.

The SSF-1600 consists of a small lightweight infrared detector, which is designed to be immersed in sample solutions, and a transmitter for converting the measured SS concentration to 4~20mA DC analog output signals and RS-485 digital signals.

### Features

#### Extensive measurement ranges

The SSF-1600 can conduct measurements across wide concentration ranges, such as ranges of 0 to 1000 mg/L (ppm) and 0 to 30000 mg/L (ppm). You can choose a two-range type or a three-range type. There are three selectable modes for switching, manual ranging, auto ranging and remote-ranging for each model.

#### Infrared detector

The light source of the SSF-1600 is an infrared light-emitting diode (LED). This LED is long lasting and is almost completely unaffected by colored samples. In addition, the pulsed light signals processing prevents it from being affected by sunlight and other forms of ambient light.

#### Practical calculation features

The SSF-1600 comes with useful features for calculation functions. The unit employs piecewise linear approximation to correct values that were analyzed manually. It also performs three-point calibration to correct approximate calculations. And self-diagnosis including system error, calibration error and others is available.



Drop-in type detector

#### Detector options: Throw-in type and drop-in type

Detectors are classified by installation conditions into two different types: throw-in type and drop-in type, the latter in which the detector is inserted into a long protection pipe that is 2 to 6 meters long.

#### Stain-resistant design

The small and lightweight detector is made of stainless steel and has a stain-resistant design. The detector plane is washed by the flow of sample water, which helps to prevent dirt deposits from accumulating.

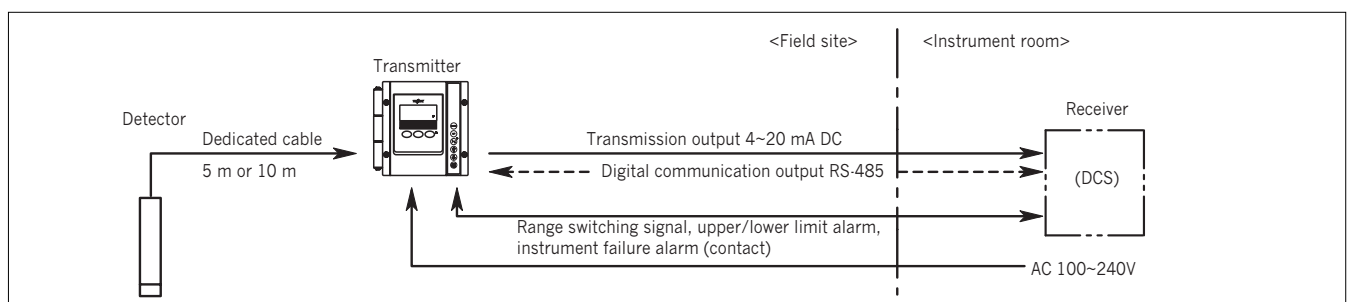
#### Jet cleaner (option for the drop-in type)

A water (air) jet cleaner or pulse air jet cleaner can be purchased as an option to remove thick layers of dirt deposits that form on the detector plane, such as when the flow rate of sample water is too slow.

Digital signal RS-485 equipped as standard.

Supports Modbus communication.

### Configuration



## Standard Specifications

Model	: SSF-1600	*1: If automatic or remote is selected as the range switching mode for the three-range type, two contact points are used exclusively to display the range.
Measurement method	: Infrared scattered light measurement	
Items measured	: SS concentration in water and MLSS concentration in activated sludge	
Entire measurement range	: 0~30000 mg/L	
Measurement ranges	: The following ranges are available. Two-range; 0~1000/3000 0~3000/5000 0~5000/10000 0~10000/20000 0~20000/30000 Three-range; 0~3000/5000/10000 0~5000/10000/20000 0~10000/20000/30000 (Three selectable range switching; manual, automatic, and remote.)	
Measurement unit	: mg/L or ppm	
Display	: LCD display with backlight Minimum value displayed; 10 (the first digit is fixed at zero.)	
Power supply	: 100~240V AC $\pm$ 10%, 50/60Hz	
Power consumption	: Approx. 10 VA	
Transmission output	: DC4~20 mA (isolated) Load resistance; 600 $\Omega$ or less	
Contact output	: Six items available between under maintenance, instrument failure, range display *1, concentration upper alarm, concentration lower alarm, output for cleaner, under cleaning, and power interrupt.(For details about connecting when the resistance load is 30V DC 0.1 A and the load is 100V AC, see Note 4 in "Terminal Connections".)	
Contact input	: Remote range switching, cleaning command	
Repeatability	: $\pm$ 2% FS (with standard solution)	
Stability	: Zero drift; $\pm$ 2% FS/7 days (with zero water) Span drift; $\pm$ 2% FS/7 days (with standard solution)	
Response time	: 5 minutes or less for 90% response when set at position 4. (Nine selectable settings between 10 s and 128 min)	
Ambient conditions	: -10~55°C, 95% RH or less (no condensation)	
Sample conditions	: Temperature; 0~50°C (no freezing). Flow rate; 0.5~1.5 m/s (0.5~1.0 m/s for float type)	
Protective construction	: Transmitter; IP65	
Detector construction	: Underwater; Withstanding pressure 0.2 MPa	
Detector cable length	: 5 m (standard)	
Light source	: Infrared LED 945 nm	
Photo sensor	: Silicon photodiode	
Wiring end connection	: Cable gland (6 pcs) for $\phi$ 6~12 cable Conduit thread G1/2 (when cable glands are removed)	
Mounting	: Transmitter; Mounted on a 50 A pipe or wall/rack Detector; Throw-in type or drop-in type with protection pipe	
Material	: Transmitter; ADC12 (aluminum die-cast) Color; Metallic silver Detector; SUS316 *2, glass BK7	
Weight	: Transmitter; Approx. 2.2 kg Detector; Approx. 3 kg (including 5 m cable)	

## Calibration

Because the composition and properties of suspended solids (mixed liquor suspended solids) are extremely complex, it is impossible to clearly define specific substances as standard suspended solids (mixed liquor suspended solids). Thus, calibration using manual analysis data at each site is required.

1) Calibration using manual analysis (weight method) as standard

Conduct manual analyses (weight method) and record SSF-1600 readings for as many samples as possible. Plot the regression line on the scatter diagram by comparing the manual analysis values to the SSF-1600 readings.

Using this regression line, calibrate the instrument.

2) Using the standard scatter plate to perform calibration

After calibration using manual analyses (weight method), measure the supplied scatter plate and record the indicated values. Then calibration using the scatter plate will be available.

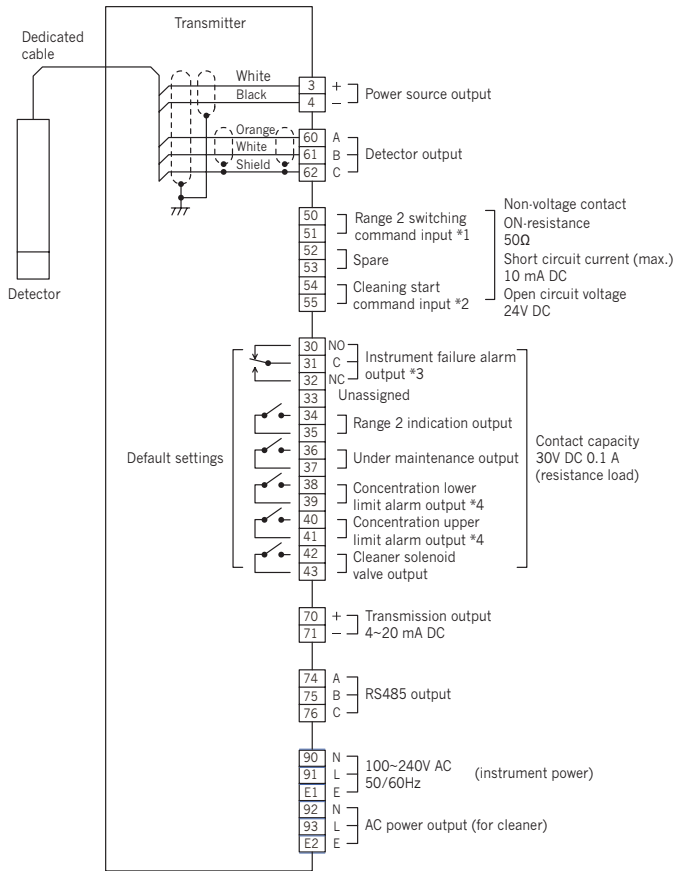
## Detector installation conditions

Avoid installing the detector in a location where the sample flow rate is slow or stagnant.

If a thick layer of dirt deposits forms on the detector plane of the drop-in type, we recommend that you purchase the optional water (air) jet cleaner or pulse air jet cleaner to remove the deposits.

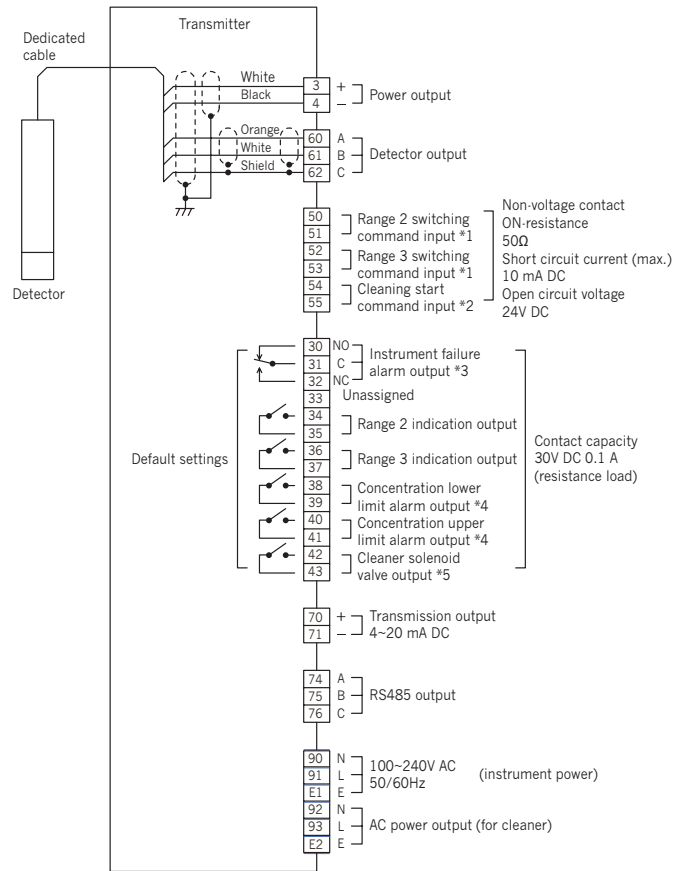
## Terminal Connections

### Two-range type



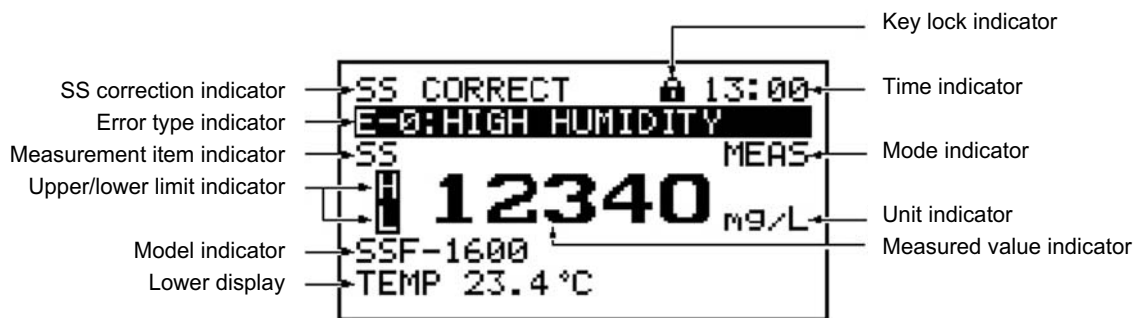
- \*1: Range 2 when closed.
- \*2: Pulse width 100 mS or longer.
- \*3: Can be changed to "Power interrupt".
- \*4: 100V AC, 1A possible when protection element is connected.

### Three-range type



- \*1: Range 2 and 3 when closed.
- \*2: Pulse width 100 mS or longer.
- \*3: Can be changed to "Power interrupt".
- \*4: 100V AC, 1A possible when protection element is connected.
- \*5: Can be changed to "Under maintenance".

## Display indication



<Display in measurement mode>

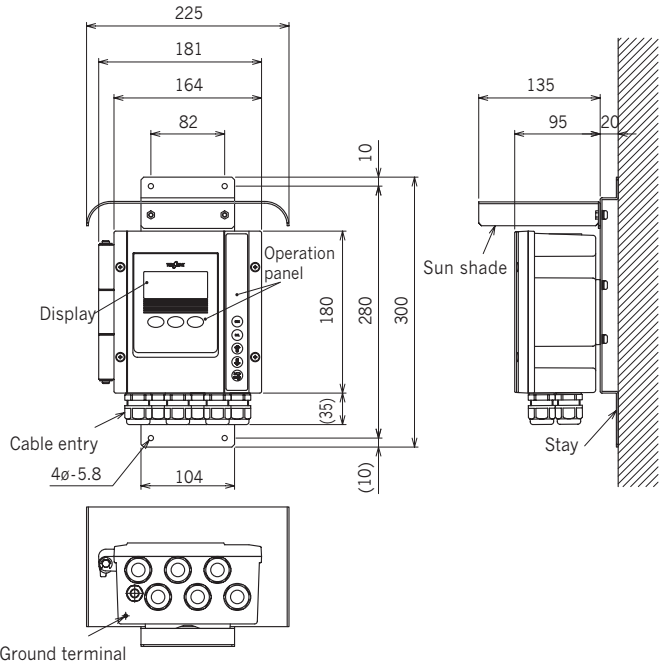
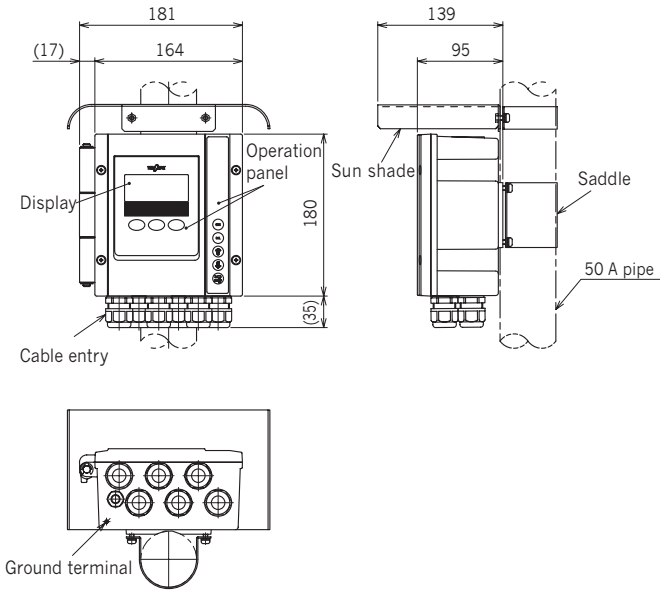
**Dimensions**

Unit : mm

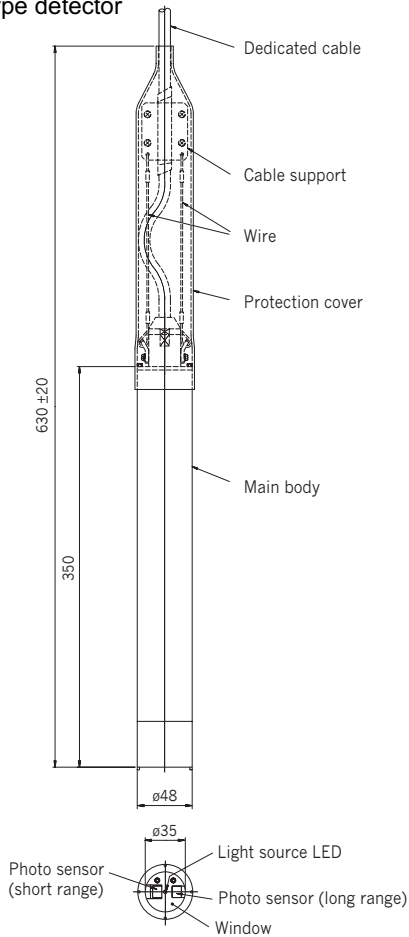
**Transmitter**

Mounted on wall or rack

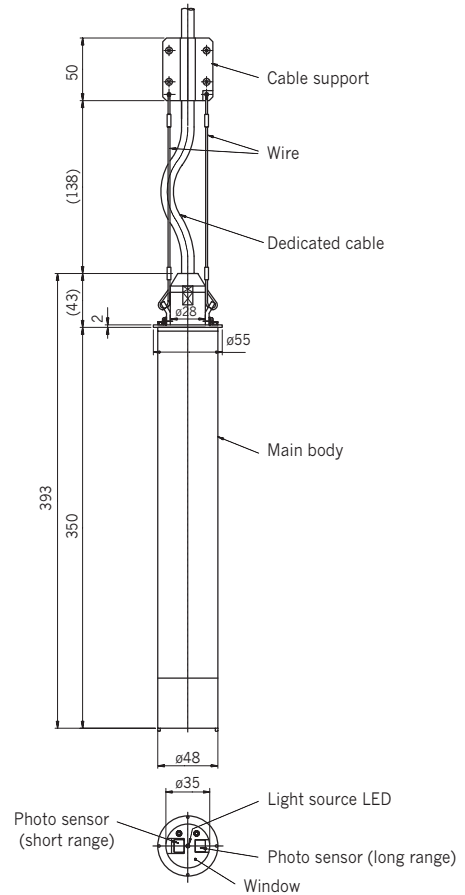
Mounted on a 50 A pipe



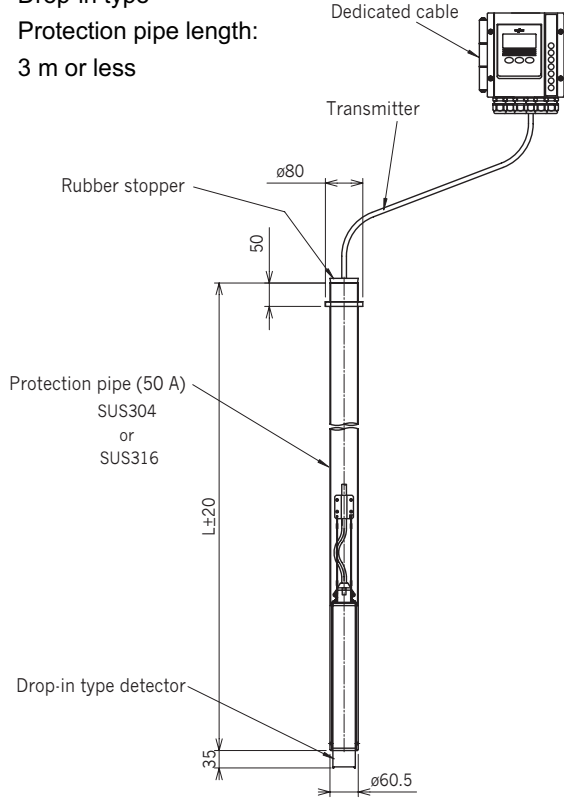
**Throw-in type detector**



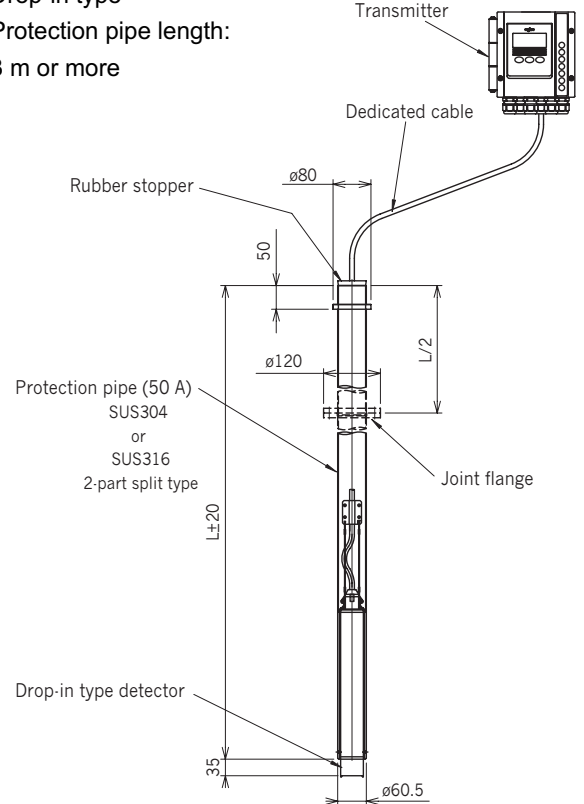
**Drop-in type detector (no protection pipe)**



Drop-in type  
Protection pipe length:  
3 m or less

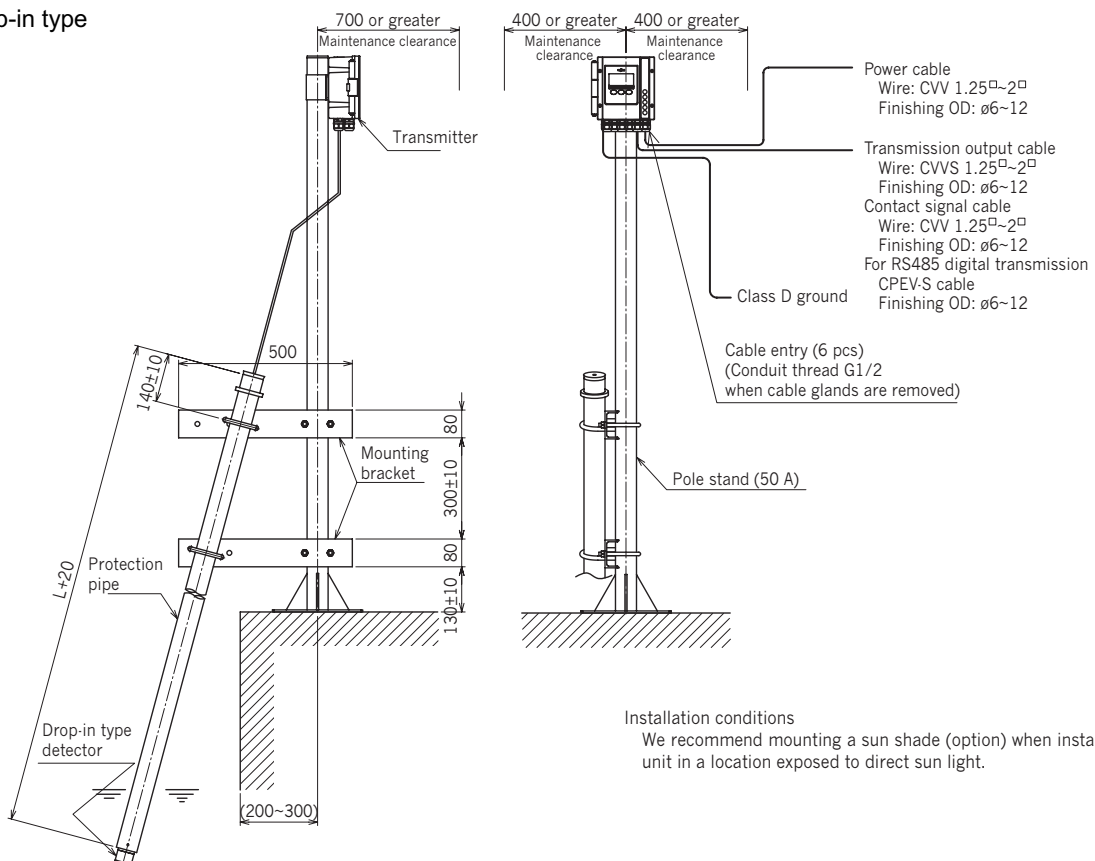


Drop-in type  
Protection pipe length:  
3 m or more



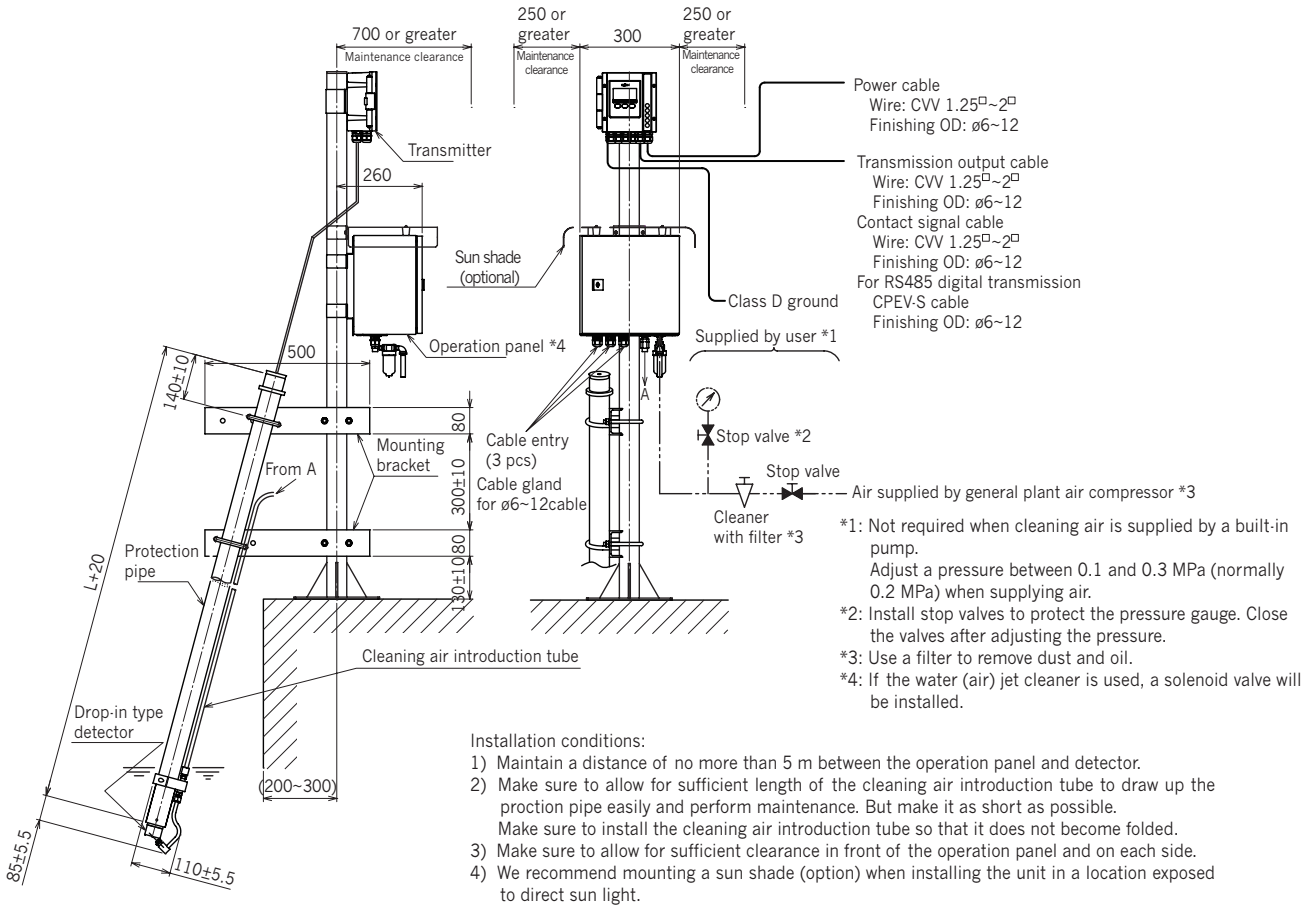
Installation example

Drop-in type

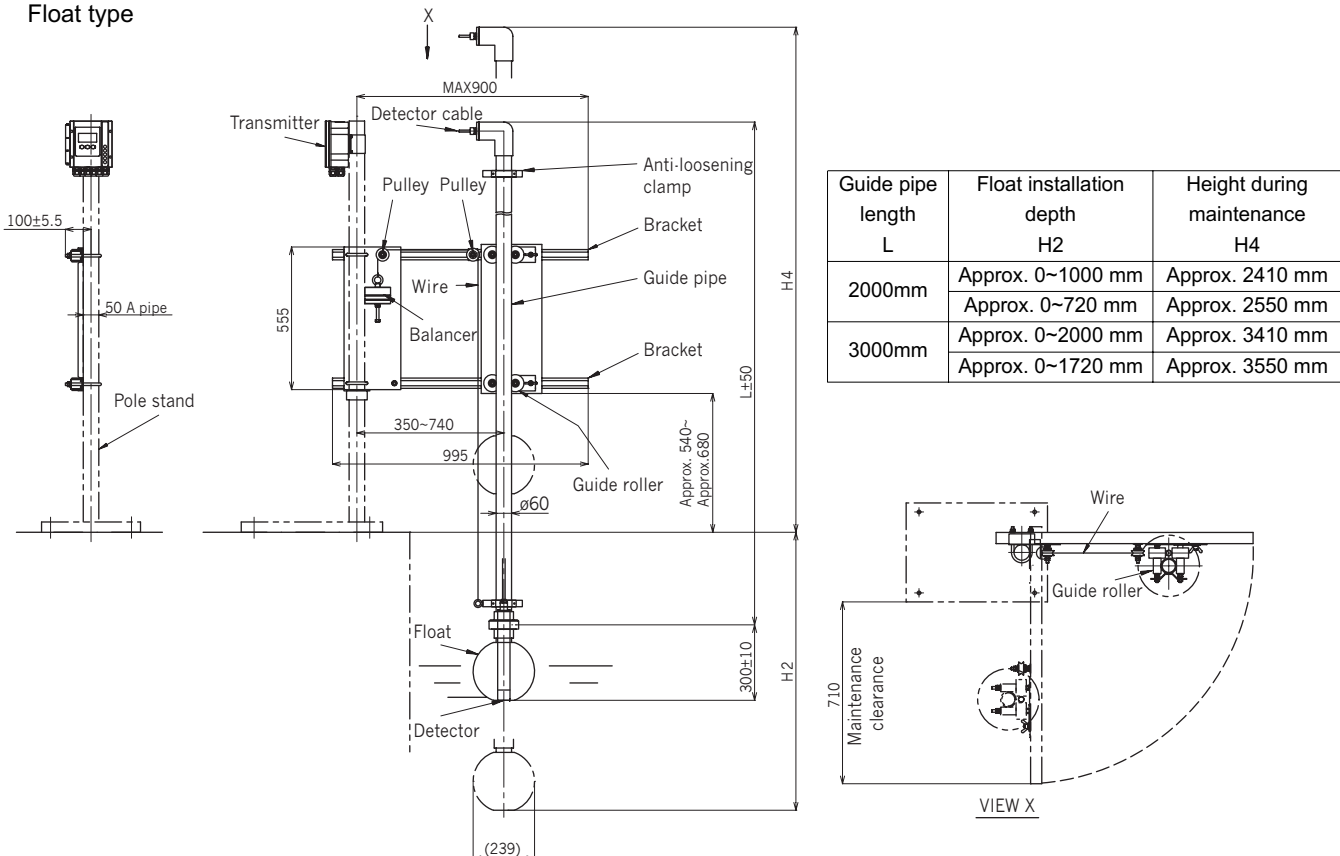


Installation conditions  
We recommend mounting a sun shade (option) when installing the unit in a location exposed to direct sun light.

### Drop-in type with pulse air jet cleaner



### Float type



Product code

SSF1600-0-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
A									Measurement range
B									0~1000/3000
C									0~3000/5000
D									0~5000/10000
E									0~10000/20000
F									0~20000/30000
G									0~3000/5000/10000
H									0~5000/10000/20000
Y									0~10000/20000/30000
									Other specifications
									Measurement units
	1								mg/L (standard)
	2								ppm
									Measurement items
	1								General SS (calibration solution: fly ash)
	2								MLSS (calibration solution: fly ash and kaolin)
									Transmitter mounting
	A								50 A pipe mounting (standard)
	B								Wall or rack mounting
									Transmitter sun shade
	0								None (not required)
	1								Equipped
									Arrester (power line/transmission line)
	0								None
	1								Included
									Detector mounting
	A								Throw-in type *1
	B								Drop-in type, protection pipe not required *1
	C								Drop-in type, protection pipe SUS304 included
	D								Drop-in type, protection pipe SUS316 included
									Protection pipe length
	Y								NA (no protection pipe)
	A								2.0 m
	B								2.5 m
	C								3.0 m
	D								3.0 m (2-part split)
	E								3.5 m
	F								3.5 m (2-part split)
	G								4.0 m
	H								4.0 m (2-part split)
	J								4.5 m (2-part split)
	K								5.0 m (2-part split)
	L								6.0 m (2-part split)
									Combined equipment
	0								None
	1								Water jet cleaner
	2								Air jet cleaner
	3								Pulse air jet cleaner (externally supplied air: Type A)
	4								Pulse air jet cleaner (built-in air pump: Type C)
	5								Float type detector (2 m guide pipe: self-cleaning, used for surface measurements) mounting unit
	6								Float type detector (3 m guide pipe: self-cleaning, used for surface measurements) mounting unit
									Dedicated cable length
	A								5 m (standard)
	B								10 m
	Y								Other specifications (max. 30 m)
									Marking
	0								Standard
	1								English

\*1: For a throw-in type or drop-in type that does not require a protection pipe, the supported equipment code is NA (not required).

Notes:

The optional pole stand ZB-1 and protection pipe mounting brackets ZCH-3 can be ordered separately. See the following page for details.

**Accessories**

**Pole stand**

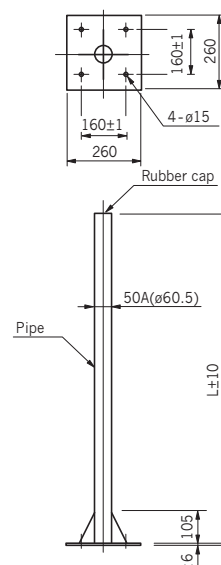
50 A pole stanchion used to mount the transmitter and detector.

ZB1-1-□□

.....	Pole stand length
A.....	1.0 m
B.....	1.6 m (standard)
Z.....	Custom spec.
.....	Materials and finish
1.....	50A steel pipe (SGP) and steel plate, Metallic silver coating
2.....	50A SUS304, no coating
3.....	50A SUS304, metallic silver coating
9.....	Custom spec.

Note 1: A general pole stanchion used to mount the on-site transmitter/detector.

Note 2: The pole stanchion has a flat plate base with reinforcement ribs to support the pole.



**Mounting brackets for the protection pipe of the drop-in type detector**

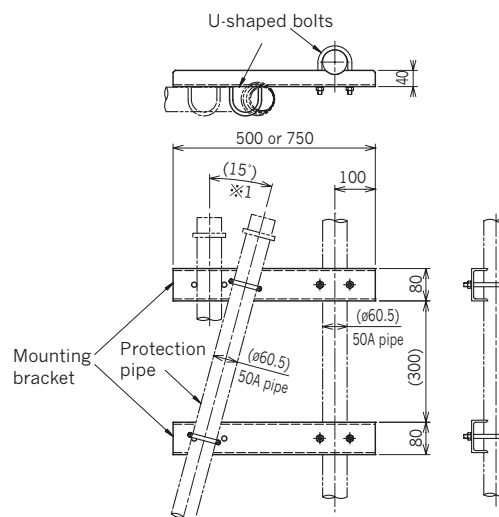
ZCH3-0-□□

.....	Protection pipe size
1.....	50A (for pH/ORP/DO/SSF)
2.....	65A (for LDO)
9.....	Custom spec.
.....	Bracket length
A.....	500 mm
B.....	750 mm
Z.....	Custom spec.

Note 1: The stainless cast C-channel brackets used to fix the 50 A protection pipe of the drop-in type pH/ORP/DO/SS analyzer detector (SUS) or the 65 A protection pipe of the LDO analyzer detector (SUS) to the 50 A pole stanchion.

The brackets are mounted in sets of two. Two U-shaped bolts are used to fix the protection pipe vertically or at a 15 degree angle.

Note 2: Combined detectors: HC-N95, JHC-95C, HC-G95, PHC-95D, OC-950, JOC-950C, POC-95D or LDO/SSF-1600.



※1: The protection pipe can be mounted vertically or at an angle.



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**CAUTION**

Do not operate products before consulting instruction manual.