SPECIFICATION SHEET

TOADKK

AUTOMATIC COD ANALYZER CODR-400

This device is an automatic measuring device for measuring the COD (Chemical Oxygen Demand) of factory effluent, lake water, etc., in compliance with effluent regulations such as total water quality regulations. Designed on the basis of 'automated COD (COD) instrument'.

The measurement principle is based on "17. Oxygen consumption by potassium permanganate at 100°C (CODMn)" of JIS K 0102 Industrial Wastewater Test Method. In the case of samples containing a large amount of chloride ions, such as seawater, a method based on the Sewage Test Method (Appendix) "Oxygen demand by potassium permanganate at alkaline 100°C (CODAlk)" is adopted.

Features

○Reduced reagent consumption by 95%.
(Reagent consumption: 1/20 compared to our conventional model) Reagent replacement is once a month*.

○Adopting a twin platinum electrode eliminates the need for maintenance of the internal solution of the reference electrode.

○Easy to operate with an interactive method using a color touch panel.

○The titration curve can be displayed on the color touch panel.

○Various log functions allow recording and checking past measured values, titration data, calibration data, alarm data, start / stop data, etc.

○Equipped as standard with an oxalic acid cleaning function that cleans reaction tanks and electrodes from manganese contamination.

*.This applies when the optional water purifier is built-in or when pure water is supplied from the outside. The specification with a built-in pure water tank requires pure water supply once every 6 days.

Standard Specifications

Product Name	: Automatic COD Analyzer
Model	: CODR-400
Measurement Object	: COD concentration in water
Measurement Method	: Oxygen consumption (acidic method, alkaline method) by potassium permanganate at 100°C
End point detection method	: Galvanostatic polarization potentiometric titration (double platinum electrode)

Measurement range and flow path (unit: mg/L):

It is recommended to select the measurement range so that the maximum sample concentration is less than 60% of the full scale value.

(1) Measurement range of 1 flow path 1 range (standard); Any 1 range from 0 to 20 to 0 to 2000

(2) 1 flow path 2 ranges (automatic range switching)
1st range: any 1 range from 0 to 20 to 0 to 1000
2nd range: any 1 range from 0 to 40 to 0 to 2000 (However, the measurement range is 1st range < 2nd range, and the measurement range ratio is doubled.)

(3) Measurement range of 2 channels 1 range; any 1 range from 0 to 20 to 0 to 2000 (channel 1 and channel 2 have the same measurement range)

(4) Measurement range of 2 channels and 2 ranges;
The range of each stream is fixed, and the range of stream 1 < the range of stream 2.
There are no restrictions on the combination of ranges, so select from the following.
1st range: Any 1 range from 0 to 20 to 0 to 1000 (1st flow path side)
2nd range: Any 1 range from 0 to 30 to 0 to 2000 (2nd flow path side)
An external dilutor is required if the measurement range is greater than 0 to 100.
The external diluter is shared by Range 1 and Range 2, and the dilution factor is set for each range.
When an external diluter is added, the external diluter operates even when Range 1 is 0 to 100 or less, so the external dilution ratio for Range 1 is set to 1 (no dilution).

Measurement cycle	: 1 measurement / 1 hour (1 day measurement schedule can be arbitrarily set in 1 hour units Or measurement start by external start signal
Load calculation function	: By inputting the flow rate signal of channel 1, the load amount of channel 1 is calculated. Flow path 2 does not perform load amount calculation.
Display / recording method	: Liquid crystal display by touch panel (Select either Japanese / English) Printed records by printer (option) in English items; date, time, measured value, load value, flow rate value, measurement parameter, daily report (daily maximum, minimum, average value, number of measurements), etc.

Repeatability (In calibration solution)	: 0 to 20mg/L range …within ±1%FS Over 20 to 100mg/L range…Within ±2%FS Range other than the above …Within ±5%FS
Stability (In calibration solution)	: Zero drift …within ±3%FS/ day Span drift 20mg/L range …within ±3%FS/ day Over 20 to 100mg/L range…Within ±4%FS/day Range other than the above… Within ±5%FS/ day
Warm-up time	: About 2 hours after turning on electricity and running water
Data memory of main unit	: Measured values, flow rate values, and load values can be displayed for up to one month.
Installation	: Indoors / Outdoors inside a cubicle, a place that is protected from direct sunlight, wind and rain, has little vibration and impact, and has sufficient maintenance space. Also, there should be no sources of noise (power equipment, etc.) nearby. In case of corrosive atmosphere, install ventilation fan etc. in the building and pay sufficient attention to ventilation.
Ambient temperature / humidity	: 2 to 40˚C 85%RH or less
Sample water condition	: Temperature; 2 to 40˚C Pressure; 0.02 to 0.05 MPa Flow rate; 1 to 3L/min Do not contain components or air bubbles that generate corrosive gases (Refer to the option column for housing air purge.)
Coexisting ingredients	: In the acid method, silver nitrate is added for masking to eliminate the effects of chloride ions in the sample. The masking limit of chloride ions by silver nitrate is up to 100 times the full-scale concentration of the measuring range. (Example) Masking for 0 to 20mg/L range The limit will be 2gCl/L. If the sample contains a large amount of salt, a large amount of silver chloride precipitates and interferes with the measurement. In such cases, we recommend using the optional ammonia cleaning to remove the silver chloride.
Reagent consumption	:●5mmol/L potassium permanganate solution…about 700mL/month ●12.5mmol/L sodium oxalate solution Without cleaning with oxalic acid: about 400 mL/month When cleaning with oxalic acid every hour: about 800mL/month ●Sulfuric acid (1+2)…About 400mL/month ●Silver nitrate solution (100g/L)…Approx. 400mL/month ●Sodium hydroxide solution (20g/L)… Approx. 400mL/month. ●53.5% ammonia water…About 15 mL/ clean once (When the ammonia cleaning function is provided, the cleaning interval depends on the setting.)
Contanct input	: 6 inputs No-voltage contact input, ON resistance 50Ω or less Short-circuit current maximum 9mA, open-circuit voltage 12VDC external start, external calibration pulse input, make time 1 second or longer Observation station stopped, flow path switched, flowmeter under maintenance, no water draining...make contact
Input signal	: Analog input; channel 1 flow rate signal DC 4 to 20mA
Output signal	: DC 4 to 20mA (load resistance 600 Ω or less), ground isolation type (but not isolated between channels), channel 1 COD, channel 1 load, channel 2 COD (for 2 channel specifications)
Contact output	: Maintenance signal, calibration signal, power off signal, abnormalmeaurement 1, 2 signal, Preprocessing control signals 1, 2, 3, instrument error 1 signal, instrument error 2 signal, range signal (flow path signal), excess load signal Selection and allocation from the above items except for the power-off signal (8 points) Non-voltage contact output (contact capacity DC 24V, 0.3A / AC 125V, 0.1A)
Power	: AC 100V±10% 50/60Hz
Power consumption	: Max. approx. 300VA Avg. 150W (25% less than our conventional model)
Wetted part material	: Structure: Indoor, floor installation type, Hard PVC, PFA, PP, silicon rubber, hard glass, acrylic, FKM
External dimension	: 500 (W) ×450 (D) ×1500 (H) mm (Excluding water tank)
Coating color	: Munsell 5 PB8/1 equivalent
Weight	: Aoorix, 95kg (Excluding reagent)

Utility

Tap water condition	: Required when the optional water purifier is installed Temperature; 2 to 40˚C Pressure; 0.1 to 0.35MPa Required amount; Approx. 110mL/1 measurement (No external dilution) Approx. 450mL/1 easurement (With external dilution)

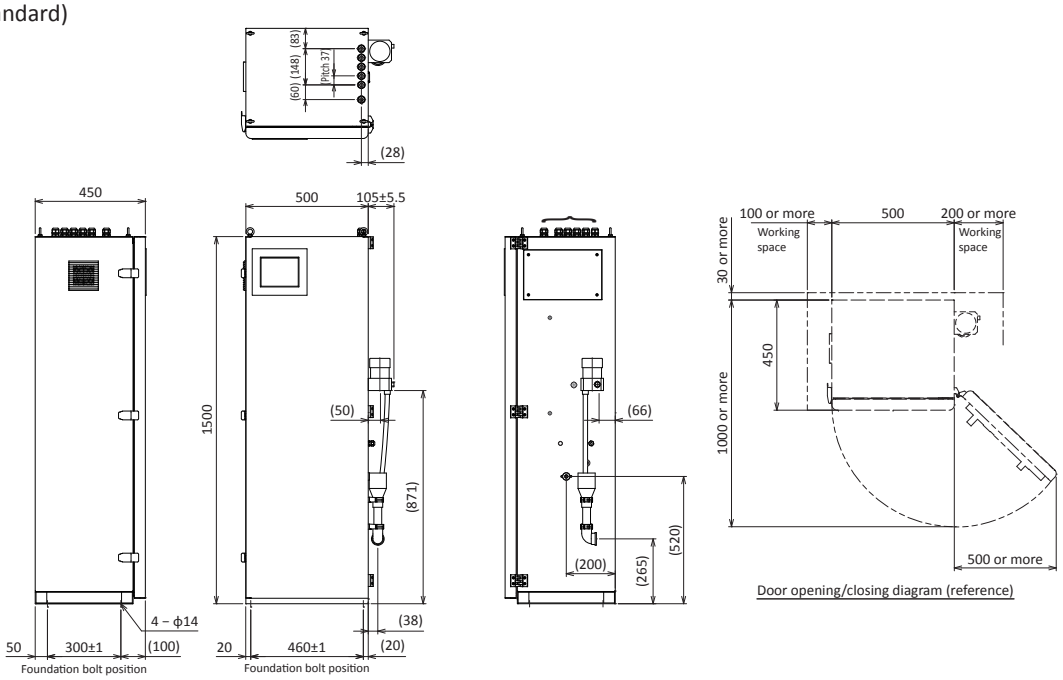
Option

Alkaline method	: Select when the chloride ion concentration is 100 times or more the full scale of the measurement range.
Ammonia cleaning function	: In the case of acid method silver nitrate addition, it is recommended to equip to remove silver chloride stains.
Line cleaning function	: Removes inorganic dirt adhering to the sample water introduction line. About 0.6% hydrochloric acid is used as the cleaning solution.
2 range specifications	: Details are described in the standard specifications and measurement range.
2-channel specifriation	: Please contact our sales representative.
Water purifier	: Instead of using the built-in pure water tank, the pure water device can be installed inside or separately.
Communication function	: RS-485 (communication protocal; Modbus-RTU) or RS-232C (communication protocol; original) (For detailed specifications, please contact our sales representative.)
Printer	: Fixed print items; year/(English print, with winder) printer that records month/ day, time, measured value, load amount, flow rate, daily report (maximum/ minimum/average value, etc.), abnormality Information printing
USB Memory	: Year/month/day, time, measured value, flow rate value, load value can be stored for 5 years
Housing air purge	: If the sample water or ambient atmosphere contains sulfur, hydrogen sulfide, or other corrosive substances, it is recommended to protect the instrument. Supply air; instrumentation air (dust-free and dehumidified air) pressure; 0.1 MPa Consumption: about 3.5L/min
Adjustment tank	: If the sample water is heavily contaminated, contains many bubbles, or has large fluctuations in flow rate, a regulating tank (separately installed) is required before the instrument receiving tank.
Door locking mechanism	: Please select if necessary for management of chemicals such as operating reagents.

<1 channel (standard) dimensional drawing, flow sheet, installation procedure drawing>

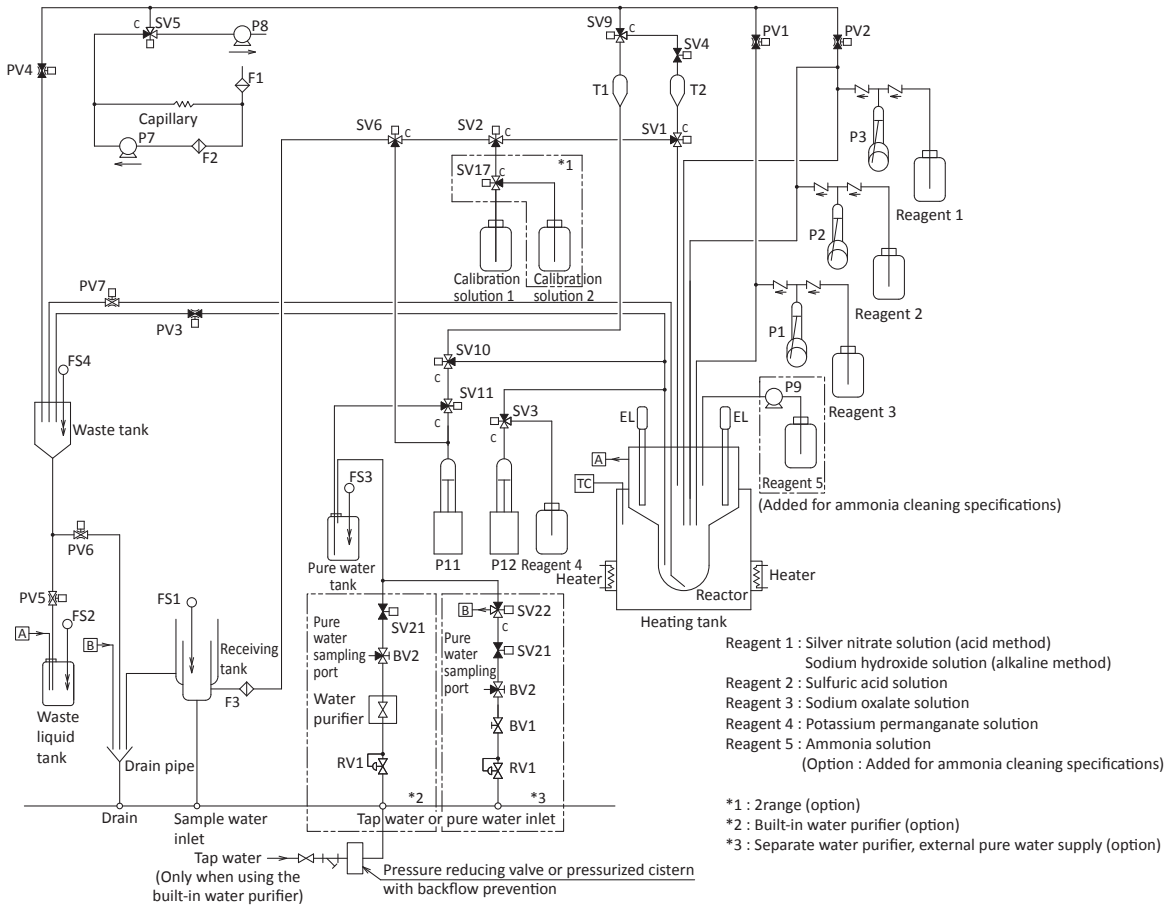
Dimensions Unit : mm

● 1 Channel (Standard)



Flow sheet

● 1 Channel (Standard)



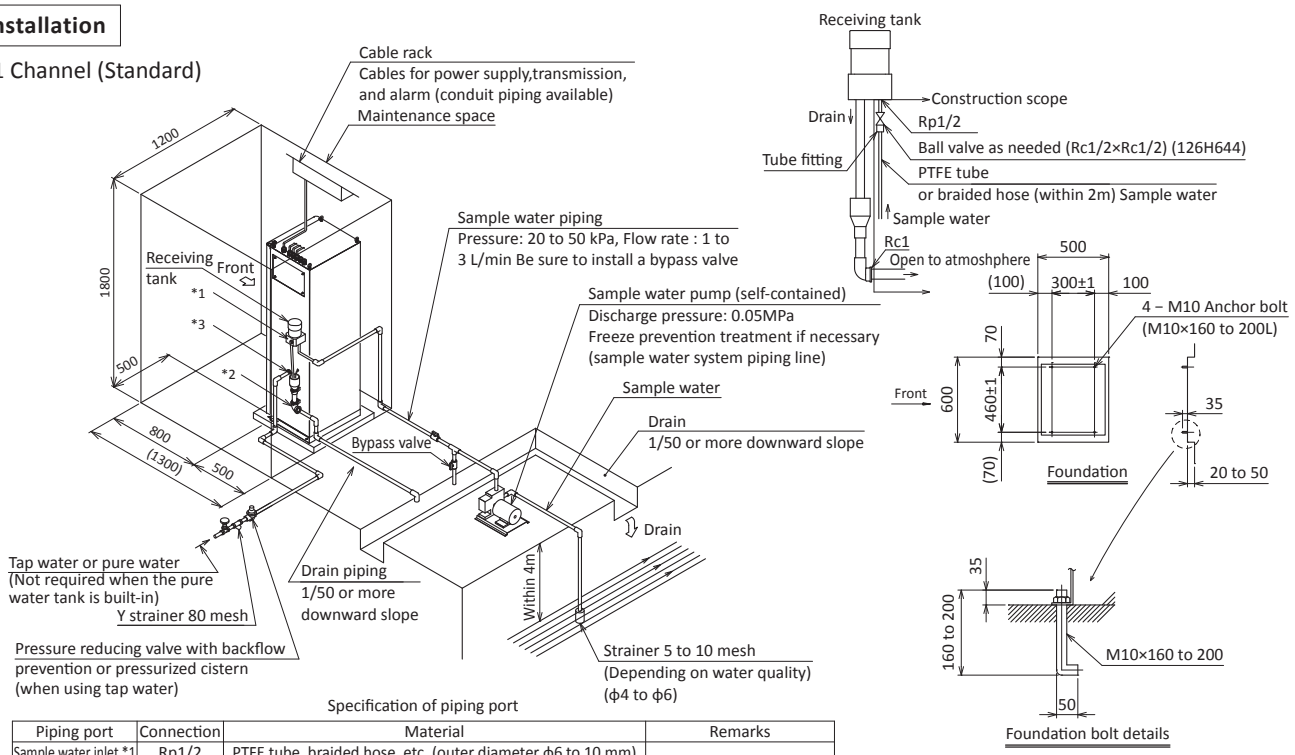
Reagent 1 : Silver nitrate solution (acid method)
Sodium hydroxide solution (alkaline method)
Reagent 2 : Sulfuric acid solution
Reagent 3 : Sodium oxalate solution
Reagent 4 : Potassium permanganate solution
Reagent 5 : Ammonia solution
(Option : Added for ammonia cleaning specifications)

*1 : 2range (option)
*2 : Built-in water purifier (option)
*3 : Separate water purifier, external pure water supply (option)

<1 channel (standard) dimensional drawing, flow sheet, installation procedure drawing>

Installation

● 1 Channel (Standard)



Specification of piping port

Piping port	Connection	Material	Remarks
Sample water inlet *1	Rp1/2	PTFE tube, braided hose, etc. (outer diameter ϕ6 to 10 mm)	
Drain *2	Rc1	Hard vinyl chloride pipe (VP20 or higher)	Open to atmosphere (tube end)
Tap water inlet *3	Rc1/2	Hard vinyl chloride pipe (VP13 or higher)	

Note Be sure to install a strainer (80 mesh) on the tap water pipe as shown in the figure. Also, thoroughly flush the inside of the pipe to remove dust before connecting it to the instrument. If there is dust, the solenoid valve will be clogged.

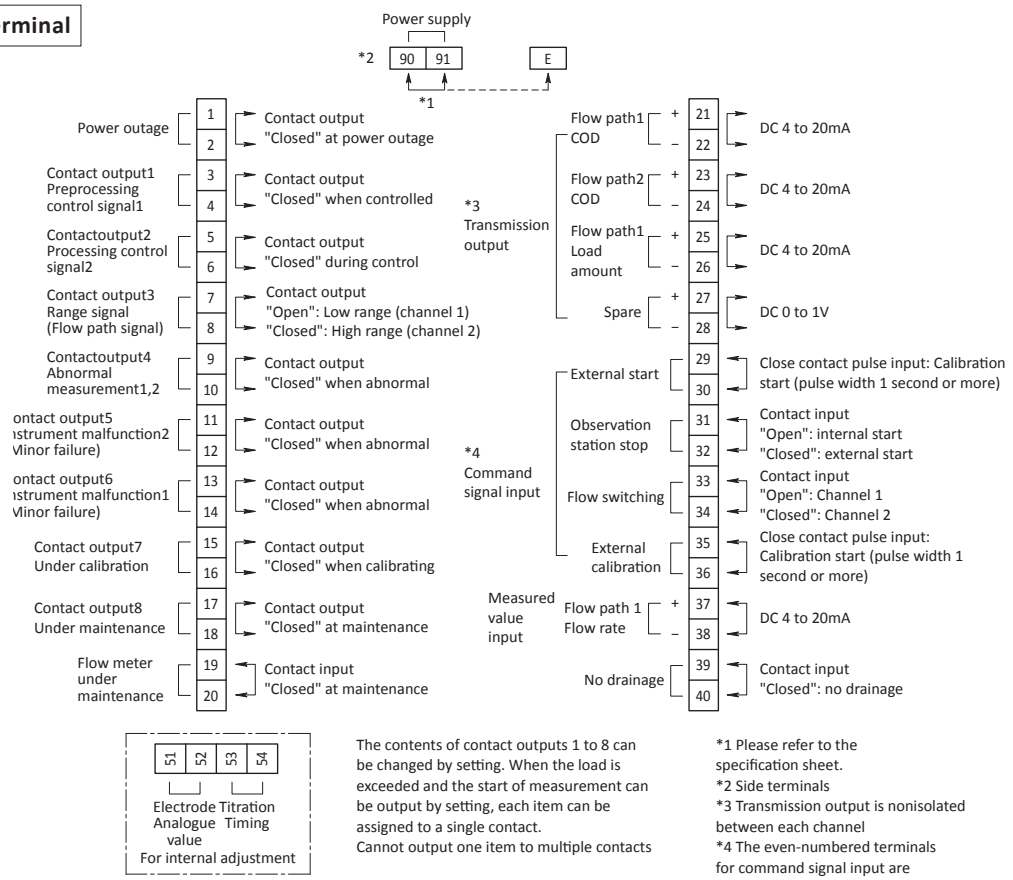
<Common to all specifications External connection terminal>

External connection terminal

● 1 Channel (Standard)

● 1 Channel with external diluter

● 2 Channel with external diluter



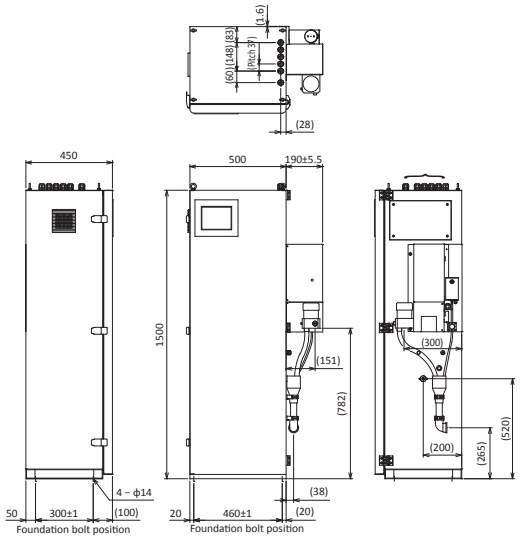
The contents of contact outputs 1 to 8 can be changed by setting. When the load is exceeded and the start of measurement can be output by setting, each item can be assigned to a single contact.
Cannot output one item to multiple contacts

*1 Please refer to the specification sheet.
*2 Side terminals
*3 Transmission output is nonisolated between each channel
*4 The even-numbered terminals for command signal input are wired inside the circuit.

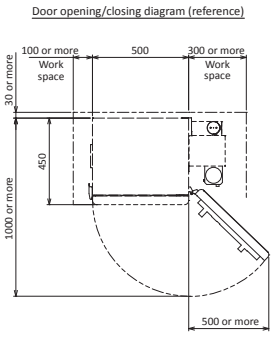
<Options External dimensions, flow sheet, installation procedure diagram>

Dimensions Unit : mm

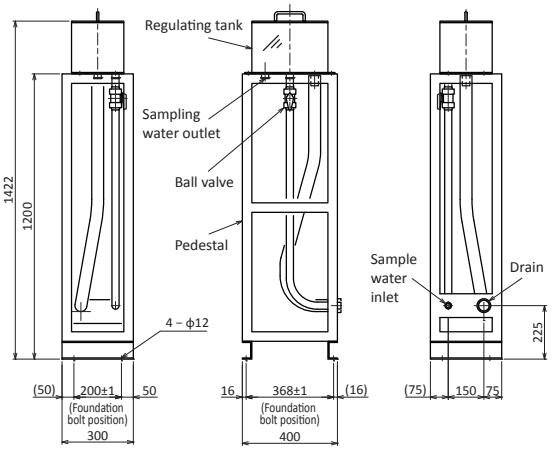
● 1 Channel
with external diluter



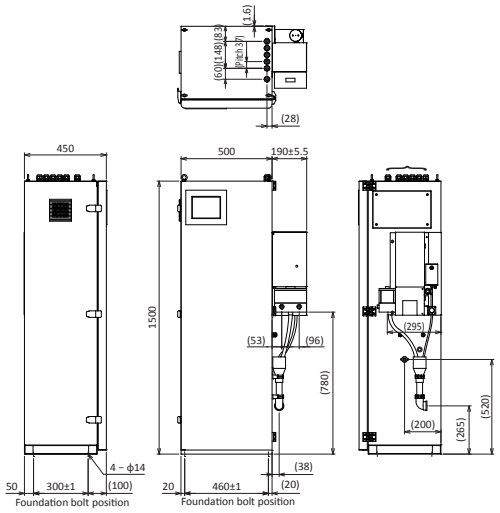
Door opening/closing diagram (reference)



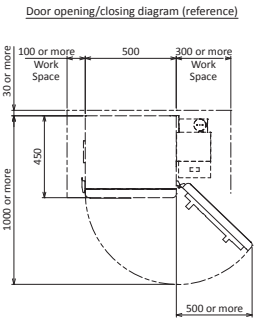
● For adjustment tank 1 channel



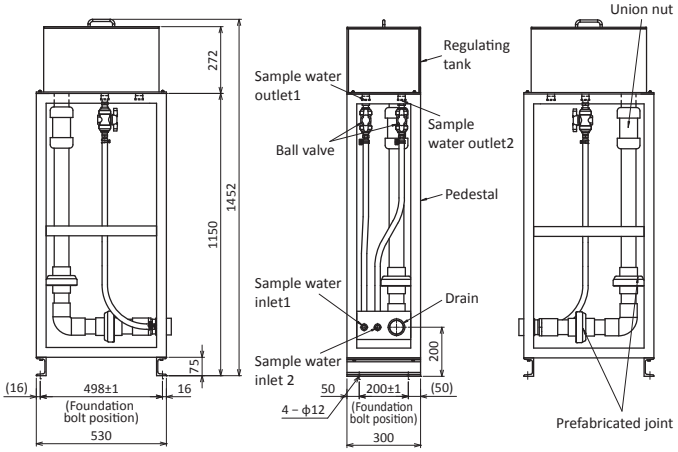
● 2 Channel
with external diluter



Door opening/closing diagram (reference)



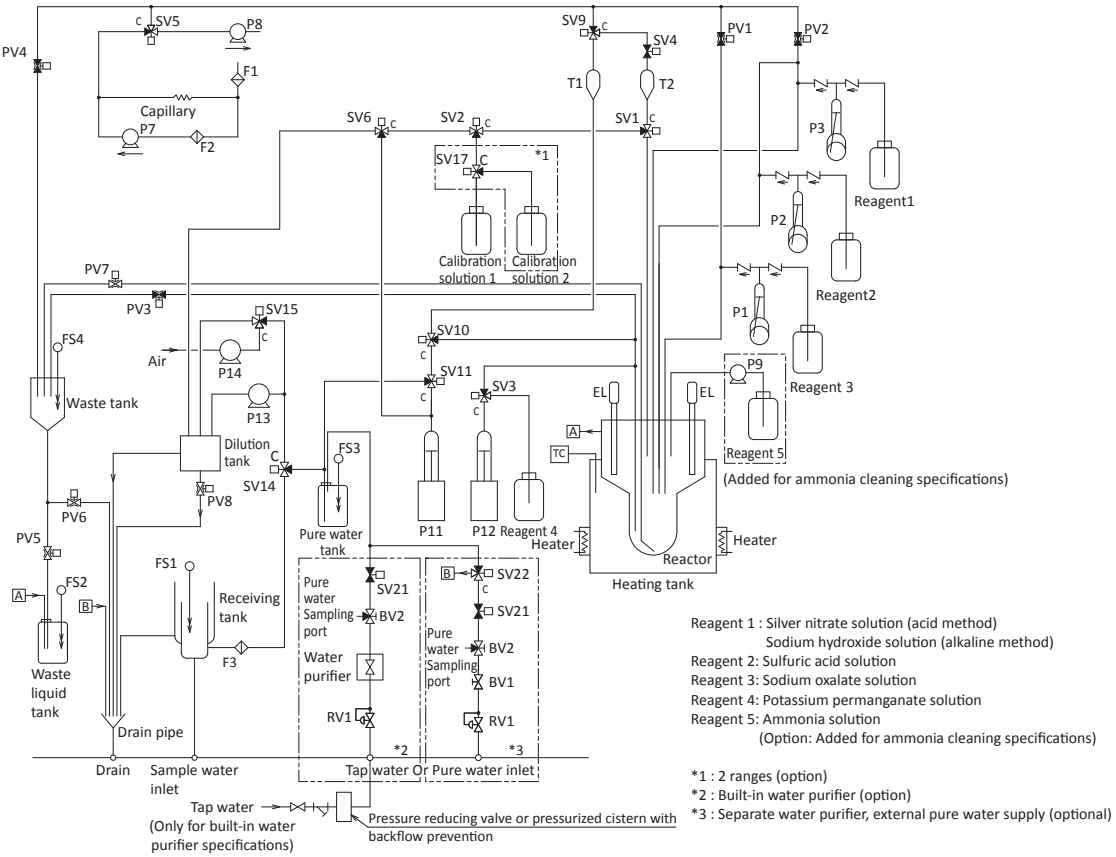
● For adjustment tank 2 channels



<Option External dimensions, flow sheet, installation procedure>

Flow sheet

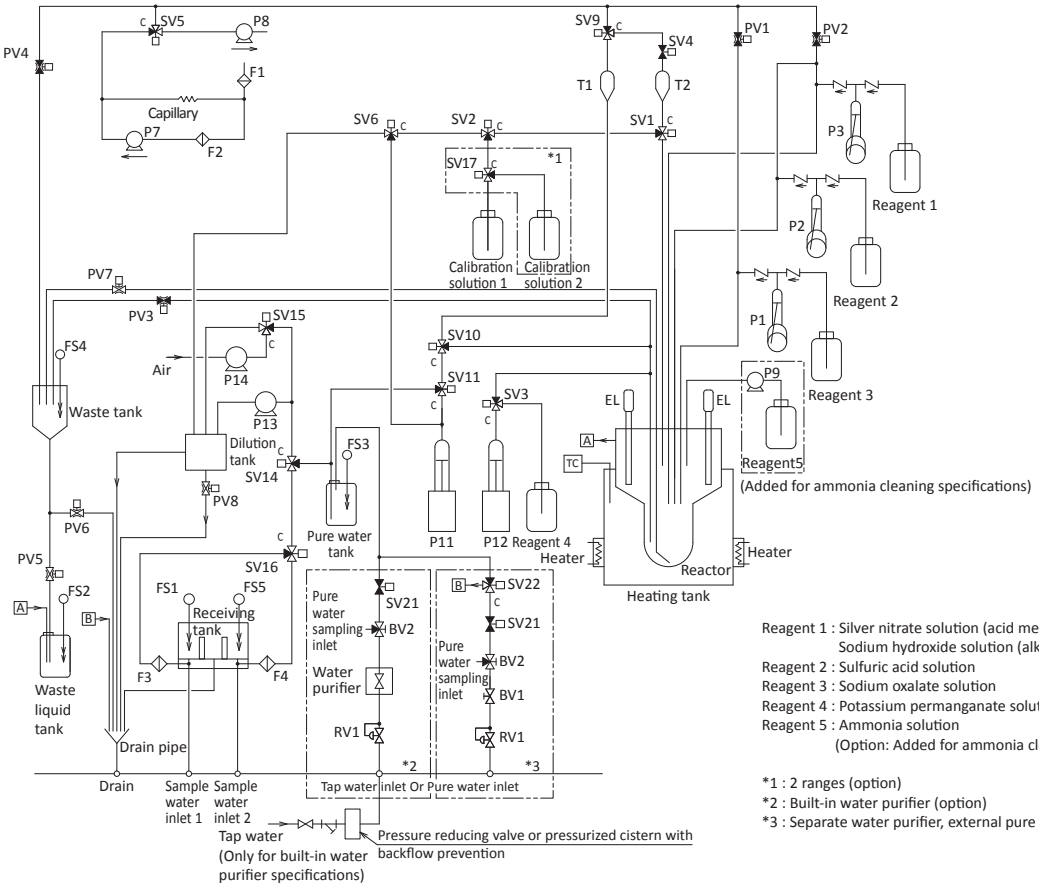
● 1 channel with external dilution device



Reagent 1 : Silver nitrate solution (acid method)
Sodium hydroxide solution (alkaline method)
Reagent 2: Sulfuric acid solution
Reagent 3: Sodium oxalate solution
Reagent 4: Potassium permanganate solution
Reagent 5: Ammonia solution
(Option: Added for ammonia cleaning specifications)

*1 : 2 ranges (option)
*2 : Built-in water purifier (option)
*3 : Separate water purifier, external pure water supply (optional)

● 2 With flow path and external dilution device



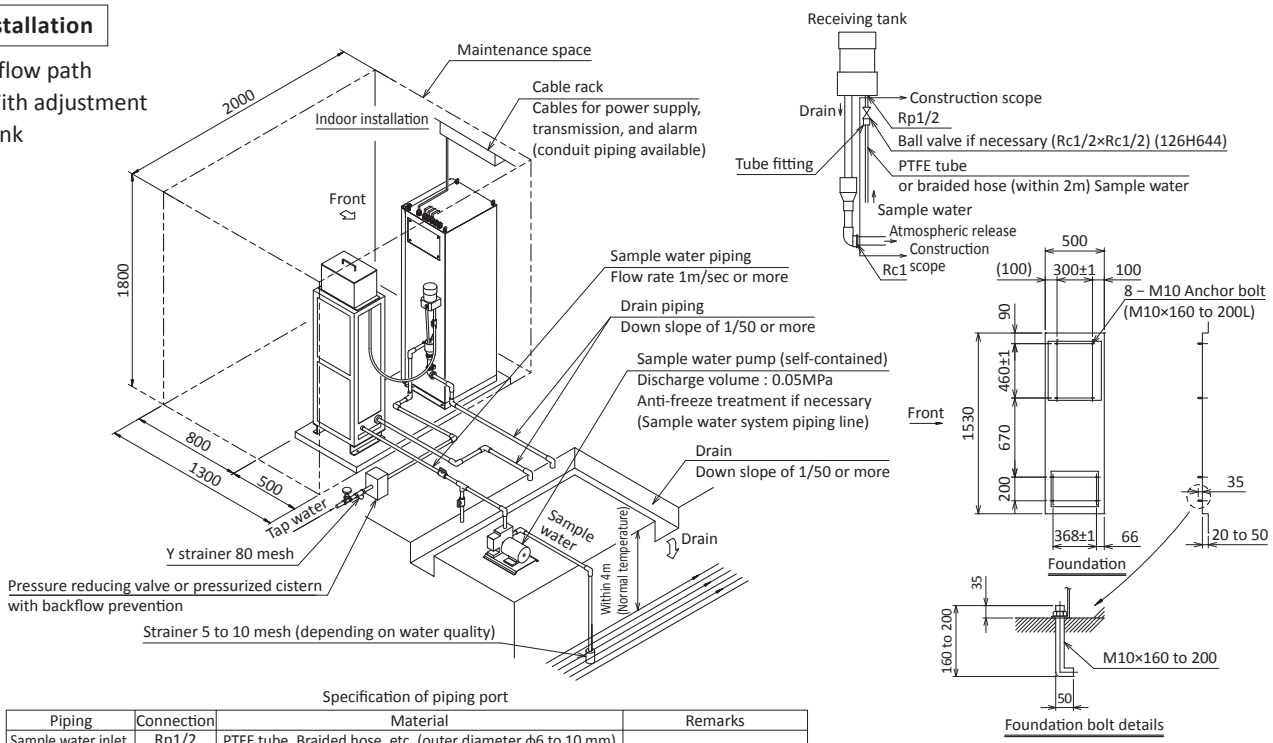
Reagent 1 : Silver nitrate solution (acid method)
Sodium hydroxide solution (alkaline method)
Reagent 2 : Sulfuric acid solution
Reagent 3 : Sodium oxalate solution
Reagent 4 : Potassium permanganate solution
Reagent 5 : Ammonia solution
(Option: Added for ammonia cleaning specifications)

*1 : 2 ranges (option)
*2 : Built-in water purifier (option)
*3 : Separate water purifier, external pure water supply (optional)

<Option External dimensions, flow sheet, installation procedure>

Installation

● 1 flow path
With adjustment tank

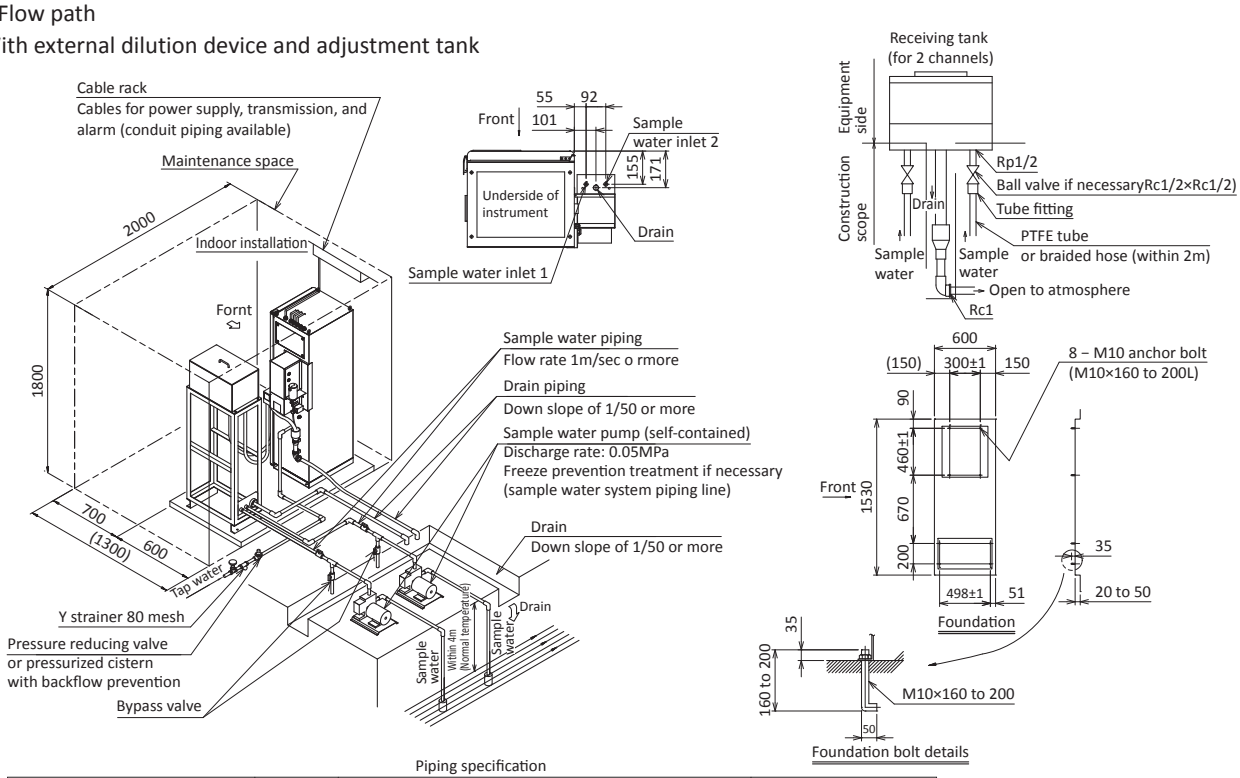


Specification of piping port

Piping	Connection	Material	Remarks
Sample water inlet	Rp1/2	PTFE tube, Braided hose, etc. (outer diameter ϕ6 to 10 mm)	
Drain	Rc1	Rigid vinyl chloride pipe (VP20 or more)	Open to atmosphere (tube end)
Tap water inlet	Rc1/2	Rigid vinyl chloride pipe (VP13 or more)	

Note • Be sure to install a strainer (80 mesh) on the tap water pipe as shown in the figure.
• Before connecting the pipe to the instrument, thoroughly flush the inside of the pipe to remove dust, etc. If there is dust, the solenoid valve will be clogged.

● 2 Flow path
With external dilution device and adjustment tank



Piping specification

Piping	Connection	Material	Remark
Sample water inlet 1,2 (instrument)	Rp1/2	PTFE tube, braided hose, etc. (Outer diameter ϕ6 to 10mm)	
Sample water inlet 1,2 (Adjustment tank)	Rc1/2	PTFE tube, braided hose, etc. (Outer diameter ϕ6 to 10mm)	
Drain (Instrument)	Rc1	Rigid vinyl chloride pipe (VP20 or more)	Open to atmosphere (tube end)
Drain (Adjustment tank)	Rc2	Rigid vinyl chloride pipe (VP20 or more)	Open to atmosphere (tube end)
Tap water inlet	Rc1/2	Rigid vinyl chloride pipe (VP13 or more)	

Note • Be sure to install a strainer (80 mesh) on the tap water pipe as shown in the figure.
• Before connecting the pipe to the instrument, thoroughly flush the inside of the pipe to remove dust, etc. please give me. If there is dust, the solenoid valve will be clogged.

Product code

CODR400-1-□□□□□□□□□□□□□□□

- Power*1
  - A: AC 100V 50/60Hz
  - B: AC 110V 50/60Hz
  - C: AC 220V 50/60Hz
- Communication function
  - 1: None (standard)
  - 2: RS-485 (Modbus)*2
  - 3: RS-232C*2
- Measurement method
  - 1: Acid method*3
  - 2: Alkaline method
- Ammoniacleaning, line cleaning
  - A: None
  - B: Ammonia cleaning: yes*4
  - C: Line cleaning: yes*5
  - D: Ammonia cleaning, line cleaning: yes*5
- Number of flow paths and ranges
  - 1: 1 stream, single range
  - 2: 1 flow path, 2 ranges (automatic switching)*6
  - 3: 2 flow paths, single range
  - 4: 2 flow paths, 2 ranges
- External diluter*7
  - 0: No
  - 1: Yes (If either 1 or the second range exceeds 0 to 100)
- Measuring range of the first range mg/ L*6
  - A: 0 to 20
  - B: 0 to 30
  - C: 0 to 40
  - D: 0 to 50
  - E: 0 to 100
  - F: 0 to 200 (with external diluter)*8
  - G: 0 to 300 (with external diluter)*8
  - H: 0 to 400 (with external diluter)*8
  - J: 0 to 500 (with external diluter)*8
  - K: 0 to 1000 (with external diluter)*8
  - L: 0 to 2000 (with external diluter)*8
- Measuring range of second range mg/L*5
  - B to L: Same as the measuring range of the 1st range
  - Y: Not applicable (single range)
- Pure water supply method
  - 1: Pure water tank built-in (standard)
  - 2: Water purifier built-in
  - 3: Separate water purifier (separately ordered)*8
  - 4: Pure water is supplied externally*8
- Housing air purge*9
  - 0: No
  - 1: Yes
- Printer
  - 0: Yes (standard)
  - 1: Yes; With roll paper automatic winder
  - 2: Yes; Mobile printer included
- USB memory
  - A: No (Standard)
  - B: Yes
- Regulating tank*10
  - 0: No
  - 1: Yes (For 1 flow path)
  - 2: Yes (For 2 flow paths)
- Door locking mechanism
  - 0: No (Standard)
  - 1: Yes*11
- Language
  - 0: Japanese (standard) Note 3
  - 1: English

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

*1. If the power supply voltage is other than AC 100V, a step-down transformer is built-in.

*2. When RS-485 or RS-232C is added, it is necessary to confirm that it matches our standard specifications. Please contact our sales representative.

*3. The acid method can be operated with or without the addition of silver nitrate.

*4. When adding silver nitrate by the acid method, it is recommended to equip an ammonia cleaning system. (It is possible to operate without using ammonia cleaning.)

*5. For line cleaning, the sample line from T2, SV1 to the receiving tank is cleaned in the case of 1 channel (standard). If the external diluter is equipped, only the dilution tank is washed, and the receiving tank cannot be washed.

*6. In the case of 2 flow ranges, the selection of the measurement range should be 1st range < 2nd range, and the range ratio should be doubled in principle. For ranges over 0 to 100 mg/L, an external diluter is required. If both ranges exceed 0 to 100 mg/L, one external diluter is shared.

*7. If either the 1st or 2nd range exceeds 0 to 100 an external diluter is required.

*8. In the case of an external diluter, a large amount of pure water is used. Therefore, for the pure water supply method, select a separate pure water device or an external pure water supply. In the case of the 0 to 2000 range, it takes approximately 1.5 days to replenish pure water for the built-in pure water tank, and approximately one month for the built-in deionizer to replace the cartridge. Whether the water purifier is installed separately or the pure water is supplied from the outside, it has a function to store the accumulated water in the built-in pure water tank after removing it.

*9. If the sample water contains corrosive elements such as chlorine, sulfur, or hydrogen sulfide, it is recommended to protect the instrument. The supplied air is instrumentation air (dust-free and dehumidified air), and the consumption is about 3.5 L/min. Keep the pressure below 0.1 MPa.

*10. When there are many bubbles in the sample water or the flow rate fluctuates greatly. requires a regulating tank (separately installed) in front of the instrument receiving tank.

*11. The key that can be used for the locking mechanism is a padlock with a shaft diameter of 5 mm or less. Padlock is not included.

Note

1. The endpoint detection method is the constant current polarization potentiometric titration method.
2. The transmission output is 4 to 20mA DC (3 outputs: Stream 1: COD value, load value, Stream 2: COD value). Load amount calculation is valid only when the motor starts on the hour.
3. If Japanese is specified for the display format, the operation panel will be the specified word, but the printer will print everything in English.
4. Please contact our sales representatives for recommended water sampling pumps.
5. When installing an arrester on the power supply and transmission line, separate designation is required.
6. Oxalic acid cleaning is standard equipment. Sodium oxalate uses a reagent for measurement. The amount of sodium oxalate used is about 800 mL/month when washing every hour.
7. If you have selected the separate water purifier, please order the water purifier separately.
   …Water purifier (made by Organo)
   G-10C type with front and rear filters (code: 134G323)
   spare cartridge (code: 134G006)

TOA DKK

DKK-TOA CORPORATION

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

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