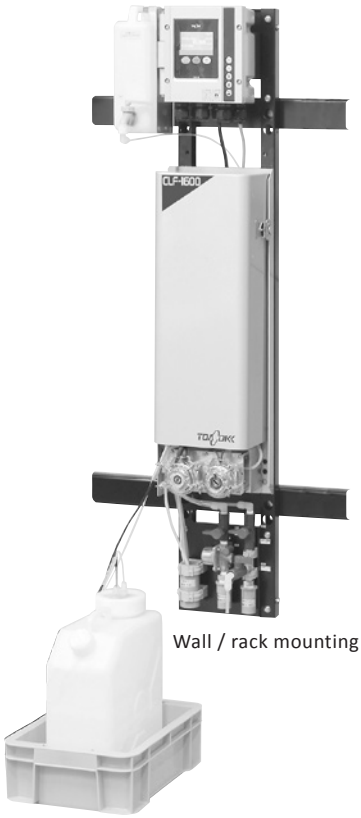
SPECIFICATION SHEET

REAGENT-TYPE RESIDUAL CHLORINE METER CLF-1600

Clean water treatment process Online, a reagent-based residual chlorine meter mainly for measuring raw water, basins, and water distribution.

By using different reagents, the total residual chlorine concentration (free chlorine + bound chlorine) or the free chlorine concentration can be continuously measured.

Raw water sample water 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.



Wall / rack mounting

Chemical solution tank

Self-supporting stand assembly type (option)

Features

○The detector is a non-contact swing rotary polarographic electrode with many achievements. Due to the unique ceramic bead cleaning and rotation speed control method, there is little influence of instructions due to flow rate fluctuations, etc., so stable measurement can be performed for a long period of time.

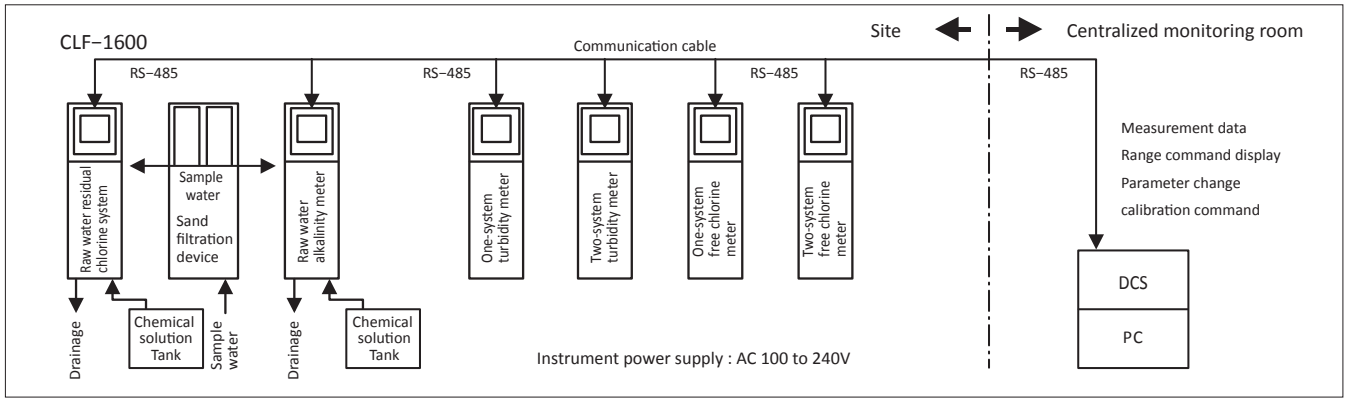
○The consumption of reagent solution is about 1/5 of the conventional one, which is a reagent-saving design. Therefore, the reagent tank is as small as 10L.

○In addition to the analog output signal DC4 to 20mA, the digital signal RS-485 is standard equipment, so it can be used for new digital instrumentation systems by Modbus communication (exchange of data and information with higher-level DCS, etc.).

○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 self-standing 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 0.3 MPa 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 : Reagent-type residual chlorine meter
Model : CLF-1600
Measurement target : Free effective chlorine in chlorinated water (FREE)
Total residual chlorine in chlorinated water (TOTAL)
Measurement method : Polarograph method using eccentric rotating micro-electrodes
Measurement range : 0 to 10
Measurement unit : mg/L or ppm
Display method : LCD (liquid crystal)Digital
Minimum display : 0.01
Transmission output range : 0 to 1/2, 0 to 2/5, 0 to 3/6, 0 to 5/10, 0 to 0.5/1.0 (Only TOTAL)
2range manual or remote switching
Transmission signal output : DC 4 to 20mA (Insulated type)
resistance load 600Ω or less
Contact signal output : Upper limit of concentration/Lower limit alarm
Under maintenance…ST-BY mode
During automatic cleaning and calibration (optional)
Instrument abnormality…Sample water cutoff, reagent cutoff, flow rate abnormality, span calibration abnormality, hardware abnormality
Power supply cutoff (closed or open when cut off)
Range display (Open for low range, closed for high range)
(Contact capacity; DC 30V 0.1A resistance load)
Contact signal input : Range switching command…Low range at open
High range at close
Cleaning start…Automatic cleaning start
Calibration start…Automatic calibration start
(Non-voltage contacts with a width of 100mS or more)
External output port : RS-485compliance 1point (max cable length 100m)
Protocol; Modbus/RTU address; 8 ×n (n=1 to 30)
Use 3 consecutive addresses
Terminal block; 2 sets (For parallel connection)
Analog signal input : DC 4 to 20mA
Converts the DC 4 to 20mA input to a preset scale.
Number of inputs; 1 point
Concentration conversion; 4 significant digits, fixed decimal point position
Power presure : AC 100 to 240V±10% 50/60Hz
Power supply : Approx. 40VA, with automatic cleaning / calibration approx. 60VA

Sample water conditions : No water stagnation or stagnation
Temperature…0 to 40˚C (No freezing)
Pressure…0.02 to 0.3MPa
Amount used…1 to 3L/min
Detector inflow…20mL/min
pH range…No buffering capacity in the range ofpH5.8 to 8.6
Reagent : Free Chlorine (FREE) Measurement composition (in 10L)

Reagent	Measurement range 0 to 10
Potassium bromide	600g
Anhydrous sodium acetate	200g
Acetic acid	200mL

Composition of Residual Chlorine (TOTAL) measurement (in 10L)

Reagent	Measurement range	
	0 to 5	0 to 10
Potassium iodide	100g	200g
Anhydrous sodium acetate	25g	50g
Acetic acid	200mL	400mL

Flow velocity…Approx.0.2mL/min
Amount used…Approx.0.3L/day
Approx.10L/month
Tank capacity…10L (with level sensor)
Tank material…Polyethylene (with receiver)
Structure : Indoor installation type (Rainproof measures required outdoors)
Transmitter IP65
Detector (Electric unit) IP52
Mounting method : Wall, or rack mounting
Material : Transmitter…aluminum die cast
Detector…Aluminum plate
Coating color : Metallic silver
Material of wetted part : PVC, PFA, PP, acrylic
Piping connection port : Sample water inlet…socket nominal diameter 16
Drainage…socket nominal diameter 25
Cleaning water inlet…socket nominal diameter 16 (optional)
Wiring port : 6 glands for φ6 to 12 cable
When removed, screw for connecting electric conduit G1/2 appears
Ambient temperature : −5 to 50˚C (Do not freeze)
Humidity : 85% RH or less (Do not freeze)
Wight : Approx...17kg
(Self-supporting stand assembly type is about 32kg)

Performance

Straightness : Within ±3%FS (0 to 0.5mg/L range within ±0.03mg/L)
Repeatability : Within ±2%FS (0 to 0.5mg/ range within ±0.02mg/L)
Temperature compensation range : 0 to 40˚C
Stability : Zero drift; within ±1%FS/month (With ion-exchanged water)
Span drift; Within ±5%FS/month (With chlorine standard solution)
Response time; 90% response within 3 mins. (From the standard liquid inlet)

Calibration method

Zero calibration : Calibrate with ion-exchanged water or dechlorinated water
Span calibration : Sample water is collected and calibrated to the concentration determined by the DPD colorimetric method. Alternatively, prepare a hypochlorous acid solution and calibrate it.

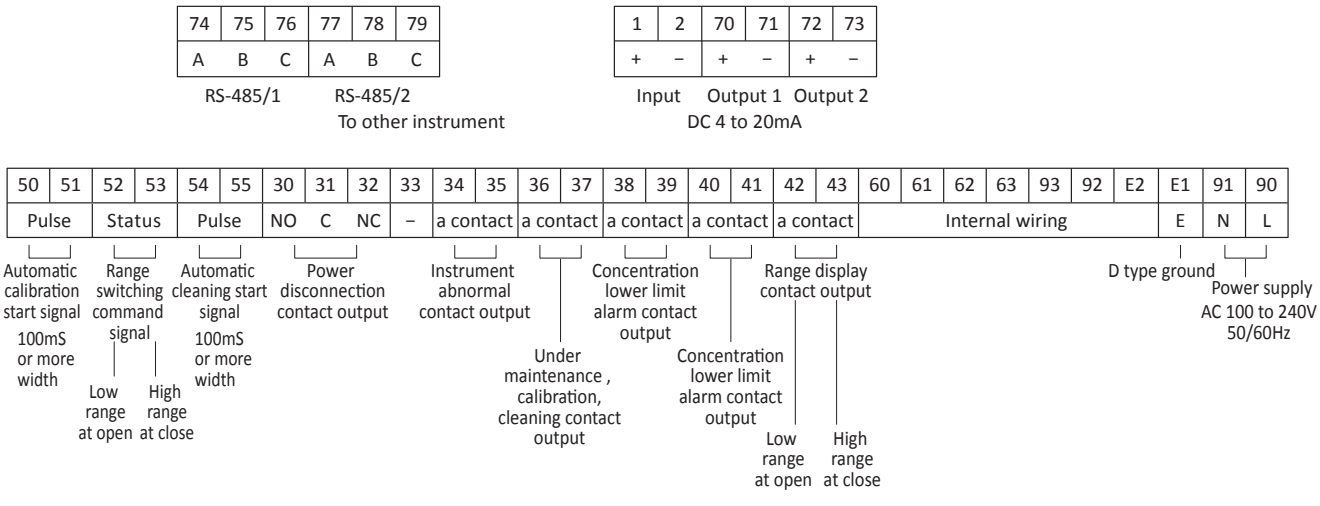
Operating principle

The sample water is supplied at a pressure of 0.02 to 0.3MPa, and the flow rate is adjusted to about 1L/min with BV1 to enter the measuring water tank. The measuring water tank is automatically controlled to a constant flow rate, and at the same time, the sample water is defoamed and filtered by a filter, and the excess is drained from the overflow. The sample water stored in the measuring water tank is introduced into the measurement cell at a constant flow rate (20mL/min) by the constant flow pump P1.

On the other hand, the reagent solution is introduced into the measurement cell at a constant flow rate (0.2mL/min) by the constant flow pump P2. The sample water and the reagent solution mix and react to release bromine or iodine depending on the chlorine concentration. This free bromine or iodine is electrolytically reduced by the detector to become bromine ion or iodine ion. At this time, the reduction current flowing between the detection electrode and the counter electrode is detected and converted to the concentration of total residual chlorine or free chlorine. (Polarograph method)

Since the surface of the detection electrode is constantly polished and cleaned with ceramic beads, the surface is kept clean and stable measurement is possible for a long period of time.

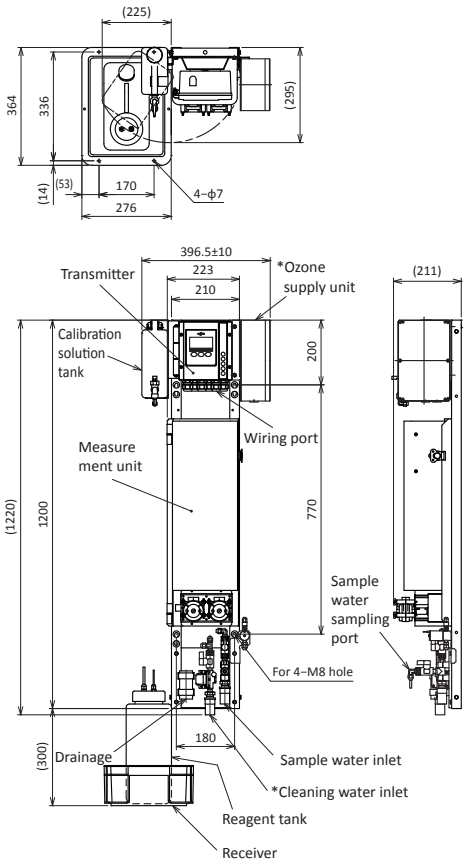
Connection terminal



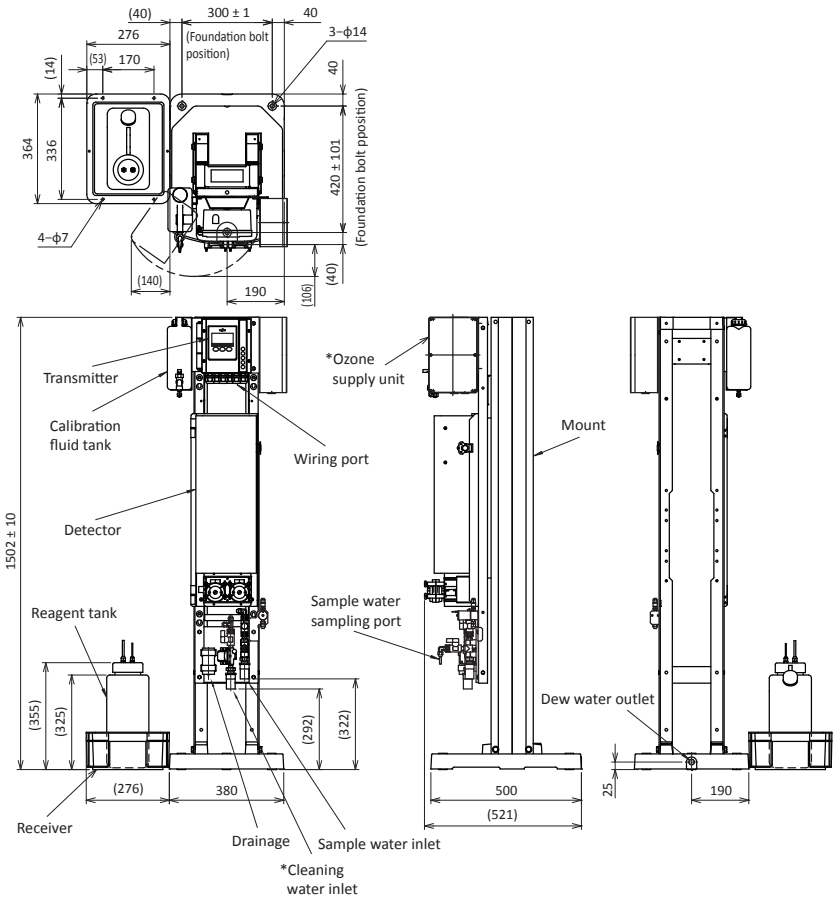
Dimensions

Unit : mm

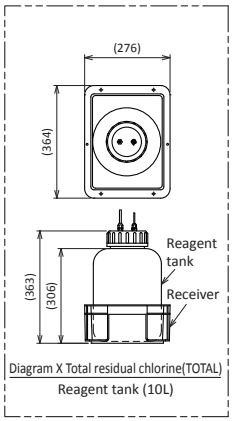
● Wall hanging · Rack mounting type



● Self-supporting stand assembly type (optional)



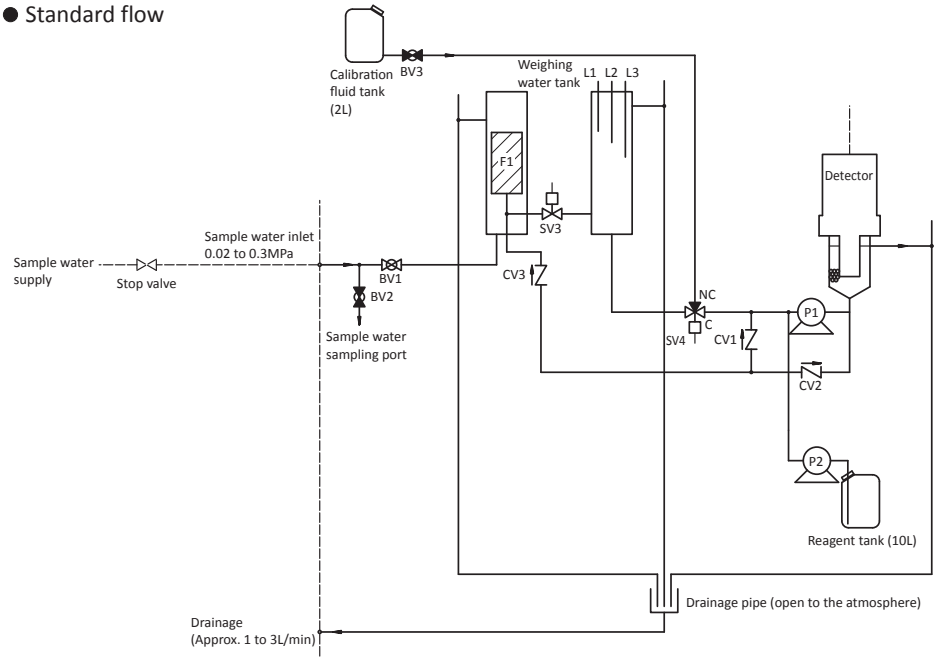
*...Optional



Use a round light-shielding reagent tank to measure total residual chlorine (TOTAL).

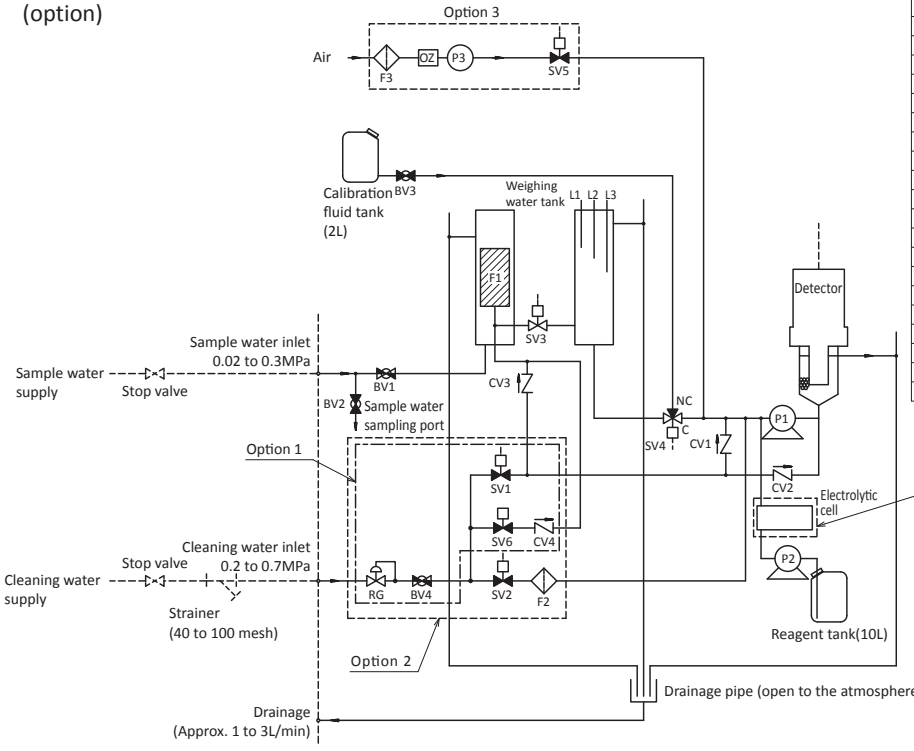
Flow sheet

● Standard flow



Symbol	Name	Remarks
SV3	Sample water supply solenoid valve	
SV4	Calibration liquid supply solenoid valve	
P1	Sample water pump	
P2	Reagent liquid feed pump	
F1	Sample water filter	
BV1	Sample water flow rate adjustment valve	
BV2	Sample water sampling valve	
BV3	Calibration fluid flow rate adjustment valve	
CV1 to 3	Check valve	
L1 to 3	Level electrode	

● Flow with automatic cleaning and automatic calibration (option)



Symbol	Name	Remarks
SV1	Washing water supply solenoid valve	
SV2	Zero liquid supply solenoid valve	
SV3	Sample water supply solenoid valve	
SV4	Calibration liquid supply solenoid valve	
SV5	Ozone supply solenoid valve	
SV6	Solenoid valve for cleaning sample water filter	
P1	Sample water pump	
P2	Reagent liquid feed pump	
P3	Air pump	For ozone
OZ	Ozone generator	
F1	Sample water filter	
F2	Zero filter	
F3	Filter	
RG	Pressure reducing valve	
BV1	Sample water flow rate adjustment valve	
BV2	Sample water sampling valve	
BV3	Calibration fluid flow rate adjustment valve	
BV4	Calibration fluid flow rate adjustment valve	
CV1 to 4	Check valve	
L1 to 3	Level electrode	

Option 1 · · · Automatic cleaning
Option 2 · · · Automatic calibration (including automatic cleaning)
Option 3 · · · Ozone cleaning

: Normally open

: Normally open (Flow rate adjustment required)

: Normally close

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 …Water cleaning 6min, Water / ozone cleaning 11min
Condition of cleaning water …Equivalent to tap water
Water cleaning approx. 6L / time Water / ozone cleaning approx. 9L / time
Pressure; 0.2 to 0.7MPa
Temperature; 2 to 30˚C

● Automatic calibration unit

Tap water is filtered with a zero filter, zero calibration is performed, and then bromine or iodine is quantitatively generated from the reagent solution by an electrolytic cell, and span calibration is performed.
It is started by an internal timer or an external start signal.
Automatic calibration is added at the same time as the above automatic cleaning.

Cycle setting ...1 to 31days (initial setting 10days)
(If set to 0day, an external start signal will be accepted)
Calibration time …Approximately 60min (fixed)
Standby 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.

● Sand filtration device FS-3

Product code

CLF1600-0-□□□□□□

- Measurement item
  - A … Continuous measurement of bromine-substituted free chlorine (FREE)
  - B … Iodine substitution residual chlorine (TOTAL) continuous measurement
- Measurement range (2 range manual / remote switching)
  - 1 … 0 to0.5/1.0 (only TOTAL)
  - 2 … 0 to1/2
  - 3 … 0 to2/5
  - 4 … 0 to3/6
  - 5 … 0 to5/10
  - 8 … Specified*1
- Measurement unit
  - A … mg/L (standard)
  - B … ppm
- Automatic cleaning / calibration*2
  - 0 … None
  - 1 … With water cleaning
  - 2 … With water cleaning +Ozone cleaning
  - 3 … With water cleaning +Zero/span calibration
  - 4 … With water cleaning +Ozone cleaning +Zero/span calibration
- Assembled to an indoor self-supporting aluminum stand*3
  - 0 … None
  - 1 … Present
- Description form
  - A … Standard
  - B … English

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

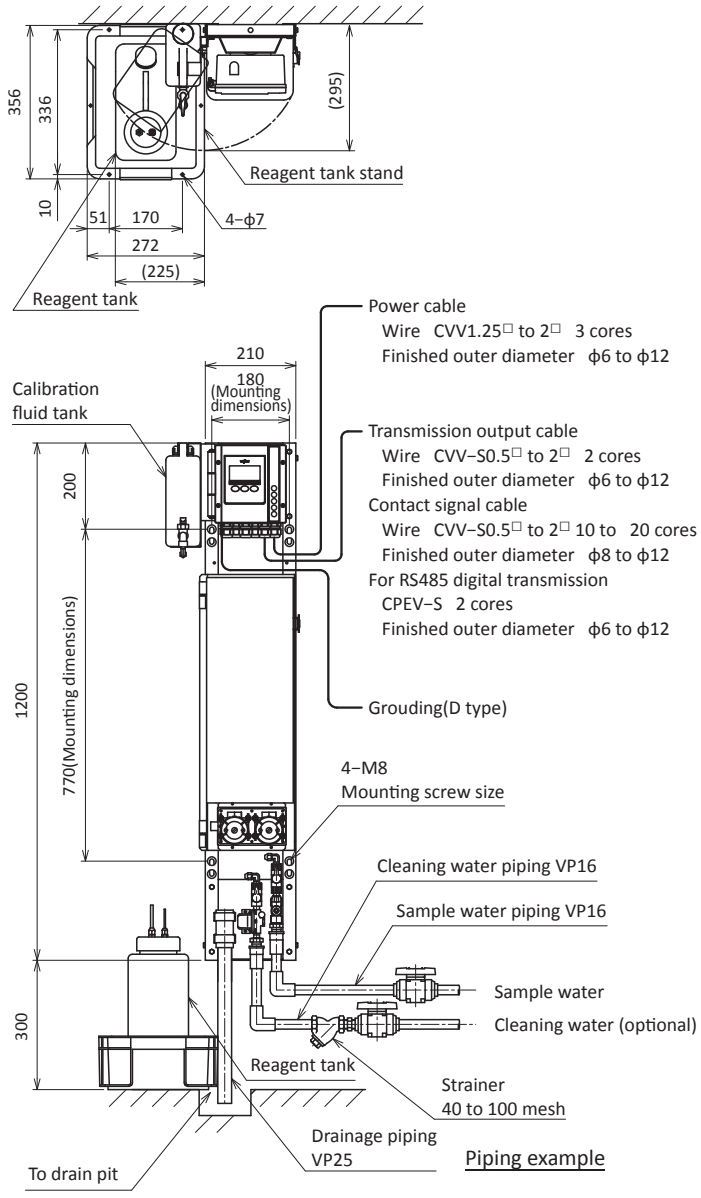
*1. Any 2 ranges are possible in the range of 1 to 10.
*2. Automatic zero-span calibration can only be added with automatic cleaning.
*3. If there is a self-standing aluminum frame, anchor bolts will be installed on the base of the frame.

Note
1. Since it contains a reagent tank (10L), it is not necessary to order the TK-50L type.
2. In addition to the transmission output DC of 4 to 20 mA, the digital output RS-485 is equipped as standard, so it can support new digital instrumentation by Modbus communication (exchange of data and information with higher-level DCS, etc.). Please contact our sales staff for details such as communication specifications.
3. The supply power supply voltage is AC 100-240V 50 / 60Hz free power supply.
4. Refer to the table below for the selection of measurement range and optional functions according to the measurement purpose.

Example of measurement location	Water purification plant		
Measurement target example	Raw water system (pre-salt)	Settling basin (medium salt)	Water distribution system (post-salt)
Measurement range example	0 to 5 / 10mg/L	0 to 2 / 5mg/L	0 to 1 / 2mg/L
Standard specifications (no options)	–	–	Apply
With automatic water cleaning	–	Apply	Recommend
With automatic water cleaning + ozone cleaning	Apply	Recommend	—

5. Equipped as standard with a sample water adjustment tank and a function to detect disconnection between sample water and reagent solution.
6. When combining with a sand filtration device, please order FS-3 type.
7. There is a deionizer G-10 type (code No. 134G005) for preparing reagent solution and calibration solution. Please order if necessary.

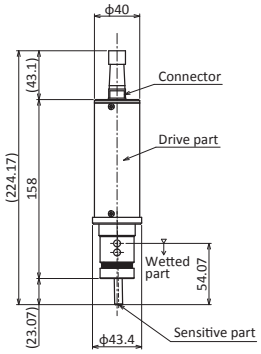
Installation



1. Instrument installation conditions
   Install it in a place that meets the following conditions.
   a) A place that is not exposed to rain, wind, or direct sunlight.
   b) A place where the temperature and pressure of the sample water can supply water quality that meets the standard "sample water conditions".
   c) Where there is no vibration
   d) Where there is no device that causes electrical noise in the surrounding area
   e) Maintenance space can be secured and work can be done easily.
2. Installation
   Standard specifications are wall-mounted or rackmounted.
   Make four holes for M8 in the mounting part in advance, and mount the instrument vertically.
   Instrument mass: Approx. 17kg
   Use the supplied reagent tank and install it next to the device (within 1 m from the device body).
   Install the reagent tank stand with M6 foundation bolts.
   Connect the piping tube and wiring that came with the reagent tank to the main body of the device.
3. Sample water supply piping
   a) Install a stop valve as shown in the figure.
      Also, insert a union, etc. near the device so that the piping can be removed (separated) from the device.
      The flow rate required for the instrument is approximately 1 to 3 L / min.
   b) Use a material with good corrosion resistance such as hard PVC (VP16) or PVC pressure resistant hose (diameter equivalent to VP16).
4. Drain piping
   a) Drain to a pit, etc. with an open-to-atmosphere descent pipe.
   b) Piping material is rigid PVC (VP25) or PVC pressure resistant hose
      Use a material with good corrosion resistance such as (diameter equivalent to VP25).
5. Cleaning water piping (optional)
   If it is equipped with automatic cleaning, pipe it to the cleaning water inlet together with a stop valve / strainer (40 to 100 mesh). Also, insert a union, etc. near the device so that the piping can be removed (separated) from the device.
   For wash water, supply water that meets the standard "wash water conditions".
6. Wiring
   a) Refer to the standard in the figure for each cable.
   b) To ground the instrument, perform class D work (grounding resistance 100Ω or less) from the ground screw on the bottom of the converter or the E terminal of the internal terminal block.
   c) Isolate the signal cable from the power line.
   d) When using conduit piping (conduit pipe), remove the cable gland and connect it to the G1/2 screw.

Detector

Model	: CLR-160
Measurement method	: Swing rotary type rotation speed control method
Cleaning method	: Rotational motion of detection electrodes and continuous cleaning with ceramic beads
Structure	: Detection electrode; Au Opposite pole; Pt Temperature compensation sensor; Pt 1000Ω
Detection electrode	: 2132 (Replacement tip)
Lead wire	: 118N0 60 (Code No.) Length 55cm

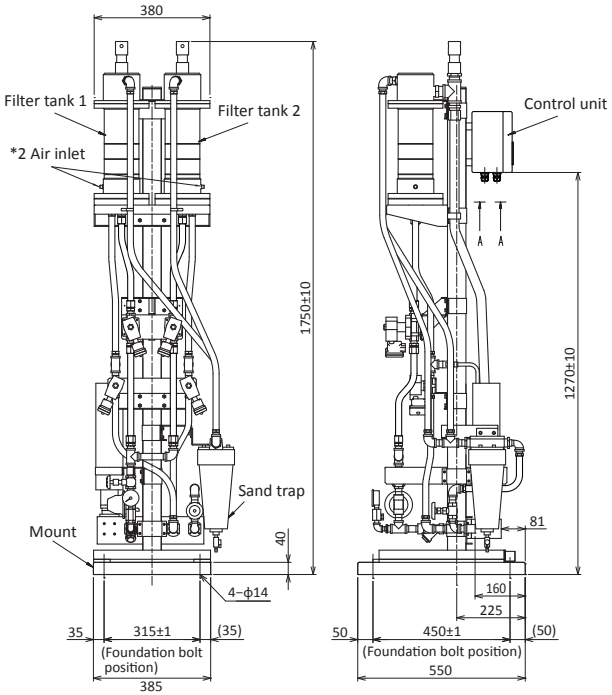


Related instruments

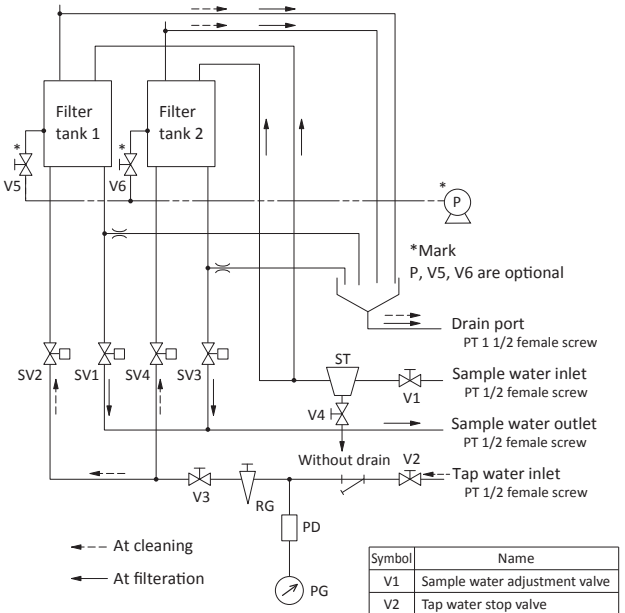
● Sand filtration device

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 size0.8 and 1.0mm)
Filtration water sampling amount	: 1 to 6L/min (depending on the turbid mass of the sample water)
Power	: AC 100V 50/60Hz

● External dimensions

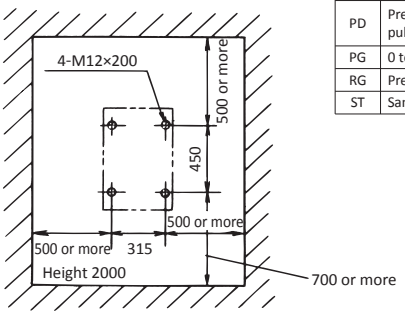


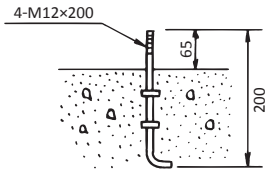
● Flow sheet



Symbol	Name
V1	Sample water adjustment valve
V2	Tap water stop valve
V3	Tap water adjustment valve
V4	Drain valve
P	Gas pump
V	Manual valve
SV	Solenoid valve
PD	Pressure gauge fitting for pulsation prevention
PG	0 to 1MPa/cm²
RG	Pressure reducing valve
ST	Sand trap

● Maintenance space





TOADKK

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⚠ CAUTION Please read the operation manual carefully before using producuts.

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