

## ALKALINE METER

ALF-1600

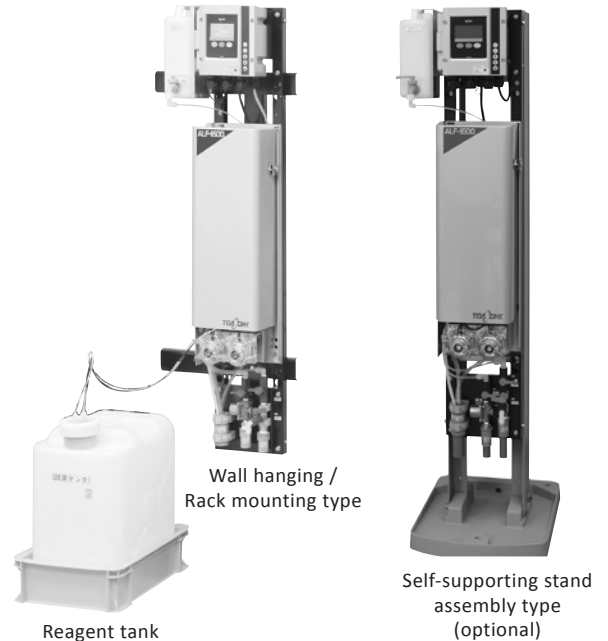
Alkali meter for waterworks process online. Alkalinity (total alkalinity) is an index that converts the alkali content in water into calcium carbonate. In addition, it is an index that affects the coagulation and sedimentation action, and is used to measure the water in the settling basin and the landing well and control the input of coagulant.

The sample water in this case may contain a lot of SS. When measuring such a sample, it is recommended to combine it with a sand filtration device (FS-3 type) to remove SS.

It can also be used for measuring purified water because it requires an appropriate alkalinity to prevent corrosion of the water supply pipe of purified water.

### Features

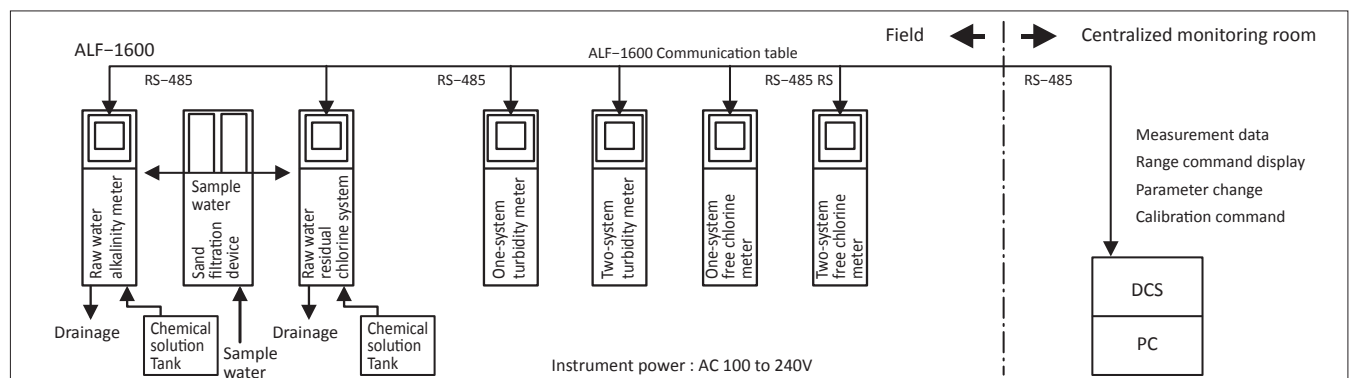
- Selectable between continuous measurement and intermittent measurement.  
It has a mode for continuous neutralization titration by the coulometric method and a mode for intermittent titration. Continuous measurement is possible when the water quality fluctuates drastically, and intermittent measurement is possible when the fluctuation is small.
- Reagent-saving design  
The consumption of reagent solution (sodium sulfate) is about 1/4 of our conventional model. Setting to intermittent measurement further saves reagents. Therefore, the reagent tank is as small as 30L.
- Adopts coulometry method (potentiometric titration method) using pH electrode  
Long-term continuous measurement is possible with simple reagent preparation.



### ○ Lineup of abundant installation methods

The detector is small and lightweight, and piping, wiring, maintenance operations, etc. can be performed from the front, saving space in the installation location. In addition to the wallmounted / rack-mounted type, an indoor selfstanding stand assembly type and an outdoor cubicle storage type are also available as options. The sample water can be supplied in a wide pressure range of 0.02 to 0.3MPa from the head pressure supply from the sand filter or water tank to the direct connection to the process line.

### Modbus Communication system Sample



## Standard Specifications

Product name	: Alkaline meter	Analogue signal input	: DC 4 to 20 mA
Model	: ALF-1600		The DC 4 to 20mA input is converted to a concentration for the preset scale and output via the external output support.
Measurement object	: (Total) alkalinity of water and purified water		Numbers of inputs: 1
Measurement method	: Potentiometric titration method (neutralization titration)		Concentration conversion: 4 significant digits, fixed decimal point position
Measurement cycle	: Continuous or intermittent * (minimum 1-hour cycle) *In intermittent measurement, it takes about 30 minutes per measurement including the liquid replacement time.	External output port	: RS-485 1 (Maximum cable length 100m) Protocol: Modbus/RTU Address: 8×n (n=1 to 30) Use 3 consecutive addresses Terminal block: 2 pairs (For parallel connection)
Measurement range	: 0 to 50 / 0 to 100 2 range manual or remote switching	Power pressure	: AC 100 to 240V±10% 50/60Hz
Measurement unit	: mg/L or ppm (As calcium carbonate)	Power consumption	: Approx. 40VA (standard), approx. 60VA (maximum)
Display method	: LCD (Liquid Crystal Display) Digital	Detection electrode	: Glass electrode...5041 Comparison electrode...4084 Electrolytic electrode...2066 (2)
Minimum display	: 0.1	Sample water condition	: Temperature...0 to 40°C (Do not freeze) Pressure...0.0 2 to 0.3MPa Flow rate...1 to 3L/min (Measuring cell inflow; approx. 4mL/min)
Transmission signal output contact	: DC 4 to 20mA (insulated type), load resistance 600Ω or less	Reagent	: Sodium sulfate solution (about 0.18mol/L) Flow rate...Approx.0.5mL/min Consumption...Approximately 22L/month in continuous measurement Approximately 16L/month for continuous 1-hour cycle intermittent measurement
Signal output	: Select and assign to 6 contacts from the following items (OR is available for 3 items) 1)Range display 2)Under maintenance 3)Concentration upper limit alarm 4)Concentration lower limit alarm 5)Instrument abnormality(*1) 6)Under calibration (*2) 7)Power off 8)Under cleaning (*3) *1; Details of instrument abnormality Communication error, hardware error, setting error, sample drainage, span calibration error, Abnormal stability discrimination (*2), reagent disconnection, abnormal flow rate *2; With automatic calibration *3; With cleaning Contact point...6 points (5 a contacts, 1 c contact) Capacity...DC 30 V0.1A load resistance	Construction	: Indoor wall mounting type (Requires storage in cubicles outdoors) Transmitter: IP65 Detection unit (electrical unit storage box); IP52
Contact signal input	: Select and assign to 3 contacts from the following items 1)Range switching ...Range 2 (high range) with closed contact reception 2)Calibration start (*1) ...Start with closed contact reception (100ms or more) 3)Cleaning start (*2) ...Start with closed contact reception (100ms or more) 4)Measurement switching ...Continuous measurement with closed contact reception *1; With automatic calibration *2; With cleaning Contact points: 3 points Non-voltage contact input; ON resistance within 50Ω, Short circuit current up to 10mA, Open circuit voltage 24V DC	Mounting method	: Wall, or rack mounting
		Material	: Transmitter...aluminum die cast Metallic silver Detector...Aluminum plate Metallic silver
		Material of wetted part	: PVC, PFA, PP, acrylic
		Piping contact port	: Sample water inlet...Socket Nominal diameter 16 Drain port...Socket Nominal diameter 25 Cleaning water inlet...Socket Nominal diameter 16
		Wiring port	: 6 glands for φ6 to 12 cable Screws G1/2 for connecting electrical conduits appear when removed
		Ambient air	: -5 to 50°C (Do not freeze)
		Humidity	: 85%RH or less (Do not freeze)
		Weight	: Approx. 20kg Self-supporting stand assembly type is about 35kg

### Performance

Straightness : Within  $\pm 3\%$ FS (by calibration fluid)  
 Repeatability : Within  $\pm 2\%$ FS (by calibration fluid)  
 Stability : Zero drift; Within  $\pm 3\%$ FS/month  
 Response speed (0 to 100mg/L range)  
 Span drift: Within  $\pm 3\%$ FS/ month  
 (0 to 100mg/L range)  
 : 90% response within 8mins  
 (from calibration fluid inlet)

### Calibration method

Zero calibration : Calibrated with ion-exchanged water  
 Span calibration : Calibrated with sodium carbonate solution

### Operating principle

This instrument measures the total alkalinity of raw or purified water in the water supply. Coulometry (potentiometric titration) using a pH electrode as a sensor is used as the detection method, and longterm continuous measurement is possible with simple reagent preparation.

The sample water is filtered by the filter in the measuring water tank and introduced into the flow cell in the detector at a constant flow rate (about 4mL/min) by the flow rate control mechanism and the constant flow rate pump P1. On the other hand, the reagent solution (sodium nitrate) is introduced into the detector (about 0.5mL/min) by the constant flow pump P2. At this time, it is electrolyzed by the

electrolytic electrode installed in the reagent liquid flow path, and acid and alkali are generated.

Only the acid produced by this electrolysis is introduced into Laussel. The flow cell has a pH electrode that detects pH deviations (deviations from the equivalence point pH 4.8) according to changes in alkalinity and controls the electrolytic current to keep the pH at the equivalence point. At this time, the amount of acid produced is proportional to the electrolytic current and corresponds to the alkalinity, so the alkalinity can be continuously known from the value of this electrolytic current (see the flow sheet on page 5).

### Connection terminal

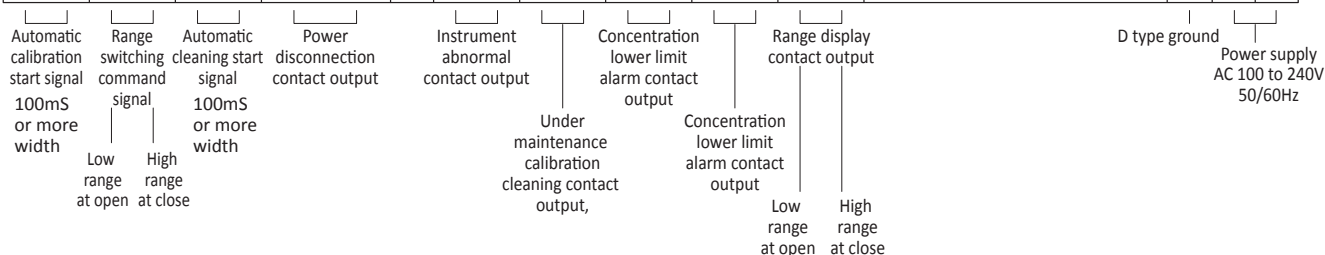
74	75	76	77	78	79
A	B	C	A	B	C

RS-485/1      RS-485/2  
 To other instrument

1	2	70	71	72	73
+	-	+	-	+	-

input      Output 1      Output 2  
 DC 4 to 20mA

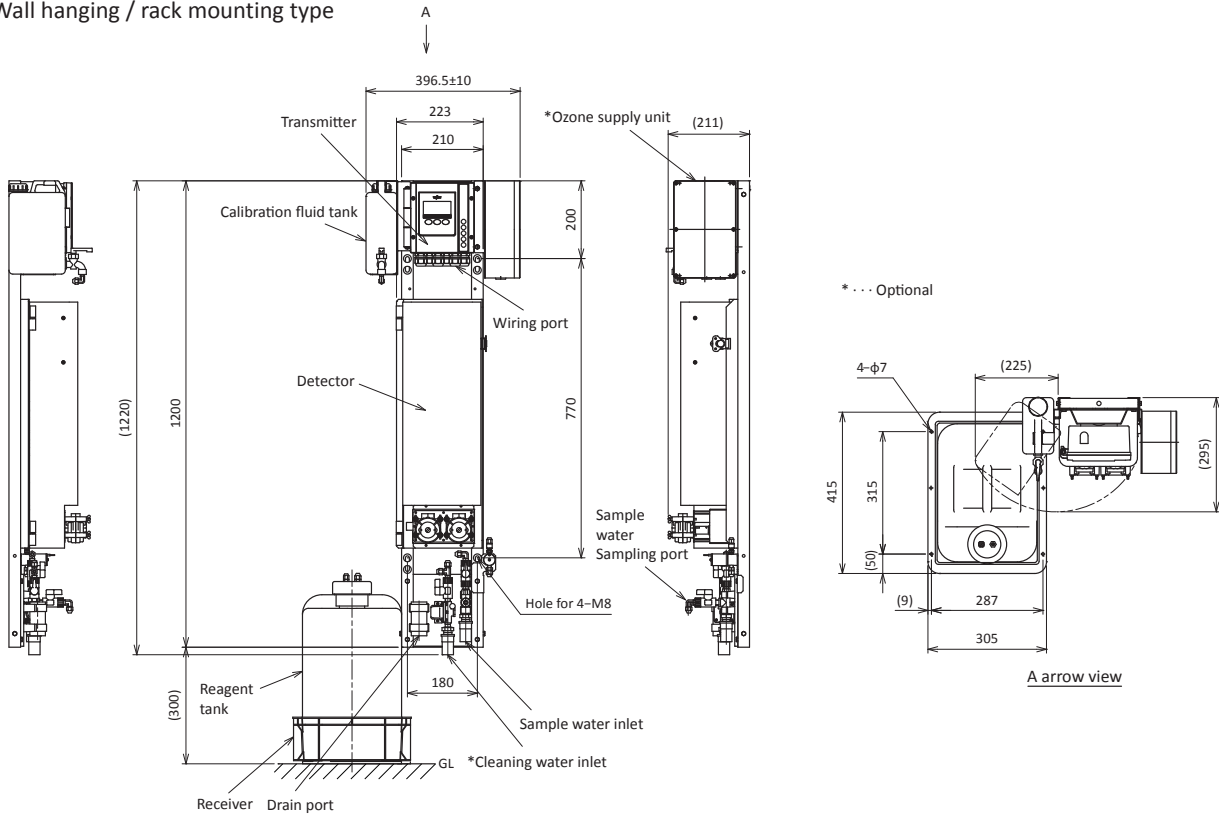
50	51	52	53	54	55	30	31	32	33	34	35	36	37	38	39	40	41	42	43	60	61	62	63	93	92	E2	E1	91	90
Pulse	Status	Pulse	NO	C	NC	-	a contact	a contact	a contact	a contact	a contact	a contact	a contact	Internal wiring												E	N	L	



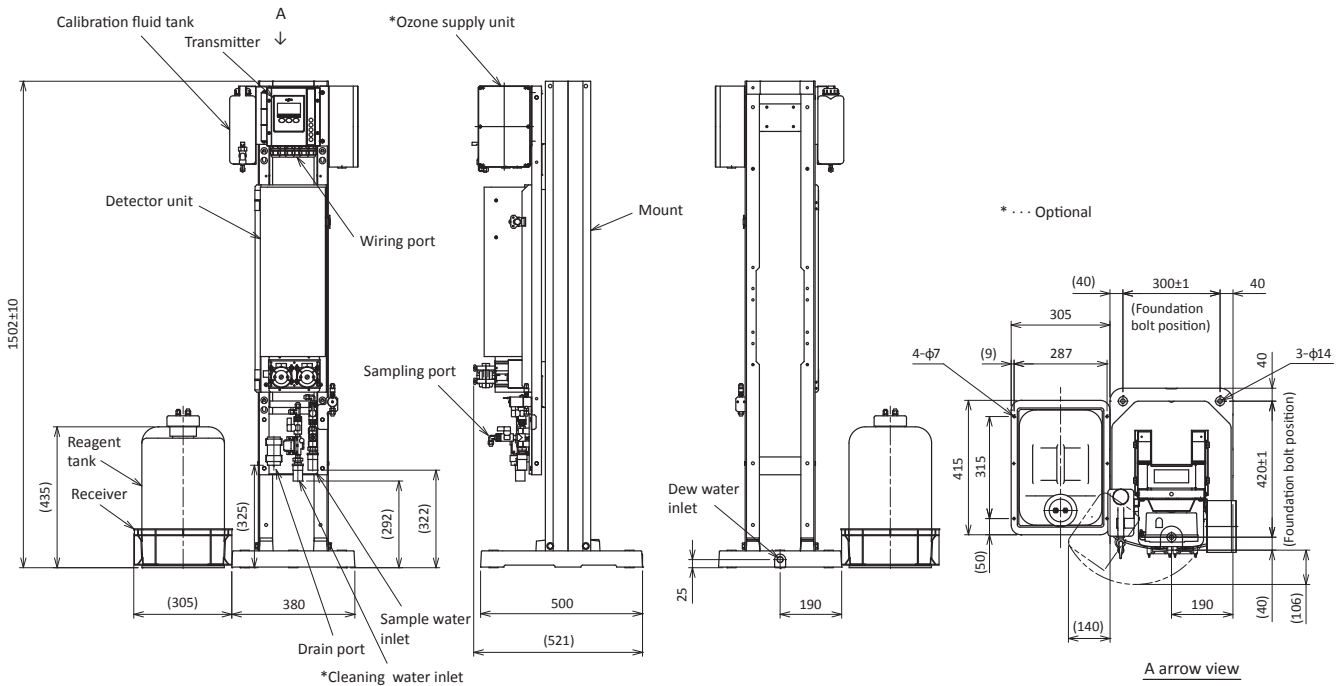
**Dimensions**

Unit : mm

● Wall hanging / rack mounting type

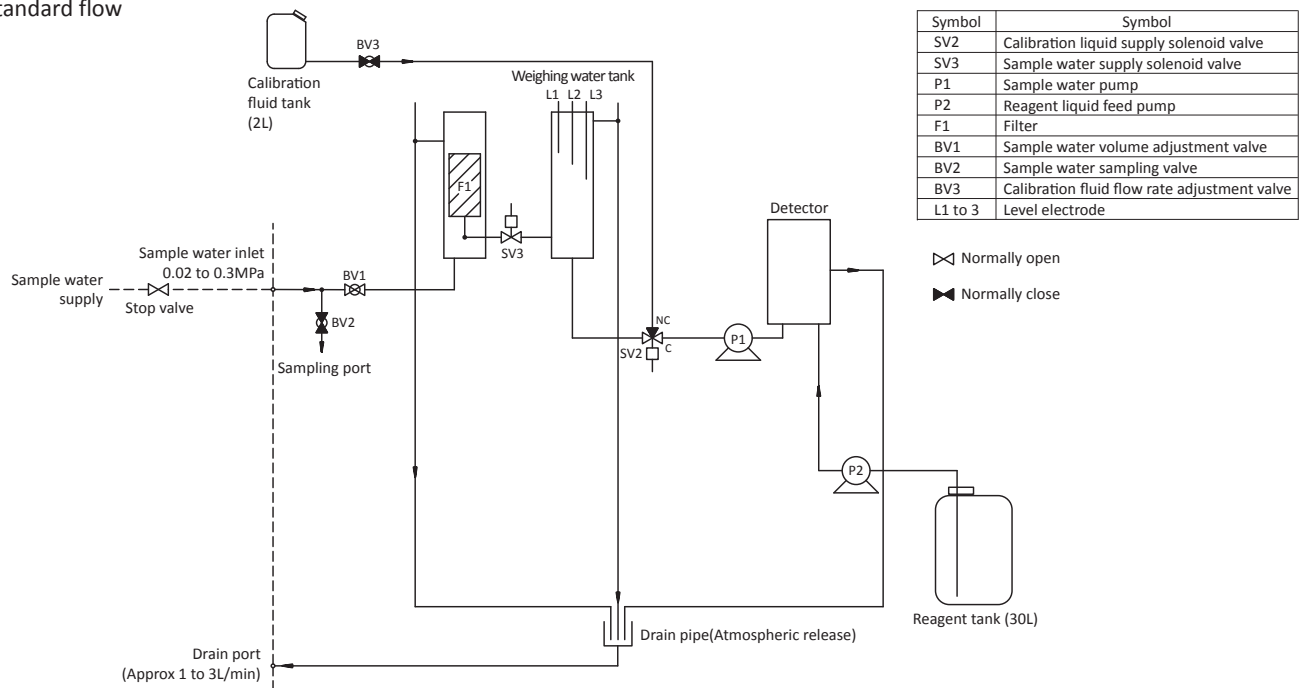


● Self-supporting stand assembly type (optional)

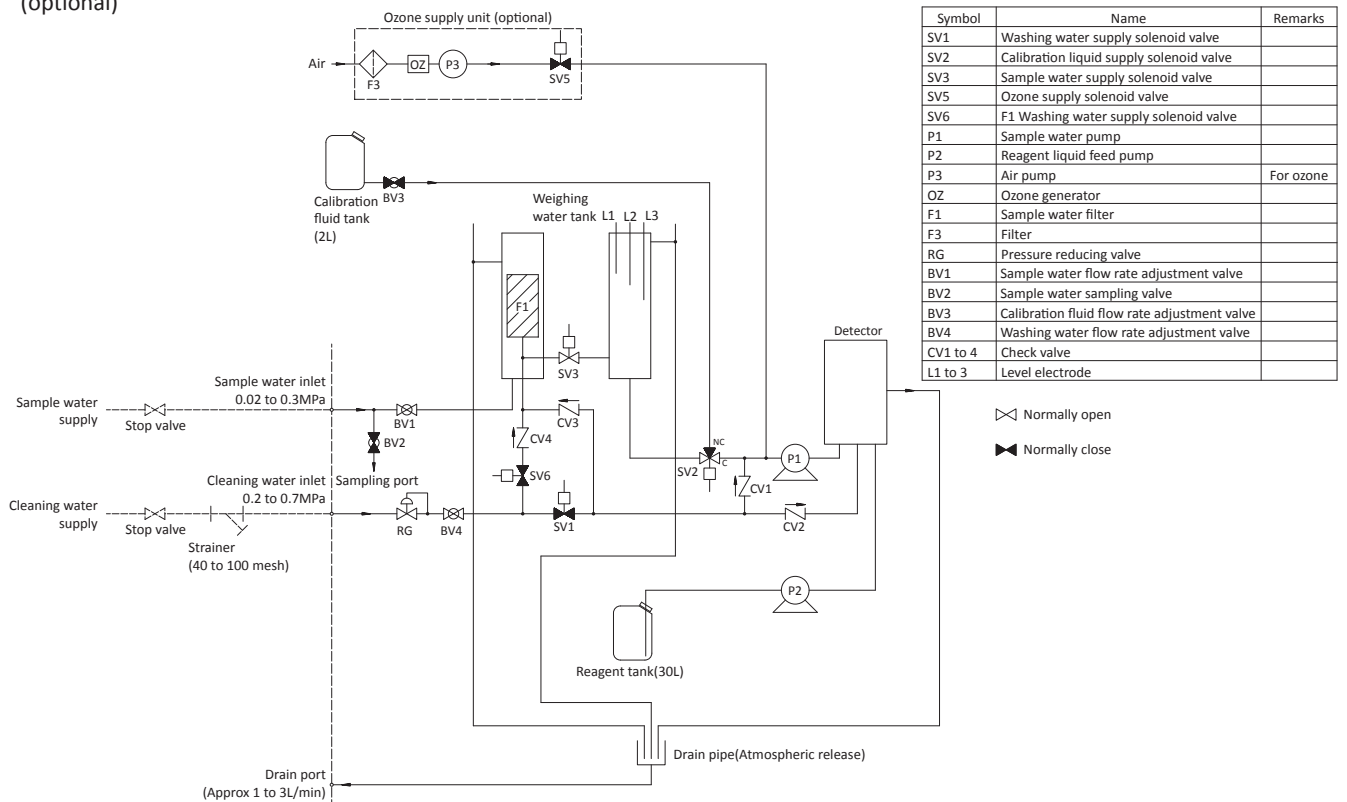


## Flow sheet

### ● Standard flow



### ● Flow with automatic cleaning and automatic span calibration (optional)



**Option**

● Automatic cleaning unit

Water or water + ozone is periodically introduced into the measurement path to automatically clean the detector and other parts.

Started by an internal timer or an external start signal

- Cycle setting ...1 to 24h (Initial setting 12h)  
(When set to 0h, an external start signal is accepted.)
- Cleaning time ...With water cleaning 6min (fixed)  
With water/ozone cleaning 11min (fixed)
- Cleaning water condition ...Water washing about 6L / time  
Water / ozone washing about 9L / time  
Pressure 0.2 to 0.7MPa  
Temperature 2 to 30°C

● Automatic span calibration unit

The span calibration liquid is periodically introduced from the calibration liquid tank into the measurement cell, and the span calibration is performed automatically. It is started by an internal timer or an external start signal.

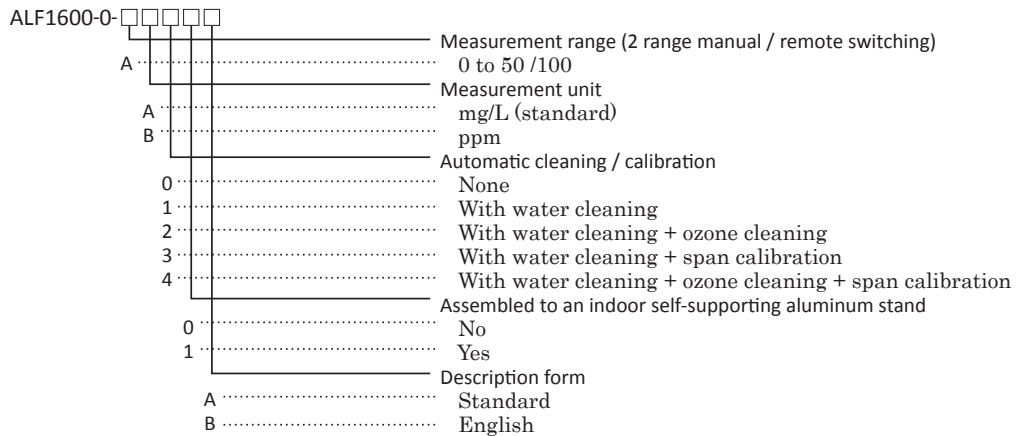
Automatic span calibration is added at the same time as the above automatic cleaning unit.

- Cycle setting ...1 to 31days (Initial setting 10days)  
(When set to 0h, an external start signal is accepted.)
- Calibration time ...Approx. 20min (fixed)
- Wait time ...0 to 30 min (Initial setting 20min)

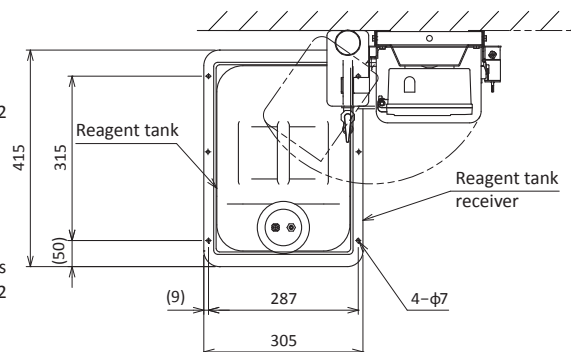
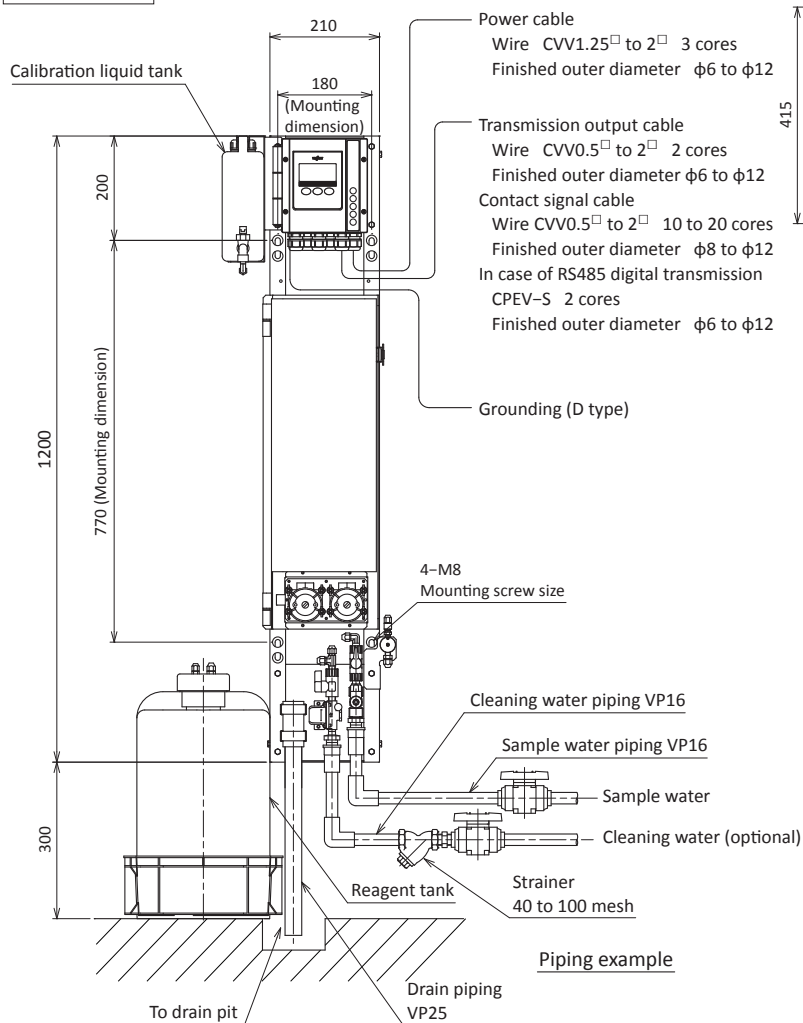
● Independent stand for indoor use

Assemble to an aluminum self-standing stand. Secure the gantry base with anchor bolts.

**Product code**



## Installation



### 1. Instrument installation conditions

Install it in a place that meets the following conditions.

- Places not exposed to rain, wind or direct sunlight.
- The temperature and pressure of the sample water are included in the "Sample water conditions" in the specifications.  
A place that can supply suitable water quality.
- Where there is no vibration.
- There are no devices around that can be a source of electrical noise.
- A place where maintenance space can be secured and work can be done easily.

### 2. Installation

Standard specifications are wall-mounted or hook-mounted. Make four holes for M8 in the mounting part in advance and mount the instrument vertically.  
Instrument mass: 20kg  
Use the supplied reagent tank and install it next to the device. (Within 1m from the main body of the device)  
Install the reagent tank stand with M6 foundation bolts.  
For piping tubes and wiring, use the ones that come with the reagent tank.  
Please connect to the main body of the device..

### 3. Sample water supply piping

- Install a stop valve as shown in the figure. The flow rate required for the instrument is approximately 1 to 3L/min.
- Use a material with good corrosion resistance, such as hard PVC (VP16) or PVC pressure resistant hose (VP16 equivalent).

### 4. Drain piping

- Drain to the pit etc. with the open descent pipe to the atmosphere.
- Use a material with good corrosion resistance such as hard PVC (VP25) or PVC pressure resistant hose (diameter equivalent to VP 25).

### 5. Cleaning water piping (optional)

With automatic cleaning, stop valve strike at the cleaning water inlet piping with a cleaner (40 to 100 mesh).  
For cleaning water, supply water that meets the "cleaning water conditions" in the specifications.

### 6. Wiring

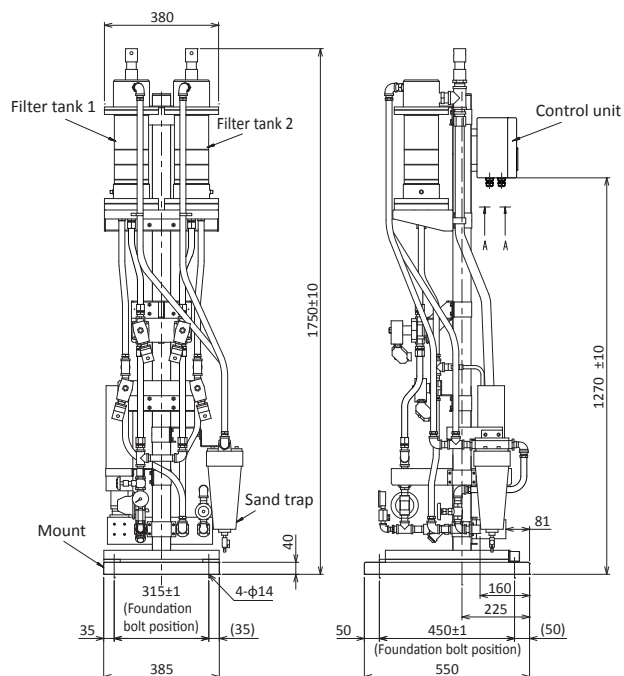
- Refer to the standard in the figure for each cable.
- To install the instrument, perform class D work (ground resistance 100Ω or less) from the ground screw on the bottom of the converter or the E terminal of the internal terminal block.
- Isolate the signal cable from the power line.
- When using composite piping (conduit), remove the cable gland and connect it to the G1/2 screw.

## Related instruments

### ● Sand filtration device

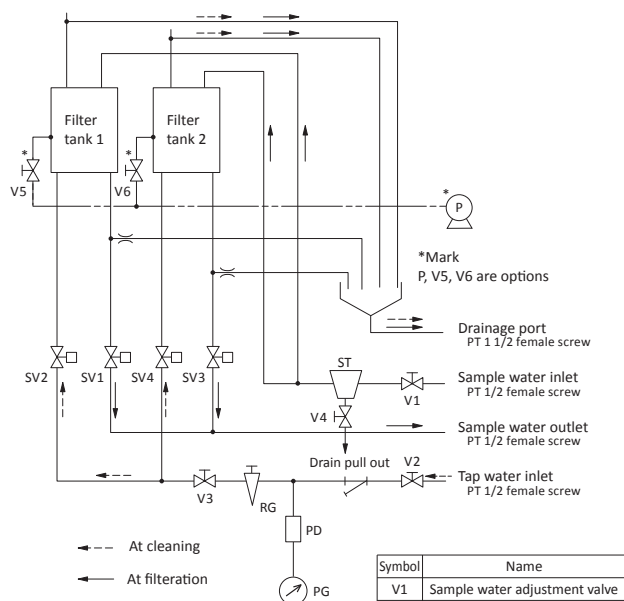
Model : FS-3  
 Usage : Removal of SS in sample water to be introduced into the water quality analyzer  
 Method : 2-cylinder continuous sand filtration (alternate automatic reversal)  
 Filter material : Sand (particle size 0.8 and 1.0mm)  
 Filtration water : 1 to 6L/min (depending on the turbid sampling amount mass of the sample water)  
 Power : AC 100V 50/60Hz

### ● External dimensions (Standard type)

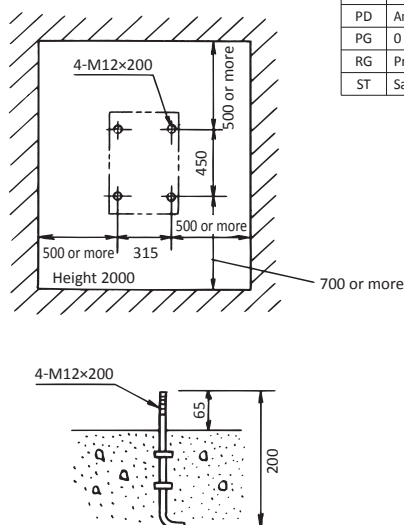


Please contact us as we have prepared a detailed spec sheet separately.

### ● Flow sheet



### ● Maintenance space



DKK-TOA CORPORATION

Overseas Sales Division:  
 DKK-TOA Corporation  
 29-10, 1-Chome, Takadanobaba, Shinjuku-ku,  
 Tokyo 169-8648 Japan  
 Tel : +81-3-3202-0225 Fax : +81-3-3202-5685  
 E-mail : intsales@dkktoa.com



Please read the operation manual carefully before using products.