

Automatic COD Monitor **CODA-500**

Acid Method CODA-500A / CODA-500C

Alkaline Method CODA-500B



CE marking compliant



Beyond Water with You

CODA-500: High-performance Automatic COD_{MN} Monitor Can Achieve Regulation and Compliance with Advanced Technology and More Than 30 Years of Accumulated Expertise



Cuts Running Costs in Half

The CODA-500 is a COD_{MN} monitor that fully automates JIS(Japanese Industrial Standards)-based measurement methods.

- **Uses only 1/10 the reagent of the existing systems**

Newly developed dispensing and quantification device enable the CODA-500 to maintain measurement accuracy while using only 1/10 the quantity of reagent required. A reagent delivery service also eliminates the need for time-consuming reagent preparation. This reduces the time and trouble involved in reagent replacement and cuts running costs in half.

- **Touch panel LCD makes operation easier**

The use of a color LCD with a touch panel makes operation intuitive, and lower power consumption reduces environmental load. These and other functions attuned to the times will enable the system to meet future water quality management needs.

- **Cuts power consumption in half**

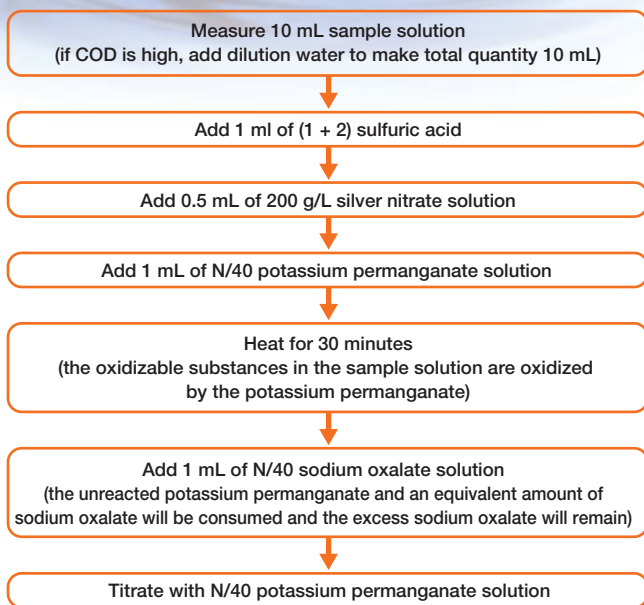
- **Direct heating method requires no cooling water**

- **Full range of interface options (RS-232C, RS-485, USB, and MODBUS®)**

2 Lines for Different Types of Samples and Applications

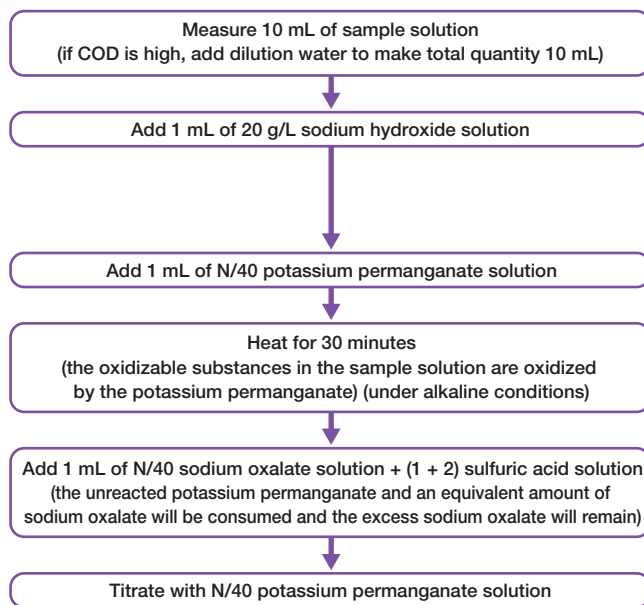
Acid method CODA-500A, C (Acid Potassium Permanganate Method)

Under acidic conditions, chloride ions are also oxidized by potassium permanganate. To prevent these ions from reacting, a silver nitrate solution must be added to cause the chloride ions to be precipitated as silver chloride. For this reason, the acid method is suitable when the concentration of chloride ions in the sample solution is low (no more than 10 times the full scale of the measurement range).



Alkaline method CODA-500B (Alkaline Potassium Permanganate Method)

When measuring sample water such as seawater that includes many chloride ions, it would be impossible to eliminate the interference effect of the chloride ions with the acid method. For these types of samples, the alkaline method is used. With the alkaline method, the chloride ions are not oxidized by potassium permanganate, so COD can be measured without the interference effect of the chloride ions.



What is Chemical Oxygen Demand (COD)?

Chemical oxygen demand (COD) is a regulatory item that is used to regulate total emissions in water. Like biochemical oxygen demand (BOD), it is a unit that expresses the quantity of oxygen consumed by oxidants when they oxidize certain substances (mainly organic matter) in water as an indicator of the degree to which water is polluted. Under the Japanese Industrial Standards (JIS), separate methods are established for measurement under acidic conditions and measurement of seawater and other measurements conducted under alkaline conditions.

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***** CODA-500 *****
Power OFF Stop 10/29 10:09
Power ON Start 10/29 10:09

** Measure Memory 2010/10/29 **
TIME L COD
2010/10/20 (mg/L)
00:09 1 11.26
01:09 1 11.26
02:09 1 11.42
03:09 1 11.89
04:09 1 11.66
05:09 1 11.42
06:09 1 11.26
07:09 1 11.11
08:09 1 11.34
09:09 1 11.11
10:09 1 9.06
11:09 1 11.11
12:09 1 11.19
13:09 1 11.42
14:09 1 11.11
15:09 1 11.11
16:09 1 11.03
17:09 1 10.87
18:09 1 11.19

** Report Memory 2010/10/29 **
2010/10/26
TIME L COD
00:00 1 10.71
01:00 1 10.71
02:00 1 10.71
03:00 1 10.71
04:00 1 10.71
05:00 1 10.71
06:00 1 10.71
07:00 1 10.71
08:00 1 10.71
09:00 1 10.71

** Cal ib. Memory 2010/10/29 **
COD ZERO SPAN
2010/09/10 04:48 18 253

** Cal ib. Memory 2010/10/29 **
COD ZERO SPAN
2010/09/09 05:45 19 253

** Cal ib. Memory 2010/10/29 **
COD ZERO SPAN
2010/09/08 20:45 20 253

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Control panel

Displays measurement values, time, measurement points and other measurement data as well as information on parameters, maintenance and adjustment operations, alarms, function keys and so on. The control panel is a touch panel that enables operation directly from the screen.
(Note: the screen shown above is a composite image.)

Printer

Equipped with an automatic winding function.

Reagent measuring unit

Measures the injection quantity for each reagent (patent pending).

Reagent tanks

Used to house reagent tanks A - E. The reagent tanks have a storage capacity of approximately one month. When reagent is low, an alarm is triggered and an external contact output signal is issued (output option).

Measuring unit

Measures sample water, dilution sample water and blank water.

Dilution water measuring tank (range option)

Weighs dilution water.

Dilution sample mixing tank (range option)

When dilution is needed to arrive at the proper sample concentration, the sample and dilution water are mixed in this tank.

Platinum electrode

Used to detect the titration endpoint.

Reaction tank unit

Used to mix, heat and agitate the sample and reagent and perform titration.

Titration unit

Used for titration injection of potassium permanganate to the reaction tank.

Waste fluid tank (Back: Standard)

When the waste fluid tank is full, a waste fluid full alarm is triggered and a contact signal is output. The capacity of the tank is 20 liters.

Pure water tank (Front: Optional)

Used when tap water cannot be supplied.

Tap water supply unit

Flowmeter

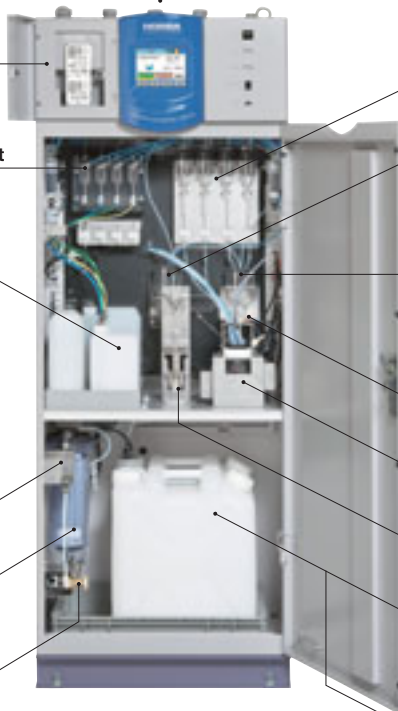
On tap water supply models, used to monitor the flow rate.

Activated charcoal cylinder

On tap water supply models, the tap water is passed through activated charcoal to remove impurities.

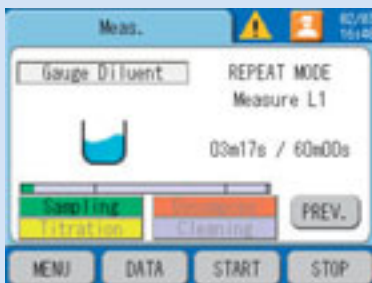
Tap water valve unit

On tap water supply models, opens and closes the pressure and flow valves to adjust the supply flow rate.



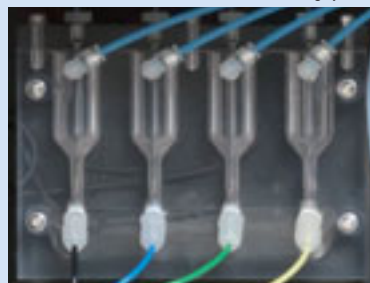
■ Screen

- Color LCD for improved visual recognition
- Touch panel enables intuitive operations
- Multilingual support (English, Japanese, Chinese, Korean)



■ Reagent measuring unit

- Newly developed dispensing and measuring methods enable the same measurement accuracy with only 1/10 the reagent quantity of existing systems
- 1/10 sample quantity = $\frac{10 \text{ mL (CODA-500)}}{100 \text{ mL (CODA-200: existing systems)}}$



- Color tubes prevent erroneous connection of reagents

■ Reagent tanks

- Reagent delivery service eliminates the need for troublesome reagent mixing; simply replace the tanks



■ Specification

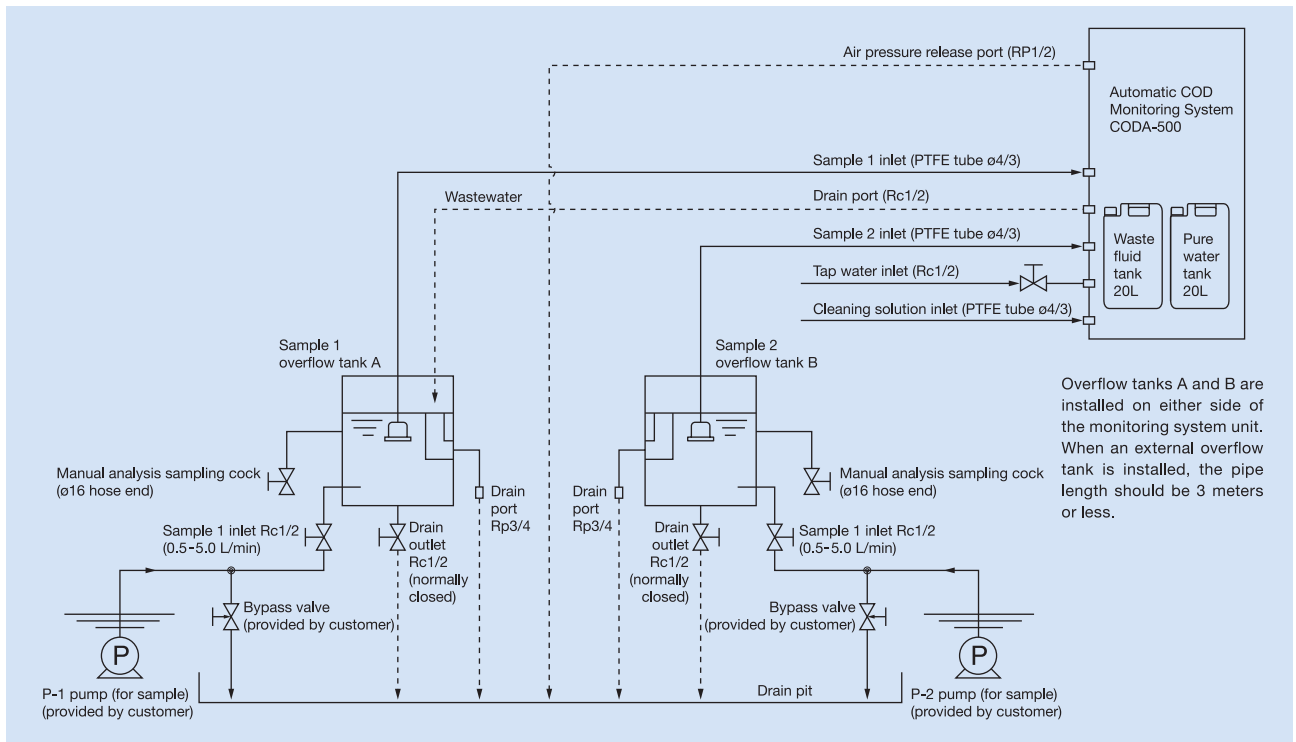
General specification	Product name		Automatic COD monitor
	Model name		CODA-500
	Objects		COD concentration in water
	Dimensions (*1)		600(W)×510(D)×1600(H) mm
	Mass		Approx. 150 kg
	Power source		100-240V AC±10% (50/60 Hz)
	Power consumption		100-120 AC : Approx. 250VA 120-240 AC : Approx. 350VA
	Installation conditions		Indoor installation type Transient overvoltage of main power source: Overvoltage categoryII (EN61010-1), pollution level 2
Performance	Measurement range (Upper limit of measurement is 50% of F.S.)		0-20 mg/L 0-30,40,50,100,200,500,1000,2000 mg/L(1-dilution type)
	Repeatability (with standard solution for glucose)	20 mg/L range	Within ±1% F.S. (*2)
		30-500 mg/L range	Within ±2% F.S. (*2)
		1000-2000 mg/L range	Within ±5% F.S.
	Stability	Zero drift (for 24 h)	20 mg/L range: within ± 3% F.S. (*2) 30-500 mg/L range: within ± 4% F.S. (*2) 1000-2000 mg/L range: within ± 5% F.S.
		Zero drift (for 24 h) (with standard solution for glucose)	20 mg/L: within ± 3% F.S. (*2) 30-500 mg/L: within ± 4% F.S. (*2) 1000-2000 mg/L: within ± 5% F.S.
	Measuring principle	CODA-500A (Acidic method)	Acid potassium permanganate method at 100°C (based on JIS K 0806)
		CODA-500B (Alkaline method)	Alkaline potassium permanganate method at 100°C
		CODA-500C (Acidic method)	Acid potassium permanganate method at 100°C (based on JIS K 0806). With cleaning function using reagent
	Number of measurement points		Standard: 1 point (optional: 2 points)
	Measuring range		Standard: 1 range (optional: 2 ranges)
	Heating method		Direct heating
	End point detection		Potentiometric titration at constant current
Titration method		Micro syringe titration	
Measurement interval		60 minutes	
Silver nitrate solution free method		Available (in case of low chloride ion concentration)	
Measuring conditions	Ambient temperature		2-40 °C
	Ambient humidity		Relative humidity: 85% max. (without condensation)
	Power supply voltage fluctuations		100-240V AC ± 10%
Sample water conditions	Temperature		2-40 °C (without freezing)
	Flow rate (when overflow tank is used)		0.5-5 L/min (when OF-5 is used), 5-20 L/min (when OF-50 is used)
	Chloride ion concentration (for acidic method)		CODA-500A: up to 1 times of F.S. CODA-500C: up to 100 times of F.S. (max) (for more than 100 times of F.S., select the alkaline method)
	Sampling point		Piping length from main unit: within 3 m
Blank water conditions	Supply method		Standard: tap water (optional: pure water tank)
	Water quality (*3)		Tap water without COD (hardness: 100 mg/L max.)
	Water supply pressure		100-500 kPa
	Consumption		20-420 mL (depends on measurement ranges and the setup of cleaning function)
Installation conditions	Well ventilated indoor location without exposure to direct sunlight. Flat and stable location with minimized vibrations and shocks. Atmosphere free from dust, mist, corrosive gas, etc.		
Input/output specification	Display		LCD color touch panel display
	Analog output	Number of points	Standard: 3 points (optional: 6 points)
		Type	Standard: 4-20mA DC, 0-16mA DC (optional: 0-1V DC, 1-5V DC) (Default setting is 4-20mA DC. On-screen switching to 0-16mA DC is available)
		Description	COD concentration, time COD load, time flow rate
		Output impedance	900 Ω max.
	Contact output	Number of points	Standard: 14 points (optional: 21 points)
		Format	Non voltage contact output
		Type	Insulated output
		Output capacity	250V AC, 3A / 30V DC, 3A (only 30V DC, 3A are available for "maintenance" contact.
		Status output	Meas., Cal., Standby, Cleaning, Blank Meas., Synchro. Idle 1, Synchro. Idle 2, Maintenance, Power, etc.
	Warning output	Limit warnings (COD Hi limit, Flow limit, and COD Hi Load), COD H.Hi limit, Sample Lack, Total Alarm 1-6, various gauge errors, etc. (optional: Lack Reagent)	
	Analog input	Number of points	Standard: 1 point (optional: 2 points)
		Type	Standard: 4-20mA DC (optional: 1-5V DC)
		Description	Flow signal (full scale setting is available optionally)
	Contact input	Number of points	Standard: 9 points (optional: 17 points)
		Format	Non voltage a contact input (open collector is available)
		Type	Insulated type input: common to (-) side
		ON resistance	100 Ω max.
		Open voltage	26V DC max.
Short-circuit current		13 mA DC max.	
Functions		Meas. Start, Cal. Start, Cleaning Start, Blank meas. Start, Modify Date, Samp. Lack, Line Select, Flow Mainte, Flow Err., Flow Power OFF, and Flow No Drain	
Load calculation		COD load calculation	
Memory		1 year (in measurement values), external USB memory.	
Communication		Standard: RS -485 (Optional: RS-232C)	
Communication protocol		Modbus®	
Printer		Standard (58 mm); with automatic take-up device.	

*1 Channel-based compatibility with the former CODA-200 series products is available (standard).

*2 Within ±5% F.S. in case options (2 points measurements, 2 ranges, line cleaning by reagent etc) are added, and when using cleaning function of CODA-500C.

*3 If tap water is used, first perform flushing for about 30 minutes and then send tap water to the CODA-500. For the version using a tank, use pure water of 10 mS/m (=1.0 · S/cm) maximum.

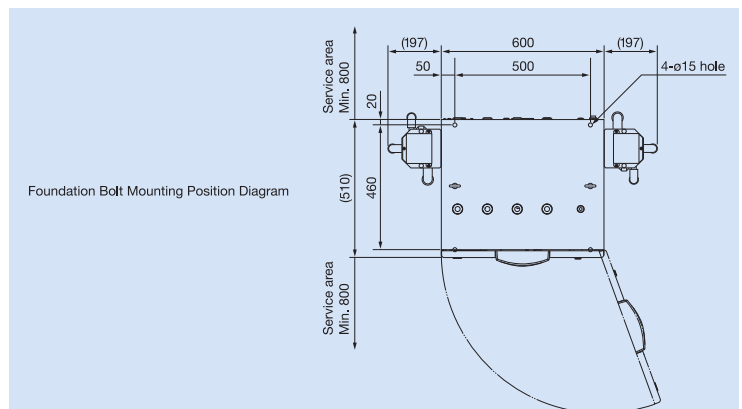
Piping Connection Diagram



Accessories

Part	Quantity
Printer paper	10 rolls per box
Instruction manual	1
Ball valve (for turning off tap water)	1
Silicone tube set	10 pieces per set
Silicone tube set (waste water)	8 pieces per set
Stirrer	3 pieces (for alkaline method)
Reaction tank	3 pieces (for alkaline method)
Reaction tank gasket	3 pieces (for alkaline method)
Dedicated reagent	3 sets

External Dimensions (unit: mm)



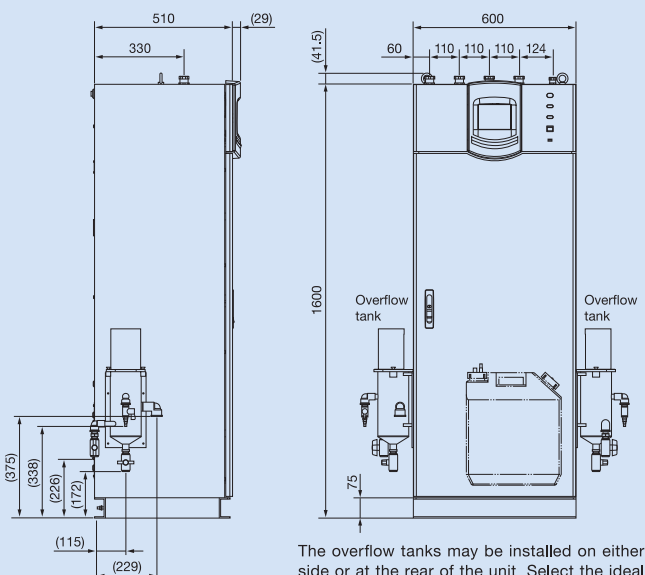
Consumables Replacement Periods

Part	Recommended interval
Reagent A (Potassium permanganate solution)	40 days
Reagent B (Sodium oxalate solution)	40 days
Reagent C (Sulfuric acid solution)	40 days
Reagent D (Silver nitrate solution)	40 days
Reagent E (Sodium thiosulfate solution)	40 days
Reagent F (Sodium hydroxide solution)	40 days
Printer paper	1 roll every 2 months
Stirrer	3 months
Reaction tank	3 months
Reaction tank gasket	6 months

*Replacement periods varies depending on sample conditions. In case of using auto cleaning system, replacement period of reagent will be shorter than 40 days.

A reagent delivery service is available for this product.

Regular delivery of reagents based on an annual contract is available for this product. For more information, contact HORIBA.



The overflow tanks may be installed on either side or at the rear of the unit. Select the ideal position for the tanks according to the location at which the system is installed.

Water Quality Monitoring System

Summary

For the monitoring station for the aquatic environment, it is required to distribute total system to deliver analysis data to the customers. To meet the requests, we can offer Water Quality Monitoring System, that include analytical instruments for water quality, water sampling equipment, data acquisition system, and remote data communication system.

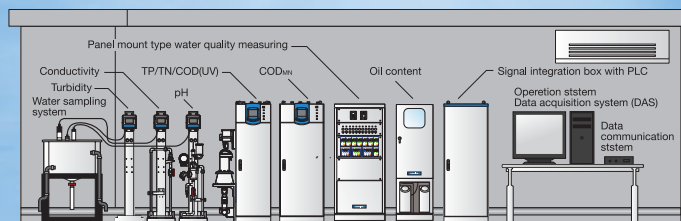
Feature

- HORIBA will provide the Water Quality Monitoring System to meet customers' request.
- Save initial cost and labor to collect analytical instruments and other additional devices. HORIBA can provide total system with isolated stations/houses.

Explanation

It has been required to observe wastewater quality (and load in some case) to discharge wastewater to natural water body, such as river and lakes. HORIBA's Water Quality Monitoring System will provide solutions for the customer's requests. We can offer Water Quality Monitoring System, which include analytical instruments for water quality, water sampling equipment, data acquisition system, and remote data communication system.

As the item to watch the water quality, we are prepared following automatic analytical instruments.



- CODA-500: Automatic Chemical Oxygen Demand (COD_{MN}) monitor,
- TPNA-500: Total nitrogen and total phosphorus concentration analyzer,
- OPSA-150 (COD(UV)): Organic Pollutant Monitor with the principle of ultraviolet ray absorption by organic matters
- pH analyzer
- Conductivity analyzer
- Turbidity analyzer
- Water sampling system
- Operation system
- Data acquisition system (DAS)
- Data communication system
- Shelter and other equipment



IMS

The HORIBA Group adopts IMS (Integrated Management System) which integrates Quality Management System ISO9001, Environmental Management System ISO14001, and Occupational Health and Safety Management System OHSAS18001. We have now integrated Business Continuity Management System ISO22301 in order to provide our products and services in a stable manner, even in emergencies.



Please read the operation manual before using this product to assure safe and proper handling of the product.

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