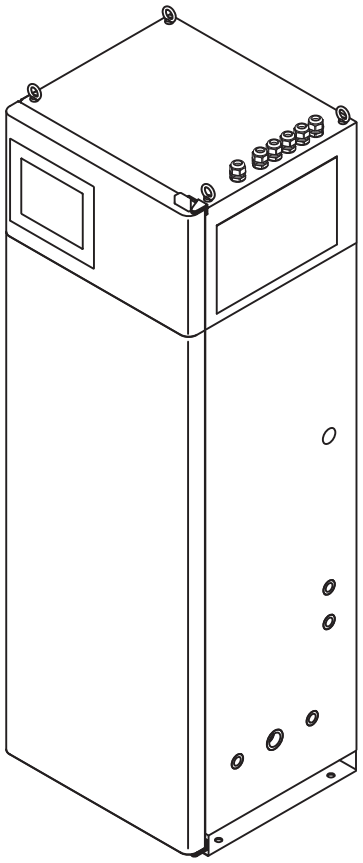
INSTRUCTION MANUAL

AMMONIUM ION MONITOR

MODEL NHMS-4



- Please keep this instruction manual close at hand of the persons who are in charge of the operation of this product.
- Before operating this product, please read this instruction manual carefully for its correct handling.

No. NHM-IB55101E

Introduction

(a) Thank you for your purchase of Ammonium Ion Monitor Model NHMS-4. The Model NHMS-4 Ammonium Ion Monitor (hereinafter referred to as the equipment or product) can continuously measure the ammonium ion concentration in the sample water. This product is used for water quality management of each process, effluent monitoring, and water quality monitoring of rivers and lakes.

(b) An abnormal measured value may be indicated or output by the following causes. Build a system such that related facilities are not damaged.

- Any problem of the product such as deterioration or damage of the detecting section or inappropriate insulation of cables.
- Improper setting of operating conditions or calibration operation.
- Electrical interference such as noise in the vicinity or improper grounding.
- Other unpredictable phenomena

(c) Since important items are described in “Safety Information,” read the contents carefully.

(d) The product should be handled by persons who have received proper training. In addition, for technical services such as repairs, ask a specialist to do who is qualified for the technical certification system in our company or a person who has technical skills equivalent to that certification system.

Safety Information

(1) Meaning of markings

The signal terminology and symbols related to warnings in the instruction manual are defined below. The alert symbol mark (⚠: General caution mark) indicates the possibility of hazard or damage and also means “Refer to the instruction manual.”

⚠WARNING:

Indicates the degree of hazard which can lead to death or serious injury if you fail to operate the product properly.
Serious injury means an injury such as loss of sight, burns (high temperature or low temperature), electric shock, bone fracture and poisoning, and the aftereffects of the injury remains or the injury requires hospitalization or long periods of outpatient treatment.

⚠CAUTION:

Indicates the degree of hazard/loss which can result in injury or property damage if you fail to operate the product properly.
Injury means an injury not requiring hospitalization or long periods of outpatient treatment and refers to burns or electric shock. Property damage refers to widespread damage to the home, household goods and livestock, pets, equipment, materials, etc. (damage to other than the product itself).

【IMPORTANT】	Indicates important matters other than ⚠WARNING and ⚠CAUTION. They are the matters such as preventing damage to the product main body, preventing data destruction, preventing wasting time, maintaining performance, and observing regulations.
〔NOTE〕	Indicates comments, reasons, background information, a case example and other items to help the reader understand the meaning.
＞＞	Indicates reference items.
①, ②, ③	Indicates item numbers such as the ones used in operations.

(2) Safety compliance items

⚠ WARNING

Hazardous Materials

- The following solutions to be used are hazardous materials. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.
  - Reagent (20 w/v% sodium hydroxide solution)
  - Acid washing solution (3w/v% nitric acid solution)
  - Ammonium ion standard solution (1000mg/L)
- Do not mix the ammonium ion standard solution and each calibration solution with an alkaline solution. They may react and generate ammonia gas.

Hazardous Gasses

- Do not use the product in an area where explosive gas, flammable gas exists. Using the product in any of these areas can cause explosion or fire.

Electric Shock

- Do not touch the terminals inside the equipment while power is applied. Touching the terminals may cause electric shock.
- The ground terminal must be grounded. If the terminal is not grounded and a problem occurs in the power supply system, electric shock may result.

⚠ CAUTION

Heavy Object

- Secure this product with foundation bolts, etc. It is heavy (approximately 100kg without the reagent) and the toppling may cause the human or physical damage.

Disassembly and Modification

- Do not disassemble or modify the sections of the product that are not described in the instruction manual. The product can be damaged.

Warning Label Lost

- If any warning label affixed to this product cannot be read, please order a new one through your local sales agent or our sales office and affix it to its original position.

(3) Notes on use of the instruction manual

Important items such as “Safety compliance items” are described in this manual. Handle the manual as follows:

(a) The instruction manual is required not only at the start of operation but also required when maintenance is performed or in case a failure occurs. Please keep the manual at hand all the time so that the operator who actually operates the product can read the manual at any time.

(b) If the manual is lost or too smeared to read, please order a new copy through your local sales agent or directly from our sales office.

(c) Some of the diagrams used in the manual or on product labels may be modified with part of their shapes or displays omitted or they may be described in abstract form. In addition, numbers etc. shown on the screen example are just examples for such cases.

(d) The contents of the manual may be changed without prior notice for reasons such as to improve performance.

Warranty

(1) Warranty Coverage

DKK-TOA Corporation (DKK-TOA) warrants its products against defective material or workmanship for the warranty period.

(a) The warranty period is one year from the date of delivery to the original user. If the date of delivery cannot be specified, the warranty period is 24 months from the month following the date of manufacture shown on the product nameplate.

(b) Specific written agreements with DKK-TOA, if any, shall take precedence over this warranty.

(c) The limitation of warranty described herein may not apply where applicable laws do not allow such limitation.

(2) Limited Warranty

This warranty does not cover the cases listed below.

(a) Direct or indirect failure or damage caused by the use of the product for a purpose or in a manner not prescribed by the specifications or the instruction manual for the product.

(b) Direct or indirect failure or damage caused by force majeure, including but not limited to an act of God, natural disaster such as earthquake, storm and flood damage, and lightning, fire, accident, abnormal voltage, salt damage, gas damage, labor unrest, acts of war (declared or undeclared), terrorism, .civil strife, or acts of any governmental jurisdiction.

(c) Failure or damage caused by any repair or modification not authorized by DKK-TOA.

(d) Failure or damage caused by the transport, moving, or dropping of the product after the purchase that is not attributable to DKK-TOA.

(e) Electrodes and consumables (The warranty period for each part has priority when the period is shorter than that for the main unit of the product. If the customer requires any part after more than six months from the date of manufacture, consult DKK-TOA or its distributor.)

(f) Failure or damage caused by the use of consumables, parts, or software not supplied by DKK-TOA.

(g) Malfunctions or damage caused by the use of connecting equipment not supplied by DKK-TOA

(h) Loss of data, settings, programs, or software stored on the product not attributable to DKK-TOA.

(i) Any product other than DKK-TOA's, if specified by the purchaser or user, that incorporates, or is incorporated into or combined with DKK-TOA's products (*1). In such cases, this warranty covers DKK-TOA's products only.

(j) Any product not under proper maintenance in accordance with the instruction manual furnished by DKK-TOA.

(k) Products without a nameplate (excluding products proved to have been delivered by DKK-TOA).

EXCEPT AS EXPRESSLY SET FORTH IN THE PRECEDING SENTENCES, DKK-TOA MAKES NO WARRANTY OF ANY KIND WHATSOEVER WITH RESPECT TO ANY PRODUCT. DKK-TOA EXPRESSLY DISCLAIMS ANY WARANTY IMPLIED BY LAW, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

LIMITATION OF REMEDIES: In the event that a defect is discovered within the warranty period, DKK-TOA or its authorized distributor will, at its option, repair or replace the defective product or its part, or will refund the purchase price of the product. **THIS IS THE EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY**.

LIMITATION OF DAMAGES: IN NO EVENT SHALL DKK-TOA BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND FOR BREACH OF ANY WARRANTY, NEGLIGENCE, ON THE BASIS OF STRICT LIABILITY, OR OTHERWISE.

(3) Others

(a) Maintenance parts (*2) for product will normally be supplied for five years (*3) from the date manufacturing and sales are discontinued.

(b) The cause of any malfunction or damage shall be determined by a DKK-TOA technician.

(c) For repairs, contact a local distributor in your country or state.

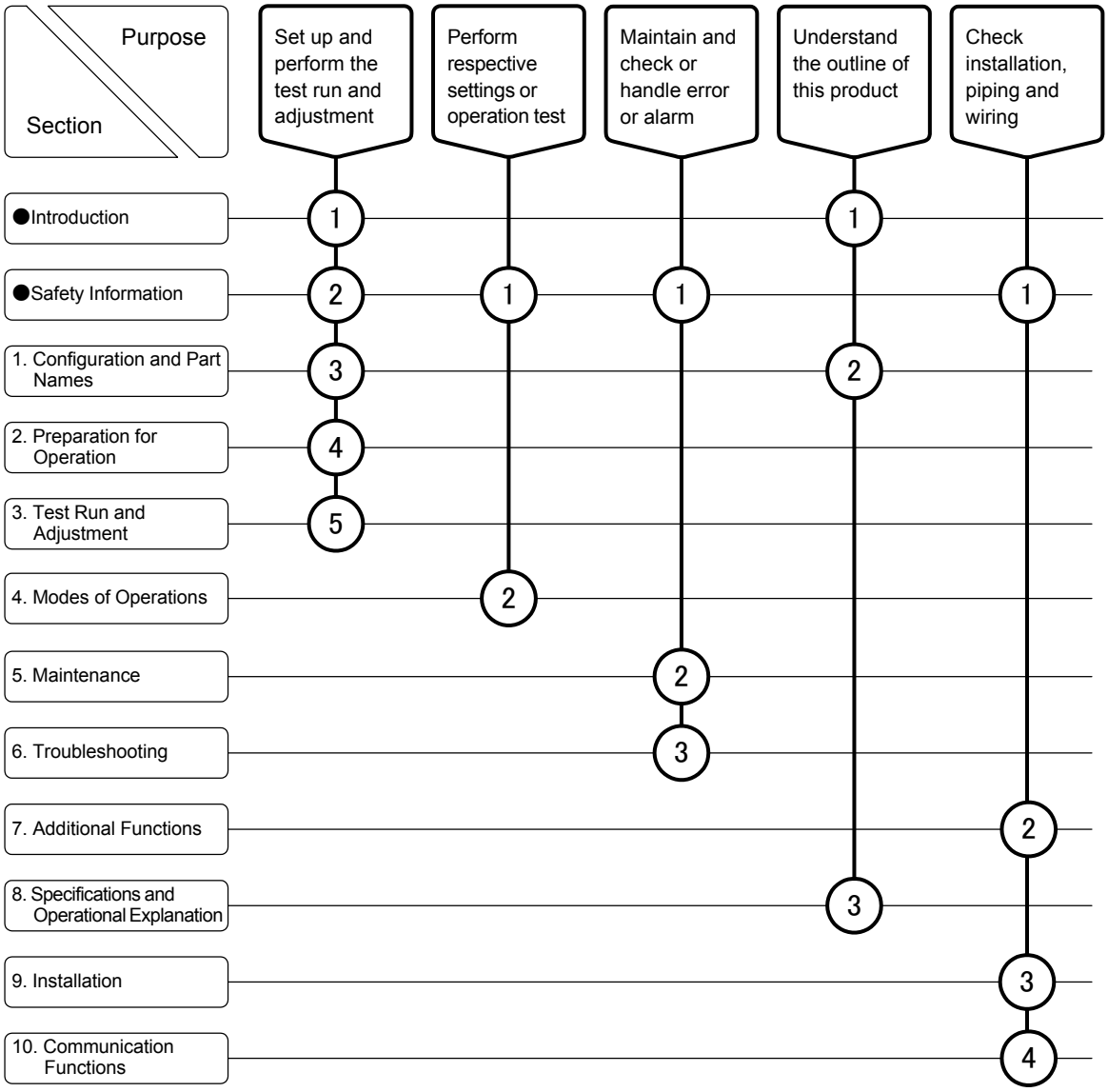
*1: Warranties for products from other companies must be maintained by the user.

*2: Maintenance parts refers to parts that are required to maintain operation of the product.

*3: This five-year period is subject to availability of parts or their replacement.

Reading Guide

Refer to the necessary sections of this instruction manual depending on your purposes such as understanding the outline of this product or starting the product as shown below. The numbers in circles indicate sections to be referred to in sequential order.



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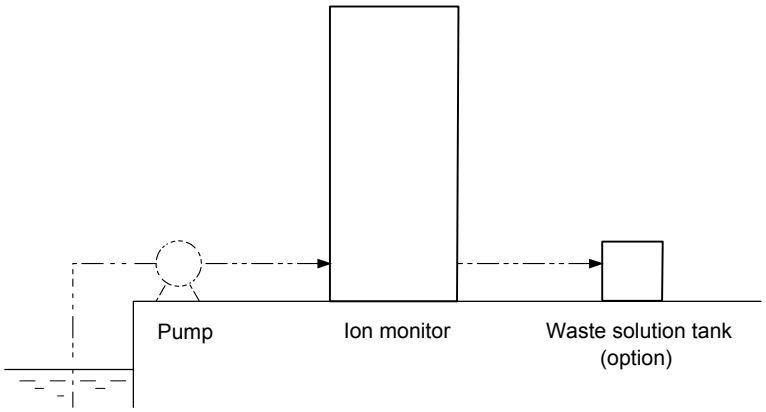
1. Configuration and Part Names

1.1 Configuration Example and Specifications Check



Configuration Example of Ammonium Ion Automatic Measurement

(a) This equipment can quantify the ammonium ion concentration by adding a reagent (sodium hydroxide solution) to the sample and measuring the electric potential with an ammonium ion electrode (hereinafter referred to as "ion electrode") as the indicating electrode.

(b) Main specifications ····· The range 0.05 to 100.0 mg/L can be measured. The measuring range specified when ordering is set and the transmission output range is also set to the specified measuring range. Check the delivery specifications for the measuring range of each equipment. The main specifications are shown in the table below.

Main Specifications

Specifications item	Contents
Measuring object	Concentration of ammonium ion contained within effluent, river water, and lake water
Measurement system	Ammonium ion electrode method (alkali solution mixed system)
Measuring range (Specified when ordering, Cannot be changed)	0.05 to 5.00 mg/L (Standard) 0.10 to 10.00 mg/L 1.0 to 100.0 mg/L
Measurement interval	Continuous or intermittent measurement (shortest interval 1 hour)
Flow path	1

(c) Reagent ····· The ammonium ion electrode method adjusts the pH of the sample water to 12 or more by adding a reagent (sodium hydroxide solution) to change the ammonium ion into ammonia. Furthermore, this method quantifies the ammonium ion concentration by measuring the electric potential of this solution with ion electrode as the indicating electrode.

(d) Features and essential points ····· The features and essential points in handling the equipment are as follows:

- Starting method ····· 1 method can be selected from among the followings:

  Internal start ··· Operation by built-in timer

  External start ··· Starting by other external contact signals.

Communication start ··· Operation by communication function (RS-485). Operation is almost the same as external starting.

- Continuous measurement and intermittent measurement ····· 1 method can be selected from among the followings:

  Intermittent measurement ··· The equipment performs the measurement operation of 1 unit (approximately 20 minutes) at each intermittent measurement period (1 to 99 hours) and updates the held value according to the obtained measured value.

  Continuous measurement ··· The equipment performs the measurement continuously until measurement stop operation is performed.

- Calibration mode····· 1 method can be selected from among the followings:

  Normal calibration ··· Normal calibration by calibration interval

  ACAS calibration ··· ACAS (Automatic Calibration cycle Adapting System) is a function that monitors a drop in performance of the ion electrode and automatically resets the equipment so that automatic cleaning and automatic calibration are performed at a suitable interval.

- USB memory ····· Measured values, calibration data, and other information can be written to USB memory from the equipment and processed by PC, etc.

- Digital I/O port ····· When communication start is selected, the measured value, calibration history, error generation history, etc. can be called and remote maintenance of measurement command, calibration command, cleaning command, etc. can be performed by communication function (RS-485).

- Contact output signal ····· There are power off, failure 1 (serious), failure 2 (minor), concentration higher limit alarm, concentration high limit alarm, concentration lower limit alarm, calibration in progress, cleaning in progress, under maintenance, and measurement in progress external contact signals.

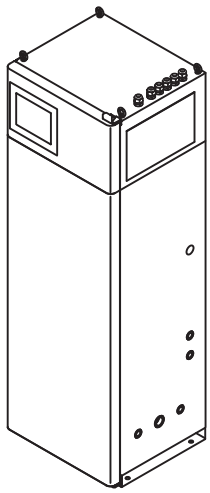
(e) Additional functions ····· The additional functions (options) shown in the table below can be added by order specification. ＞＞ 7. “Additional Functions”

Additional Functions

Functions	Contents
Air cleaning	Cleaning of sample water line and filter by reverse air flow
Waste solution recovery	Function that recovers the calibration solution to a waste solution tank
Leak sensing	A receiving tray with leak sensor is added.
Recorder	1 pen system, 100 mm wide chart
Low concentration calibration	Low concentration region concentration arithmetic expression is added by LL calibration, and 3-point calibration is available.
Junction box	Contacts capable of using 100VAC are built in.

(f) Countermeasures against sample water with many turbid components ····· An acid cleaning function is provided as standard, but when measuring sample water that is dirty or has many turbid components, combined use with a sand filter, etc. is recommended. In this case, the piping from the sampling position to the equipment must be also periodically blow cleaned.

1.2 Name of Each Part



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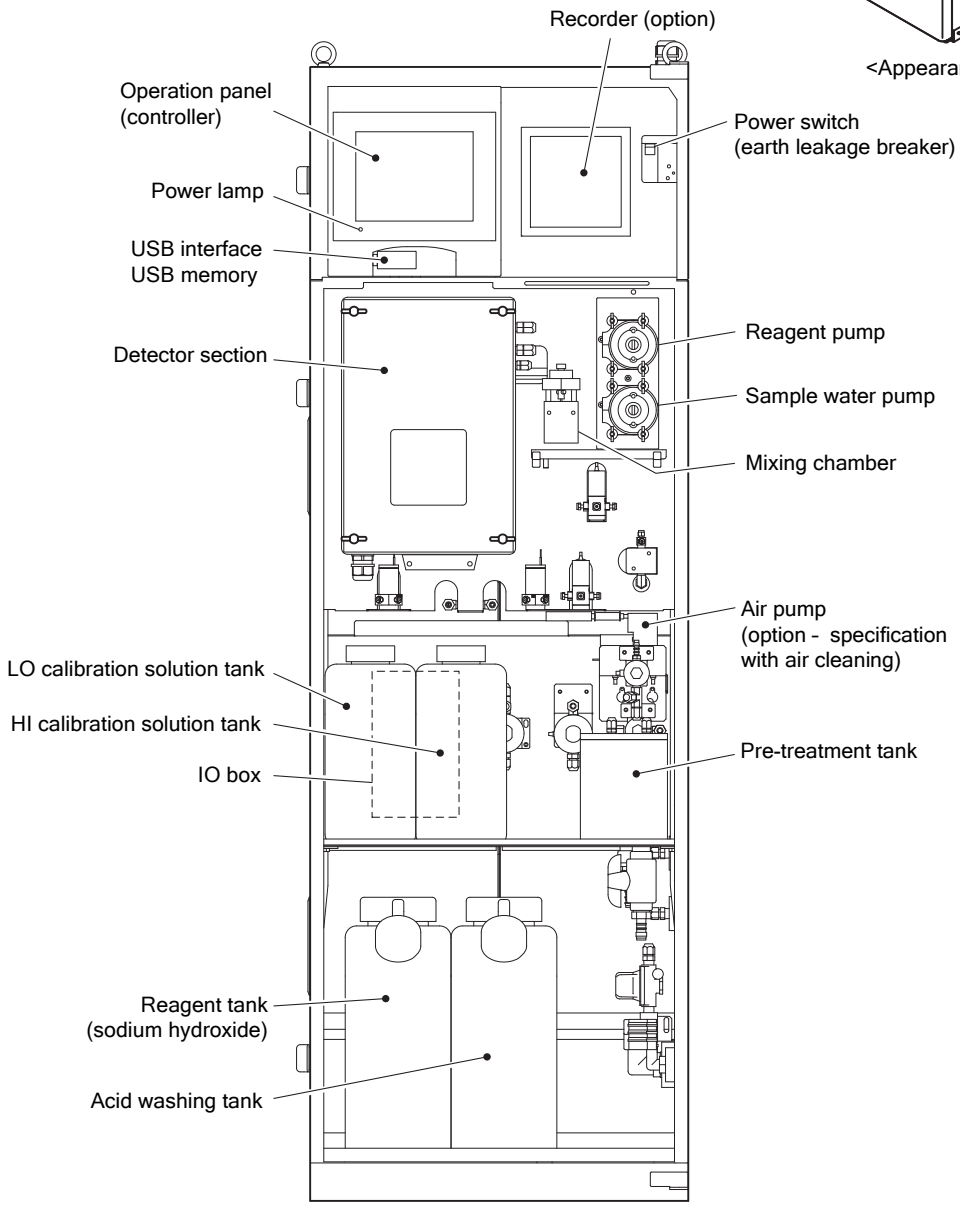
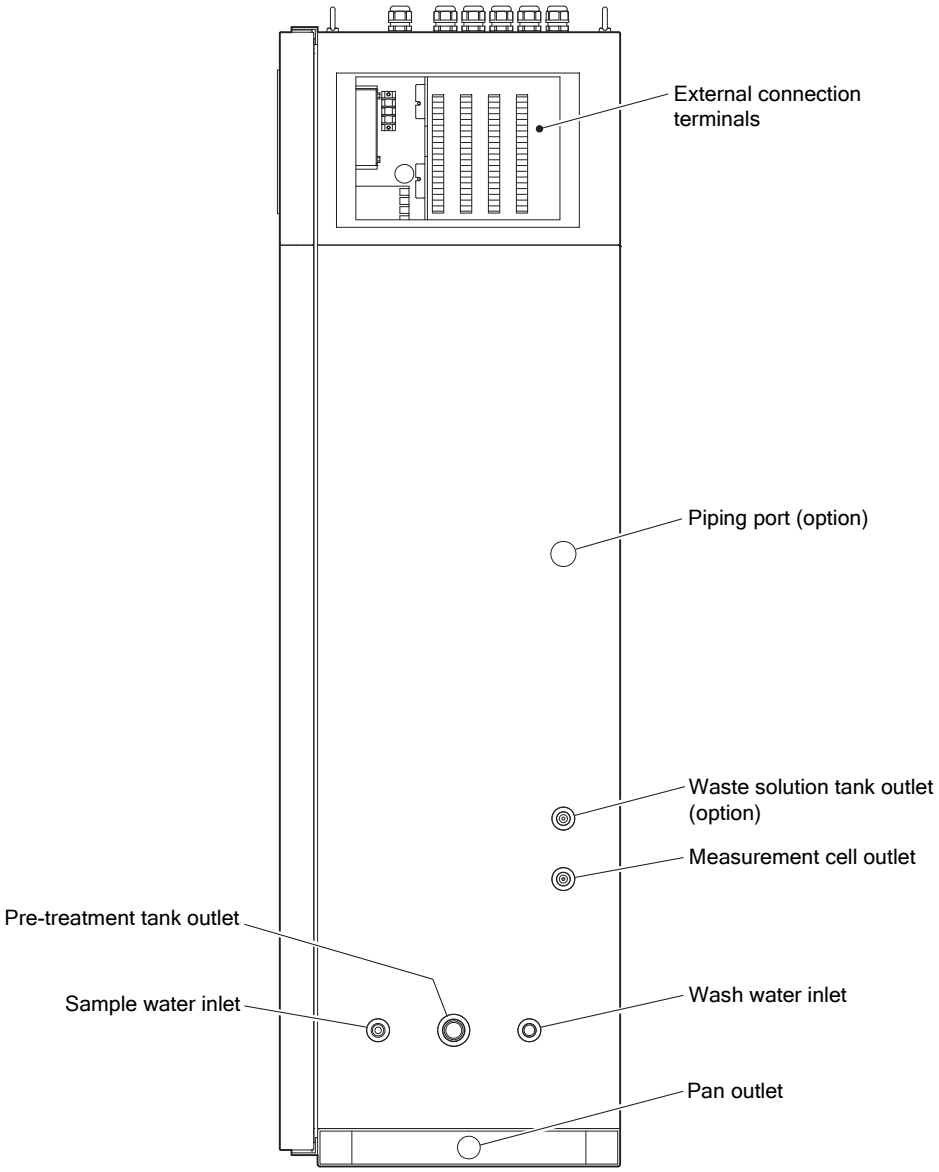


Name of Main Parts on the Front



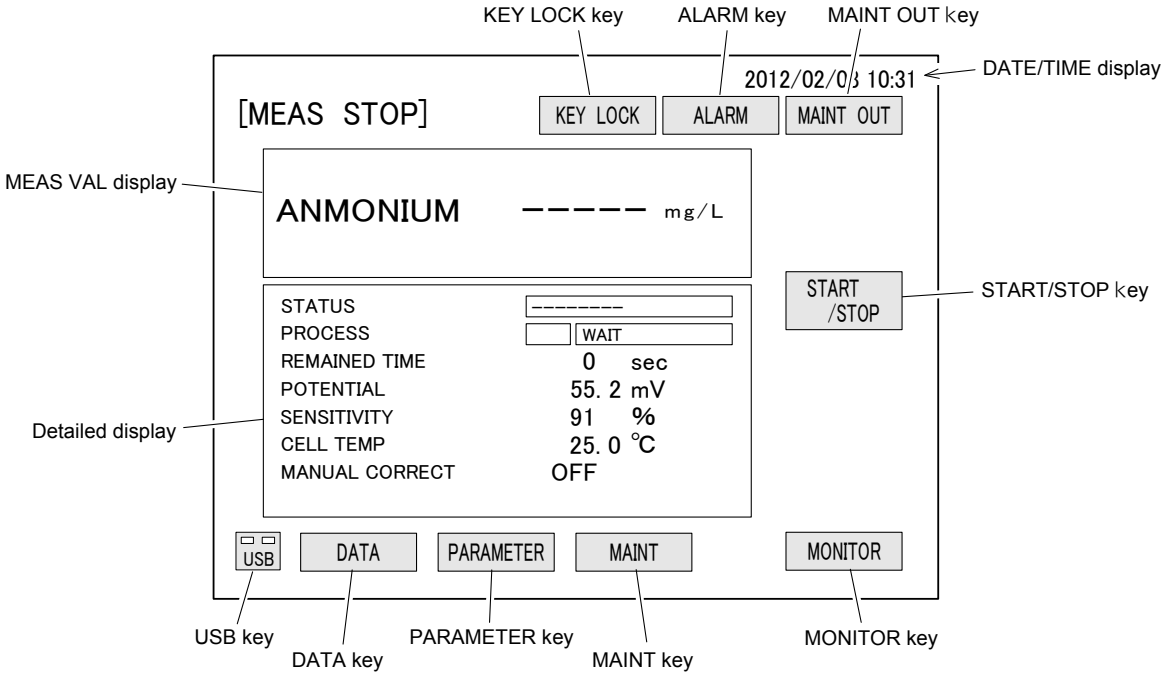
Name of Main Parts on the Right Side

1.3 Operation Panel

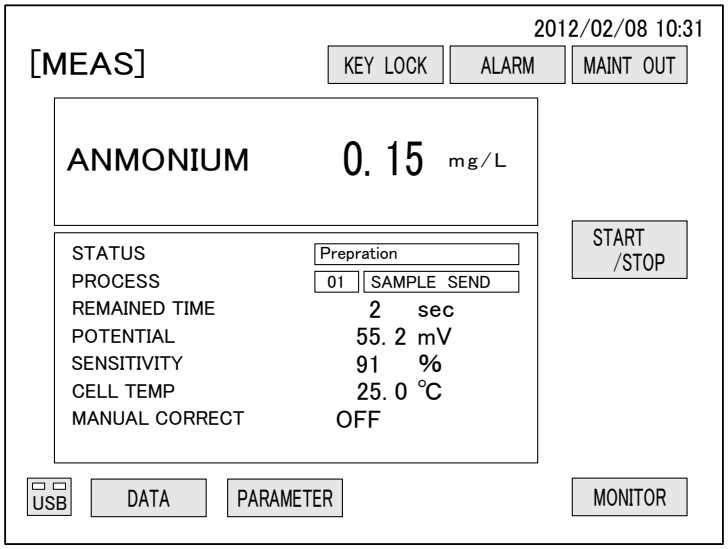
(a) Operation panel function outline ····· The operation panel is a graphic type touch panel. Screen switching and parameters settings, which are the operation conditions, can be changed by touching the operation key according to the purpose such as automatic operation, maintenance, etc.

(b) Home screen ····· When the power switch (breaker) is set to "ON", the "Measurement screen (MEAS STOP)", which is the home screen, is displayed. In the case of external start or communication start, some of the screens are different. For a detailed description of the screens, see 4. "Modes of Operations".

(c) Automatic turn-off ····· If the equipment is not operated for about 60 minutes, the screen is turned off by the automatic screen turn-off function. If you touch the screen turned-off by that function, it appears again.

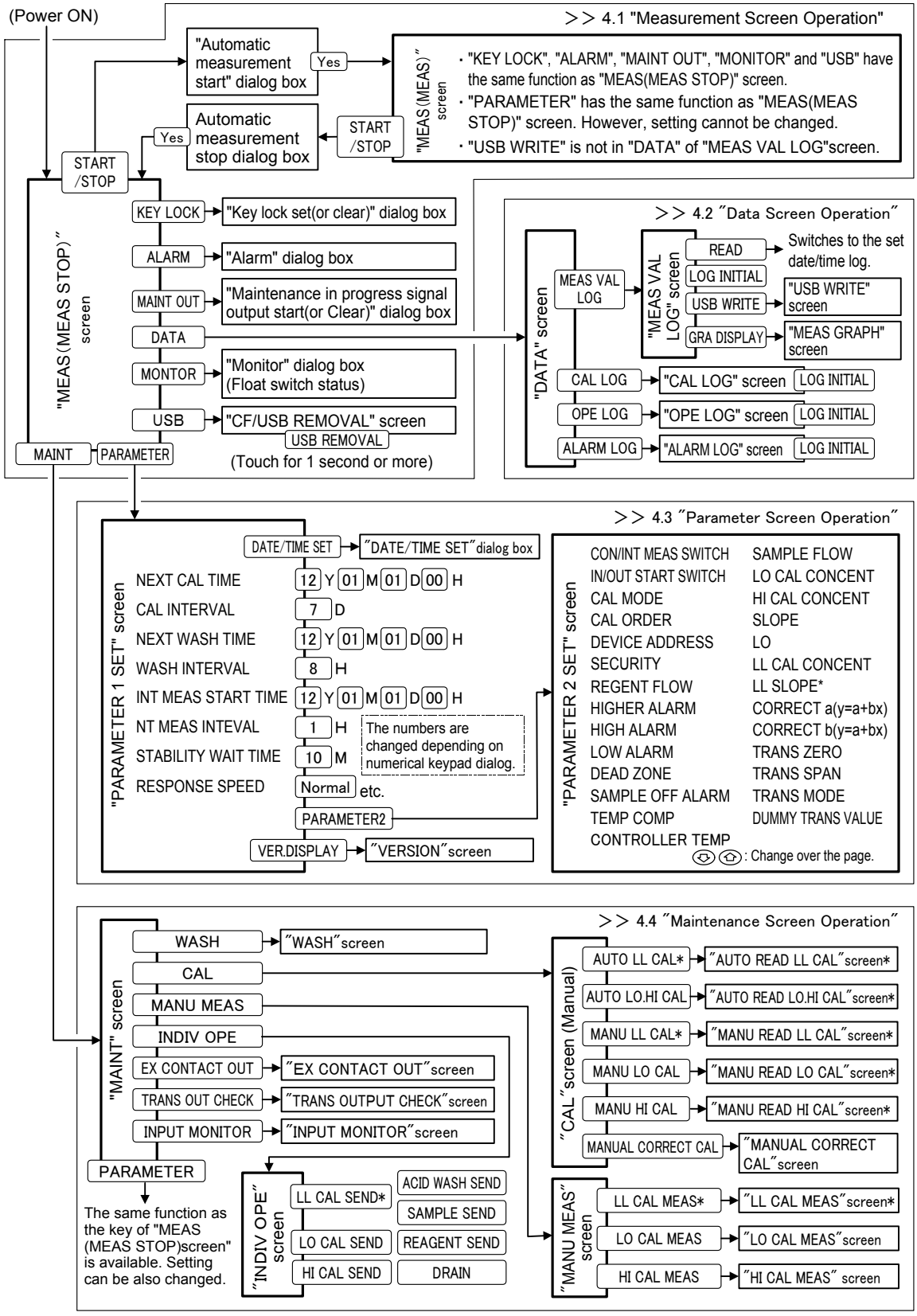


Measurement Screen (MEAS STOP)



Measurement Screen (MEAS)

1.4 Operation Screens Map

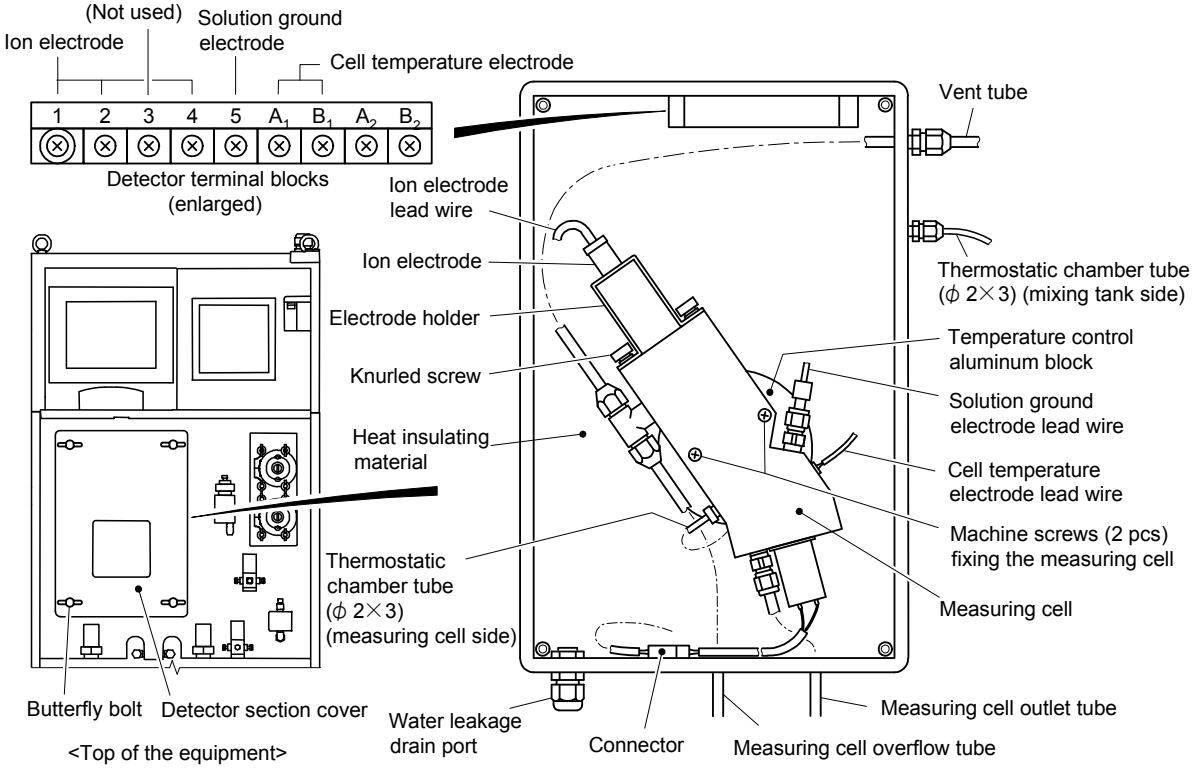


Operation Screens Map

2. Preparation for Operation

This chapter explains the operations that are performed before power is supplied to the equipment. If power is being supplied to the equipment, turn off the power at the supply source.

2.1 Ion Electrode Installation



Detector Section

Ion electrode is not assembled to the equipment at the factory. Assemble the accessory ion electrode to the measuring cell as follows.

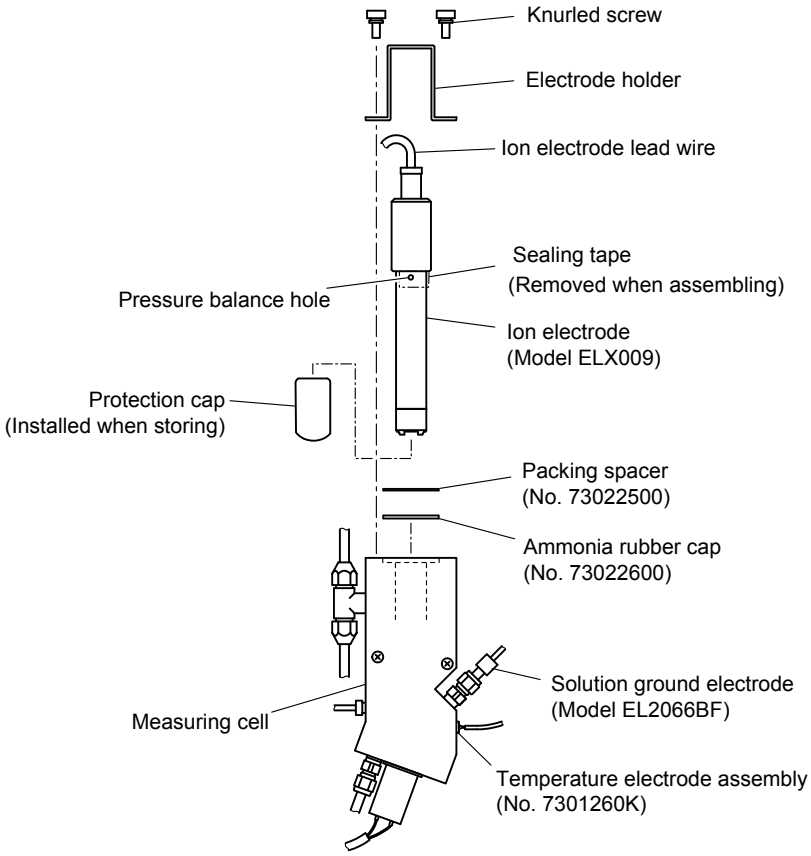
①Remove the detector section cover. ····· Loosen the butterfly bolts (4) and remove the detector section cover.

②Remove the electrode holder. ····· Loosen the knurled screws (2) and remove the electrode holder from the measuring cell.

【IMPORTANT】 • At this time, be careful that the packing spacer and ammonia rubber cap assembled at the top of the cell and the knurled screws do not get lost.

③Remove the sealing tape, etc. ····· Remove the accessory ion electrode from the carton, and remove the sealing tape and protective cap from the ion electrode. As the protective cap will be reinstalled when storing the ion electrode, store it.

【IMPORTANT】
- Do not touch the membrane at the ion electrode end with your hands. If the membrane is dirty or damaged, membrane and the internal solution must be replaced.
- If the membrane is scratched or otherwise abnormal, replace the membrane and internal solution before installing the ion electrode. >> 5.8(3) “Membrane and internal solution replacement”
- If measurements are started with the sealing tape not removed from the ion electrode and assembled, the indication may be unstable
- Do not get the end of the ion electrode lead wires wet or dirty. If the end of the lead wires is wet or dirty, clean it with alcohol and dry it.



Installing and Removing the Electrode

④Install the ion electrode. ····· After checking that there is a packing spacer and ammonia rubber cap at the top of the measuring cell, carefully insert the ion electrode into the measuring cell and secure it with the electrode holder and knurled screws (2 pcs).

⑤Connect the lead wire. ····· Connect the lead wire of the ion electrode to the terminal (1, 2, and 4) at the inside top of the detector section by matching the wire mark numbers.

[Wired terminals]

Terminal 3 ····· (Not used)	Terminal B_1 ···· Cell temperature
Terminal 5 ····· Solution ground	Terminal A_2 ···· Controller temperature
Terminal A_1 ····· Cell temperature	Terminal B_2 ···· Controller temperature

⑥**Install the detector section cover.** ····· Return the detector section cover to its original state and tighten it securely with the butterfly bolt.

【**IMPORTANT**】 • If the cover is loose, air may enter the detector section and condense on the aluminum block and cause trouble.

2.2 Solution Preparation and Filling

(1) Solution type

(a) The following tanks must be filled with each solution.

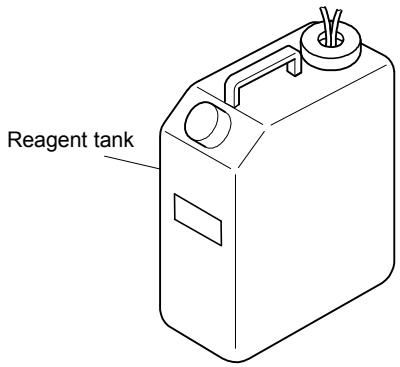
Solution Type

Solution	Tank and capacity	Remarks
Reagent	Reagent tank (10 L)	20 w/v% sodium hydroxide solution
Acid washing solution	Acid washing solution tank (10 L)	3w/v% nitric acid solution (standard)
LO calibration solution	LO calibration solution tank (5 L)	Usually 1/10 the concentration of the HI calibration solution.
HI calibration solution	HI calibration solution tank (5 L)	Varies depending on the measuring range.
LL calibration solution (Option)	LL calibration solution tank (1 L)	Prepared according to LO calibration solution

(b) Each calibration solution can be prepared by diluting the accessory ammonium ion standard solution (1000mg/L). ＞＞2.2 (4-1) “Calibration solution key points”

(c) The equipment sends the LO calibration solution to the cell in preparation for the next measurement after acid washing. For this reason, always refill the LO calibration solution even when making measurements without performing calibration.

(2) Filling of reagent (sodium hydroxide solution)



Reagent Tank (Sodium Hydroxide Solution, 10L)

Fill the reagent tank with the accessory reagent (20w/v% sodium hydroxide solution, NaOH). The reagent plays the role of a pH adjuster.

⚠ WARNING

Hazardous Materials

- The reagent (sodium hydroxide solution) is toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.

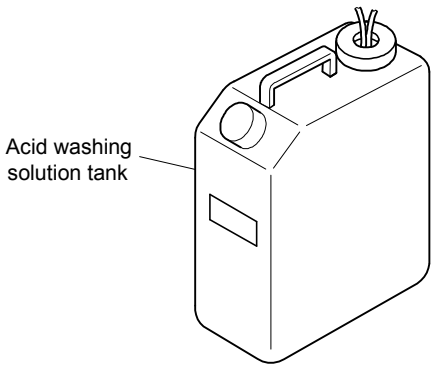
①**Prepare the reagent.** ····· Prepare the accessory reagent (sodium hydroxide solution).
Sodium hydroxide solution ····· Code No.: XC883025

②Fill the reagent tank. ····· Remove the reagent tank from the equipment and remove the cover with tube, after checking that the tank is empty, fill the tank with 10L of reagent.

③Return to the original position. ····· Install the cover with tube to the reagent tank and return the tank to its original position in the equipment.

【IMPORTANT】
- Do not bend the tube, etc.
- Store the reagent away from sunlight.

(3-1) Filling of acid washing solution



Acid Washing Solution Tank (10 L)

(a) Fill the acid washing solution tank with the accessory acid washing solution. The acid washing solutions shown in the following table are available. The solution specified when ordering is supplied.

Acid Washing Solution Type

Acid washing solution	Code No.
3w/v% nitric acid solution (standard)	143C336
5w/v% nitric acid solution	143C337

【IMPORTANT】
- If the nitric acid concentration of the acid washing solution is high, the life of the ion electrode will be shortened.

(b) If necessary, change the concentration of the acid washing solution to match the dirtiness of the sample water.

(c) The acid washing solution can also be prepared. ＞＞ 2.2(3-2) “Preparing the acid washing solution”

⚠ WARNING

Hazardous Materials

- The acid washing solution is toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.

【IMPORTANT】 • The acid washing solution is corrosive. If it spills into or around the equipment, immediately wipe it off and thoroughly clean with city water, etc.

①**Prepare the acid washing solution.** ····· Prepare the accessory acid washing solution.

②**Fill the acid washing solution tank.** ····· Remove the acid washing solution tank from the equipment and remove the cover with tube, after checking that the tank is empty, fill the tank with 10L of acid washing solution.

③**Return to the original position.** ····· Install the cover with tube cover to the acid washing solution tank and return the tank to its original position in the equipment.

(3-2) Preparing the acid washing solution

We sell acid washing solution, but it can also be prepared. The following is an example of preparation of 10L of 3 w/v% nitric acid solution.

①**Procure nitric acid.** ····· Procure some ACS grade nitric acid (HNO_3, 60 to 61%).

⚠ WARNING

Hazardous Materials

● The ACS grade nitric acid and acid washing solution are toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.

②**Fill with pure water.** ····· Fill a plastic mixing tank with 2 to 3 L of pure water.

③**Add nitric acid.** ····· Add about 350 mL of the ACS grade nitric acid slowly to the tank of step ② and mix them.

④**Add pure water.** ····· Add more pure water to make 10 L of solution and mix thoroughly.

- You have now made 3 w/v% nitric acid solution.

(4-1) Calibration solution key points

(a)Two kinds of ammonium ion calibration solution of different concentrations are used in calibration. Ordinarily, HI calibration solution and LO calibration solution of 1/10 the concentration of the HI calibration solution are used.

- When the low concentration calibration function (option) is added, LL calibration solution is also necessary. ＞＞ 2.2(4-4) “Preparation of LL calibration solution”.

(b)Make the HI calibration solution and LO calibration solution concentrations appropriate for the measuring range of each equipment (check the Delivery Specifications). The following table shows the standard measuring ranges and their calibration solution concentration. There may also be examples that use concentrations different from the standard concentrations for matching to the sample water concentration of the measurement site and other reasons.

Measuring Range and Standard Calibration Solution Concentrations

Measuring range of equipment (NH_4^+)	Transmission output range		Standard calibration solution concentration (NH_4^+)	
	Transmission zero (4 mA)	Transmission span (20 mA)	LO calibration solution	HI calibration solution
0.05 to 5.00 mg/L (standard)	0 mg/L	5 mg/L	0.50 mg/L	5.00 mg/L
0.10 to 10.00 mg/L	0 mg/L	10 mg/L	1.00 mg/L	10.00 mg/L
1.00 to 100.00 mg/L	0 mg/L	100 mg/L	10.00 mg/L	100.00 mg/L

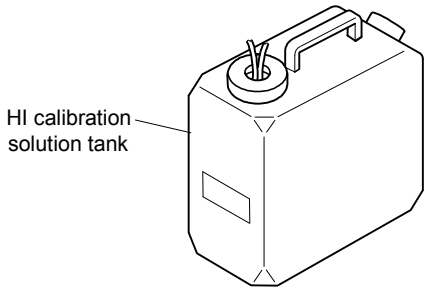
(c) The calibration solution can be prepared by diluting the accessory ammonium ion standard solution (1000mg/L).

- We also sell the ammonium ion standard solution.
  Ammonium ion standard solution (1000 mg/L, 500 mL) ····· No.143A041
- The ammonium ion standard solution can also be prepared. ＞＞ 2.2(4-5) “Preparing the ammonium ion standard solution”

(d) Procure a measuring flask (5L or 1000mL) and pipetter, and prepare each calibration solution by referring to 2.2(4-2) “Preparation and filling the HI calibration solution”.

(e) One calibration consumes about 100ml of calibration solution. Find the amount of calibration solution required according to the number of calibrations. The capacity of the calibration solution tank is 5L.

(4-2) Preparation and filling of HI calibration solution



HI Calibration Solution Tank (5 L)

①Decide the concentration. ····· Decide the concentration of the HI calibration solution to be prepared.

When the measuring range is 0.05 to 5.00mg/L ····· HI calibration solution concentration 5.00 mg/L (standard)

When the measuring range is 0.10 to 10.00 mg/L ····· HI calibration solution concentration 10.00 mg/L

When the measuring range is 1.00 to 100.00 mg/L ····· HI calibration solution concentration 100.00 mg/L

②Decide the amount to be prepared. ····· An empty HI calibration solution tank holds 5L. Decide the amount of HI calibration solution to be prepared to match your future operation plan.

⚠ WARNING

Hazardous Materials

- The ammonium ion standard solution used is toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.
- Do not mix the ammonium ion standard solution and each calibration solution with an alkaline solution. They may react and generate ammonia gas.

③Check the standard solution collecting amount. ····· Check the collecting amount of the ammonium ion standard solution (1000 mg/L) matched to the HI calibration concentration and preparation amount by the following table.

Ammonium Ion Standard Solution Collecting Amount by HI Calibration Solution Concentration and Preparation Amount

HI Calibration solution concentration (NH_4^+)	Ammonium ion standard solution (1000 mg/L) collecting amount	
	Preparation amount 1000 mL	Preparation amount 5 L
5.0 mg/L	5.0 mL	25.0 mL
10.0 mg/L	10 mL	50 mL
100.0 mg/L	100 mL	500 mL

[Example of collecting amount]

- When preparing 5 L of 5.0 mg/L concentration solution ····· Collecting amount 25.0 mL
- When preparing 1000 mL of 5.0 mg/L concentration solution ····· Collecting amount 5.0 mL
- When preparing 5 L of 10.0 mg/L concentration solution ····· Collecting amount 50 mL

④Collect the standard solution. ····· Using a pipetter, fill a measuring flask with ammonium ion standard solution (1000 mg/L) of the amount checked at step ③.

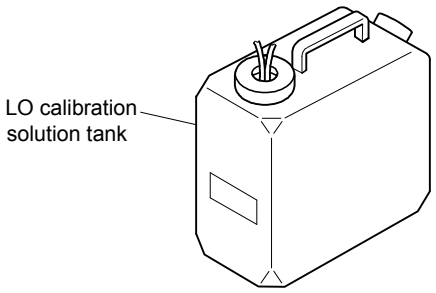
- For 5L preparation amount ····· Use a 5L measuring flask.
- For 1000 mL preparation amount ····· Use a 1000 mL measuring flask.

⑤Dilute. ····· Add pure water to the measuring flask of step ④ to obtain the total amount (5 L or 1000 mL) to be prepared and mix thoroughly.

⑥Fill the HI calibration solution tank ····· Remove the HI calibration solution tank from the equipment and remove the cover with tube, after check that the tank is empty, fill the tank with the HI calibration solution prepared at step ⑤.

⑦Return to the original position. ····· Install the cover with tube to the HI calibration solution tank and return the tank to its original position in the equipment.

(4-3) Preparation and filling of LO calibration solution



LO Calibration Solution Tank (5 L)

Since the equipment sends the LO calibration solution to the cell in preparation for the next measurement after acid washing, fill the tank with LO calibration solution even when measurements are made without performing calibration.

①**Decide the concentration.** ····· Decide the concentration of the LO calibration solution to be prepared.

When the measuring range is 0.05 to 5.00 mg/L ····· LO calibration solution concentration 0.50 mg/L (standard)

When the measuring range is 0.10 to 10.00 mg/L ····· LO calibration solution concentration 1.00 mg/L

When the measuring range is 1.00 to 100.00 mg/L ····· LO calibration solution concentration 10.00 mg/L

②**Decide the amount to be prepared.** ····· An empty LO calibration solution tank holds 5L. Decide the amount of LO calibration solution to be prepared to match your future operation plan.

⚠ WARNING

Hazardous Materials

- The ammonium ion standard solution used is toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.
- Do not mix the ammonium ion standard solution and each calibration solution with an alkaline solution. They may react and generate ammonia gas.

③Check the standard solution collecting amount. ····· Check the collecting amount of the ammonium ion standard solution (1000 mg/L) matched to the LO calibration solution concentration and preparation amount by the following table.

Ammonium ion standard solution collecting amount by LO calibration solution concentration and preparation amount

LO Calibration solution concentration (NH_4^+)	Ammonium ion standard solution (100 mg/L) collecting amount	
	Preparation amount 1000 mL	Preparation amount 5 L
0.5 mg/L	0.5 mL	2.5 mL
1.0 mg/L	1.0 mL	5.0 mL
10.0 mg/L	10 mL	50 mL

[Example of collecting amount]

- When preparing 5 L of 0.5 mg/L concentration solution ····· 2.5 mL
- When preparing 1000 mL of 0.5 mg/L concentration solution ····· 0.5 mL
- When preparing 5 L of 1.0 mg/L concentration solution ····· 5.0 mL

④Collect the standard solution. ····· Using a pipetter, fill a measuring flask with ammonium ion standard solution (1000 mg/L) of the amount checked at step ③.

- For 5 L preparation amount ····· Use a 5 L measuring flask.
- For 1000 mL preparation amount ····· Use a 1000 mL measuring flask.

⑤Dilute. ····· Add pure water to the measuring flask of step ④ to obtain the total amount (5 L or 1000 mL) to be prepared and mix thoroughly.

⑥Fill the LO calibration solution tank ····· Remove the LO calibration solution tank from the equipment and remove the cover with tube, after check that the tank is empty, fill the tank with the LO calibration solution prepared at step ⑤.

⑦Return to the original position. ····· Install the tube with cover to the LO calibration solution tank and return the tank to its original position in the equipment.

(4-4) Preparation of LL calibration solution (Option)

(a) When performing low concentration calibration (option, 3-point calibration), LL calibration solution is necessary. ＞＞ 7.4(2) “Low concentration calibration”

(b) 3-point calibration by LL calibration solution is a function limited to manual calibration. It is not performed by automatic calibration.

(c) Prepare the LL calibration solution in accordance with 2.2(4-3) “Preparation and filling the LO calibration solution”.

(4-5) Preparing the ammonium ion standard solution

The ammonium ion standard solution (1000 mg/L) can be prepared by the following procedure.

⚠ WARNING

Hazardous Materials

- The ACS grade ammonium chloride used and the ammonium ion standard solution prepared are toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.
- Do not mix the ammonium ion standard solution and each calibration solution with an alkaline solution. They may react and generate ammonia gas.

①Fill a measuring flask with ACS grade ammonium chloride. ····· Measure 2.964g of ACS grade ammonium chloride (NH_4Cl, molecular weight 53.50) and add it to a 1000 mL measuring flask.

②Make the total amount 1000 mL. ····· Add pure water to the measuring flask of step ① to make the total amount 1000 mL.

- You have now made 1000 mL of ammonium ion standard solution (1000 mg/L).

3. Operation

3.1 Test Run and Adjustment Procedure

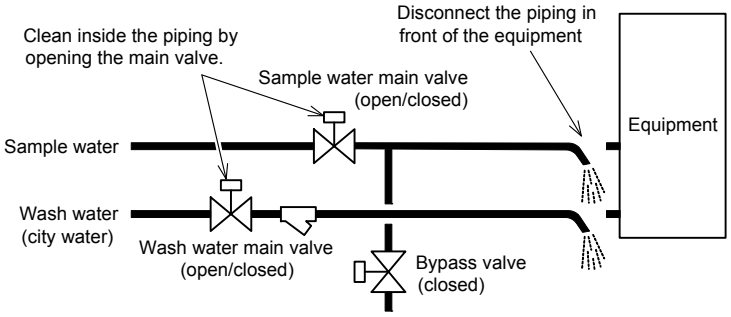
Perform normal measurement by performing test run and adjustment as follows:

①Check the installation. ····· Before running; check that installation work (installation, piping, and wiring) is complete. ＞＞ 9. “Installation”

②Check the operation preparations. ····· Check that electrode installation and solution preparation and filling are complete. ＞＞ 2. “Preparation for Operation”

③Flush. ····· Flush the foreign matter remaining in the piping up to the sample water and the wash water equipment.

ⓐ Disconnect the sample water or wash water piping in front of the equipment and place the end of the piping into a drain trench.

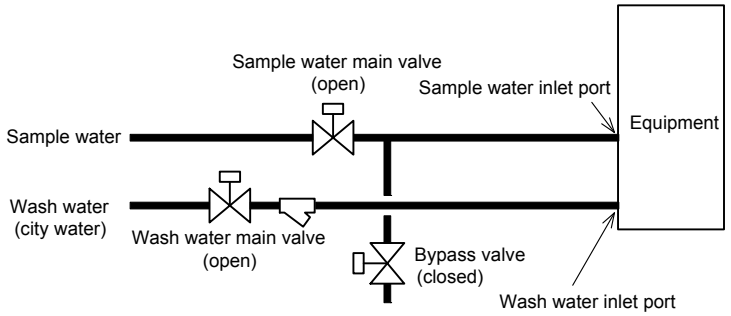


Flushing of the Piping

ⓑ Turn the sample water or wash water on and off several times by opening and closing the main valve.

ⓒ Reconnect the disconnected piping.

④Introduce the water. ····· Close the bypass valve and open the sample water main valve and wash water main valve.



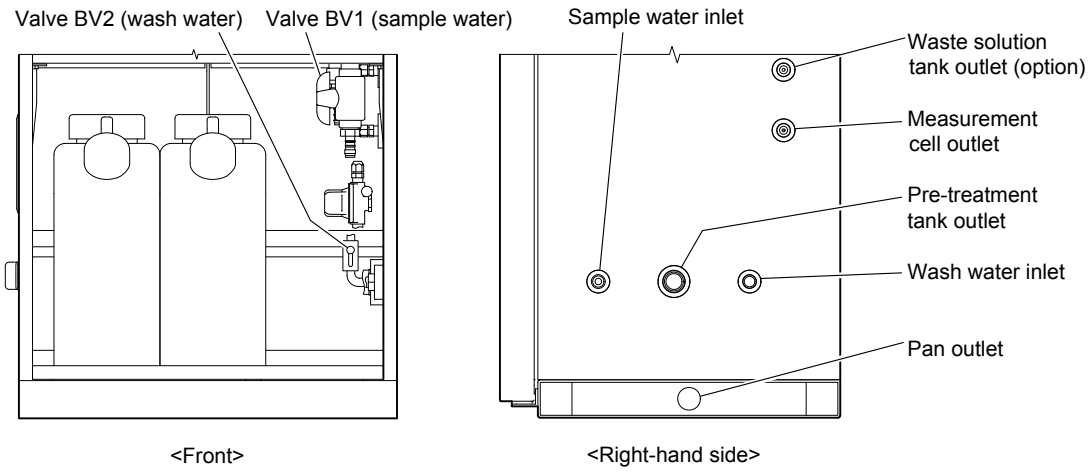
Introducing the Sample Water and Wash Water

⑤Introduce the wash water. ····· Open wash water valve BV2 (bottom right-hand side inside the equipment).

⑥Introduce the sample water. ····· Open sample water valve BV1 (bottom right-hand side inside the equipment) and adjust the valve to obtain a sample water flow of about 1 to 3 L/min.

- If the flow cannot be adjusted sufficiently, adjust it by including the sample water main valve and bypass valve.

• Introduce the sample water into the pre-treatment tank.

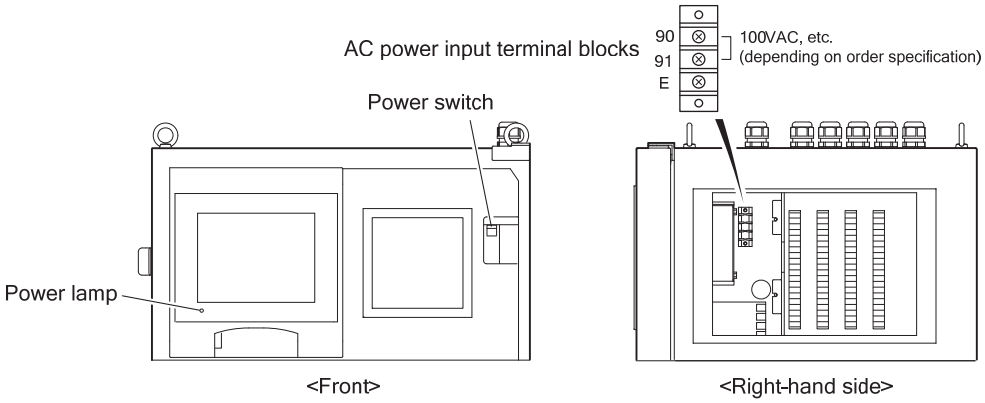


Position of Valve BV1 and Valve BV2

⑦**Supply power and check the voltage.** ····· Supply power to the equipment and check its voltage as follows:

ⓐ Prepare a tester, etc. to check the power supply voltage.

ⓑ Check that the power switch is OFF (down position) and turn on the main supply switch, etc.



Power Switch and AC Power Input Terminal

⚠ WARNING

Electric Shock

● Do not touch the terminals inside the equipment while power is applied. Touching the terminals may cause electric shock.

ⓒ Remove the external connection terminals cover at the right-hand side of the equipment.

ⓓ Using a tester, etc., check that power of the voltage given in 8.1 “Specifications” is being supplied to the AC power input terminal (90-91).

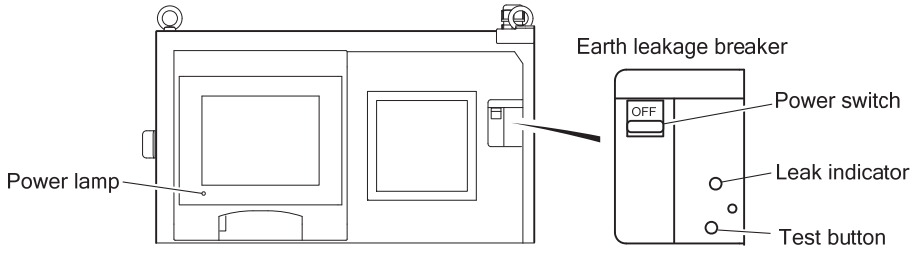
ⓔ Reinstall the external connection terminals cover.

⑧Test the earth leakage breaker. ····· The earth leakage breaker switch also serves as the equipment power switch.

ⓐ Check that the power lamp (POWER) is off, and turn on the power switch (ON, up position).

ⓑ Press the earth leakage breaker test switch, and check that the leak indicator pops out and that the power switch moves to the center position (between ON and OFF).

- The power switch cannot be turned on from this center position. Step ⓒ must be performed.



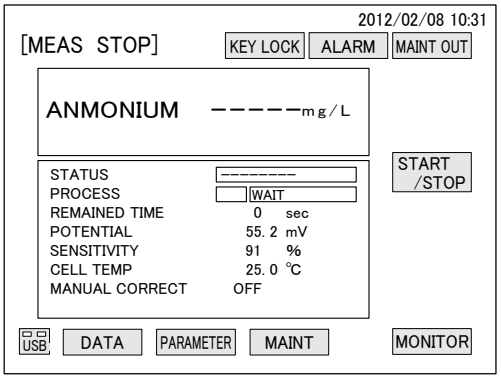
Earth Leakage Breaker

ⓒ Push down the power switch from the center position and set it to the off (OFF, down) position.

- The popped out leak indicator returns to its original state.

⑨Turn on the power. ····· Set the power switch to ON (up), and check that the power lamp lights.

- The "MEAS (MEAS STOP)" screen is displayed



Measurement Screen (MEAS STOP)

- When power is restored or when the power switch was turned on, the "WASH RECOVERY" screen shown below may be displayed. In this case, wait about 3 minutes and after this screen disappears and the screen switches to the "MEAS (MEAS STOP)" screen), go to step ⑩ "Prepare the recorder".

【IMPORTANT】 • Do not touch [STOP] in the "WASH RECVOVERY" screen unless necessary. If equipped with the waste solution recovery function (option), when the wash recovery operation is interrupted, the acid washing solution remaining in the pipe may mix in the waste solution tank.

"WASH RECOVERY" Screen

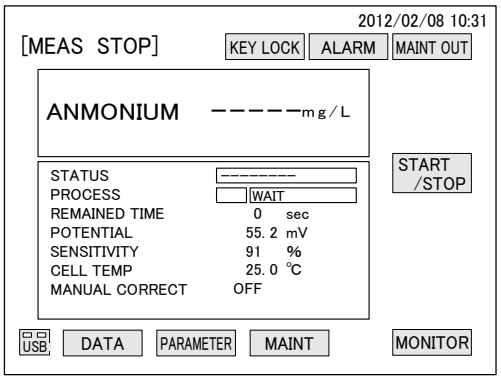
- The "WASH RECOVERY" screen is displayed when the power is turned on after the power was turned off by a power interruption or by mistake during acid washing. This screen shows that the recovery operation that discharges the acid washing solution remaining in the measuring cell or its route is performed. When the recovery operation ends, automatically switches to the "MEAS (MEAS STOP)" screen.

⑩ **Prepare the recorder.** ····· When the product is equipped with a recorder (option), refer to the recorder instruction manual and load the cartridge (1-pen system) or ink pad (dot system) and chart (recording paper).

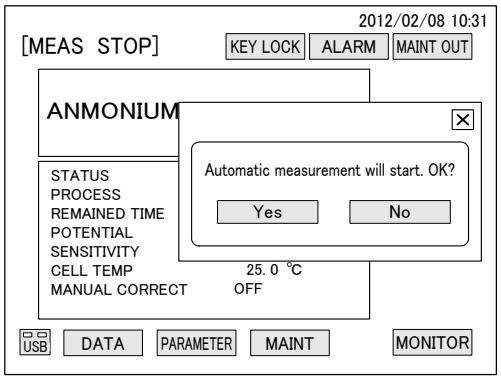
⑪ **Start warm-up operation.** ····· Start (internal start) automatic measurement by screen operation as follows:

ⓐ Touch **[START/STOP]** of the "MEAS (MEAS STOP)" screen.

- An "automatic measurement start" dialog box is displayed.



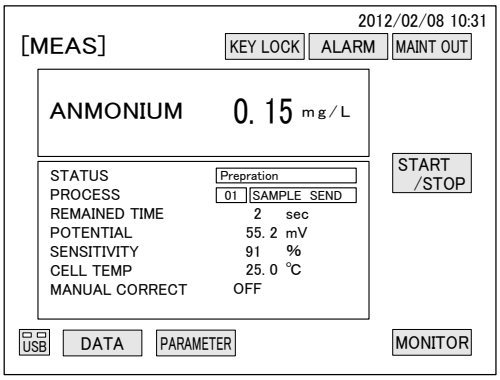
Measurement Screen (MEAS STOP)



Automatic Measurement Start Dialog Box

ⓑ Touch **[Yes]** in the dialog box.

- After measurement preparations are performed, automatic measurement starts.



Measurement Screen (MEAS)

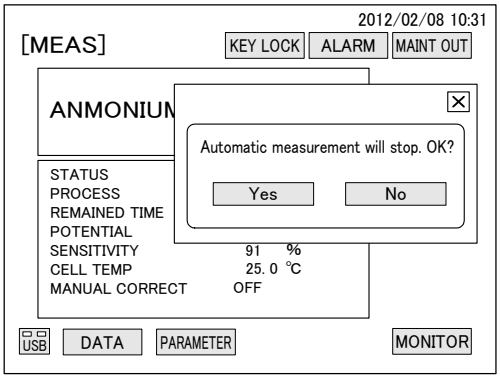
⑫**Check for alarms.** ····· Check that the alarm display on the "MEAS (MEAS)" screen is not reverse displayed in red.

- If an alarm is confirmed, check the alarm contents (4.1(5) "Alarm check and clear") and troubleshot in accordance with 6.2 "Alarm Handling for Items".

⑬**Continue warm-up measurement**. ····· Continue operation in the automatic measurement state for 2 to 3 hours.

【IMPORTANT】
- When the piping is new, the measured value may show an abnormality due to dirt inside the pipe. Repeat automatic measurement until the measured value stabilizes.
- After checking that the state of the sample water and wash water is stable, perform calibration.

⑭**Stop automatic measurement**. ····· Touch **[START/STOP]** on the "MEAS (MEAS)" screen and then touch **[Yes]** in the displayed "Automatic measurement stop" dialog box.



Automatic Measurement Stop Dialog Box

⑮**Select the operation method and calibration method.** ····· Select the operation method (starting method, continuous/intermittent operation) and calibration method. ＞＞ 3.2 "Operation Method Selection", 3.3 "Calibration Method Selection"

⑯**If necessary, check and change the parameters.** ····· Check that the following parameters are appropriate for the measurement policy and change them, as required. Also check the other parameters. ＞＞ 4.3 "Parameter Screen Operation"

- The parameters can be checked even during measurement, but to make changes, measurement must be stopped.

[Measuring range and calibration solution concentration]

- Make “TRANS ZERO” and “TRANS SPAN” suitable for the measuring range. ＞＞ 4.3(29) “Transmission output range check and change”
- Make “TRANS MODE” and “DUMMY TRANS VALUE” the necessary values. ＞＞ 4.3(30) “Transmission mode switching”, 4.3(31) “Dummy transmission value change”

[Alarm]

- Make “HIGHER ALARM”, “HIGH ALARM” and “LOW ALARM” the necessary values. ＞＞ 4.3(20) “Alarm value change”
- Make “DEAD ZONE” the necessary concentration. ＞＞ 4.3(21) “Dead zone change”

⑰ **Perform a loop check.** ····· Check the external input/output function and perform a loop check. ＞＞ 3.4 “External Input/Output and Loop Check”

⑱ **Perform manual calibration.** ····· Execute “Automatic reading LO, HI calibration”. ＞＞ 4.4(3-2) “Automatic reading calibration”

- When low concentration calibration (option) is performed, execute “Automatic reading LL calibration” in addition to “Automatic reading LO, HI calibration”. ＞＞ 4.4(3-2) “Automatic reading calibration”

⑲ **Restart automatic measurement.** ····· Check that the alarm display is not reversed displayed in red and then start automatic operation by the following starting methods;

- For internal start ····· Touch **[START/STOP]** on the “MEAS (MEAS STOP)” screen and touch **[Yes]** in the displayed “Automatic measurement start” dialog box.
- For external start ····· Input the measurement start signal to the equipment.
- For communication start ····· Enter the measurement start command into the equipment.

⑳ **Check the measured result.** ····· Continue automatic measurement for 1 or 2 hours, and check that a normal measured result is displayed on “MEAS (MEAS)” screen and that **[ALARM]** is yellow-green.

The above places the equipment into the normal operation state.

To stop automatic measurement, refer to 4.1(3) “Automatic measurement stop” and to restart automatic measurement, refer to 4.1(2) “Automatic measurement start”.

3.2 Operation Method Selection

(1) Starting method selection

(a) Select internal start, external start, or communication state of the following table and switch the parameter settings according to the reference item.

(b) For internal start, also check “NEXT WASH TIME”, etc. based on the following table. For external start, wire so that “MEAS START” input signal, etc. can be input. In the case of communication start, adjust the communication environment by wiring to the digital input/output ports.

Parameter Setting by Start Method

	Function	Parameter setting, others	Reference item
Internal start	• Continue measurement by equipment internal timer. Includes automatic calibration, automatic wash, and intermittent measurement functions.	(1) Set “IN/EX START” to “IN START”.	4.3(14) “Start method switching”
		(2) Set “NEXT WASH TIME” to the necessary date and time.	4.3(6) “Next wash time change”
		(3) Set “WASH INTERVAL” to the necessary time.	4.3(7) “Wash interval change”
External start	• Control measurement by contact signal input from the outside. In this case, the automatic calibration, automatic wash and intermittent measurement by timer functions are disabled. However, except the intermittent measurement interval.	(1) Set “IN/EX START” to “EX START”.	4.3(14) “Start method switching”
		(2) Wire to the external connection terminals so that the following signals can be input to the equipment. Measurement start input signal (Terminals 50-51) Measurement stop input signal (Terminals 52-53) Calibration start input signal (Terminals 54-55) Wash start input signal (Terminals 56-57) Continuous/intermittent switching input signal (Terminal 58-59) Waste solution level switch (waste solution tank) input signal(Terminals 60-61)	3.4(3) “External start and loop check” 9.5(1) “External connection terminals”
Communication start	• Control measurement by digital communication (RS485) from a network. In this case, the automatic calibration, automatic wash, and intermittent measurement by internal timer functions are disabled. However, except the intermittent measurement interval.	(1) Set “IN/EX START” to “COMM START”.	4.3(14) “Start method switching”
		(2) Wire to the following terminals to connect to the network. Digital input/output port (Terminals 74-79)	3.4(5) “Digital input/output and loop check” 10. “Communication Functions”

(2) Continuous/intermittent measurement selection

(a) Select continuous measurement or intermittent measurement of the following table, and switch the parameter settings according to the reference item.

(b) When intermittent measurement by internal start was selected, set the intermittent measurement start time to a time different from next calibration time and next wash time.

【IMPORTANT】 • When the intermittent measurement start time is the same as the next wash time or the next calibration time, calibration is given priority and intermittent measurement is not performed.

(c) The intermittent measurement interval is effective not only for internal start, but also when intermittent measurement is performed by external start and communication start.

Continuous/Intermittent Measurement Parameters Setting

	Function	Parameter setting, others	Reference item
Continuous measurement	• Reads the measured value every minute and continues measurement until the measurement stop operation is performed.	Set “CON/INT MEAS SWITCH” to “CON MEAS”.	4.3(13) “Continuous measurement and intermittent measurement switching”
Intermittent measurement	• Repeats measurement which updates the hold value by 1 unit measurement (approx. 20 mins) at each intermittent measurement interval.	(1) Set “CON/INT MEAS SWITCH” to “INT MEAS”.	4.3(13) “Continuous measurement and intermittent measurement switching”
		(2) Set “INT MEAS START TIME” to the necessary date and time. (Unnecessary at external start/communication start.)	4.3(8) “Intermittent measurement start time change”
		(3) Set “INT MEAS INTERVAL” to the necessary time. However, make it more than 1 hour.	4.3(9) “Intermittent measurement interval change”

3.3 Calibration Method Selection

(1) Times when the calibration is necessary

Calibration is a function which corrects the concentration conversion formula. This equipment requires calibration by LO calibration solution and HI calibration solution at the following times:

(a) At test run and adjustment ····· When starting measurement for the first time after installation and when starting calibration while the equipment has not been operated for a long time, advance calibration is necessary.

(b) At electrode replacement ····· Calibration is always necessary when an electrode has been replaced. The recommended replacement interval of the ion electrode and reference electrode is 6 months. However, since it may be different depending on the sample water conditions, replace them periodically to match the sample water.

(c) At internal solution and membrane replacement ····· When internal solution and membrane are replaced, calibration is necessary. The recommended replacement interval is 2 to 3 months. However, since it may be different depending on the sample water conditions, replace them periodically to match the sample water.

(d) During automatic measurement ····· In addition to the above, periodic calibration is also necessary during automatic measurement.

(2) Calibration method classification

(a) The calibration method that can be selected depends on the starting method as shown in the following table.

Calibration Method Classification

			Overview
Internal start	Internal start automatic calibration	Normal calibration	• During automatic measurement, the internal timer starts calibration by "NEXT CAL TIME" and "CAL INTERVAL" and executes LO and HI calibrations and then returns to automatic measurement. ＞＞ 4.3(15) "Calibration mode switching"
		ACAS calibration	• During automatic measurement, the automatic calibration interval adapting system corrects the calibration interval by self-judgment. The internal timer starts calibration by "NEXT CAL TIME" and "CAL INTERVAL" and executes LO and HI calibrations and then returns to automatic measurement. ＞＞ 3.3(4) "ACAS calibration function", 4.3(15) "Calibration mode switching"
	Manual calibration	Automatic read LO/HI calibration	• When calibration is started by screen operation, the equipment executes LO and HI calibrations. After calibrations, the equipment changes to "MEAS STOP". Calibration value is automatically read. ＞＞ 4.4(3-2) "Automatic reading calibration"
		Manual read LO calibration	• When calibration is started by screen operation, the equipment starts LO calibration solution measurement. When **[CAL OPE]** is touched after the indication stabilizes, the equipment executes zero calibration. After calibration, recalibration is possible until the screen operation of calibration end is performed. ＞＞ 4.4(3-3) "Manual reading calibration"

(To be continued)

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			Overview
(Continued) Internal start	(Continued) Manual calibration	Manual read HI calibration	• When calibration is started by screen operation, the equipment starts HI calibration solution measurement. When **[CAL OPE]** is touched after the indication stabilizes, the equipment executes span calibration. After calibration, recalibration is possible until the screen operation of calibration end is performed. ＞＞ 4.4(3-3) “Manual reading calibration”
		Manual correcting calibration	• Calibration which calibrates to the manual correcting value by updating the correction coefficient “b(y=a+bx)” without changing the concentration formula (calibration curve) created by other calibration • When calibration is started by screen operation, the equipment starts the measurement of the solution in the LO calibration solution tank. When **[CAL OPE]** is touched after the indication stabilizes, the equipment update the correction coefficient. Recalibration is possible until the screen operation of calibration end is performed. ＞＞ 4.4(3-4) “Manual correcting calibration”
		Automatic read LL calibration (For low concentration calibration) (Option)	• When calibration is started by screen operation, the equipment measures LL calibration solution and executes calibration (low concentration region SLOPE change) by automatically reading the calibration value. After calibration, the equipment changes to “MEAS STOP”. ＞＞ 4.4(3-2) “Automatic reading calibration”
		Manual read LL calibration (For low concentration calibration) (Option)	• When calibration is started by screen operation, the equipment starts LL calibration solution measurement. When **[CAL OPE]** is touched after the indication stabilizes, the equipment executes calibration (SLOPE change of the low concentration region). After calibration, recalibration is possible until the screen operation of calibration end is performed. ＞＞4.4(3-3) “Manual reading calibration”
		LO calibration solution measurement	• Only measures the calibration solution. Calibration cannot be performed. • When measurement is started by screen operation, the equipment starts measurement of the LL calibration solution (option), LO calibration solution, or HI calibration solution. Measurement is continued until the screen operation of measurement is performed. ＞＞ 4.4(4) “Manual measurement”
		HI calibration solution measurement	
		LL calibration solution measurement (option)	
Automatic calibration of external start			• When the automatic measurement is stopped by the measurement stop input signal (terminals 52-53) and the calibration start input signal (terminals 54-55) is set to “closed”, the equipment executes LO and HI calibrations. After calibrations, the equipment changes to “MEAS STOP”. ＞＞ 3.4(3) “External start and loop check”, 9.5(1)”External connection terminals”
Automatic calibration of communication start			• When measurement is stopped and calibration is commanded, the equipment executes LO and HI calibrations. After calibrations, the equipment changes to “MEAS STOP”. ＞＞ 3.4(5) “Digital input/output and loop check”, 9.5(1)”External connection terminals”

(b)Only automatic calibration is applicable in the case of external start and communication start. However, manual calibration and manual measurement can be performed by once switching to internal start by screen operation. ＞＞ 4.1(9) “Switching to internal start from external start and communication start”

(c) The automatic calibration function is different depending on the starting method. Refer to 3.2(1) “Starting method selection” and perform the necessary settings.

(d) Manual calibration is calibration performed while measurement is stopped. Perform it by referring to the relevant items, as required. ＞＞ 4.4(3-1) “Calibration screen functions”

(e) Perform 2-point calibration by manual reading from the “MAINT” screen by the following procedure:

① Manual read LO calibration

② Manual read HI calibration

(f) Perform low concentration calibration (option, 3-point calibration) by the following procedure. LO calibration must be performed first at this 3-point calibration only because electrode potential (electromotive force) of LO calibration is necessary at LL SLOPE operation. Moreover, since LL SLOPE is also updated at SLOPE update, it is different from the general calibration procedure performed from low concentration solution.

[Procedure of manual read LO and HI calibrations]

① Manual read LO calibration

② Manual read HI calibration

③ Manual read LL calibration or automatic read LL calibration

[Procedure of automatic read LO and HI calibrations]

① Manual read LO and HI calibrations

② Manual read LL calibration or automatic read LL calibration

(3) Automatic calibration setting

Some of the automatic calibration functions are different depending on the starting method. Perform parameters setting, etc. in accordance with the following table

Automatic Calibration Parameter Setting

	Function	Parameter setting, others	Reference item
Internal start automatic calibration	• When starting by internal start, the automatic calibration of external start and communication start becomes invalid. • At automatic calibration, normal calibration or ACAS calibration can be selected. Refer to 3.3(4) “ACAS calibration function” for information regarding ACAS. • At normal calibration, the equipment first performs automatic calibration by the date and time set at NEXT CAL TIME and then repeats automatic calibration at the calibration interval.	(1) Set “IN/EX START” to “IN START”.	4.3(14) “Start method switching”
		(2) Set “NEXT CAL TIME” to the necessary date and time.	4.3(4) “Next calibration time change”
		(3) Set “CAL INTERVAL” to the necessary time.	4.3(5) “Calibration interval change”
		(4) Select either “NORMAL” or “ACAS” of “CAL MODE”.	4.3(15) “Calibration mode switching” 3.3(4) “ACAS calibration function”

(To be continued)

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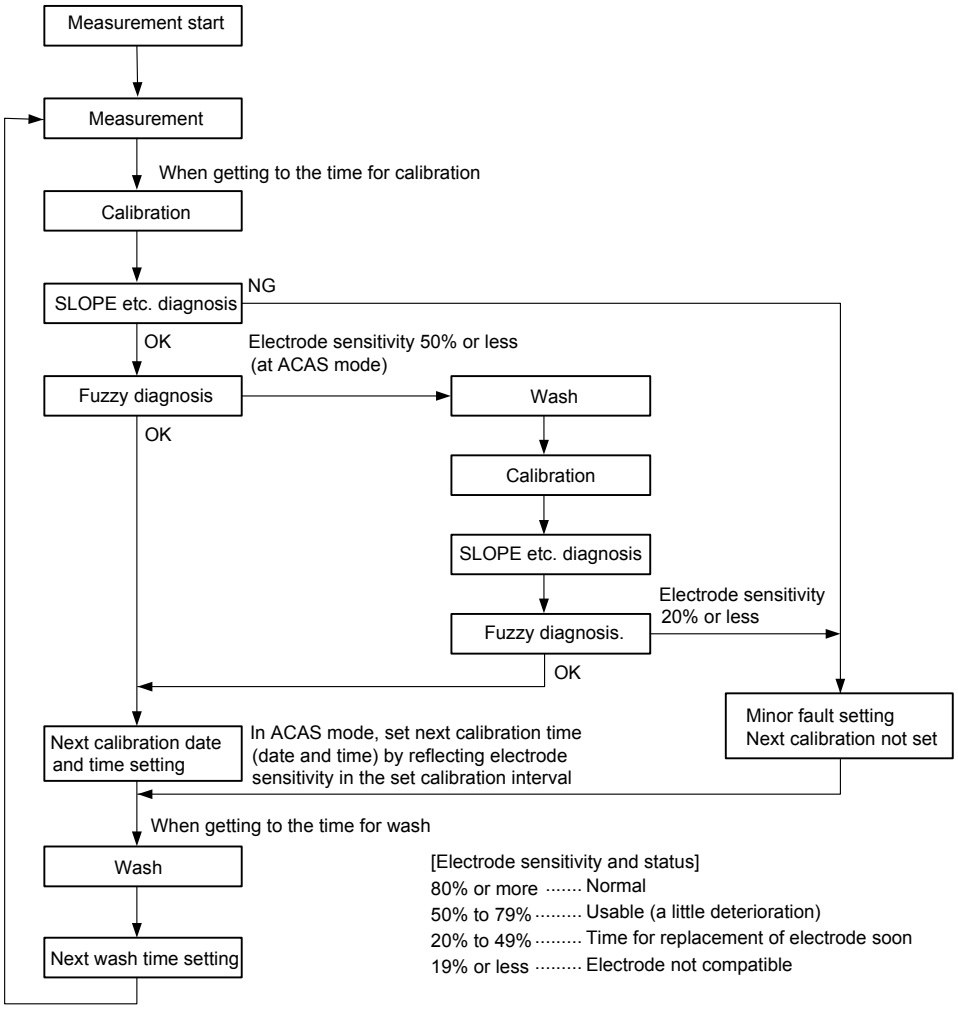
	Function	Parameter setting, others	Reference item
(Continued) Internal start automatic calibration	• At normal calibration, if the electrode sensitivity is under 20%, an electrode sensitivity alarm and calibration alarm are transmitted. In this case, automatic operation continues, but automatic calibration is not performed until the calibration alarm is cleared. • For ACAS calibration, when the electrode sensitivity is under 50% as a result of calibration, the equipment performs washing and then performs recalibration and rechecks the electrode sensitivity. If the electrode sensitivity is under 20%, an electrode sensitivity alarm and calibration alarm are transmitted. In this case, automatic operation continues, but automatic calibration is not performed until the calibration alarm is cleared.	(5) Make “LO CAL CONCENT” and “HI CAL CONCENT” the concentration of the calibration solution filled in the tank.	4.3(26) “Calibration solution concentration change”
External start automatic calibration	• Performs calibration by calibration start input signal (0.1 sec or more pulse closed contact signal) from the outside. • In this case, internal start and communication start automatic calibration is disabled. • The calibration start input signal is not accepted during measurement (continuous/intermittent), washing, and calibration. • When the electrode sensitivity drops below 20%, an electrode sensitivity alarm and calibration alarm are transmitted. In this case, automatic measurement continues, but automatic calibration is not performed until the calibration alarm is cleared.	(1) Set “IN/EX START” to “EX START”.	4.3(14) “Start method switching”
		(2) Make “LO CAL CONCENT” and “HI CAL CONCENT” the concentration of the calibration solution filled in the tank.	4.3(26) “Calibration solution concentration change”
		(3) Wire to the calibration start input signal (terminals 54-55)	9.5(1) “External connection terminals”
Communication start automatic calibration	• Performs calibration by calibrate command of digital communications (RS-485) from a network. • In this case, internal start and external start automatic calibration is disabled. • The calibration command is not accepted during measurement (continuous/intermittent), washing, and calibration. • When the electrode sensitivity drops below 20%, an electrode sensitivity alarm and calibration alarm are transmitted. In this case, automatic measurement continues, but automatic calibration is not performed until the calibration alarm is cleared.	(1) Set “IN/EX START” to “COMM START”.	4.3(14) “Start method switching”
		(2) Make “LO CAL CONCENT” and “HI CAL CONCENT” the concentration of the calibration solution filled in the tank.	4.3(26) “Calibration solution concentration change”
		(3) Connect through a high level computer and RS-485. (Terminals 74-75-76)	10. “Communication Functions”

(4) ACAS calibration function

(a) ACAS calibration ····· ACAS is the abbreviation for “Automatic Calibration cycle Adapting System”. It is a function that predicts soiling and deterioration of the ion electrode and performs calibration by determining a suitable interval based on the set calibration interval and wash interval. This function can prevent degradation of the measurement accuracy caused by the electrode.

(b) Calibration is performed at the date and time set at “NEXT CAL TIME” and performs self-check from the result and determines the next calibration interval and performs calibration according to the state of the ion electrode.

(c) ACAS calibration cannot be selected with external start and communication start. The calibration mode becomes normal calibration.



ACAS Automatic Calibration Flow

(d) When setting ACAS calibration, set the parameters as follows:

- Set “IN/EX START” to “IN START”. ＞＞ 4.3(14) “Start method switching”
- Set “NEXT CAL TIME” to the necessary date and time. ＞＞ 4.3(4) “Next calibration time change”
- Set “CAL INTERVAL” to the necessary time. ＞＞ 4.3(5) “Calibration interval change”
- Make “LO CAL CONCENT” and “HI CAL CONCENT” the concentration of the calibration solution filled in the tank. ＞＞ 4.3(26) “Calibration solution concentration change”
- Set “CAL MODE” to “ACAS”. ＞＞ 4.3(15) “Calibration mode switching”

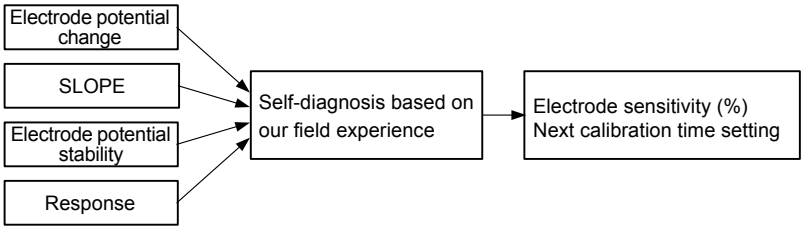
(e) The sensitivity of the ion electrode is calculated based on our field experience and the calibration and wash intervals are decided for the following items:

Electrode potential change ····· EMF different from last calibration of LO calibration solution

SLOPE ····· Electrode potential (mV) between solutions of 10 times concentration difference by LO or HI calibration

Electrode potential stability ····· EMF stability of HI calibration solution

Response ····· Response of HI calibration solution



Electrode Sensitivity Criteria

- When the sensitivity of the ion electrode is under 50%, the equipment performs calibration once more after washing. When the sensitivity is under 20%, calibration alarm is transmitted (electrode sensitivity alarm is also transmitted at the same time) and the next calibrate date and time is not set. Therefore, calibration is not performed. ＞＞ Figure “ACAS Automatic Calibration Flow”

3.4 External Input/output and Loop Check

(1) External input/output list

(a) The following signals can be input and output through the external input/output terminals of the equipment. Refer to 3.4(2) “External contacts output and loop check” – 3.4(5) “Digital input/output and loop check” and perform loop checks and others.

(b) When external start was selected, the equipment is operated by external contact input.

External Input/Output List

Terminal No.	Name (abbreviation, display)	Operation contents
External contact output list - alarms		• Capacity···30 VDC, 0.1 A load resistance
30-31	Power off output signal (POWER OFF, PW-OFF)	• The equipment power is turned off or the supply of power is stopped. • NC contacts (“Closed” at power off)
32-33	Failure 1 (serious) output signal (FAILURE 1, AL1_□□)	• Cell temperature error or other serious failure occurred in the equipment. • NO contact s (“Closed” at error)
34-35	Failure 2 (minor) output signal (FAILURE 2, AL2_□□)	• Calibration error or other minor failure occurred in the equipment. • NO contacts (“Closed” at error)
36-37	Higher alarm output signal (HIGHER ALARM, ALM_HH)	• Concentration measured value exceeds the higher alarm set value. • NO contacts (“Closed” at error)
38-39	High alarm output signal (HIGH ALARM, ALM_H)	• Concentration measured value exceeds the high alarm set value. • NO contacts (“Closed” at error)
40-41	Low alarm output signal (LOW ALARM, ALM_L)	• Concentration measured value is lower than the low alarm set value. • NO contacts (“Closed” at error)
External contact output - status		• NO contacts (Closed at the relevant time), capacity···30 VDC, 0.1 A load resistance
42-43	Calibration in progress output signal (UNDER CAL)	• Equipment is in the automatic calibration state.
44-45	Wash in progress output signal (UNDER WASH)	• Equipment is in the automatic wash state.
46-47	Maintenance in progress output signal (MAINT OUT)	• [MAINT OUT] that informs the outside that the equipment is under maintenance is turned on.
48-49	Measurement in progress output signal (UNDER MEAS)	• Equipment is in the automatic measurement state.

(To be continued)

(Continued from previous page)

Terminal No.	Name (abbreviation, display)	Operation contents
External contact input		• No-voltage contact input, ON resistance···within 50 Ω, short-circuit current···max. 10 mA, open voltage···24 VDC
50-51	Automatic measurement start input signal (MEAS START)	• This signal causes equipment in the automatic measurement stop state to start automatic measurement. • When operation is necessary, a pulse closed contact signal of more than 0.1 second is input.
52-53	Automatic measurement stop input signal (MEAS STOP)	• This signal causes equipment in the automatic measurement state to stop automatic measurement. • When operation is necessary, a pulse closed contact signal of more than 0.1 second is input.
54-55	Calibration start input signal (CAL START)	• This input causes equipment in the automatic measurement stop state to start automatic calibration. • When operation is necessary, a pulse closed contact signal of more than 0.1 second is input.
56-57	Wash start input signal (WASH START)	• This input causes equipment in the automatic measurement stop state to start automatic wash. • When operation is necessary, a pulse closed contact signal of more than 0.1 second is input.
58-59	Continuous measurement /intermittent measurement switch input signal (CON/INT SWITCH)	• This input switches the next measurement start by equipment in the automatic measurement stop state to continuous measurement or intermittent measurement. • When setting to intermittent measurement, the contact input is “Closed” and when setting to continuous measurement, the contact input is “Open”.
60-61	Waste solution tank full input signal (Waste solution level switch) (option)	• This input is closed when the external waste solution tank (option) becomes full and is opened when the waste solution tank is replaced with an empty tank. • Normally, the signal of a float switch installed to the waste solution tank is input.
Transmission output		• 4-20 mADC isolated type (load resistance less than 600 Ω)
70-71	Measured value output signal (Concentration, CH1)	• Ion concentration
72-73	Electrode potential output signal (Electrode potential, CH2)	• -250 to 250 mV
Digital input/output ports		
74-75-76	RS-485 input/output port 1 (RS-485-1)	• ＞＞ 10. “Communication Functions”
77-78-79	RS-485 input/output port 2 (RS-485-2)	

(2) External contacts output and loop check

(a) At the start of operation, refer to 4.4(6) “External contact output check” and perform external contract output signal loop check. This operation checks that the external contact output signals operate appropriately.

(b) When EX CONTACT OUTPUT - ALARM is transmitted after operation starts, refer to 6.2 “Alarm Handling for Items” and perform the necessary processing.

(c) EX CONTACT OUTPUT – STATE is one means of remotely grasping the status of the equipment. When the equipment is operated (at external start) by external contact signal, the statue of the equipment can be checked.

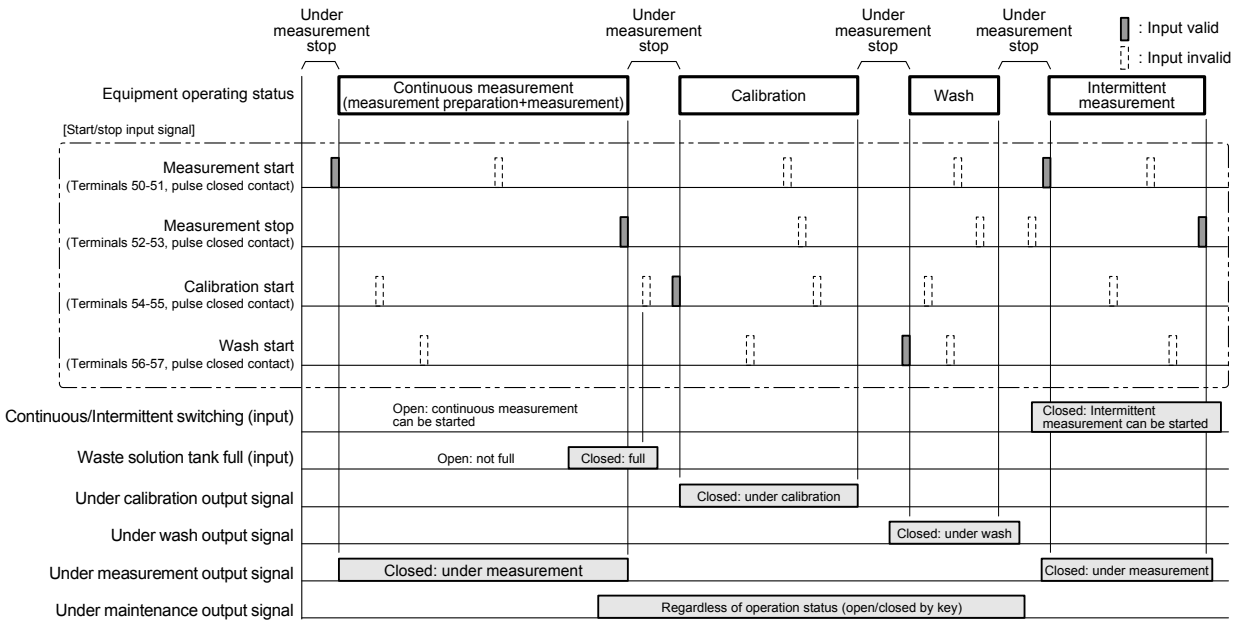
(3) External start and loop check (External contact input)

(a) At the start of operation, refer to 4.4(8) “Check by input monitor” and perform external contract input signal loop check. This operation checks that the external contact input signals operate appropriately.

(b) External start operation ····· External start operates the equipment not by equipment operation screen but from the outside by measurement start input signal (terminals 50-51) and other external contact input signals.

(c) Valid/invalid of Start/stop signal ····· Measurement, calibration, and wash inputs (0.1 sec or more pulse closed contact) are performed while measurement is stopped as shown in the table “Valid/Invalid of Start/Stop Input Signal”.

【IMPORTANT】
- The automatic measurement start, calibration start and wash start are invalid during measurement (continuous measurement, intermittent measurement), calibration, and washing.
- When the waste solution tank full input signal (option) is “Closed (full)”, the calibration start and wash start input signals are invalid.



Valid/Invalid of Start/Stop Input Signal

(d) Continuous/intermittent switching signal ····· This signal is not a pulse closed contact signal but is an open/closed contact signal. When terminals 58-59 are "Open" and a measurement start input signal (pulse closed contact) is input, continuous measurement starts. When terminals 58-59 are "Closed", intermittent measurement starts. The equipment accepts this switching only while measurement is stopped.

(e) Waste solution tank full signal ····· This signal is also not a pulse close contact signal but is an open/closed contact signal. When the waste solution tank (option) becomes full, a float switch operates and this input signal switches from "Open" to "Closed." The equipment transmits a tank full alarm (minor failure) and makes the calibration start and wash start signals invalid. The equipment always accepts this switching without regard to the operation state.

- The equipment can be placed into the same state [failure 2 (minor failure), calibration start and wash start signals invalid] as waste solution tank full alarm (AL2_EFFLU) by switching to "Closed" by connecting an arbitrary contact signal separately from the waste solution tank full input signal.

(4) Transmission output and loop check

(a) At the start of operation, refer to 4.4(7) "Transmission output check" and perform transmission contract output signal loop check. This operation checks that the measured value and the electrode potential outputs operate appropriately.

(b) **[CH1 SELECT]** of the "TRANS OUTPUT CHECK" screen corresponds to the measured value output signal (Concentration, terminals 70-71) and **[CH2]** corresponds to the electrode potential signal (Electrode potential, terminals 72-73).

(5) Digital input/output and loop check

(a) At the start of operation, refer to 10. "Communication Functions" and use a dedicated terminal to check the measurement start command and other communication functions.

(b) Commands with measurement start and other operations conform to the measurement start signal, etc. in the case of external start

3.5 Operation Stop

(a) If the equipment is stopped for a long time, the reagents remaining inside the equipment may precipitate. For this reason, the operation stop procedure is different depending on the period operation is to be stopped.

(b) When operation will be stopped for less than 1 week, perform 3.5(1) “Short-term stop” and when operation will be stopped for more than 1 week, perform 3.5(2) “Long-term stop”.

(1) Short-term stop

When the operation stop period is within 1 week, proceed as follows. This method leaves the reagents inside the equipment.

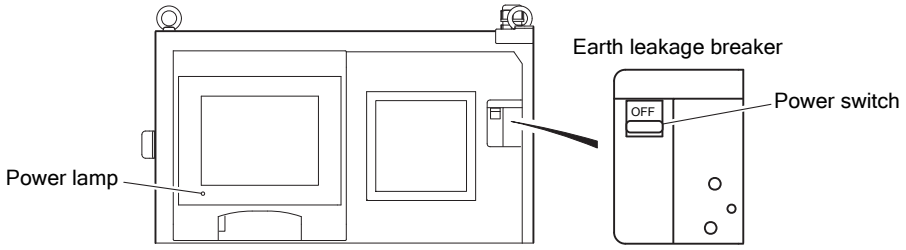
①Output the under maintenance signal. ····· If necessary, touch [MAINT] and check that it becomes yellow.

- When unnecessary, go to step ②.

②Stop automatic measurement. ····· Touch **[START/STOP]** on the “MEAS (MEAS)” screen and check that the screen changes to “MEAS (MEAS STOP)” screen.

③Stop the supply of wash water. ····· If necessary, close the wash water valve at the main supply.

④Turn off the power. ····· Set the earth leakage circuit breaker power switch to OFF and the external power supply main switch to OFF.



Power Switch

To restart operation, refer to 3.1 “Test Run and Adjustment Procedure”

(2) Long-term stop

When the operation stop period exceeds 1 week, proceed as follows. This method washes the reagents inside the equipment, empties the equipment, and stops the supply of wash water, sample water, and power.

①Stop automatic measurement. ····· ＞＞ 4.1(3) “Automatic measurement stop”

⚠ WARNING

Hazardous Materials

- The solution in reagent tank and acid washing solution tank are toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.
- Do not mix the calibration solution in each calibration solution tank with the alkaline solution. If mixing them, they may react and generate ammonia gas.

②Empty each tank. ····· Remove the cover of the reagent tank, acid washing tank, LO calibration solution tank, HI calibration solution tank, and LL calibration solution tank (option) and transfer the remaining solutions to the waste solution tank.

③Fill the tanks with pure water. ····· After thoroughly washing the inside of each empty tank, fill the tanks with pure water.

④Insert the end of the sample water tube into a tank containing pure water.

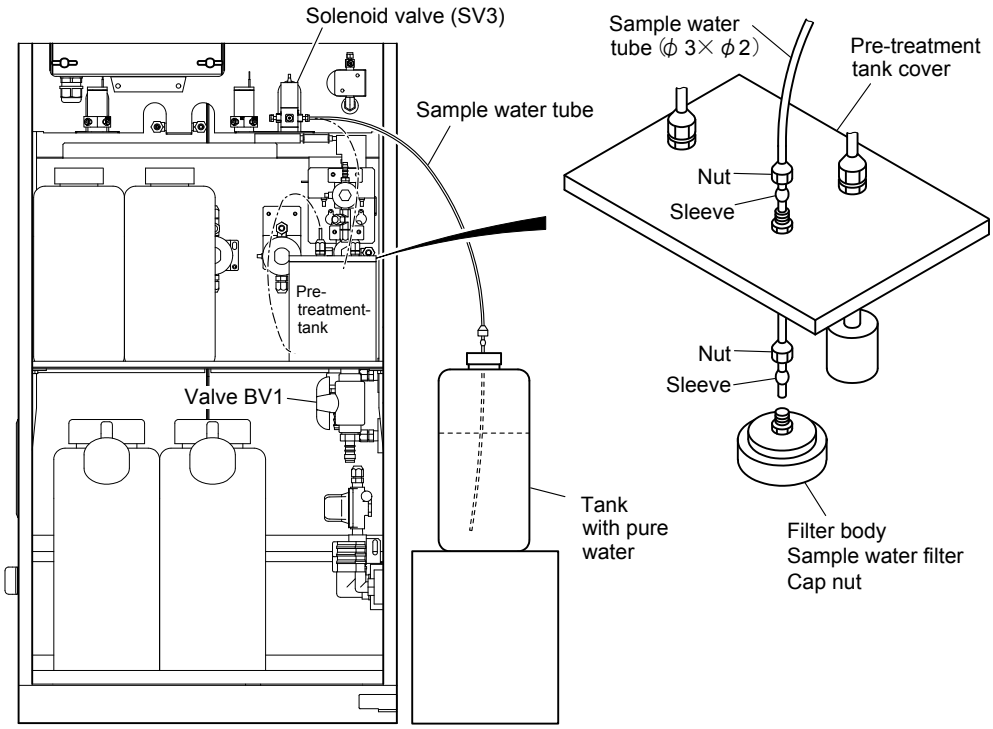
ⓐ Remove the pre-treatment tank cover and loosen the nut and sleeve and remove the sample water filter connected to the end of the sample water tube.

- Assemble the nut and sleeve to the sample water filter so they will not get lost.
- When air cleaning function (option) is added, see 7.1 (3) “Sample water filter with air cleaning function”. The tubing is different.

ⓑ Loosen the nut and sleeve fixing the sample water tube to the pre-treatment tank and pull out the sample water tube from the pre-treatment tank cover.

- The nut and sleeve do not have to be removed. Be sure not to lose them.

ⓒ Fill a plastic tank with pure water and insert the end of the sample water tube into the tank to near the bottom.



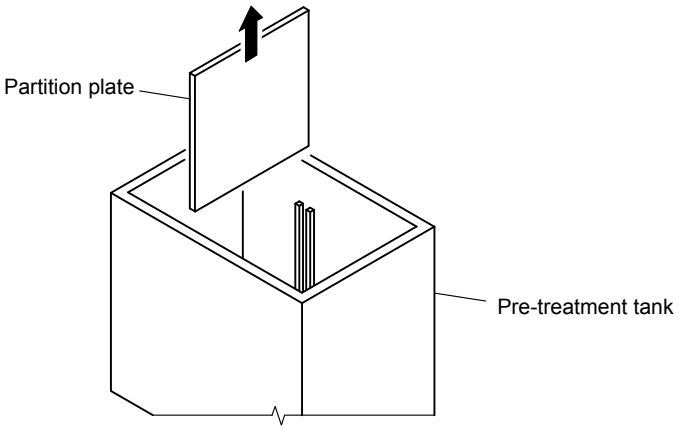
Sample Water Tube and Pre-treatment Tank Cover

⑤**Wash each line.** ····· Send the sample water, acid washing solution, calibration solutions (LO, HI) and reagent by individual operation. ＞＞ 4.4(5) “Individual operation”

- Wash each line with the pure water in each tank.

⑥**Stop the sample water and return the sample water tube to its original state.** ····· Set the sample water main valve to “Closed” and set valve BV1 inside the equipment to “Closed”.

⑦**Drain the pre-treatment tank.** ····· Raise the pre-treatment tank partition plate, drain the sample water from the pre-treatment tank, and then return the partition plate to its original state.



Pre-treatment Tank Partition Plate

⑧**Return the sample water tube to its original state.** ····· Pass the sample water tube through the pre-treatment tank cover and connect the sample water filter and return the tube to the pre-treatment tank.

⑨**Empty the measuring cell.** ····· Perform “DRAIN” of individual operation. ＞＞ 4.4(5) “Individual operation”

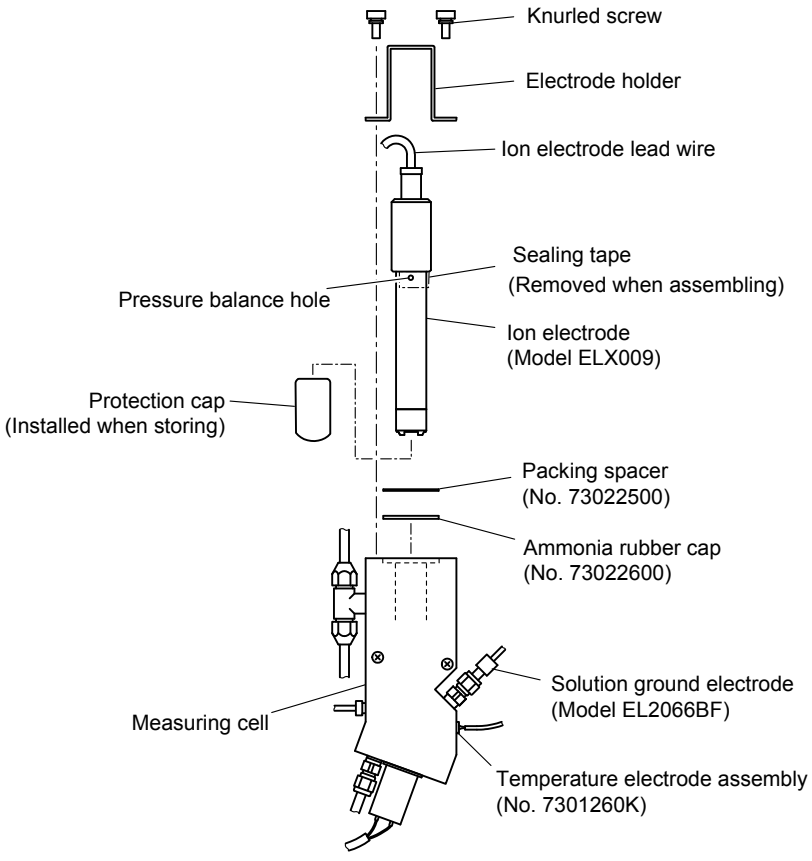
⑩**Empty each tank.** ····· Throw away the pure water inside each tank. To prevent soiling, connect the tubes to the tanks.

⑪**Empty each line.** ····· Send the sample water, acid washing solution, calibration solutions (LO, HI), and reagent by individual operation, and send out the pure water remaining in each line. Finally, perform “DRAIN” of individual operation to drain the pure water inside the measuring cell. ＞＞ 4.4(5) “Individual operation”

⑫**Stop the supply of wash water.** ····· Set the main valve of the external wash water line to “Closed” and valve BV2 inside the equipment to “Closed”.

⑬**Remove the electrodes.** ····· Remove the detector cover and remove the ion electrode.

- When storing the electrodes, install the protective cap so that the end will not dry out. In addition, place the sealing tape to the pressure balance hole.

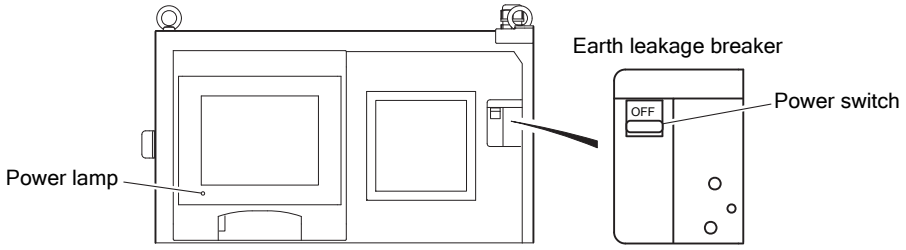


Installing and Removing the Electrode

⑭**Reinstall the detector cover** ····· Return the removed detector cover to its original state.

⑮**Close other valves.** ····· In addition, if there is a valve provided outside the equipment, close it.

⑯**Turn off the power.** ····· Set the power switch to OFF.



Power Switch

⑰**Stop the supply of power.** ····· Set the external main power switch provided outside to OFF.

The above completes the long-term stop operation.

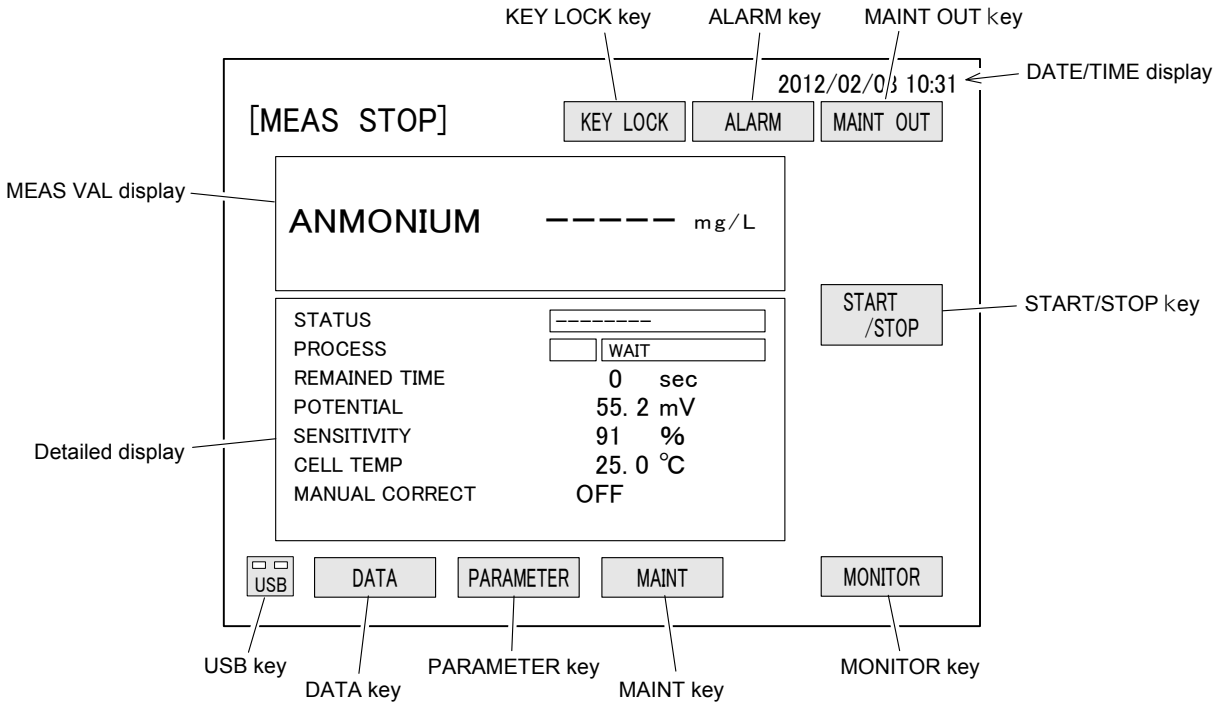
When restarting measurements after the equipment has been stopped for a long time, check that the operation preparations are complete and then perform test run and adjustment.
＞＞ 2. “Preparation for Operation”, 3.1 “Test Run and Adjustment Procedure”

4. Modes of Operations

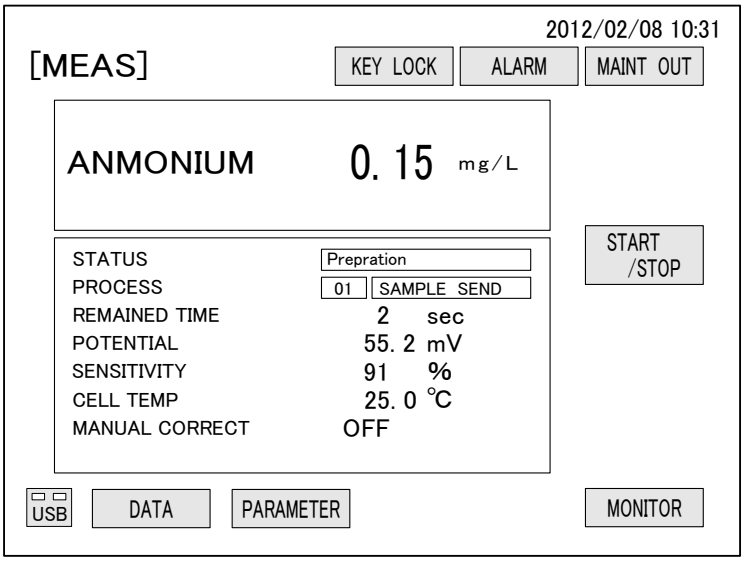
4.1 Measurement Screen Operation

(1) Measurement screen functions

(a) Functions of measurement screens and keys ····· The "MEAS (MEAS STOP)" screen is the basic screen. When the power switch is turned ON, this screen appears. Measurement start, switching to the "MAINT" screen, and switching to the "PARAMETER" screen can be performed at this screen.



"MEAS (MEAS STOP)" Screen



"MEAS (MEAS)" Screen

Measurement Screen Keys and Displays

Name and notation in text	Function and display contents
Start/Stop key **[START/STOP]**	• When "MEAS (MEAS STOP)" screen is displayed ····· When touched it, an "Automatic measurement start" dialog box opens. ＞＞ 4.1(2) "Automatic measurement start" • When "MEAS (MEAS)" screen is displayed ····· When touched it, an "Automatic measurement stop" dialog box opens. ＞＞ 4.1(3) "Automatic measurement stop"
Data key **[DATA]**	• When touched, the "DATA" screen is displayed and measured values, operation, alarms, and calibration recording (log) can be checked. ＞＞ 4.2 "Data Screen Operation" • When touched at the "MEAS (MEAS STOP)" screen, writing of the measured value log to USB memory is also performed. ＞＞ 4.2(3) "Batch writing to USB memory"
Parameter key **[PARAMETER]**	• When touched, the "PARAMETER 1 SET" screen is displayed and parameters set value (measurement conditions, etc.) can be checked. Switching to the "PARAMETER 2 SET" screen is also possible. ＞＞ 4.1(10) "Parameters check" • When touched at the "MEAS (MEAS STOP)" screen, the set values can be not only checked but also changed. ＞＞ 4.3 "Parameter Screen Operation"
Maintenance key **[MAINT]**	• When touched, the "MAINT" screen is displayed. Wash, calibration, etc. can be operated. ＞＞ 4.4 "Maintenance Screen Operation" • This key is displayed on the "MEAS (MEAS STOP)" screen, but is not displayed on the "MEAS (MEAS)" screen.
Maintenance output key **[MAINT OUT]**	• When this key is yellow ····· It indicates that "Maintenance in progress" signal (terminal: 46-47) of the equipment is ON (closed). When touched, a "Maintenance in progress signal output clear" dialog box opens. ＞＞ 4.1(6) "Maintenance in progress" signal switching • When this key is yellow-green ····· It indicates that "Maintenance in progress" signal is OFF (open). When touched, a "Maintenance in progress signal output start" dialog box opens.
Alarm key **[ALARM]**	• When this key is red ····· It indicates that equipment transmits alarms. For alarms, there are failure 1 (serious failure), failure 2 (minor failure), measured value failure (Higher alarm output signal), and power off alarm are included. In addition, for power off alarm, this key is not turned to red. ＞＞ 6.1 "Alarm Items and Transmission" • When this key is yellow-green ····· It indicates that equipment does not transmit alarms. • When touched, an "Alarm" dialog box opens. ＞＞ 4.1(5) "Alarm check and clear"
Key lock key **[KEY LOCK]**	• When this key is yellow ····· It indicates the key lock is ON. The function of keys other than this key is disabled. When touched, "Key lock clear" dialog box opens. ＞＞ 4.1(4) "Key lock switching" • When this key is yellow-green ····· It indicates the key lock is OFF (clear). When touched, a "Key lock start" dialog box opens.
Monitor key **[MONITOR]**	• When this key is red ····· It indicates the liquid levels of one or more solution tanks are abnormal. When the liquid level is normal, this key is yellow-green. The liquid level is sensed by a float switch. • When this key is yellow-green ····· It indicates the liquid levels of all solution tanks are abnormal. • When touched, a "Monitor" dialog box opens and the liquid level judgment result of each tank (OK or NG) is displayed. ＞＞ 4.1(7) "Liquid level check of tanks by monitor"

(To be continued)

(Continued from previous page)

Name and notation in text	Function and display contents
USB key **[USB]**	• When touched, the “CF/USB REMOVAL” screen is displayed and when touched for more than 1 second at [USB REMOVAL] of that screen, the equipment enters the “USB REMOVAL OK” state. ＞＞ 4.1(8) “USB memory removal” • When the USB memory is not inserted, the display of key is not “USB” but “---”.
Measured value display	• The ion concentration measured value and its units are displayed on the “MEAS (MEAS)” screen. The measured value is not displayed on the “MEAS (MEAS STOP)” screen. • When the measured value exceeds 150% (may be different depending on the order specifications) of the full scale value of the measuring range set at the individual equipment, the value of the measured value display is fixed and does not increase. • For intermittent measurement, “INT MEAS” is displayed under measured value.
Details display	• The operating status (by time chart) and the status of the main items of the progressing equipment are displayed • STATUS DISPLAY ····· Operating conditions • PROCESS ····· Process No. and process name • REMAINED TIME ····· Remaining time (seconds) of the process • POTENTIAL ····· Ion electrode potential (mV) • SENSITIVITY ····· 0 to 100 (%) • CELL TEMP ····· Measuring cell temperature (°C) • MANUAL CORRECT (COR) ····· When “CORRECT a = 0, CORRECT b = 1”, “OFF” is displayed. When not “CORRECT a = 0, CORRECT b = 1” by Manual correct or key input, “ON” is displayed.
Date/time display	• The current date and time of the timer built into the equipment is displayed. ＞＞ 4.3(3) “Date and Time setting”

(b) Screen function difference between “MEAS (MEAS STOP)” and “MEAS (MEAS)” screens ····· “MEAS (MEAS STOP)” and the “MEAS (MEAS)” screens have many common functions, but the following points are restricted at the “MEAS (MEAS)” screen:

Switching to the “MAINT” screen.

Changing the set values (measurement conditions) at the “PARAMETER” screen.

“USB WRITE” operation at the “Measured Value Log” screen of the “DATA” screen.

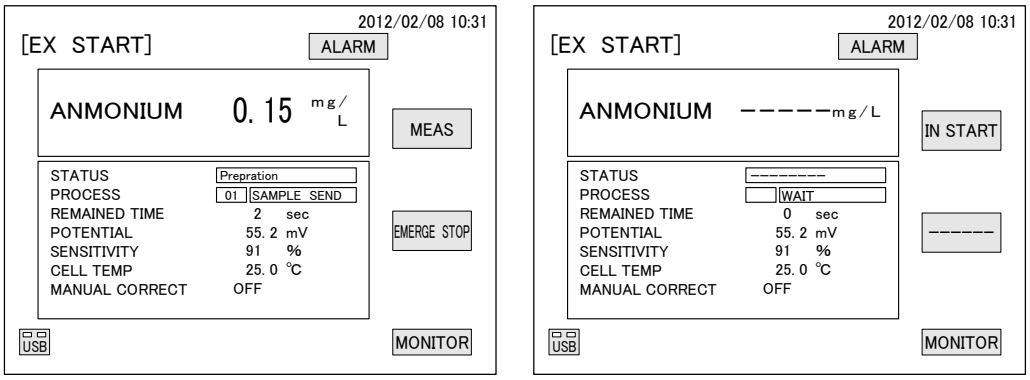
(c) Screen operation system ····· Each operation by screen is classified into the following 4 screens. The procedure, etc. is described at each item. The overall system is described in 1.4 “Operation Screens Map”

“MEAS” screen ····· 4.1 “Measurement Screen Operation”

”DATA” screen ····· 4.2 “Data Screen Operation”

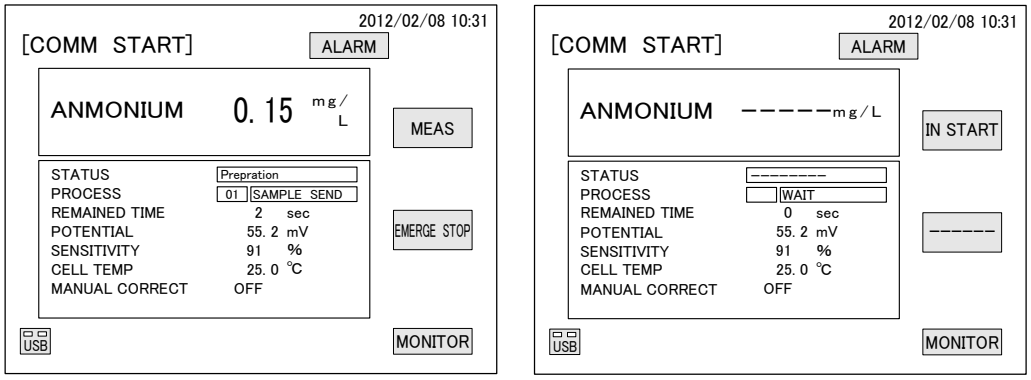
“PARAMETER” screen ····· 4.3 “Parameter Screen Operation”

“MAINT” screen ····· 4.4 “Maintenance Screen Operation”



＜“MEAS（EX START—MEAS)” screen＞ ＜“MEAS（EX START—MEAS STOP)” screen＞

“MEAS (EX START)” Screen



＜“MEAS（COMM START—MEAS)” screen＞ ＜“MEAS（COMM START—MEAS STOP)” screen＞

“MEAS (COMM START)” Screen

(d) Screen differences by starting method ····· When “EXT START” is selected at “INT/EXT START” of the “PARAMETER 2” screen, the “MEAS (EXT START)” screen appears and only some of the keys are displayed. When a hidden key operation is performed, operation temporarily switches to “INT START”. This also applies to “COMMUNICATION START”. ＞＞ 4.1(9) “Switching to internal start from external start and communication start”, 4.3(14) “Start method switching”

(e) Display and output by operation status ····· Measured value display, transmission output, and high/low alarm output format are different depending on the operation status. In particular, at intermittent measurement, transmission mode selection (hold, dummy, through) is disabled. Refer to the following table.

Display and Output by Operation Status

		Measurement screen concentration display	Transmission output	Modbus communication and USB memory log data	High/low alarm output
Measurement stop		"---" displayed	Transmission mode format	None *2	None
Continuous measurement	Measurement preparations process	Instantaneous measured value	Same as above	Transmission mode format *3	None
	Measuring	Same as above	Instantaneous measured value	Value measured every minute	Judged and output
	Calibrating and washing	Same as above	Transmission mode format	Transmission mode format *3	Held at previous status
	Waiting and sampling water off	Same as above	Same as above	Same as above	None
Intermittent measurement		Hold value *1 (Update by measurement point)	Transmission mode format (Update by measurement point)	Transmission mode format (Update by measurement point)	Judged and output by measurement point
Maintenance screen	"WASH" screen operating	Instantaneous measured value	Transmission mode format	Transmission mode format *3	None
	"CAL" screen operating	Same as above	Same as above	Same as above	None
	"MANU MEAS" screen operating	Same as above	Same as above	Same as above	None
	"INDIV OPE" screen operating	No display	Same as above	None	None

*1: Displays the instantaneous value only during calibration and washing.

*2: Outputs the hold value at Modbus communication. (>> 10 "Communication Function")

*3: Becomes the same as the "HOLD" setting even when the transmission mode was set to "DUMMY".

(f) Screen automatic turn off ····· Not only the measurement screen, but all the other screens are turned off if not touched for 60 minutes or more. When a screen that was automatically turned off is touched, it is turned on again.

(2) Automatic measurement start

(a) Automatic measurement can be started by “MEAS (MEAS STOP)” screen key operation.

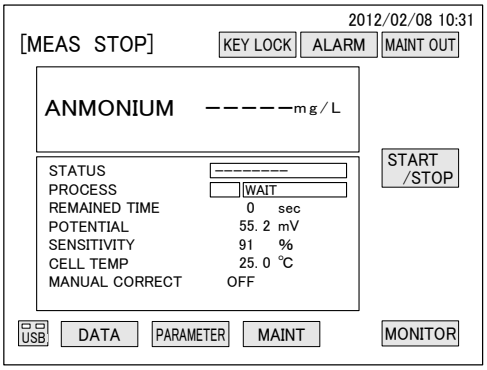
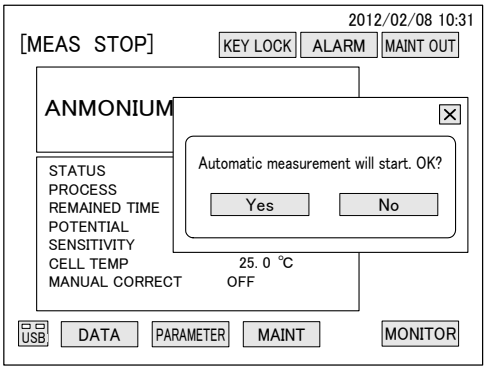
- Touch **[START/STOP]** while the equipment is stopped. ····· “Automatic measurement start” dialog box opens.

【IMPORTANT】 • Always perform this operation at the “MEAS (MEAS STOP)” screen. If “Yes” is touched at the dialog box opened by START/STOP of the “MEAS (MEAS)” screen, automatic measurement will stop without starting.

(b) To restart automatic operation for the first time after the equipment is installed or after the equipment was stopped for a long time, perform 2. “Preparations for Operation” and then start automatic operation based on 3.1 “Test Run and Adjustment Procedure”.

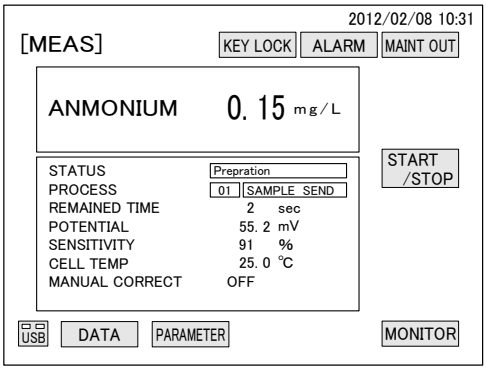
(c) This screen operation cannot be performed at the “MEAS (EXT START)” screen. Perform it after once switching to “INT START”. ＞＞ 4.1(9) “Switching to internal start from external start and communication start “

Automatic Measurement Start Operation

Step and operation	Screen example
①Display the “MEAS (MEAS STOP)” screen. ····· Check that “MEAS STOP” is displayed at the top left-hand corner of the screen. • When “MEAS” is displayed at the top left-hand corner of the screen, the equipment is already performing automatic measurement and the following operation is unnecessary. • When a screen other than the “MEAS” screen is displayed, refer to the relevant item and switch to the “MEAS (MEAS STOP)” screen. ＞＞ 4.2 “Data Screen Operation”, 4.3 “Parameter Screen Operation”, 4.4 “Maintenance Screen Operation”	 **“MEAS (MEAS STOP)” screen**
②Open the “Automatic measurement start” dialog box. ····· Touch **[START/STOP]** of the “MEAS (MEAS STOP)” screen.	
③Start automatic measurement. ····· Touch [Yes] in the “Automatic measurement start.” dialog box. • For “CON measurement”, automatic measurement starts immediately. For “INT measurement”, the equipment enters the wait state until the start time arrives. The dialog box is closed. [X] ··· When touched, the dialog box closes. [No] ··· When touched, the dialog box closes without starting automatic measurement.	 **“Automatic measurement start” dialog box**

(To be continued)

(Continued from previous page)

Step and operation	Screen example
④Check that the "MEAS (MEAS)" screen is displayed. ····· Check that "MEAS" is displayed at the top left-hand corner of the screen. • Equipment continues the measurement until the measurement stop operation is performed. When a power failure occurs, measurement is automatically resumed when the power recovers. **⑤Clear the "Maintenance in progress" signal output.** ····· When **[MAINT OUT]** is yellow make it yellow-green by touching it. • When **[ALARM]** is red, troubleshoot the alarm. ＞＞ 4.1(5) "Alarm check and clear"	 **"MEAS (MEAS)" screen**

(3) Automatic measurement stop

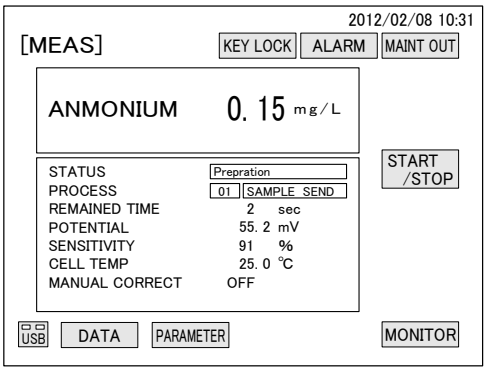
(a) Automatic measurement can be stopped by "MEAS (MEAS)" screen key operation.

- Touch **[START/STOP]** while the equipment is operating. ····· "Automatic measurement stop" dialog box opens.

【IMPORTANT】 • Always perform this operation at the "MEAS (MEAS)" screen. If "Yes" is touched at the dialog box opened by START/STOP of the "MEAS (MEAS STOP)" screen, automatic measurement will start without stopping.

(b) This screen operation cannot be performed at the "MEAS (EXT START)" screen. Perform it after once switching to "INT START". ＞＞ 4.1(9) "Switching to internal start from external start and communication start "

Automatic Measurement Stop Operation

Step and operation	Screen example
①Display the "MEAS (MEAS)" screen. ····· Check that "MEAS" is displayed at the top left-hand corner of the screen. • When "MEAS STOP" is displayed at the top left-hand corner of the screen, the equipment has already stopped operating and the following operation is unnecessary. • When a screen other than the "MEAS" screen is displayed, refer to the relevant item and switch to the "MEAS (MEAS)" screen. ＞＞ 4.2 "Data Screen Operation", 4.3 "Parameter Screen Operation", 4.4 "Maintenance Screen Operation" **②Open the "Automatic measurement stop" dialog box.** ····· Touch **[START/STOP]** of the "MEAS (MEAS)" screen.	 **"MEAS (MEAS)" screen**

(To be continued)

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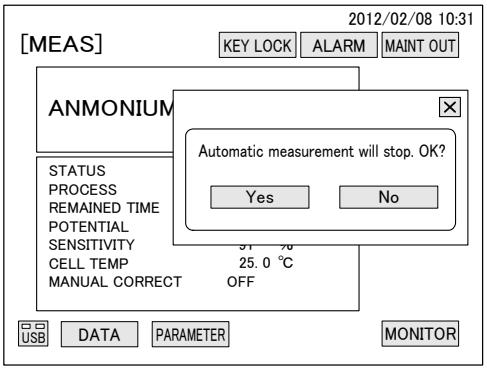
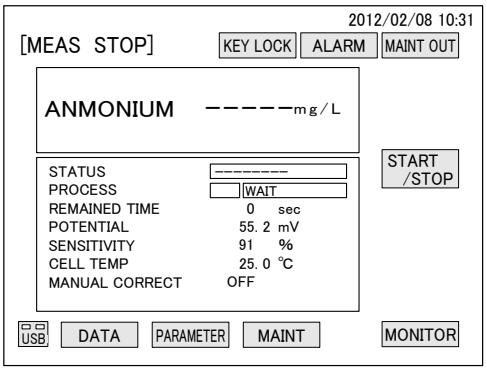
Step and operation	Screen example
③**Stop automatic measurement.** ····· Touch [Yes] in the "Automatic measurement stop" dialog box. • Automatic measurement stops and the dialog box closes. **[X]** ··· When touched, the dialog box closes. **[No]** ··· When touched, the dialog box closes without stopping measurement and the "MEAS (MEAS)" screen is displayed.	 **"Automatic measurement stop" dialog box**
④**Check that the "MEAS (MEAS STOP)" screen is displayed.** ····· Check that "MEAS (MEAS STOP)" is displayed at the top left-hand corner of the screen. • Measurement remains stopped until the measurement start operation is performed. • If necessary, make **[MAINT OUT]** yellow by touching it. The "Maintenance in progress" signal is output.	 **"MEAS (MEAS STOP)" screen**

(4) Key lock switching

(a) The key lock status can be checked by the color of **[KEY LOCK]** as follows:

- [KEY LOCK] is yellow-green. ····· Key lock cleared (normal).
- [KEY LOCK] is yellow ····· Key lock set

(b) When **[KEY LOCK]** is touched, a dialog box for switching opens.

- Touch yellow-green **[KEY LOCK]**. ····· "Key lock set" dialog box opens.
- Touch yellow **[KEY LOCK]**. ····· "Key lock clear" dialog box opens.

(c) In the key lock set state only **[KEY LOCK]** is enabled; other keys are disabled. Its purpose is to prevent erroneous operation.

Key Lock Switching Operation

Step and operation	Screen example

①Check that [KEY LOCK] is displayed on the screen. ····· Check that the "MEAS (MEAS)" or other screen with **[KEY LOCK]** is displayed.

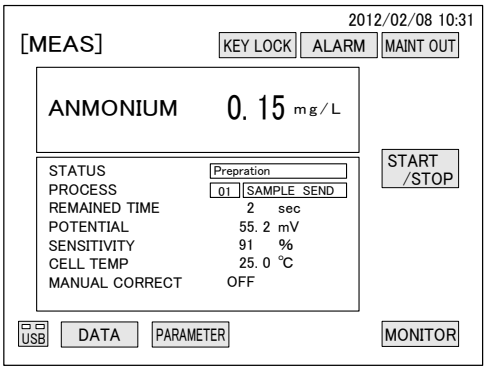
②Check the key lock state. ····· Check the key lock state by **KEY LOCK** color.

[KEY LOCK] is yellow-green. ····· Key lock cleared (normal).

[KEY LOCK] is yellow ····· Key lock set

- When not switching key lock, the following operations are unnecessary.

③Open the dialog box. ····· Touch **[KEY LOCK]**.



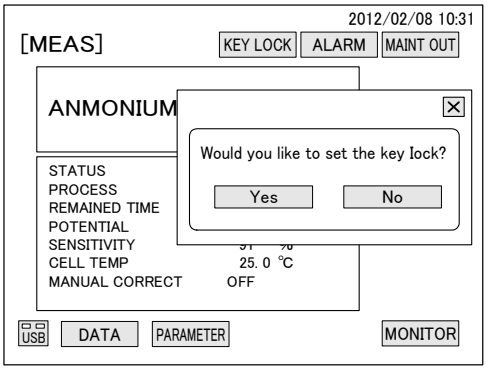
"MEAS (MEAS)" screen

④Switch key lock. ····· Touch **[Yes]** in the "Key lock set" or "Key lock clear" dialog box.

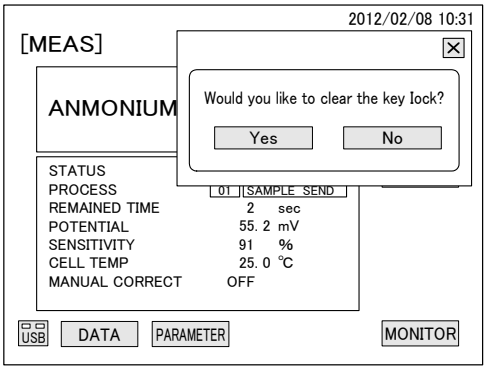
- The key lock is switched and the dialog box is closed.

[X] ··· When touched, the dialog box closes.

[No] ··· When touched, the dialog box closes without switching.



"Key lock set" dialog box



"Key lock clear" dialog box

⑤Check the key lock state. ····· Check the color of **[KEY LOCK]** after switching.

[KEY LOCK] is yellow-green. ····· Key lock cleared

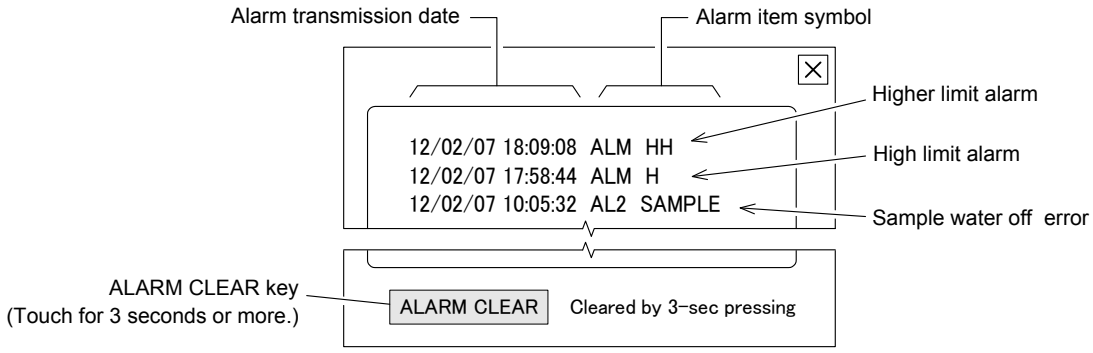
[KEY LOCK] is yellow ····· Key lock set

(5) Alarm check and clear

(a) Whether or not an alarm is currently transmitted can be checked by **[ALARM]** color as follows:

- **[ALARM]** is yellow-green. ····· No alarms
- **[ALARM]** is red. ····· Alarm

(b) When **[ALARM]** is touched, an "Alarm" dialog box opens. The alarm transmission date and alarm item symbol can be checked as long as alarm is not cleared. For the contents of alarm item symbol, refer to 6.1 "Alarm Items and Transmission".



Alarm Dialog Example

(c) The alarm items are classified as follows. Transmission of an alarm causes this equipment to output the appropriate signal.

- POWER OFF·····Power off output signal (Terminals: 30－31)
- FAILURE 1 (SERIOUS) ····· Failure 1 (serious) output signal (Terminals: 32 – 33)
- FAILURE 2 (MINOR) ····· Failure 2 (minor) output signal (Terminals: 34 – 35)
- HIGHER ALARM ····· Higher alarm output signal (Terminals: 36 – 37)
- HIGH ALARM ····· High alarm output signal (Terminals: 38 – 39)
- LOW ALARM ····· Low alarm output signal (Terminals: 40 – 41)

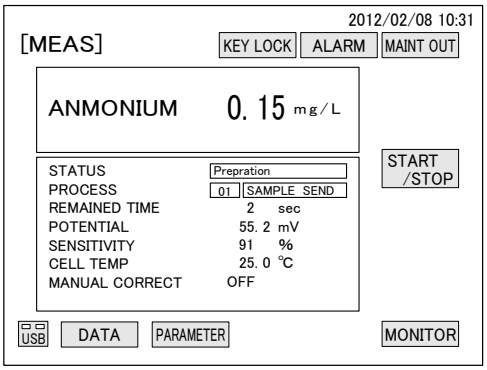
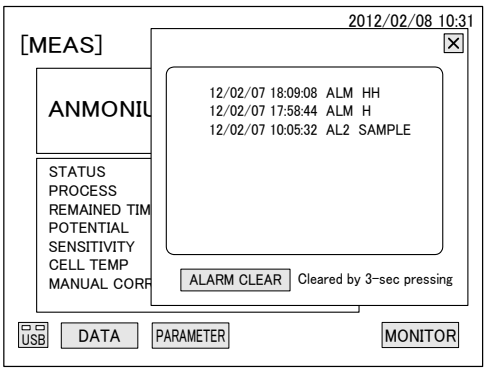
(d) Alarms transmitted by FAILURE 1 (SERIOUS) are not automatically cleared even when the failure returns to normal. In this case, it must be cleared by **[ALARM CLEAR]** of the "Alarm" dialog box. This operation closes all the "Alarm" dialog boxes, returns **[ALARM]** to yellow-green, and returns the FAILURE 1 (SERIOUS) signal output to OPEN.

- All the transmissions of alarms are recorded at "ALARM LOG" on the "DATA" screen as long as it is not initialized.

(e) When **[ALARM CLEAR]** is touched while an alarm is being transmitted, the transmitting alarm is cleared once. However, the same alarm item is immediately transmitted as a new alarm.

(f) When **[ALARM]** turns red, that is, when an alarm was transmitted, first touch **[ALARM]** and check the alarm item at the "Alarm" dialog box, and then process the alarm based on 6.2 "Alarm Handling for Items".

Alarm Check and Clear Operation

Step and operation	Screen example
①Display a screen with [ALARM] on it. ·····Display the "MEAS (MEAS)" screen or other screen with **[ALARM]** on it. **②Check for the transmission of alarms.** ····· Check for the transmission of alarms by **[ALARM]** color. **[ALARM]** is yellow-green. ··· Alarm is not transmitted **[ALARM]** is red. ··· Alarm is transmitted • When Alarm is not being transmitted, the following operations are unnecessary. **③Open the "Alarm" dialog box.** ····· Touch **[ALARM]**.	 **"MEAS (MEAS)" screen**
④Check the alarm item. ····· Check the alarm item symbols in the "Alarm" dialog box. • Refer to 6.1 "Alarm Items and Transmission" for the contents of the alarm item symbols. • To clear an alarm, go to step ⑥ after this operation. **⑤End alarm check.** ····· Touch [X] of the "Alarm" dialog box. • The dialog box closes and the display returns to the screen checked at step ①. **⑥Remove the cause of the alarm.** ····· Remove the cause of all the alarm items displayed in the "Alarm" dialog box. ＞＞ 6.2 "Alarm Handling for Items" **⑦Clear the alarms.** ····· Touch **[ALARM CLEAR]** of "Alarm" dialog box for more than 3 seconds. • All the transmissions of alarms are cleared, the dialog box is closed, and **[ALARM]** turns yellow-green. • The screen checked at step ① is displayed.	 **Alarm dialog box**

(6) "Maintenance in progress" signal switching

(a) The purpose of the "Maintenance in progress" signal is to inform a remote site that this equipment is under maintenance by opening and closing contacts.

(b) The output status of the "Maintenance in progress" signal (terminals 46-47) can be checked by **[MAINT OUT]** color as follows:

- **[MAINT OUT]** is yellow-green. ····· "Maintenance in progress" signal output cleared (normal)
- **[MAINT OUT]** is yellow. ····· "Maintenance in progress" signal output state

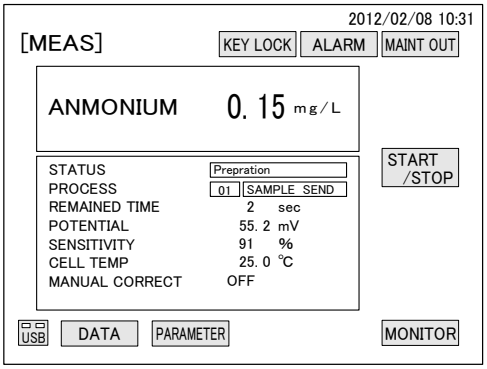
(c) Touching **[MAINT OUT]** opens a switching dialog box.

- Touch yellow-green **[MAINT OUT]**. ····· "Maintenance in progress signal output start" dialog box
- Touch yellow **[MAINT OUT]**.····· "Maintenance in progress signal output clear" dialog box

"Maintenance in progress" Signal Switching Operation

Step and operation	Screen example

①Check that [MAINT OUT] is displayed on the screen. ····· Check that the "MEAS (MEAS STOP)" or other screen with **[MAINT]** is displayed.



"MEAS (MEAS)" screen

②Check the output state of the "Maintenance in progress" signal. ····· Check the output state of the "Maintenance in progress" signal by **[MAINT OUT]** color.

[MAINT OUT] is yellow-green. ····· "Maintenance in progress" signal output cleared (normal)

[MAINT OUT] is yellow. ····· "Maintenance in progress" signal output state

- When not switching "Maintenance in progress" signal output, the following operations are unnecessary.

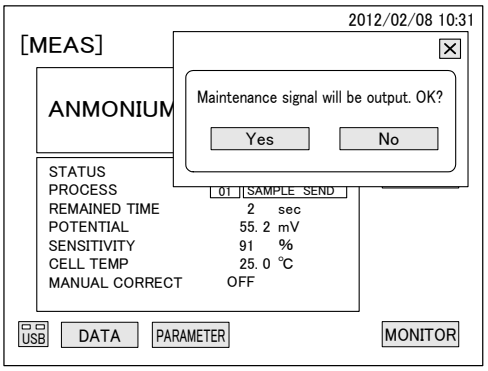
③Open the "Maintenance in progress" signal dialog box. ····· Touch **[MAINT OUT]**.

④Switch the "Maintenance in progress" signal output. ····· Touch **[Yes]** in the "Maintenance in progress signal output start" or "Maintenance in progress signal output clear" dialog box.

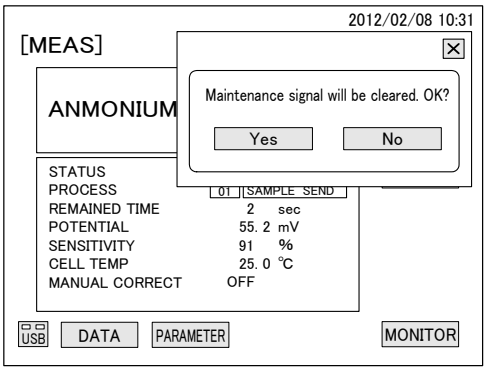
- The "Maintenance in progress" signal output is switched and the dialog box is closed.

[X] ··· When touched, the dialog box closes.

[No] ··· When touched, the dialog box closes without switching.



"Maintenance in progress signal output start" dialog box



"Maintenance in progress signal output clear" dialog box

⑤Check the "Maintenance in progress" signal output. ····· Check that **[MAINT OUT]** becomes the post-switching color.

[MAINT OUT] is yellow-green. ····· "Maintenance in progress" signal output cleared.

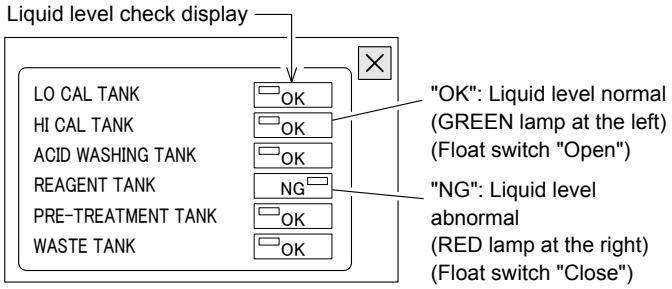
[MAINT OUT] is yellow. ····· "Maintenance in progress" signal output state

(7) Liquid level check of tanks by monitor

(a) The liquid level of the LO calibration solution tank and other tanks can be checked by “Monitor” dialog box opened by touching **[MONITOR]**.

(b) The result of judgment of the liquid level by float switch of each tank is displayed in the “Monitor” dialog box.

- “OK” (green lamp at the left) ····· Liquid level normal
- “NG” (red lamp at the right) ····· Liquid level abnormal



Display by Monitor Dialog Box Liquid Level Judgment

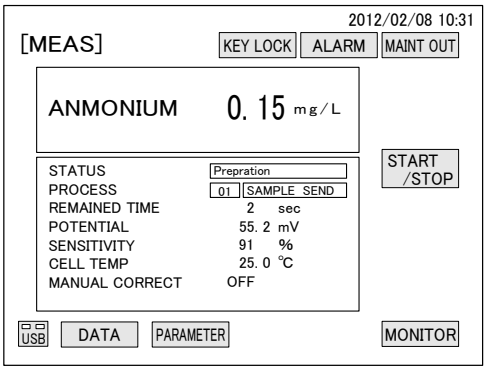
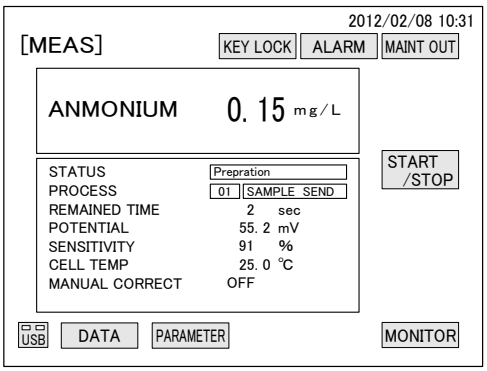
(c) The “WASTE TANK” judgment displays “NG” when the waste tank input signal (contacts “Closed”, terminals 60-61) from the waste tank (option) provided outside the equipment was input.

(d) When “NG” (red, liquid level abnormal) was displayed, an alarm is also transmitted. However, the pre-treatment tank may not transmit an alarm depending on the setting. If “NG” was displayed, refer to the relevant item and fill (or drain) that tank. After processing, the display automatically returns to “OK” (green, liquid level normal). ＞＞ 5.5 “Solution Addition and Replacement”

Liquid Level Abnormal (NG) Alarms

Monitor item	Alarm item	Alarm type	Function
LO calibration solution tank	LO calibration solution off error (AL2_CALIB_L)	FAILURE 2 (MINOR)	Measurement continues, not calibrated
HI calibration solution tank	HI calibration solution off error (AL2_CALIB_H)	Same as above	Measurement continues, not calibrated
Acid washing tank	Acid washing off error (AL2_WASH)	Same as above	Measurement continues, not washed
Reagent tank	Reagent off error (AL2_REAGENT)	Same as above	Measurement continues.
Pre-treatment tank	Sample off error (AL2_SAMPLE)	Same as above	Measurement stops, When “Sample water alarm” setting is OFF at the “PARAMETER 2 SET (2)” screen, an alarm is not transmitted.
Waste tank	Waste tank full error (AL2_EFFLU)	Same as above	Measurement stops, displayed by input of waste tank full input signal (option) input.

Monitor Dialog Box Liquid Level Judgment Operation

Step and operation	Screen example
①Display a screen with [MONITOR] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[MONITOR]** on it. **②Open the "Monitor" dialog box.** ····· Touch **[MONITOR]**	 **"MEAS (MEAS)" screen**
③Specify the kind tank whose liquid level is abnormal. ····· Specify the kind of tank whose liquid level is abnormal by monitor dialog box liquid level judgment result. **④Close the dialog box** ····· Touch **[X]** in the dialog box (Perform 5.5 "Solution Addition and Replacement")	 **Monitor dialog box**

(8) USB memory removal

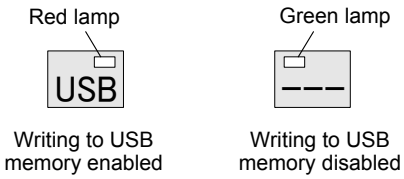
(a) Before the USB memory inserted into the equipment to recover data to a PC, etc. can be removed it must be placed into the removable state.

【IMPORTANT】 • If the USB memory was removed when it was not in the removable state, writing to the USB memory may not be performed normally.

(b) Preparation of spare USB ····· The measured value is written minute by minute to the USB memory inserted into the equipment. Since writing to USB memory is not performed while the USB memory is removed, when removing the USB memory, we recommend that you prepare a spare USB memory so that it can be immediately installed.

〔NOTE〕 • When writing the measured value, etc. recorded by the equipment to USB memory in a batch, refer to 4.2(3) "Batch writing to USB memory".

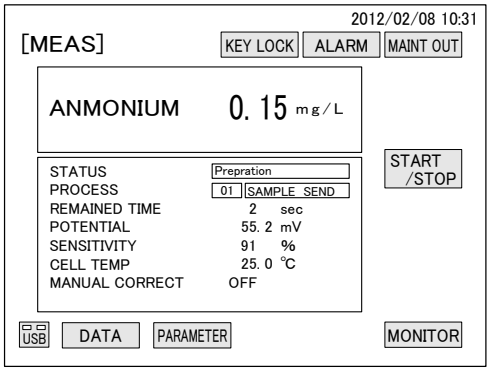
(c) Write OK check ····· When the red lamp at the top right-hand side of the USB key is lit, a USB memory is installed to the equipment and data can be written. When the green lamp at the top left-hand side of the USB key is lit and "USB" is not displayed, a USB memory is not inserted or is not operating normally. When a USB memory was re-inserted, check that the red lamp of the USB key is lit.



USB Key Display Change

【IMPORTANT】 • When [USB REMOVAL] at the "USB REMOVAL" screen was touched for more than 1 second and USB removal was aborted at "USB REMOVAL OK", [RETURN] does not function and writing also remains disabled. In this case, remove and re-insert the USB memory. [RETURN] is enabled.

USB Memory Removal Operation

Step and operation	Screen example
①Display a screen with [USB] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[USB]** on it. **②Display the "CF/USB REMOVAL" screen.** ····· Touch **[USB]**. • When "---" is displayed (when the green lamp is lit) at [USB] even though USB memory is installed, remove the USB memory and then reinstall it correctly.	 **"MEAS (MEAS)" screen**
③Place the USB memory into the removable state. ····· Touch **[USB REMOVAL]** of the "CF/USB REMOVAL" screen for more than 1 second. • **[USB REMOVAL]** switches to "USB REMOVAL OK".	 **"CF/USB REMOVAL" screen**

(To be continued)

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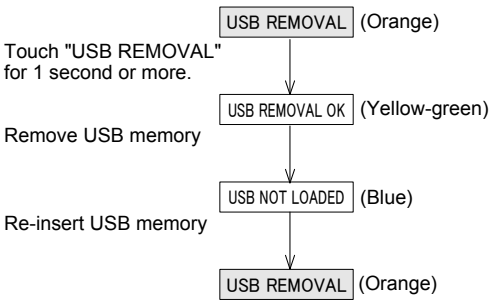
Step and operation	Screen example
④Remove the USB memory. ····· Check that the "CF/USB REMOVAL" screen becomes [USB REMOVAL OK] (yellow-green), remove the USB memory from the equipment, and install the alternate USB memory. • After [USB REMOVAL] changes to [USB NOT LOADED], it changes to **[USB REMOVAL]**. • Even if removal of USB memory is stopped here, it must be removed and re-inserted. **⑤Close "CF/USB REMOVAL" screen** ····· Touch **[RETURN]** of the "CF/USB REMOVAL" screen for more than 1 second. • The display returns to the screen at step ①.	 **Display change of "CF/USB REMOVAL" screen**

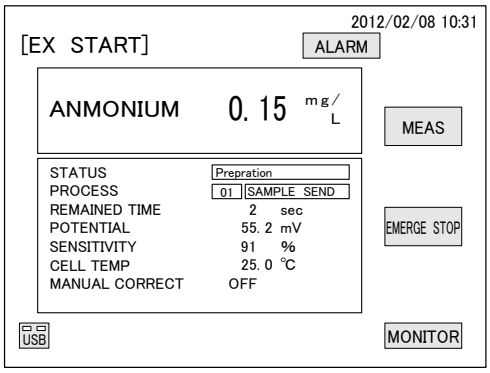
(9) Switching to internal start from external start and communication start

(a) When "IN/EX START" of the "PARAMETER 2" screen is set to "EX START" or "COMM START", the screen changes to the "MEAS (EX START)" or "MEAS (COMM START)" screen unlike in the case of internal start. Before operating the keys displayed on this screen, temporarily switch to internal start.

(b) Refer to the following items for a description of operation after switching to internal start.

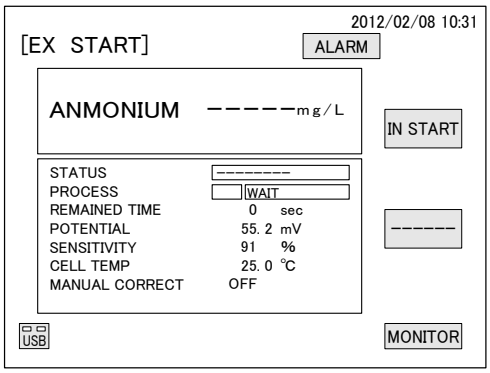
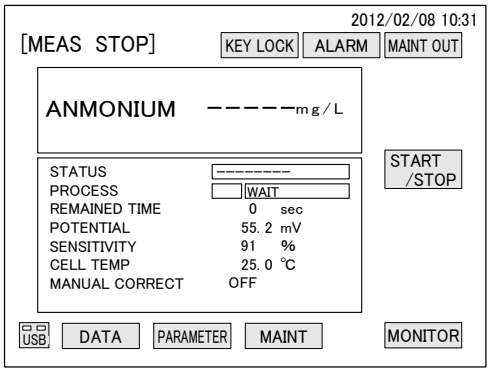
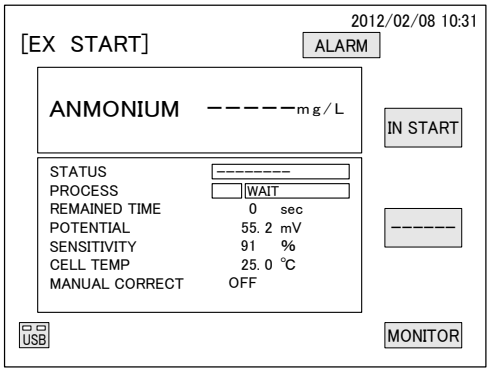
- 4.1 "Measurement Screen Operation"
- 4.2 "Data Screen Operation"
- 4.3 "Parameter Screen Operation"
- 4.4 "Maintenance Screen Operation"

Switching to Internal Start from External Start and Communication Start Operation

Step and operation	Screen example
①Stop measurement. ····· When "EX START" or "INNER START" is displayed at the top left-hand corner of the screen and "MEAS" is displayed at the right-hand side of the screen, touch [EMERGE STOP]. • The screen changes to the "MEAS (EX START – MEAS STOP)" or "MEAS (COMM START – MEAS STOP)" screen. • When **[IN START]** is displayed at the right-hand side of the screen before this operation, since measurement is already stopped, go to step ②.	 **"MEAS(EX START – MEAS)" screen**

(To be continued)

(Continued from previous page)

Step and operation	Screen example
②Switch to internal start. ····· Touch **[IN START]** of the "MEAS (EX START-MEAS STOP)" or "MEAS (COMM START-MEAS STOP)" screen. • The screen changes to the "MEAS (MEAS STOP)" screen.	 **"MEAS (EX START – MEAS STOP)" screen**
③Perform the necessary operations. ····· Perform operation by referring to the necessary items of this instruction manual. **④Return to external start or communication start.** ····· >> 4.3(14) "Start method switching" • The screen changes to the "MEAS (EX START-MEAS STOP)" or "MEAS (COMM START-MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
⑤Restart measurement. ····· Restart measurement by inputting the measurement start signal (35-36) from the outside or by communication function.	 **"MEAS (EX START – MEAS STOP)" screen**

(10) Parameters check

(a) The parameters (measurement conditions) can be checked even during measurement. Refer to 4.3 "Parameter Screen Operation" for a detailed description of each parameter.

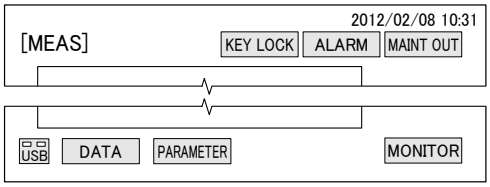
(b) Parameters cannot be changed during measurement. When changing the parameters, stop measurement and refer to 4.3 "Parameter Screen Operation".

Parameters Check Operation

Step and operation	Screen example

①Display a screen with [PARAMETER] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[PARAMETER]** on it.

②Display the "PARAMETER 1 SET" screen. ····· Touch **[PARAMETER]** in the "MEAS (MEAS)" screen or other screen.

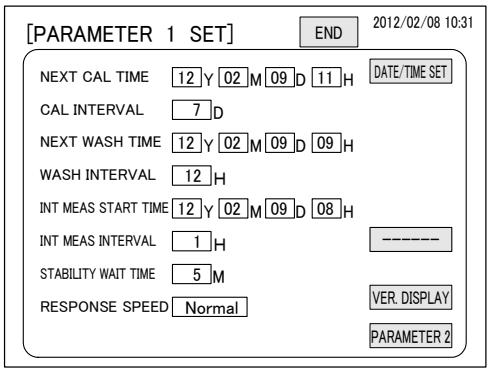


"MEAS (MEAS)" screen

③Check the parameters of the "PARAMETER 1 SET" screen. ····· Check the set value of each parameter of the "PARAMETER 1" screen.

- When not checking the "PARAMETER 2" screen, go to step ⑥ after this operation.
- When **[VER DISPLAY]** is touched, the version number (update number) of the program currently installed in this equipment is displayed.
  >> 4.3(12) "Version screen check"

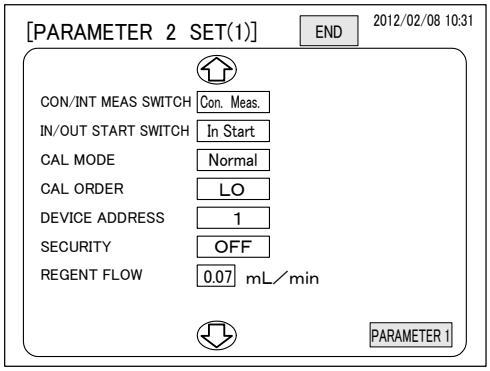
④Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1" screen.



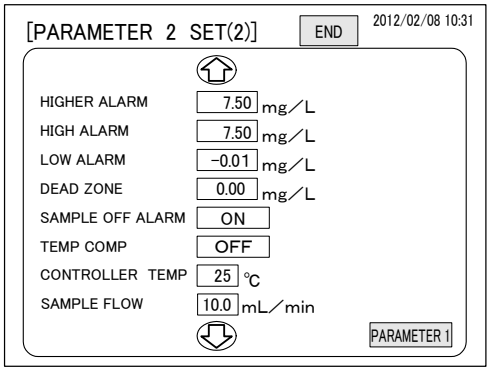
"PARAMETER 1 SET" screen

⑤Check the parameter of the "PARAMETER 2 SET" screen. ····· Check the set value of each parameter of the "PARAMETER 2 SET" screen.

[↓] • [↑] ··· When touched, the page is switched.



"PARAMETER 2 SET(1)" screen



"PARAMETER 2 SET (2)" screen

(To be continued)

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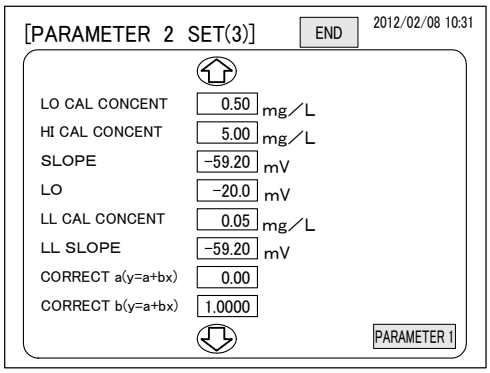
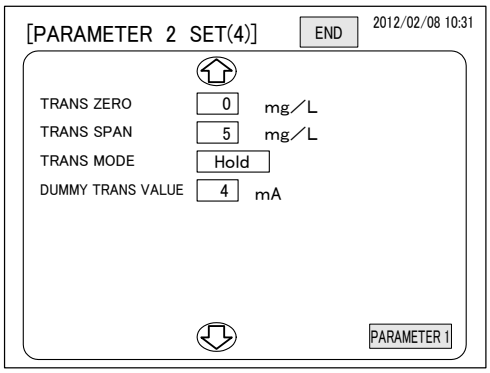
Step and operation	Screen example



“PARAMETER 2 SET (3)” screen



“PARAMETER 2 SET (4)” screen

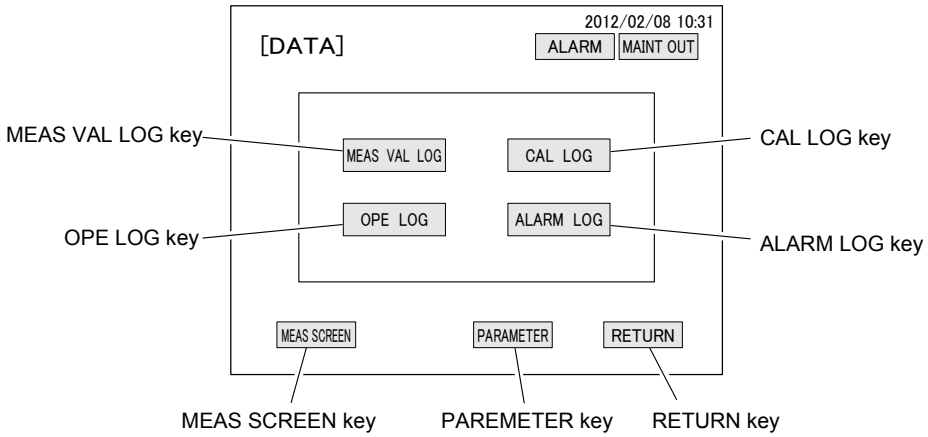
⑥**Return to the “MEAS (MEAS)” screen.** ····· After the end of parameters check, touch **[END]** of the “PARAMETER 1” or “PARAMETER 2” screen.

4.2 Data Screen Operation

(1) Data screen functions

(a) When **[DATA]** is touched at the "MEAS (MEAS STOP)" or "MEAS (MEAS)" screen, the "DATA" screen is displayed.

(b) The four logs, including the measured values log (recording), can be checked and initialized. Batch writing to USB memory is also possible. Refer to 4.2(2) "Measured value log check and initialize" and subsequent items.



"DATA" Screen

Data Screen Keys

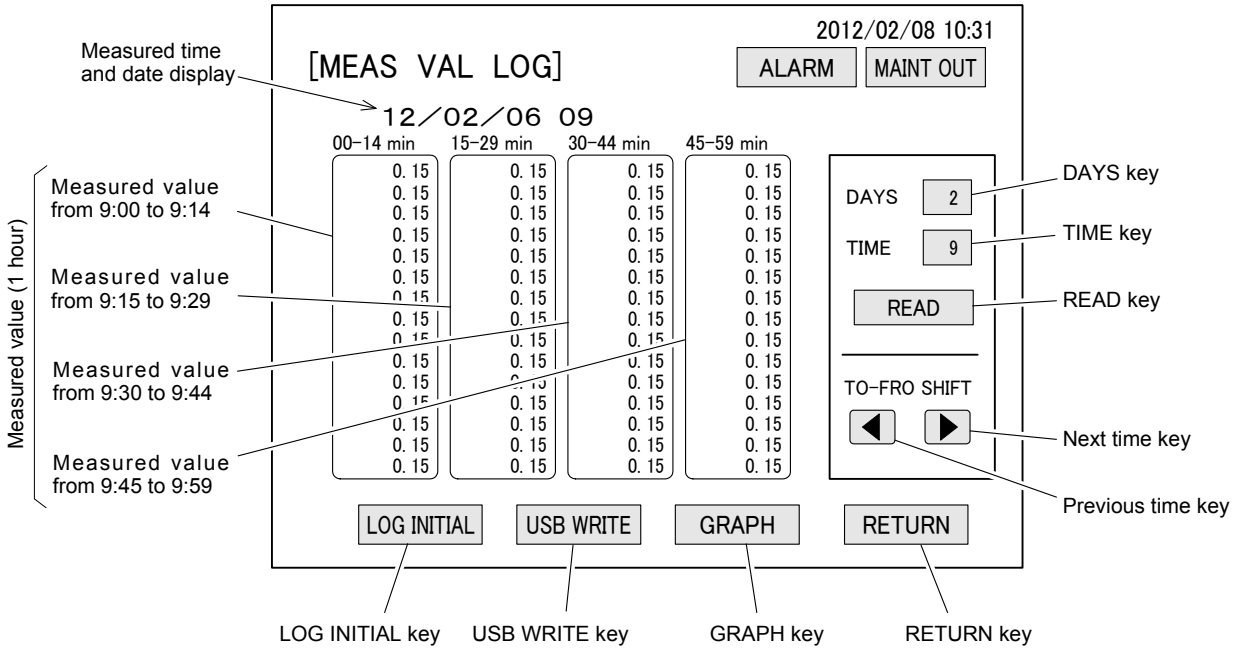
Name and notation in text	Function
Measured value log key **[MEAS VAL LOG]**	• When touched, the "MEAS VAL LOG" screen is displayed. At the screen, measured value check by the specified date and time, graph display, measured value log initialization, and writing to USB memory can be performed. ＞＞ 4.2(2) "Measured value log check and initialize", 4.2(3) "Batch writing to USB memory"
Operation log key **[OPE LOG]**	• When touched, the "OPE LOG" screen is displayed. At the screen, power on (ON) and other operation recordings can be checked. ＞＞ 4.2(5) "Operation log check and initialize"
Calibration log key **[CAL LOG]**	• When touched, the "CAL LOG" screen is displayed. At the screen, the calibration date and time and the calibration contents can be checked. ＞＞ 4.2(4) "Calibration log check and initialize"
Alarm log key **[ALARM LOG]**	• When touched, the "ALARM LOG" screen is displayed. At the screen, power off and other alarm recordings can be checked. ＞＞ 4.2(6) "Alarm log check and initialize"
Measurement screen key **[MEAS SCREEN]**	• When touched, the "MEAS (MEAS STOP)" or "MEAS (UNDER MEAS)" screen is displayed.
Parameter key **[PAREMETER]**	• When touched, the "PARAMETER 1 SET" screen is displayed.
Return key **[RETURN]**	• When touched, the "MEAS (MEAS STOP)" or "MEAS (MEAS)" screen is displayed.

(2) Measured value log check and initialize

(a) The date and time can be specified and the measured value log (recording) can be read to the screen and checked. The measured value log can also be changed to graph display and checked and initialized (batch erased).

(b) Since the measured values, etc. for a month before the current time are recorded in the equipment, the measured value log for at least the last month can be checked. If initialized, only the measured values after initialization are displayed.

(c) Refer to 4.2(3) "Batch writing to USB memory" for a description of the [USB WRITE] operation.



"MEAS VAL LOG" Screen (Measured value log screen)

Measured Value Log Screen Keys

Name and notation in text	Function
Days key **[DAYS]**	• When touched repeatedly, the numerical keypad dialog box is displayed and the number of previous days of measured value logs that are to be displayed (read) can be changed.
Time key [**TIME**]	• When touched repeatedly, the numerical keypad dialog box is displayed and the number of previous hours of measured value logs that are to be displayed (read) can be changed. • When **[READ]** is touched, the measured values for 1 hour from this time are displayed.
Read key [**READ**]	• When touched, the measured value of the time set at **[DAYS]** and **[TIME]** is displayed on this screen. • The display divides the measured values of 1 hour into 15 minute segments.
Previous time key **[◀]**	• When touched, the measured values 1 hour before the measurement date and time display are displayed.
Next time key **[▶]**	• When touched, the measured values 1 hour after the measurement date and time display are displayed.

(To be continued)

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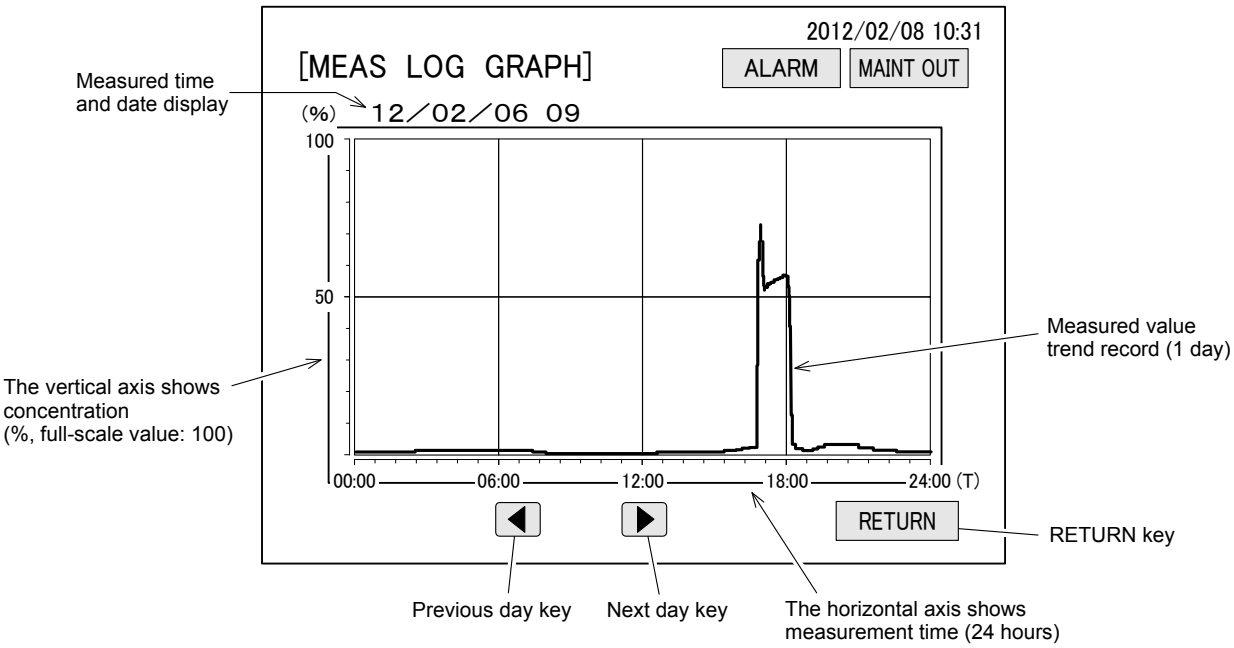
Name and notation in text	Function
Log initializing key **[LOG INITIAL]**	• When touched, "Log initializing" dialog box targeted for the measured value log opens. When **[Yes]** is touched at this dialog box, all the measured value logs are erased.
USB write key **[USB]**	• When touched, the "USB WRITE" screen is displayed. • When **[WRITE START]** is touched at the "USB WRITE" screen, the measured value logs for the last 1 month saved by the equipment are copied to USB memory. ＞＞ 4.2(3) "Batch writing to USB memory"
Graph display key **[GRAPH]**	• When touched, the "MEAS GRAPH" screen is displayed and the measured values are displayed on a chart graph.
Return key **[RETURN]**	• When touched, the "DATA" screen is displayed.

(d) When **[GRAPH]** is touched at the "MEAS VAL LOG" screen, the "MEAS LOG GRAPH" screen is displayed and the measured values for the day are displayed by trend recording. The vertical axis scale of the measured value log graph is percent. When the measurement range is 0.1-10 mg/L (transmission ZERO is 0 and transmission SPAN is 10), 0 mg/L becomes 0% and 10 mg/L becomes 100%.

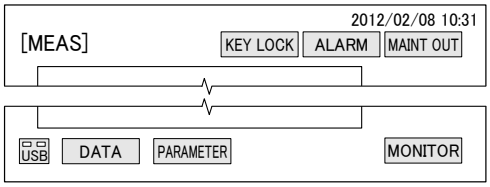
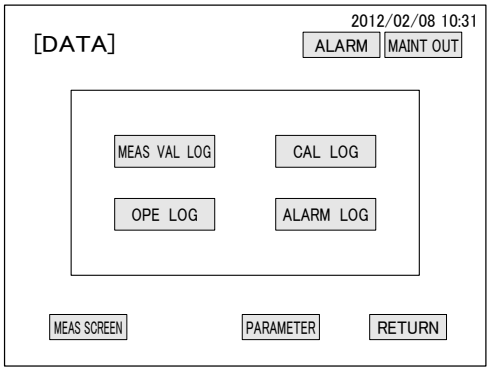
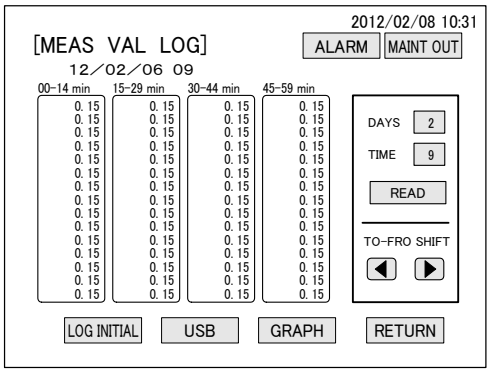
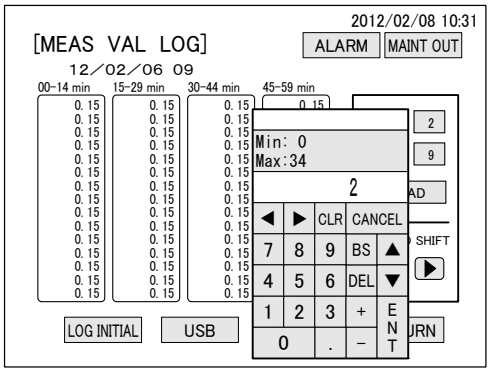


"MEAS LOG GRAPH" Screen (Measured value log graph screen)

Measured Value Log Graph Screen Keys

Name and notation in text	Function
Previous day key **[◀]**	• When touched, recording switches to previous day's measured values trend recording.
Next day key **[▶]**	• When touched, recording switches to next day's measured values trend recording.
Return key **[RETURN]**	• When touched, the "MEAS VAL LOG" screen is displayed.

Measured Value Log Check and Initialization Procedure

Step and operation	Screen example
①Display a screen with [DATA] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[DATA]** on it. **②Display the "DATA" screen.** ····· Touch **[DATA]**.	 **"MEAS (MEAS)" screen**
③Display the "MEAS VAL LOG" screen. ····· Touch **[MEAS VAL LOG]** in the "DATA" screen. • When performing initialization without checking the measured values, go to step ⑨ after this operation. • When checking the measured value log by graph instead of value, go to step ⑥ "Display a graph" after this operation.	 **"DATA" screen**
④Set the time to be checked. ····· Set the measurement date display of the **[MEAS VAL LOG]** screen to the date to be checked by the following procedure. ⓐ Touch the box at the right side of "DAYS". •A numerical keypad dialog box is displayed.	 **"MEAS VAL LOG" screen**
ⓑ Enter the "number of previous days" at "INPUT VALUE DISPLAY" section from the numerical keypad and touch **[ENT]**. ＞＞ Figure "Kinds of numerical keypad keys" Setting range: 0 to 34 days (number of days from the date at the top right corner of the screen) •When **[ENT]** is touched, the numerical keypad of "DAYS" dialog box disappears. ⓒ Touch the box at the right of "TIME" to display the time display of the measurement log to be checked at "INPUT VALUE DISPLAY" section of the numerical keypad and touch **[ENT]**. Setting range: 0 to 23 days (1 hour measured value start time) •When **[ENT]** is touched, the numerical keypad of "TIME" dialog box disappears at the same time.	 **Numerical Keypad of "DAYS" dialog box**

(To be continued)

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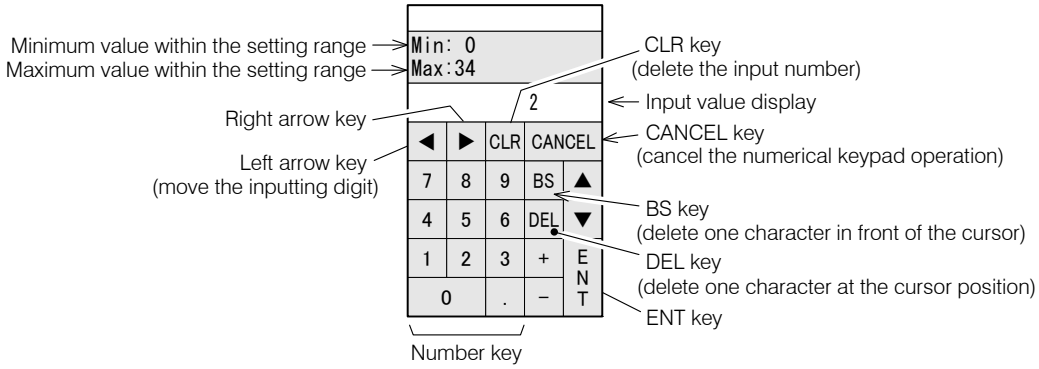
Step and operation	Screen example



Kinds of numerical keypad keys

⑤Check the measured values. ····· Check the measured values of the "MEAS VAL LOG" screen.

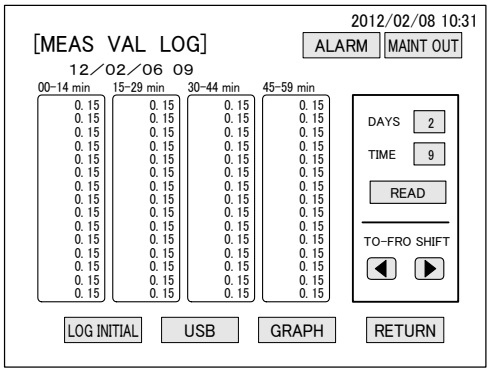
- The measured values log of the previous and next time can be displayed by the following to-and-fro shift keys.

[◀] ··· Read the measured values of the one hour ago to the screen.

[▶] ··· Read the measured values of the one hour later to the screen.

- When not displaying a graph, go to step ⑧ after this operation.

⑥Display a graph. ····· Touch **[GRAPH]** in the "MEAS VAL LOG" screen.



"MEAS VAL LOG" screen

⑦Check at the graph display. ····· Check the displayed trend recorded measured values at the "MEAS VAL LOG GRAPH" screen. After checking, touch **[RETURN]**.

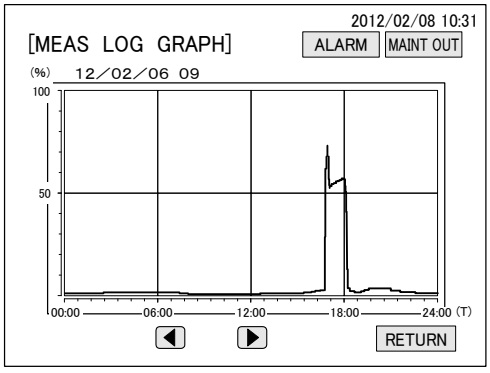
- The measured values graph of the previous and next day can be displayed by the following keys.

[◀] ··· Switches to the previous day's measured values graph

[▶] ··· Switches to the next day's measured values graph

⑧Return to the "MEAS VAL LOG" screen. ····· Touch **[RETURN]** of the "MEAS VAL LOG" screen

- When not initializing the measured value log, go to step ⑪ "End "DATA" screen operation" after this operation.



"MEAS LOG GRAPH" screen

(To be continued)

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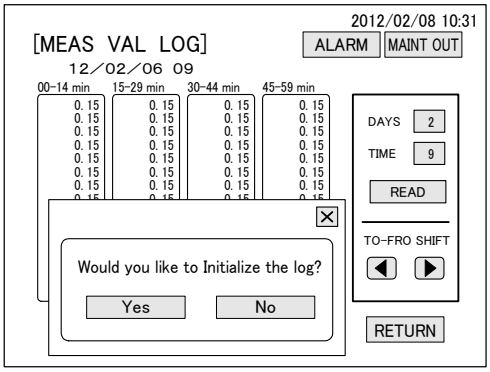
Step and operation	Screen example
⑨**Open "Log initializing" dialog box** ····· Touch **[LOG INITIAL]** in the "MEAS VAL LOG" screen. ⑩**Initialize the measured value log.** ····· Touch **[Yes]** in the "Log initializing" dialog box. • The dialog box is closed by initialization. **[X]** ··· When touched, the dialog box closes. **[No]** ··· When touched, the dialog box closes without initializing. ⑪**End "DATA" screen operation.** ····· Touch **[RETURN]** of the "MEAS VAL LOG" screen and then touch **[RETURN]** of the displayed "DATA" screen. • The display returns to the screen at step ①	 **"Log initializing" dialog box**

(3) Batch writing to USB memory

(a) The data of the last month saved by the equipment can be batch written to USB memory.

【IMPORTANT】 • Since this operation must stop measurement, measurements are missed during this time. Moreover, since it takes about 3 hours, depending on the amount of data saved, perform this operation only when necessary.

〔NOTE〕 • Normally, the equipment saves the data every minute. The amount of data saved by the equipment is 1 month's worth. When 1 month is exceeded, the newest month's data is written over the old data. If a USB memory is inserted at the USB interface, the data is also saved to the USB memory. USB memory can save about 1 years' worth of data. This function is called "USB sequential write". "USB batch write" is a function which copies the data of the last 1 month saved by the equipment to USB memory under a different filename.

(b) The data to be written is measured values, electrode potential (EMF), cell temperature, and equipment status (status display). Each of them is read every minute.

(c) Since there is no **[USB WRITE]** key on the "MEAS VAL LOG" screen opened from the "MEAS (MEAS)" screen, this batch write operation cannot be performed. Always open it from the "MEAS (MEAS STOP)" screen.

(d) When "USB FILE LIST" of the "USB WRITE" screen is touched, a list of the files currently stored in the USB memory is displayed in a dialog box. Filenames preceded by "L" like the following example are batch saved data. One file holds one day's worth of data.

Example) 20120204. CSV ····· Sequentially saved data of February 4, 2012.

Example) L_120204. CSV ····· Batch saved data of February 4, 2012.

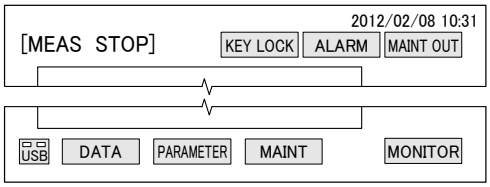
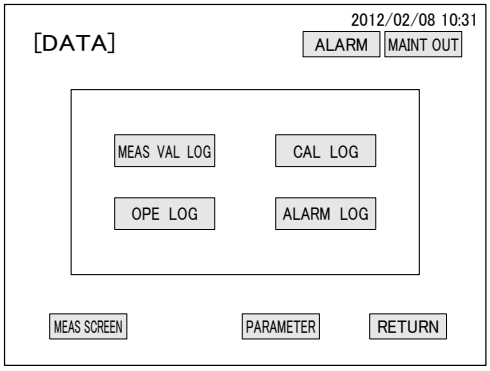
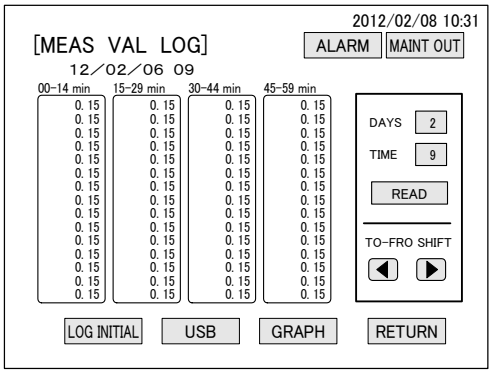
(e) If the following conditions are met, commercial USB memory can also be used.

Standard ····· USB1.1Mass storage Class

Format ····· FAT

Capacity ····· More than 32 MB (The data of 1 year can be stored.)

Batch Write to USB Memory Procedure

Step and operation	Screen example
①Display the "MEAS (MEAS STOP)" screen. ····· When measuring, stop the measurement. ＞＞ 4.1(3) "Automatic measurement stop"	
②Display the "DATA" screen. ····· Touch **[DATA]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
③Display the "MEAS VAL LOG" screen. ····· Touch **[MEAS VAL LOG]** in the "DATA" screen.	 **"DATA" screen**
④Display the "USB WRITE" screen. ····· Touch **[USB WRITE]** in the "MEAS VAL LOG" screen.	 **"MEAS VAL LOG" screen**

(To be continued)

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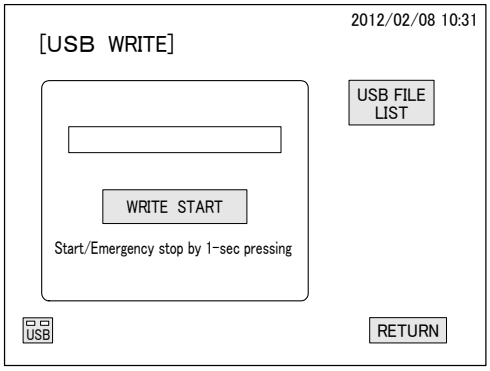
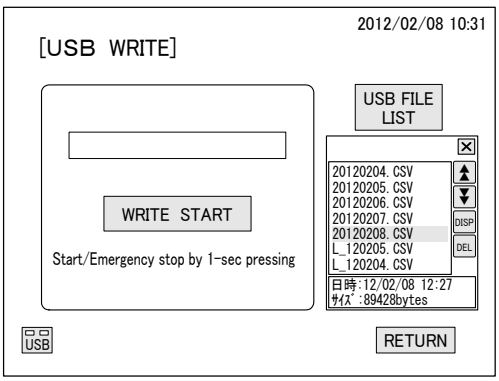
Step and operation	Screen example

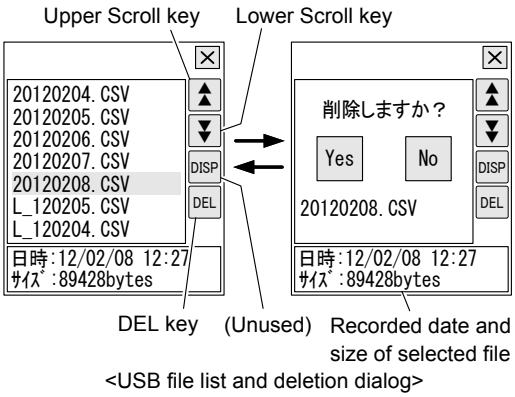
⑤Load the USB for batch write. ····· Remove the USB memory for sequential write from the USB interface and insert the USB memory for batch write.

- Common use with USB memory for sequential write is also possible.
- When **[USB FILE LIST]** is touched, a list of the files currently stored in the USB memory is displayed in a "USB file" dialog box.
- If there is a file you want to delete to secure capacity before writing, select (reverse display) the file by touching it, then touch **[DEL]** and touch **[Yes]** in the "Deletion" dialog box and the file is deleted.



"USB WRITE (START)" screen





<USB file list and deletion dialog>

"USB FILE LIST" dialog box

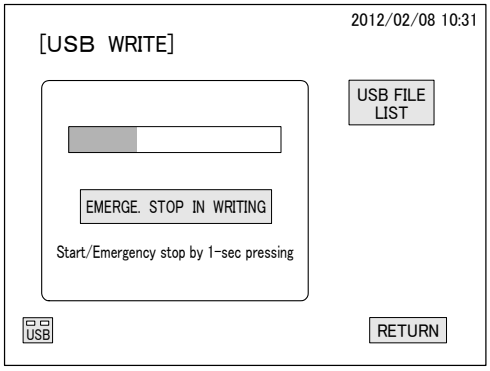
⑥Start writing. ····· Touch **[WRITE START]** at the "USB WRITE (START)" screen.

- Display the "USB WRITE (WRITING)" screen.

⑦Wait for writing to end. ····· Wait until **[EMERGE. STOP IN WRITING]** of the "USB WRITE (WRITING)" screen switches to **[WRITE START]**.

- When **[EMERGE. STOP IN WRITING]** is touched, writing is aborted.
- A bar graph shows how far writing has progressed

⑧Display the "CF/USB REMOVAL" screen. ····· Touch **[USB]** of the "USB WRITE (START)" screen.



"USB WRITE (WRITING)" screen

(To be continued)

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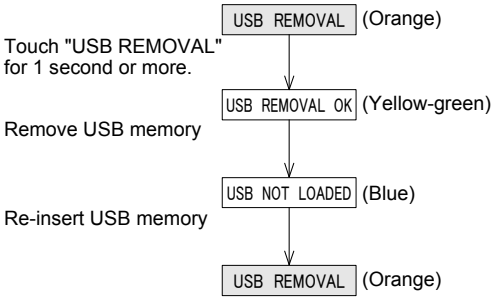
Step and operation	Screen example
⑨**Enable USB removal.** ····· Touch **[USB REMOVAL]** of the "CF/USB REMOVAL" screen for more than 1 second.	 **"CF/USB REMOVAL" screen**
⑩**Return to the sequential write USB memory.** ····· Check that **[USB REMOVAL]** has switched to **[USB REMOVAL OK]** and remove the USB memory for batch write from the USB interface. When switched to **[USB NOT LOADED]**, insert the USB memory for sequential write. ⑪**End writing to USB memory.** ····· Touch **[RETURN]** of the "CF/USB REMOVAL" screen and then touch **[RETURN]** of the displayed "MEAS VAL LOG" screen. Next, touch **[RETURN]** of the displayed "DATA" screen. • The display returns to the screen at step ① ⑫**Restart measurement.** ····· Restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **Display change of "CF/USB REMOVAL" screen**

(4) Calibration log check and initialize

(a) The calibration log (recording) can be checked by reading it to the screen. That calibration log can also be initialized (batch erased).

(b) Since the calibration log for the last 1 month before the current time is recorded by the equipment, when the calibration log is initialized within 1 month, only the calibration log after initialization is displayed.

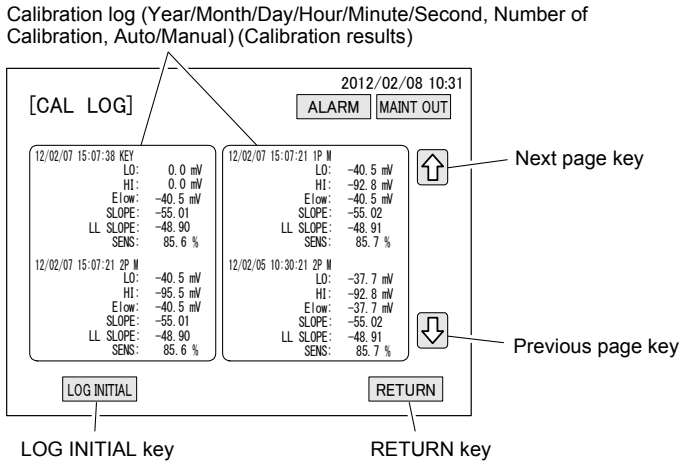
(c) 1P, 2P or 3P displayed together with the calibration date and time on the "CAL LOG" screen show the following calibration results, respectively. This calibration result is reflected at the calibration curve (calibration arithmetic expression). Measurements are based on this calibration curve until the next calibration is performed.

1P ····· LO calibration result. LO calibration updates the LO (LO calibration solution electrode potential) and Elow (calibration correction value) values and reflects them in the calibration curve (arithmetic expression).

2P ····· HI calibration result. HI calibration updates the HI (HI calibration solution electrode potential) and SLOPE (LO, HI calibration slope) values and reflects them in the calibration curve (arithmetic expression).

3P ····· LL calibration result. LL calibration (option) updates the LL SLOPE (LL calibration slope) value and reflects it in the calibration curve (arithmetic expression).

(d) The "CAL LOG" screen log symbols and their contents are shown in the table "Calibration log symbols and items".



"CAL LOG" Screen (Calibration log screen)

Calibration Log Screen Keys

Name and notation in text	Function
Next page key **[⇧]**	• When touched, the calibration log screen is switched in the present direction.
Previous page key **[⇩]**	• When touched, the calibration log screen is switched in the past direction.
Log initialize key **[LOG INITIAL]**	• When touched, a calibration log "Log initializing" dialog box opens. When **[Yes]** is touched at this dialog box, all the calibration logs are erased.
Return key **[RETURN]**	• When touched, the "DATA" screen is displayed.

(e) The calibration log is displayed by symbols. The calibration log symbols and their meaning are shown in the following table.

Calibration Log Symbols and Items

Log symbol	Item name	Contents
1P	LO calibration result	• This symbol shows the calibration result by LO calibration solution.
2P	HI calibration result	• This symbol shows the calibration result by HI calibration solution.
3P	LL calibration result	• This symbol shows the calibration result by LL calibration solution.
A	Automatic calibration	• Shows that this calibration is the automatic calibration.
M	Manual calibration	• Shows that this calibration is the manual calibration.
KEY	Change calibration value	• This symbol shows the change results of parameter value by key operation.
NG STB	Stability check at calibration error	• Shows that calibration is not performed normally because error is generated by stability check at calibration. The values are based on the previous calibration results.
NG	Calibration error	• Shows that calibration is not performed normally because calibration error (1P: LO Electrode potential drift error, 2P: SLOPE error, 3P: LLSLOPE error) is generated. The values are based on the previous calibration results.

(To be continued)

(Continued from previous page)

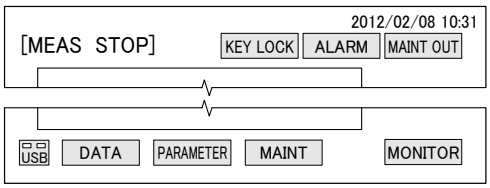
Log symbol	Item name	Contents
LO	LO calibration solution electrode potential	• LO calibration solution EMF (potential) by latest LO calibration
HI	HI calibration solution electrode potential	• HI calibration solution EMF (potential) by latest HI calibration
Elow	Calibration correct value	• Electrode potential by LO calibration. Key input can be performed.
SLOPE	LO, HI calibration slope	• Slope of calibration curve by latest LO, HI calibration
LL SLOPE	LL calibration slope (option)	• Slope of calibration curve by latest LL calibration
SENS	Electrode sensitivity	• Ion electrode sensitivity (%)

Calibration Log Check and Initialization Procedure

Step and operation	Screen example

①Display a screen with [DATA] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[DATA]** on it.

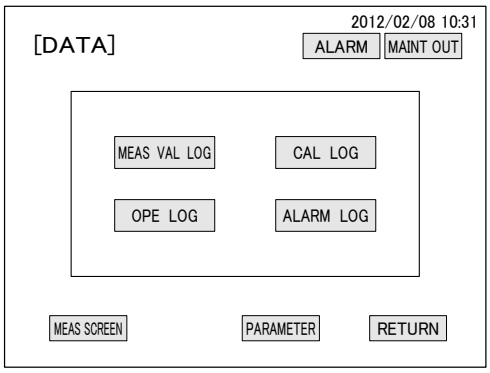
②Display the "DATA" screen. ····· Touch **[DATA]**.



"MEAS (MEAS)" screen

③Display the "CAL LOG" screen. ····· Touch **[CAL LOG]** in the "DATA" screen.

- When performing initialization without checking the calibration log, go to step ⑤ after this operation.



"DATA" screen

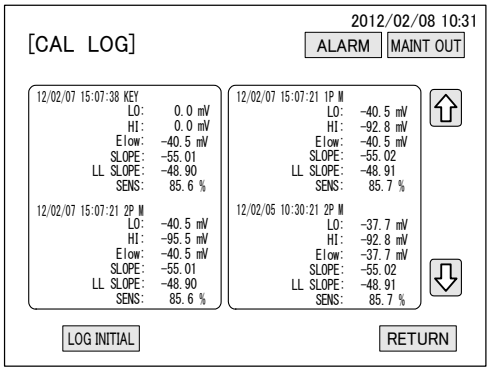
④Check the operation items. ····· Switch the page at the "CAL LOG" screen and check the necessary calibration items.

[↑] ··· When touched, switches to the next page.

[↓] ··· When touched, switches to the previous page.

- When not initialization calibration log, go to step ⑦ after this operation.

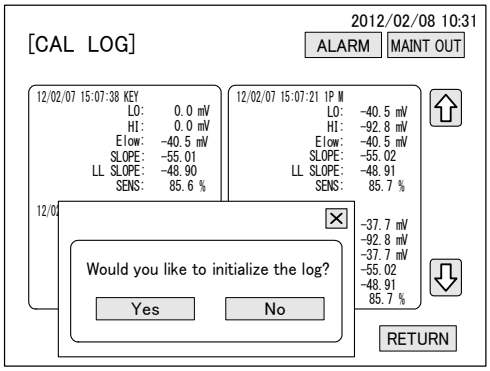
⑤Open "Log initializing" dialog box ····· Touch **[LOG INITIAL]** in the "CAL LOG" screen.



"CAL LOG" screen

(To be continued)

(Continued from previous page)

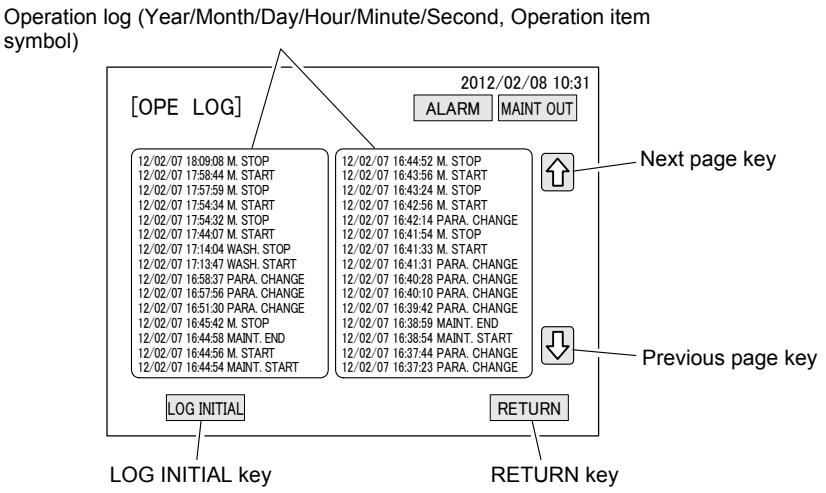
Step and operation	Screen example
⑥Initialize the calibration log. ····· Touch **[Yes]** in the "Log initializing" dialog box. • The dialog box is closed by initialization. **[X]** ··· When touched, the dialog box closes. **[No]** ··· When touched, the dialog box closes without initializing. **⑦End "DATA" screen operation.** ····· Touch **[RETURN]** of the "CAL LOG" screen and then touch **[RETURN]** of the displayed "DATA" screen. • The display returns to the screen checked at step ①	 **"Log initializing" dialog box**

(5) Operation log check and initialize

(a) The operation log (recording) can be checked by reading it to the screen. That operation log can also be initialized (batch erased).

(b) Since the operation log for the last 1 month before the current time is recorded by the equipment, when the operation log was initialized within 1 month, only the operation log after initialization is displayed.

(c) The log symbols and their contents in the operation log screen are shown in the table "Operation Log Symbols and Items".



"OPE LOG" Screen (Operation log screen)

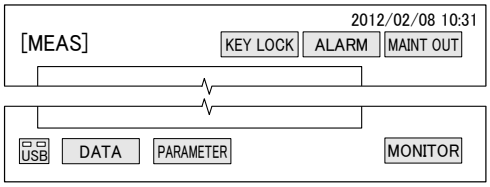
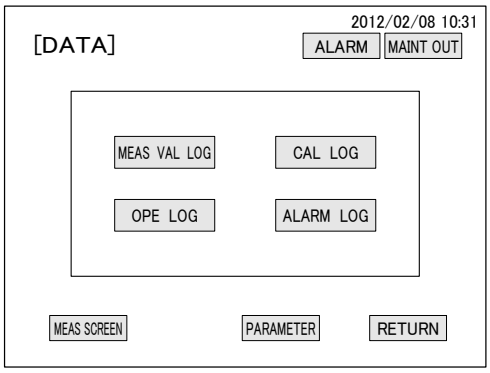
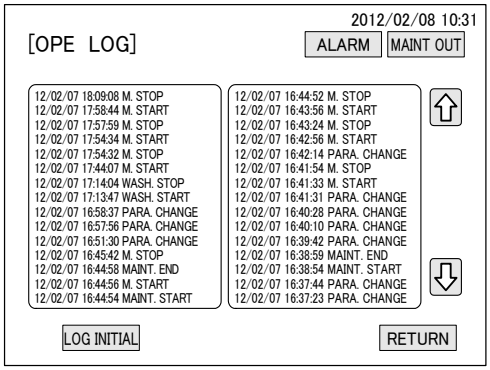
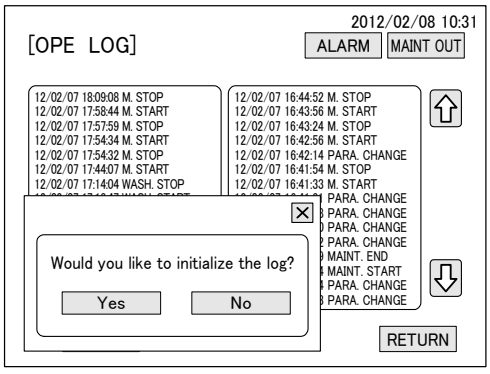
Operation Log Screen Keys

Name and notation in text	Function
Next page key **[↑]**	• When touched, the operation log screen is switched in the present direction.
Previous page key **[↓]**	• When touched, the operation log screen is switched in the past direction.
Log initialize key **[LOG INITIAL]**	• When touched, "Log initializing" dialog box targeted for the operation log opens. When **[Yes]** is touched at this dialog box, all the operation logs are erased.
Return key **[RETURN]**	• When touched, the "DATA" screen is displayed.

Operation Log Symbols and Items

Log symbol	Item name	Contents
PW OFF	Power off (OFF)	• Power switch was set to off (OFF). • Power switch (breaker) was automatically set to off (OFF). • Power supply to equipment stopped.
PW ON	Power on (ON)	• Power switch was set to on (ON). • Power switch (breaker) was set to on (ON). • Power supply to equipment recovered.
M. START	Measurement start	• Measurement was started.
M. STOP	Measurement stop	• Measurement was stopped.
MAINT. START	Maintenance in progress	• Maintenance output was "Closed".
MAINT. ENT	Maintenance in progress clear	• Maintenance output was "Open".
PARA. CHANG	Parameter change	• Parameter settings were changed.
PARA. INIT	Parameter initialize	• Parameter settings were initialized.
MEAS. INIT	Measured value log initialize	• Measured value log settings (record) were initialized.
OPERA. INIT	Operation log initialize	• Operation log settings (record) were initialized.
ALARM. INIT	Alarm log initialize	• Alarm log settings (record) were initialized.
CALIB. INIT	Calibration log initialize	• Calibration log settings (record) were initialized.
WASH. START	Wash start	• Manual wash started.
WASH. STOP	Wash end	• Manual wash ended.
CALIB. START	Calibration start	• Manual calibration started.
CALIB. STOP	Calibration end	• Manual calibration ended.
CLB-H START	Manual correcting calibration start	• Calibration to manual correcting value started.
CLB-H END	Manual correcting calibration end	• Calibration to manual correcting value ended.

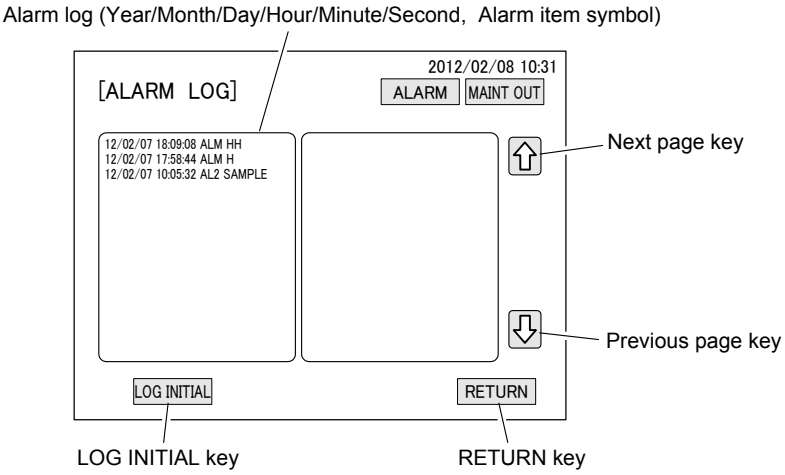
Operation Log Check and Initialization Procedure

Step and operation	Screen example
①Display a screen with [DATA] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[DATA]** on it. **②Display the "DATA" screen.** ····· Touch **[DATA]**.	 **"MEAS (MEAS)" screen**
③Display the "OPE LOG" screen. ····· Touch **[OPE LOG]** in the "DATA" screen. • When performing initialization without checking the operation log, go to step ⑦ after this operation.	 **"DATA" screen**
④Check the operation items. ····· Switch the page at the "OPE LOG" screen and check the necessary operation items. **[↑]** ··· When touched, switches to the next page. **[↓]** ··· When touched, switches to the previous page. • When not initialization operation log, go to step ⑦ after this operation. **⑤Open "Log initializing" dialog box** ····· Touch **[LOG INITIAL]** in the "OPE LOG" screen.	 **"OPE LOG" screen**
⑥Initialize the operation log. ····· Touch **[Yes]** in the "Log initializing" dialog box. • The dialog box is closed by initialization. **[X]** ··· When touched, the dialog box closes. **[No]** ··· When touched, the dialog box closes without initializing. **⑦End "DATA" screen operation.** ····· Touch **[RETURN]** of the "OPE LOG" screen and then touch **[RETURN]** of the displayed "DATA" screen. • The display returns to the screen checked at step ①	 **"Log initializing" dialog box**

(6) Alarm log check and initialize

(a) Alarm logs can be checked by reading them to the screen. The alarm logs can also be initialized (batch erased).

(b) Since alarm logs for the last 1 month before the current time are recorded at the equipment, when alarm logs are initialized within 1 month, only the alarm recordings after initialization are displayed.



"ALARM LOG" Screen

Alarm Log Screen Keys

Name and notation in text	Function
Next page key **[↑]**	• When touched, the operation log screen is switched in the present direction.
Previous page key **[↓]**	• When touched, the operation log screen is switched in the past direction.
Log initialize key **[LOG INITIAL]**	• When touched, the "Log initializing" dialog box targeted for the alarm log opens. When **[Yes]** is touched at this dialog box, all the alarm logs are erased.
Return key **[RETURN]**	• When touched, the "DATA" screen is displayed.

(c) The log symbols and their contents in the alarm log screen are shown in the table "Alarm Log Symbols and Items". Refer to 6.1(1) "Alarm types and transmission method" for the alarm transmission conditions and operation when generated.

Alarm Log Symbols and Items

Log symbol	Item name	Contents
FAILURE 1 (SERIOUS)		
AL1_COMU	Communication error	• Communication error between internal units.
AL1_A/D	A/D error (no response)	• Error generated at A/D.
AL1_EEPROM	EEPROM error	• Error generated at EEPROM.
AL1_CELL_T	Cell temperature error	• Measuring cell temperature is abnormal.
AL1_BLOCK_T	Controller temperature error	• Controller temperature is abnormal.
AL1_SENSOR	Ion electrode error	• Ion electrode is abnormal.

(To be continued)

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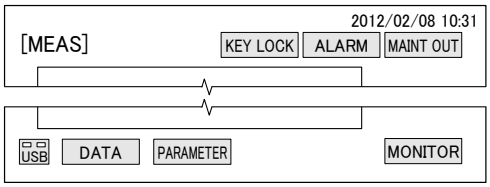
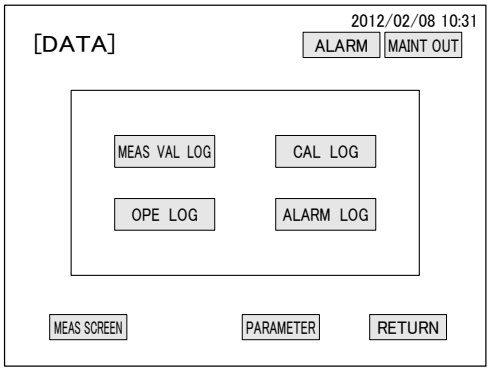
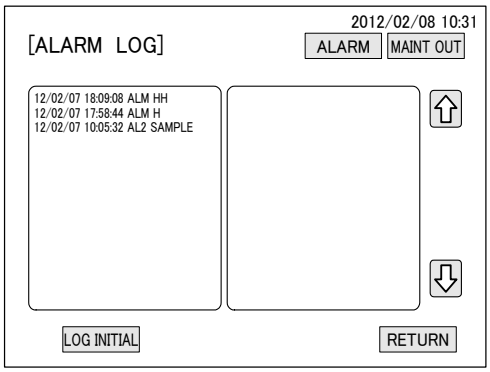
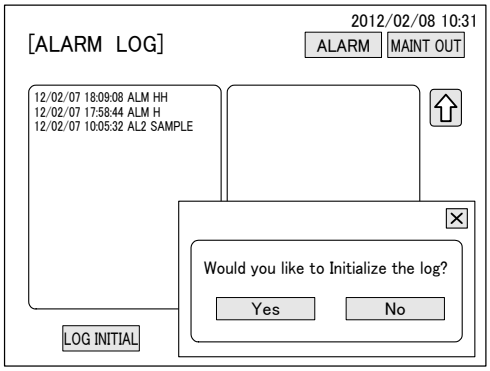
Log symbol	Item name	Contents
AL1_TEMP_CTL	Temperature control error	• Temperature adjustment function at temperature controller is abnormal.
AL1_LEAK	Leak detection	• Leak detected at pan.
FAILURE 2 (MINOR)		
AL2_CALIB	Calibration error	• Calibration impossible due to ion electrode characteristic
AL2_CALIB_CP	Manual correcting calibration error	• Manual correcting calibration impossible due to ion electrode characteristic
AL2_STB	Electrode stability error	• Ion electrode stability check at calibration error
AL2_SAMPLE	Sample water off error	• Pre-treatment tank liquid level drop.
AL2_CALIB_L	LO calibration solution off error	• LO calibration solution tank liquid level drop.
AL2_CALIB_H	HI calibration solution off error	• HI calibration solution tank liquid level drop.
AL2_REAGENT	Reagent off error	• Reagent (buffer solution) tank liquid level drop.
AL2_WASH	Acid washing off error	• Acid washing tank liquid level drop.
AL2_SENS	Electrode sensitivity error	• Ion electrode sensitivity dropped to 20%.
AL2_EFFLU	Waste tank full error	• Waste tank full status
Concentration alarms		
ALM_HH	Higher alarm	• Measured value higher alarm point exceeded.
ALM_H	High alarm	• Measured value high alarm point exceeded.
ALM_L	Low alarm	• Measured value low alarm point exceeded.
Power off		
PW_OFF	Power off	• Power supply off or power switch off (OFF).

Alarm Log Check and Initialization Procedure

Step and operation	Screen example
①Display a screen with [DATA] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[DATA]** on it. **②Display the "DATA" screen.** ····· Touch **[DATA]**.	 **"MEAS (MEAS)" screen**

(To be continued)

(Continued from previous page)

Step and operation	Screen example
③Display the "ALARM LOG" screen. ····· Touch **[ALARM LOG]** in the "DATA" screen. • When performing initialization without checking the operation log, go to step ⑥ after this operation.	 **"DATA" screen**
④Check the alarm items. ····· Switch the page at the "ALARM LOG" screen and check the necessary alarm items. **[↑]** ··· When touched, switches to the next page. **[↓]** ··· When touched, switches to the previous page. • When not initialization alarm log, go to step ⑦ after this operation. **⑤Open "Log initializing" dialog box** ····· Touch **[LOG INITIAL]** in the "ALARM LOG" screen.	 **"ALARM LOG" screen**
⑥Initialize the alarm log. ····· Touch **[Yes]** in the "Log initializing" dialog box. • The dialog box is closed by initialization. **[X]** ··· When touched, the dialog box closes. **[No]** ··· When touched, the dialog box closes without initializing. **⑦End "DATA" screen operation.** ····· Touch **[RETURN]** of the "ALARM LOG" screen and then touch **[RETURN]** of the displayed "DATA" screen. • The display returns to the screen at step ①	 **"Log initializing" dialog box**

4.3 Parameter Screen Operation

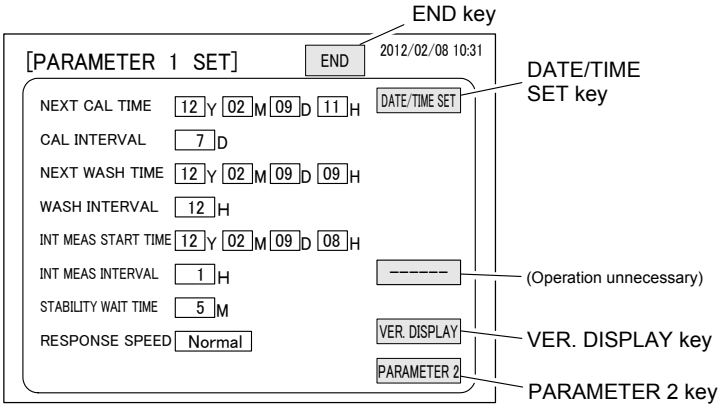
(1) Parameter screen functions

(a) Parameters are information that gives the operation conditions to the program of this equipment. They are set at the factory, but can also be changed.

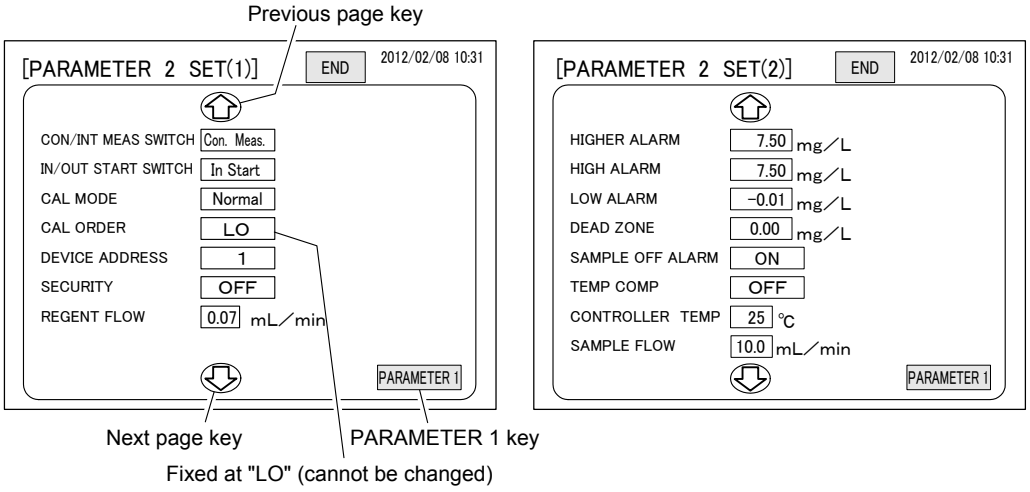
【IMPORTANT】 • Do not change the parameters unless absolutely necessary. Unnecessary changes may cause the equipment to malfunction.

(b) The parameter screens can be opened even at the "MEAS (UNDER MEAS)" screen during measurement. However, even at the "MEAS (UNDER MEAS)" screen, the parameters can only be checked (viewed); they cannot be changed. To change the parameters, open the parameter screen from the "MEAS (MEAS STOP)" screen.

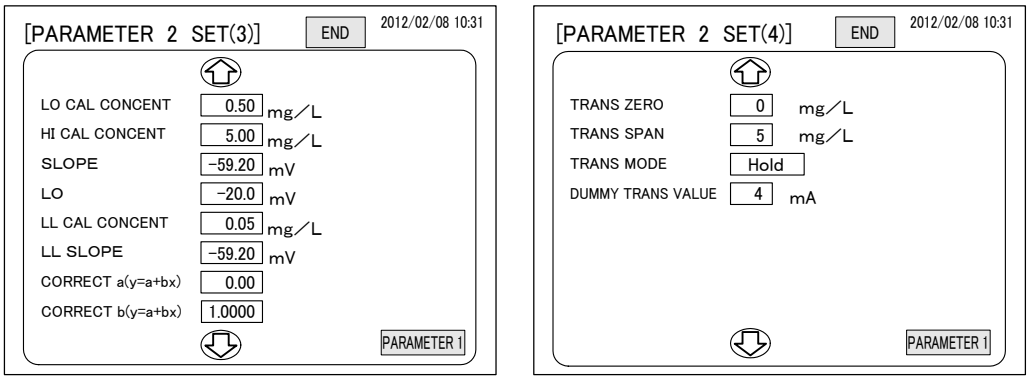
(c) Parameters are displayed over the following 5 screens. When **[PARAMETER 2]** is touched at the "PARAMETER 1 SET" screen, the "PARAMETER 2 SET (1)" screen opens. The screen can be switched to screens (2) to (4) by touching "↓" or "↑" at the "PARAMETER 2 SET (1)" screen.
＞＞ 4.3(2) "Parameters list"



"PARAMETER 1 SET" Screen



"PARAMETER 2 SET (1)" Screen and "PARAMETER 2 SET (2)" Screen



"PARAMETER 2 SET (3)" Screen and "PARAMETER 2 SET (4)" Screen

Parameter Screen Keys

Name and notation in text	Function
Date/time set key **[DATE/TIME SET]**	• When touched, "DATE/TIME SET" dialog opens. Can be changed by touching Y, M, D, H, or M in the dialog box.
Version display key **[VER. DISPLAY]**	• The version number (update number) of the software for the display board, main board, and data board installed currently in the equipment is displayed.
End key **[END]**	• When touched, the "MEAS (MEAS STOP)" screen is displayed.
Parameter 2 key **[PARAMETER 2]**	• When touched, the "PARAMETER 2 SET (1)" screen is displayed.
Parameter 1key **[PARAMETER 1]**	• When touched, the "PARAMETER 1 SET" screen is displayed.
Next page key **[↑]**	• When touched, the screen switches to the next page.
Previous page key **[↓]**	• When touched, the screen switches to the previous page.

(d)Priority when start times overlap ····· The priority when the next calibration time, next wash time, and intermittent measurement start time set times are the same is shown in the following table. The calibration, wash, and intermittent measurement start functions are enabled during internal start automatic measurement and are disabled when internal measurement is stopped and at external start and communication start.

Priority When Calibration, Wash, and Intermittent Measurement Start Times Overlap

			Operation by built-in timer		
			Start of automatic calibration by "next calibration time"	Start of automatic wash by "next wash time"	Start of intermittent measurement by "intermittent measurement start time"
Internal start	Measurement in progress	Continuous measurement	◎	△	×
		Intermittent measurement	◎	○	△
	Measurement stopped		×	×	×
External start and communication start			×	×	×

◎: High priority ○: Medium priority △: Low priority ×: Invalid

(2) Parameters list

Parameters List

Parameter item	Factory setting example (Differs depending on order specifications.)	Setting range
[PARAMETER 1 SET screen]		
Date/time set	Example (2012.02.20 12:00)	
Next calibration time	Example (12.02.26 17)	
Calibration interval	7 days	0 to 99 days
Next wash time	Example (12.02.20 16)	
Wash interval	12 hours	0 to 999 hours
Intermittent measurement start time	Example (12.02.20 18)	
Intermittent measurement interval	1 hour	1 to 99 hours
Stability wait time	5 minutes	0 to 60 minutes
Response speed	Normal	Fast, Normal, Slow
[PARAMETER 2 SET (1) screen]		
Continuous measurement/intermittent measurement switching	Continuous measurement	Continuous measurement/ intermittent measurement
Internal start/external start switching	Internal start	Internal start, external start, communication start
Calibration mode	Normal	Normal/ACAS
Calibration order (preceding item)	LO	Fixed (Cannot be changed)
Device address	1	1 to 255
Security	OFF	OFF•ON (Password: 7144)
Reagent flow	0.07 mL/min	Fixed (Cannot be changed)
[PARAMETER 2 SET (2) screen]		
Higher alarm	7.50 mg/L	-0.01 mg/L to (maximum scale value x 1.5) mg/L Alarm is not transmitted at -0.01.
High alarm	7.50 mg/L	
Low alarm	-0.01 mg/L	
Dead zone	0.00 mg/L	0.00 mg/L to (maximum scale value x 1.5) x 0.2mg/L
Sample water off alarm	ON	ON•OFF
Temperature compensation	OFF	ON•OFF
Temperature control temperature	25°C	15 to 35°C
Sample water flow	10.0 mL/min	Fixed (Cannot be changed)
[PARAMETER 2 SET (3) screen]		
LO calibration solution concentration	0.50 mg/L	0.10 to 1000.00 mg/L
HI calibration solution concentration	5.00 mg/L	0.10 to 1000.00 mg/L
SLOPE	-59.20 mV	-70.00 to -30.00 mV
LO (LO calibration solution electrode potential)	-20.0 mV	±250.0 mV
LL calibration solution concentration	0.05 mg/L	0.01 to 10.00 mg/L
LL SLOPE	-59.20 mV	-70.00 to -5.00 mV
Correct a (y=a+bx)	0.00	±1000.00 mV
Correct b (y=a+bx)	1.000	0.001 to 9.999

(To be continued)

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Parameter item	Factory setting example (Differs depending on order specifications.)	Setting range
[PARAMETER 2 SET (4) screen]		
Transmission ZERO	0 mg/L	0 to 1000 mg/L
Transmission SPAN	5 mg/L	0 to 1000 mg/L
Transmission mode	Hold	Hold/Through/Dummy
Dummy transmission value	4 mA	4 to 20 mA

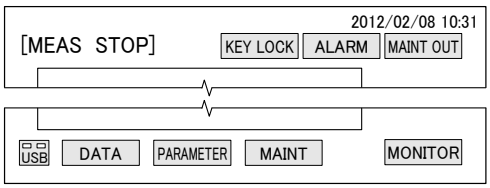
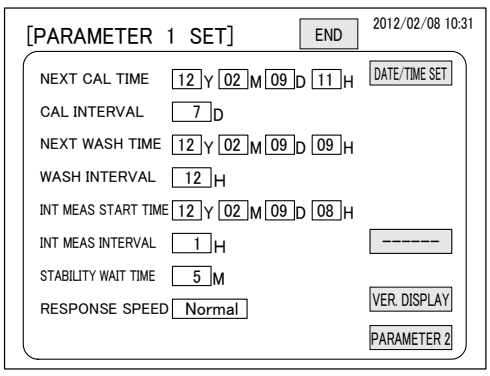
(3) Date and time setting

(a) The time of the clock built into this equipment can be set.

(b) When the date and time display at the top right-hand corner of the display is incorrect, reset it.

【IMPORTANT】 • The life of the battery of the built-in clock is about 100 days in the initial state and is backed up for about 6 days even at the end of the battery life. When the power was turned off for more than 6 days, check the date and time to be safe when the power is turned back on.

Date and Time Setting Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ·····Stop measurement (＞＞ 4.1(3) "Automatic measurement stop"), and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Proceed to date and time setting. ····· Touch **[DATE/TIME SET]** in the "PARAMETER 1 SET" screen. • The "DATE/TIME SET" dialog box is displayed.	 **"PARAMETER 1 SET" screen**

(To be continued)

(Continued from previous page)

Step and operation	Screen example

③Set the date and time. ····· Enter the new date and time as follows at the "DATE/TIME SET" dialog box.

ⓐ Touch the box to be changed in the Y, M, D, H, or M box.

- The time is 24 hours system.
- Input of "0" of tens digit can be omitted.
- Always touch **[ENT]** at each box.

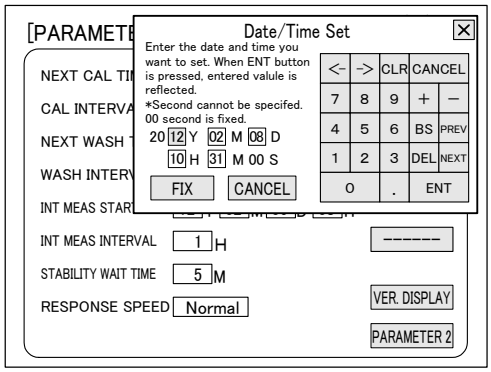
ⓑ Enter the new date and time using the numerical keypad and touch **[ENT]**.

- Enter the time about 1 minute ahead of the current time at "M" box.

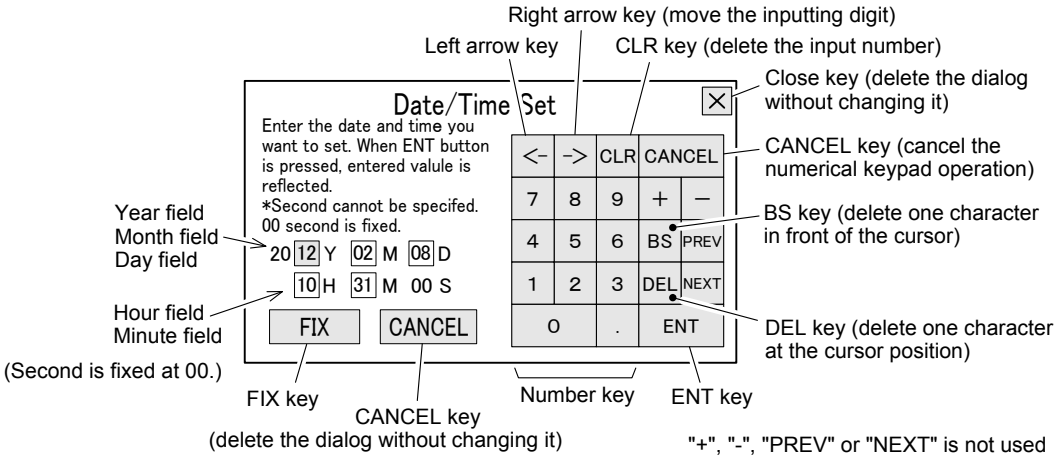
ⓒ Touch the other boxes to be changed and input the new date and time the same as ⓑ and touch **[ENT]**.

ⓓ Touch [FIX] at 00 second of the entered time.

- Date and time setting ends and the dialog box closes.



"DATE/TIME SET" dialog box



Kinds of "DATE/TIME SET" dialog box keys

④End the date and time setting. ····· Check that the date and time display at the top right-hand corner of the screen is new and touch **[END]**.

⑤Restart measurement. ····· If necessary, restart measurement. >> 4.1(2) "Automatic measurement start"

(4) Next calibration time change

(a) The next calibration time is not only the time, but also includes the date. It is the date and start time the first automatic calibration is to be performed after automatic measurement is started. When this date and time arrive, automatic measurement stops and the automatic calibration sequence starts. At the end of the automatic calibration sequence, the equipment returns to automatic measurement. This date and time can be changed.

(b) When automatic calibration starts for the first time, the date at the right-hand side box of the "NEXT CAL TIME" of the "PARAMETER 1 SET" screen switches to the current date plus the number of days of the calibration interval of the first calibration. The time is not switched.

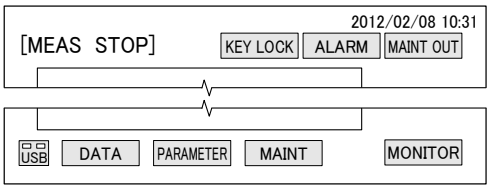
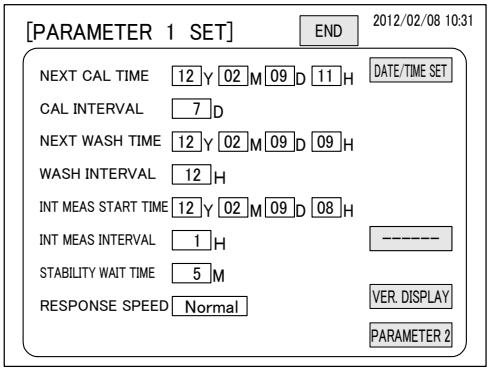
(c) The next calibration time is valid at internal start and is invalid at external start and communication start. When the calibration interval is “0 day”, automatic calibration is not performed.

(d) When the next calibration time overlaps the next wash time or intermittent measurement start time, the next calibration start time has priority and the other starts become invalid. ＞＞ (d) “Priority when start times overlap” in 4.3(1) “Parameter screen functions”

〔NOTE〕 • If there was a power failure including the date and time of the next calibration time, when the power recovers, the equipment performs arithmetic processing automatically so that the calibration interval based on the original next calibration time (day, hour) does not change. The date can be checked at “NEXT CAL TIME” at the “PARAMETER 1 SET” screen. For example, when automatic calibration is performed at noon on Monday of each week at a 7 days calibration interval and there was a 24 hour power interruption from 5 PM on Sunday, the date of “NEXT CAL TIME” is automatically written so that automatic calibration is performed at noon of the first Monday after the power recovers. Even if there was a power failure, when the power recovered before the next calibration time, writing is not performed.

• The next calibration time, next wash time, and intermittent measurement start time are set in 1 hour units, and 00 minutes of the time becomes the start time. Also, the time required by calibration, wash, and intermittent measurement is less than 1 hour. Therefore, it does not become the start time of the remaining operation during operation. For example, wash does not start during calibration.

Next Calibration Time Change Procedure

Step and operation	Screen example
①Display the “PARAMETER 1 SET” screen. ····· Stop measurement (＞＞ 4.1(3) “Automatic measurement stop”) and touch **[PARAMETER]** in the “MEAS (MEAS STOP)” screen.	 **“MEAS (MEAS STOP)” screen**
②Change the date and time of the “next calibration”. ⓐ Touch the box to be changed of the Y, M, or D boxes at the right-hand side of the “NEXT CAL TIME” of the “PARAMETER 1 SET” screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure “Kinds of numerical keypad keys”	 **“PARAMETER 1 SET” screen**

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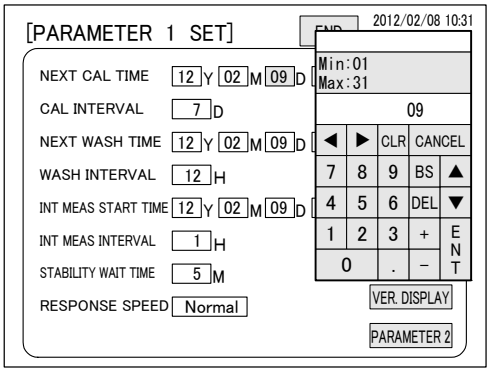
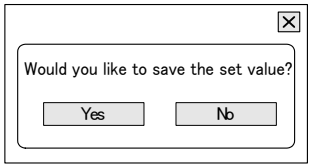
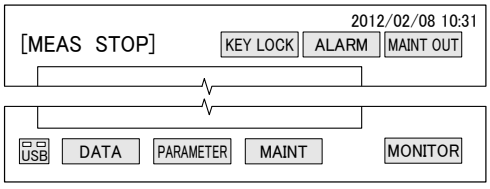
Step and operation	Screen example
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. • Input of "0" of tens digit can be omitted. • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. ⓒ If necessary, change Y, M, and D the same as ⓐ and ⓑ. ⓓ Make the H box the new value the same as ⓐ and ⓑ and touch **[ENT].** • The time is 24 hours system. • This time is not only the 1st calibration start, but is also applied thereafter.	 **Numerical keypad dialog box**
③End input. ····· Touch **[END]** in the "PARAMETER 1 SET" screen. • The "Set value saving" dialog box is displayed.	
④Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch [No].	 **"Set value saving" dialog box**
⑤Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(5) Calibration interval change

(a) The calibration interval (number of days) can be changed during automatic measurement.

(b) The calibration interval is valid at internal start, and is invalid at external start and communication start. When the calibration interval is made "0 days", automatic calibration is not performed.

Calibration Interval Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**

(To be continued)

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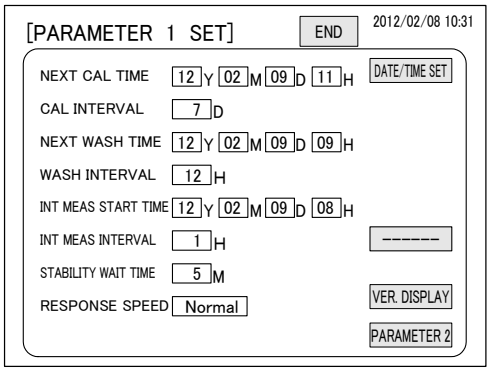
Step and operation	Screen example

②Change the calibration interval.

ⓐ Touch the box at the right-hand side of the "CAL INTERVAL" in the "PARAMETER 1 SET" screen.

- The "numerical keypad" dialog box is displayed.

＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"

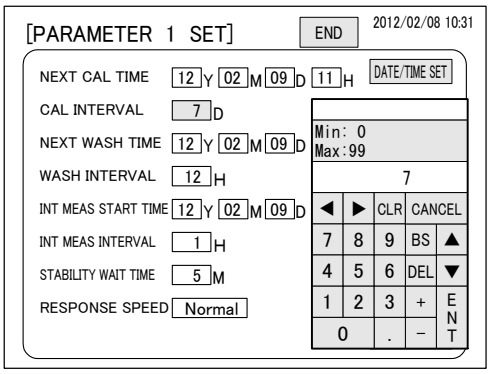


"PARAMETER 1 SET" screen

ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**.

Setting range: 0 to 99 days (normal: 7)

- Input of "0" of tens digit can be omitted.
- When **[ENT]** is touched, the change of that box is fixed and the dialog box closes.
- Refer to the figure "Kinds of numerical keypad dialog box keys" of "4.3(4)②ⓓ".



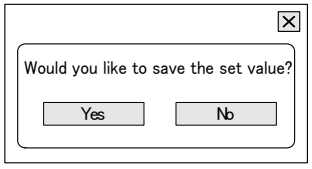
Numerical keypad dialog box

③End input. ····· Touch **[END]** in the "PARAMETER 1 SET" screen.

- The "Set value saving" dialog box is displayed.

④Save the changed set values.·····Touch **[Yes]** in the "Set value saving" dialog box.

- The dialog box closes and the MEAS (MEAS STOP) screen is displayed.
- To abort the change, touch **[No]**.



"Set value saving" dialog box

⑤Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"

(6) Next wash time change

(a) The next wash time is not only the time, but also includes the date. It is the date and start time the first automatic wash is to be performed after automatic measurement is started. When this date and time arrive, automatic measurement stops and the automatic wash sequence starts. At the end of the automatic calibration sequence, the equipment returns to automatic measurement. This date and time can be changed.

(b) When automatic wash starts for the first time, the date at the right-hand side box of "NEXT WASH TIME" of the "PARAMETER 1 SET" screen switches to the current date plus the number of days of the wash interval of the first wash.

(c) The next wash time is valid at internal start and is invalid at external start and communication start. When the wash interval is made "0H", automatic wash is not performed.

(d) When the next wash time overlaps the next calibration time, calibration has priority and wash becomes invalid. On the other hand, when the next wash time overlaps the intermittent

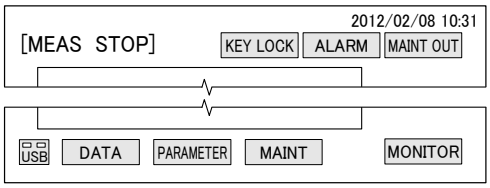
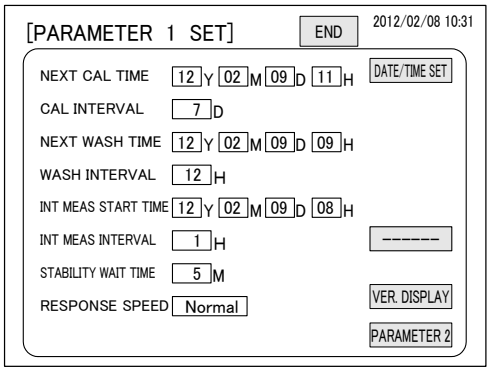
measurement start time, wash has priority and intermittent measurement becomes invalid.
＞＞ (d) “Priority when start times overlap” in 4.3(1) “Parameter screen functions”

【IMPORTANT】 • Set the next wash time to a date and time that do not overlap the next calibration time. If they are the same time, the next wash time becomes invalid and wash is not performed.

〔NOTE〕 • If there was a power failure including the date and time of the next wash time, when the power recovers, the equipment performs arithmetic processing automatically so that the wash interval based on the original next wash time (day, hour) does not change. The date can be checked at “NEXT WASH TIME” at the “PARAMETER 1 SET” screen.

• The next calibration time, next wash time, and intermittent measurement start time are set in 1 hour units, and 00 minutes of the time becomes the start time. Also, the time required by calibration, wash, and intermittent measurement required is less than 1 hour. Therefore, it does not become the start time of the remaining operation during operation. For example, calibration does not start during wash.

Next Wash Time Change Procedure

Step and operation	Screen example
①Display the “PARAMETER 1 SET” screen. ····· Stop measurement (＞＞ 4.1(3) “Automatic measurement stop”) and touch **[PARAMETER]** in the “MEAS (MEAS STOP)” screen.	 “MEAS (MEAS STOP)” screen
②Change the date and time of the “next wash”. ⓐ Touch the box to be changed of the Y, M, or D boxes at the right-hand side of the “NEXT WASH TIME” of the “PARAMETER 1 SET” screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure “Kinds of numerical keypad keys”	 “PARAMETER 1 SET” screen

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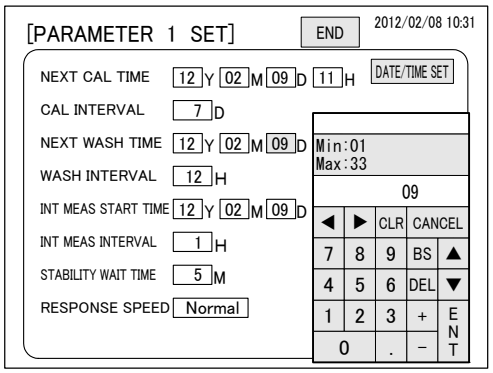
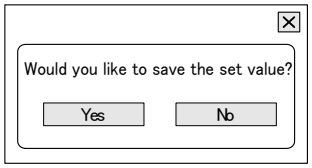
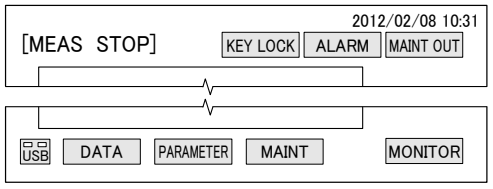
Step and operation	Screen example
ⓑEnter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. • Input of "0" of tens digit can be omitted. • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. ⓒ If necessary, change Y, M, and D the same as ⓐ and ⓑ. ⓓ Enter the new value at the H box the same as ⓐ and ⓑ and touch **[ENT]**. • The time is 24 hours system. • This time is not only the 1st wash start, but is also applied thereafter.	 **Numerical keypad dialog box**
③End input. ····· Touch **[END]** in the "PARAMETER 1 SET" screen. • The "Set value saving" dialog box is displayed.	
④Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑤Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(7) Wash interval change

(a) The automatic wash interval (time) can be changed during automatic measurement.

(b) The wash interval is valid at internal start, and becomes invalid at external start and communication start. When the wash interval is made "0H", automatic wash is not performed.

Wash Interval Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**

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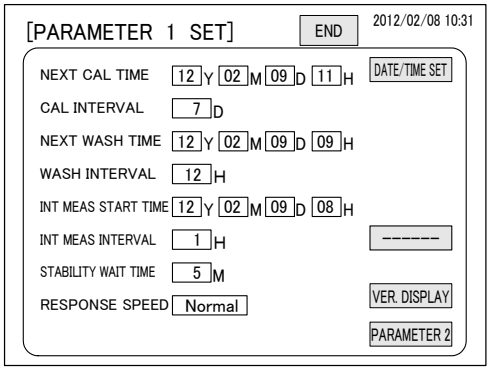
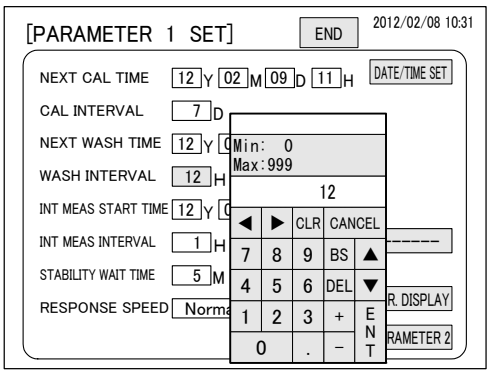
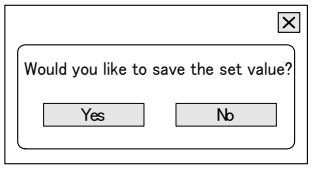
Step and operation	Screen example
②Change the wash interval. ⓐ Touch the box at the right-hand side of the "WASH INTERVAL" in the "PARAMETER 1 SET" screen. • The "numerical keypad" dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 **"PARAMETER 1 SET" screen**
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: 0 to 999 hours (normal: 12) • When **[ENT]** is touched, the change of that box is fixed and the dialog box closes. • Refer to the figure "Kinds of numerical keypad dialog box keys" of "4.3(4)②ⓓ". **③End input.** ····· Touch **[END]** in the "PARAMETER 1 SET" screen. • The "Set value saving" dialog box is displayed.	 **Numerical keypad dialog box**
④Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**. **⑤Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"Set value saving" dialog box**

(8) Intermittent measurement start time change

(a) The intermittent start time is not only the time, but also includes the date. It is the date and time up to the start of the 1st intermittent measurement after the power is turned on or the equipment is switched to "INT MEAS". This time can be changed.

(b) When the 1st intermittent measurement start time arrives, the intermittent measurement of 1 unit (approximately 20 minutes) is performed and the hold value is updated and the equipment waits for arrival of the next intermittent measurement interval. Simultaneously with the 1st intermittent measurement start time, the date and time at the right-hand side box of "INT MEAS START TIME" of the "PARAMETER 1 SET" screen becomes the date and time with the number of hours of the intermittent measurement interval added to the 1st intermittent measurement start time.,

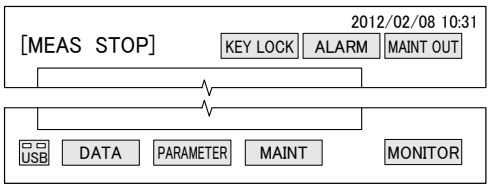
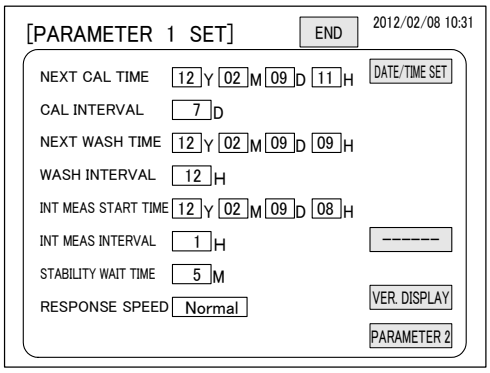
(c) The intermittent measurement start time is valid at internal start and is invalid at external start and communication start. Furthermore, the intermittent measurement start time is valid as long as "Int. Meas." appears at the right-hand side box of "CON/INT MEAS" of the "PARAMETER 2 SET" screen.

(d) The automatic calibration and automatic wash functions are also valid at intermittent measurement. In addition, set the intermittent measurement start time to a time different from the next calibration time and next wash time. If they overlap, calibration or wash has priority and intermittent measurement start becomes invalid. ＞＞ 4.3(1)(d) "Priority When Calibration, Wash, and Intermittent Start Times Overlap"

【IMPORTANT】 • If the intermittent measurement start time is the same as the next calibration time or next wash time, the intermittent measurement start time becomes invalid and intermittent measurement is not performed.

〔NOTE〕 • If there was a power failure including the date and time of the intermittent measurement start time (including the day), when the power recovers, the equipment automatically performs arithmetic processing so that the measurement interval based on the original intermittent measurement start time does not change. The date and time of "INT MEAS START TIME" on the "PARAMETER 1 SET" screen can be checked.

Intermittent Measurement Start Time Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Change the date and time of the next intermittent measurement start time. ⓐ Touch the box to be changed of the Y, M, or D boxes at the right-hand side of the "INT MEAS START TIME" of the "PARAMETER 1 SET" screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 **"PARAMETER 1 SET" screen**

(To be continued)

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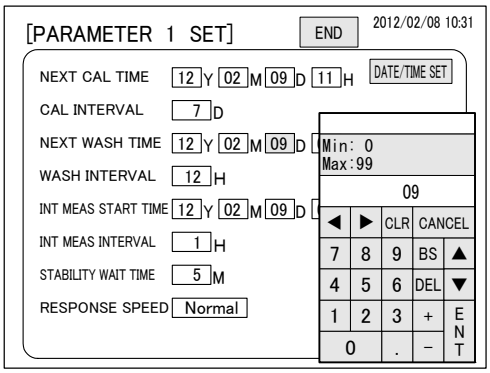
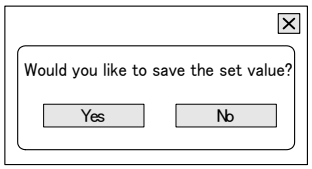
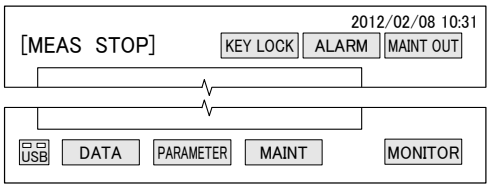
Step and operation	Screen example
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. • Input of "0" of tens digit can be omitted. • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. ⓒ If necessary, change Y, M, and D the same as ⓐ and ⓑ. ⓓ Enter the new value at the H box the same as ⓐ and ⓑ and touch **[ENT]**. • The time is 24 hours system. • This time is not only the 1st measurement start, but is also applied thereafter.	 **Numerical keypad dialog box**
③End input. ····· Touch **[END]** in the "PARAMETER 1 SET" screen. • The "Set value saving" dialog box is displayed.	
④Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑤Restart measurement. ····· If necessary, restart measurement. >> 4.1(2) "Automatic measurement start"	

(9) Intermittent measurement interval change

(a) The intermittent measurement interval (time) can be changed.

(b) The intermittent measurement interval is valid when "Int. Meas." appears at the right-hand side box of "CON/INT MEAS" of the "PARAMETER 2 SET" screen. The intermittent measurement interval is valid not only at internal start, but also at external start and communication start.

Intermittent Measurement Interval Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (>> 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**

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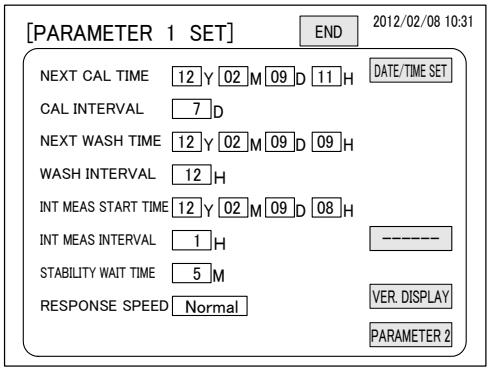
Step and operation	Screen example

②Change the intermittent measurement interval.

ⓐ Touch the box at the right-hand side of the "intermittent measurement interval" in the "PARAMETER 1 SET" screen.

- The numerical keypad dialog box is displayed.

＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"

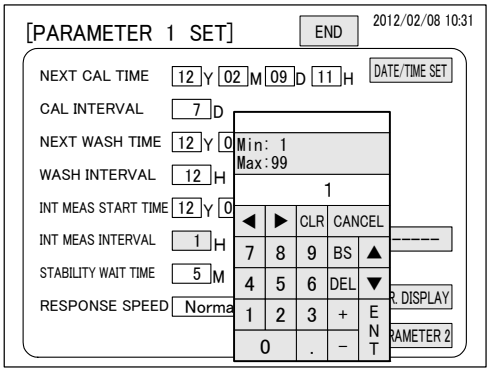


"PARAMETER 1 SET" screen

ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**.

Setting range: 1 to 99 hours (normal: 1)

- When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed.



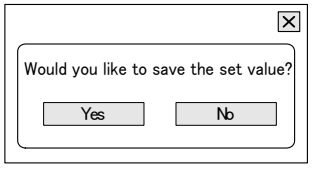
Numerical keypad dialog box

③End input. ····· Touch **[END]** in the "PARAMETER 1 SET" screen.

- The "Set value saving" dialog box is displayed.

④Save the changed set values. ····· Touch [Yes] in the "Set value saving" dialog box.

- The dialog box closes and the MEAS (MEAS STOP) screen is displayed.
- To abort the change, touch [No].



"Set value saving" dialog box

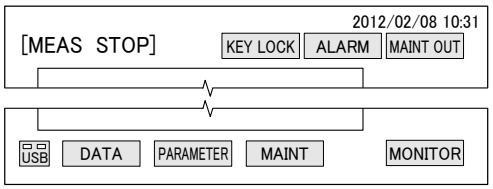
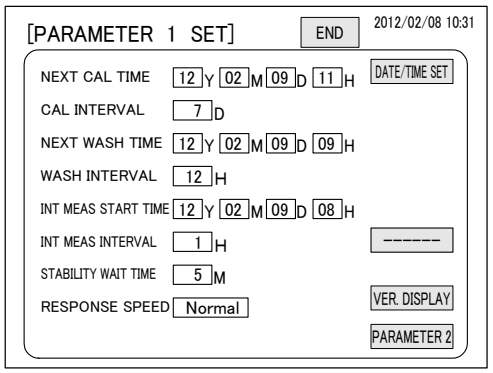
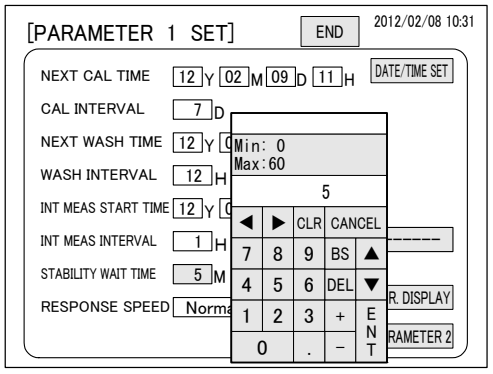
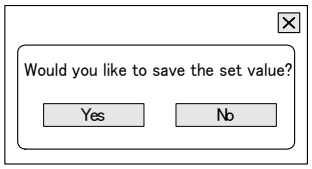
⑤Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"

(10) Stability wait time change

(a) The stability wait time (minutes) of the measurement sequence can be changed. Use it when you need to lengthen the response time due to ion electrode characteristic changes (deterioration), etc.

(b) The stability wait time is the time until ambient conditions change after the sample water inside the measuring cell was replaced before measurement. This time is included in the measurement preparation time of the measurement sequence, and when it is long, the measurement preparation time becomes long.

Stability Wait Time Change Procedure

Step and operation	Screen example
①「Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Change the stability wait time. ⓐ Touch the box at the right-hand side of the "stability wait time" in the "PARAMETER 1 SET" screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 "PARAMETER 1 SET" screen
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: 0 to 60 minutes (normal: 5) • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. • Refer to the figure "Kinds of numerical keypad dialog box keys" of "4.3(4)②ⓓ".	 Numerical keypad dialog box
③End input. ····· Touch **[END]** in the "PARAMETER 1 SET" screen. • The "Set value saving" dialog box is displayed.	
④Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**.	 "Set value saving" dialog box
⑤Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(11) Response speed change

(a) The response speed of the measurement sequence can be changed. When it is changed if the measured value fluctuates wildly over a short time, monitoring becomes easier.

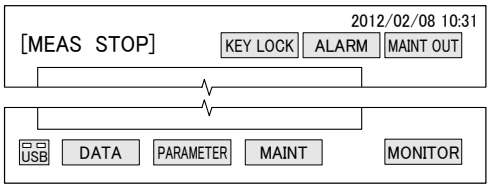
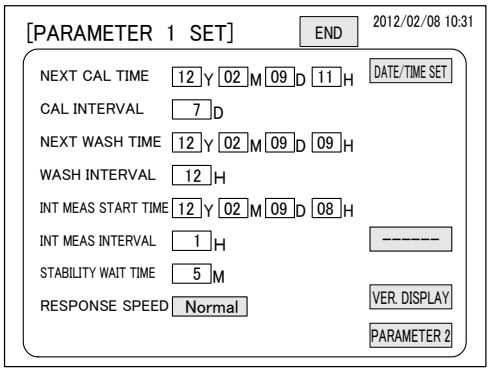
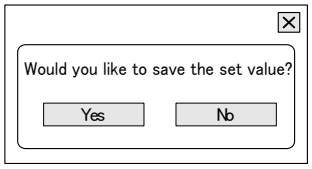
(b) The response speed is the time until the ion electrode signal is output to the display and terminals as the measured value after being fetched. There are the following selections:

Fast····· Fast (time constant: 1s)

Normal····· Normal (time constant: 10s) (normal)

Slow····· Slow (time constant: 60s)

Response Speed Procedure

Step and operation	Screen example
①「Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Change the response speed. ····· Touch the box at the right-hand side of the "RESPONSE SPEED" in the "PARAMETER 1 SET" screen. Setting range: Fast/Normal (normal) /Slow **③End input.** ····· Touch **[END]** in the "PARAMETER 1 SET" screen. • The "Set value saving" dialog box is displayed.	 "PARAMETER 1 SET" screen
④Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**. **⑤Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 "Set value saving" dialog box

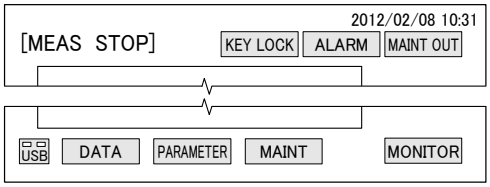
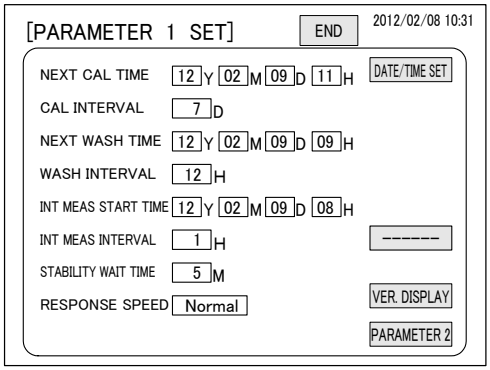
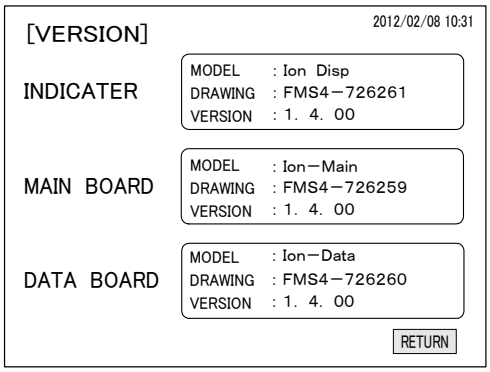
(12) Version screen check

(a) The version number (update number) of each program of this equipment can be checked at the "VERSION" screen.

- Display program
- Main board program
- Data board program

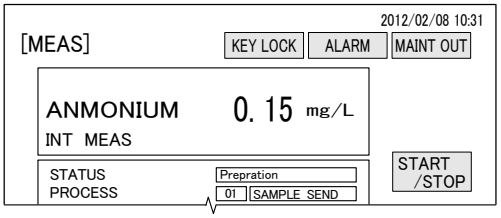
(b) When technical service is necessary, please check from us.

Version Number Check Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Display the "VERSION" screen. ····· Touch **[VER. DISPLAY]** in the "PARAMETER 1 SET" screen.	 "PARAMETER 1 SET" screen
③Check the version. ····· Check the version number of each board in the "VERSION" screen. **④End the version check.** ····· Touch **[RETURN]** in the "VERSION" screen and touch **[END]** of the "PARAMETER 1 SET" screen.	 "VERSION" screen
⑤Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(13) Continuous measurement and intermittent measurement switching

(a) Continuous measurement and intermittent measurement can be switched. In the case of intermittent measurement, "INT MEAS" is displayed in the measured value display box of the "MEAS" screen. If it is not displayed, the equipment is in the continuous measurement mode.



"MEAS (INT MEAS - MEAS STOP)" Screen

(b) Continuous measurement is measurement which is continued until the measurement stop operation is performed. Intermittent measurement is measurement that repeats measurement of 1 unit at the intermittent measurement interval.

- 1 unit intermittent measurement time ····· Approximately 20 minutes (measurement preparation time + measurement time)
- Intermittent measurement interval ····· 1 to 99 hours (normal: 1)

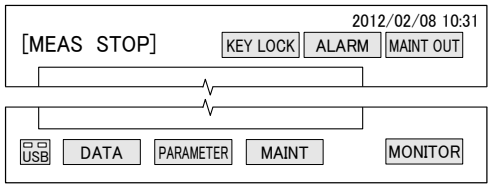
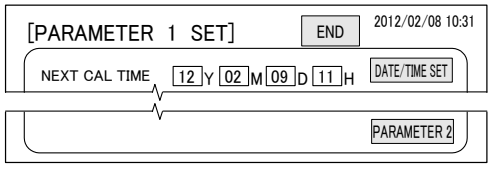
(c) At continuous measurement, the real-time measured value is displayed or transmitted and output. At intermittent measurement only one measured value is fetched at the end of intermittent measurement of 1 unit and that value is held until the next measured value is acquired. Therefore, at intermittent measurement the hold value is constantly displayed, transmitted, and output and it is updated at each intermittent measurement.

(d) When switching to intermittent measurement check the following parameters and change them, as required.

- Intermittent measurement start time ····· >> 4.3(8) "Intermittent measurement start time change"
- Intermittent measurement interval ····· >> 4.3(9) "Intermittent measurement interval change"

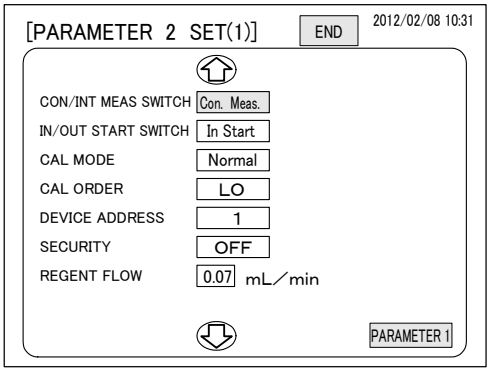
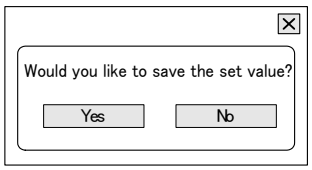
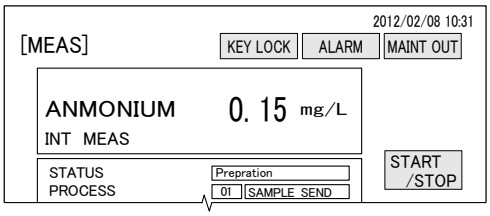
(e) The following procedure is valid for internal start. For external start, switching is performed by "CON/INT SWITCH" signal input and for communication start, switching is performed by "CON/INT SWITCH" command.

Continuous Measurement and Intermittent Measurement Switching Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (>> 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**

(To be continued)

(Continued from previous page)

Step and operation	Screen example
③Switch continuous measurement/intermittent measurement. ····· Touch the box at the right-hand side of "CON/INT MEAS SWITCH" at the "PARAMETER 2 SET (1)" screen and display after switching. Setting range ····· Continuous measurement (normal), intermittent measurement. **④End input.** ····· Touch **[END]** in the "PARAMETER 2 SET (1)" screen. • The "Set value saving" dialog box is displayed.	 **"PARAMETER 2 SET (1)" screen**
⑤Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the" MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑥Restart measurement. ····· If necessary, restart intermittent measurement and check if "INT MEAS" is displayed in the measured value display box of the "MEAS (MEAS STOP)" screen. ＞＞ 4.1(2) "Automatic measurement start"	 **"MEAS (INT MEAS - MEAS STOP)" screen**

(14) Start method switching

(a) Internal start, external start, and communication start can be switched.

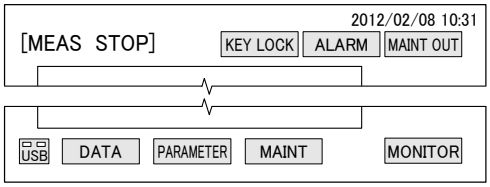
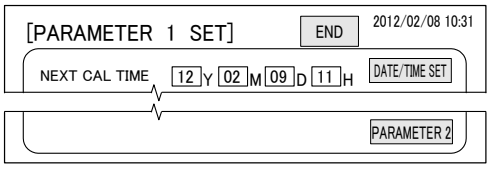
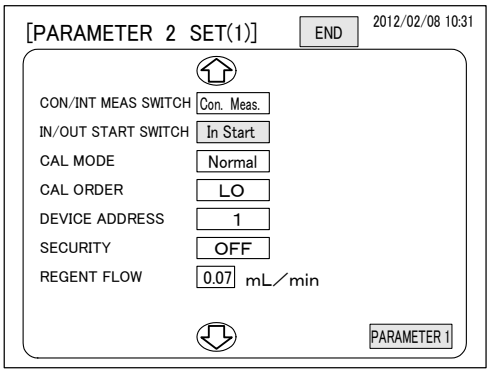
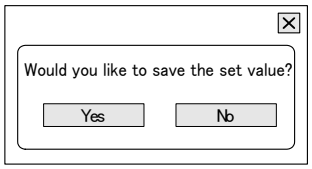
(b) Each start method is outlined below. ＞＞ 3.2(1) "Starting method selection"

• Internal start ····· This method continues measurement by equipment internal timer. It also has automatic calibration, automatic wash, and intermittent measurement functions.

• External start ····· This method controls measurement by measurement start input signal from the outside. In this case, the automatic calibration, automatic wash, and intermittent measurement by internal timer functions are invalid. However, except intermittent measurement interval.
＞＞ 3.4(3) "External start and loop check"

• Communication start ····· This method controls measurement by means of a communication function. ＞＞ 10. "Communication Functions"

Start Method Switching Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Switch internal start/external start. ····· Touch the box at the right-hand side of "IN/OUT START SWITCH" at the "PARAMETER 2 SET (1)" screen and display after switching. Setting range ····· Internal start (normal), external start, communication start **④End input.** ····· Touch **[END]** in the "PARAMETER 2 SET (1)" screen. • The "Set value saving" dialog box is displayed.	 **"PARAMETER 2 SET (1)" screen**
⑤Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**. **⑥Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"Set value saving" dialog box**

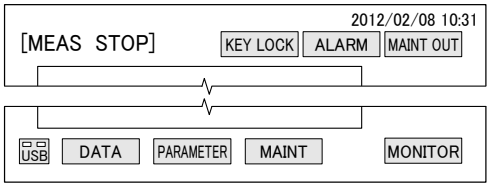
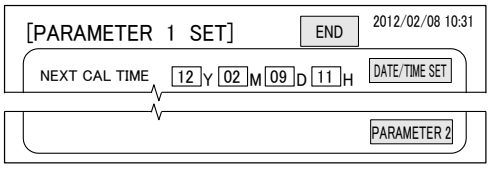
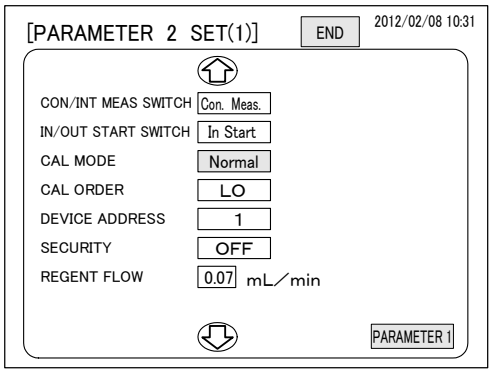
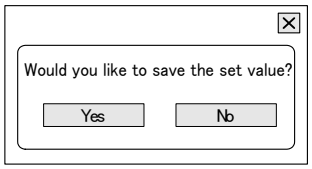
(15) Calibration mode switching

(a) Normal calibration and ACAS calibration can be switched. Calibration mode switching is valid for internal start and normal calibration is always performed for external start and communication start.

(b) Normal calibration is a function which performs automatic calibration at the date and time interval set at "NEXT CAL TIME" and "CAL INTERVAL".

(c) ACAS calibration is a function which performs calibration by Automatic Calibration cycle Adapting System. The 1st calibration is performed at the date and time set at "NEXT CAL TIME". At the 2nd and subsequent calibrations the "NEXT CAL TIME" is calculated based on the set "CAL INTERVAL" according to the drop in performance of the monitored ion electrode, and "NEXT CAL TIME" of the "PARAMETER 1 SET" screen is changed.

Calibration Mode Switching Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Switch calibration mode. ····· Touch the box at the right-hand side of the "CAL MODE" at the "PARAMETER 2 SET (1)" screen and display after switching. Setting range ····· Normal (normal), ACAS **④End input.** ····· Touch **[END]** in the "PARAMETER 2 SET (1)" screen. • The "Set value saving" dialog box is displayed.	 **"PARAMETER 2 SET (1)" screen**
⑤Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **"[No]**. **⑥Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"Set value saving" dialog box**

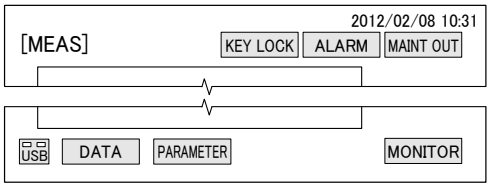
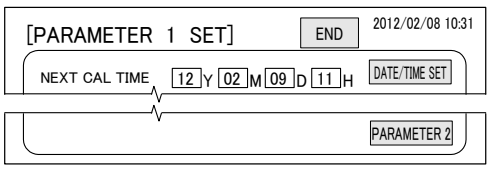
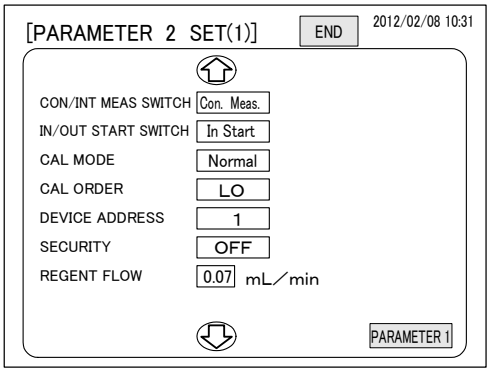
(16) Calibration order check

(a) At automatic calibration, whether calibration by LO calibration solution or calibration by HI calibration solution is first can be checked.

【IMPORTANT】 • This calibration order is fixed and cannot be changed.

(b) This order applies to automatic calibration (LO, HI) and automatic reading LO, HI calibration. In the case of automatic read LO calibration and other manual calibrations, perform calibration by LO calibration solution first as long as not necessary.

Calibration Order Check Procedure

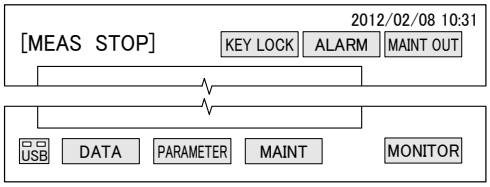
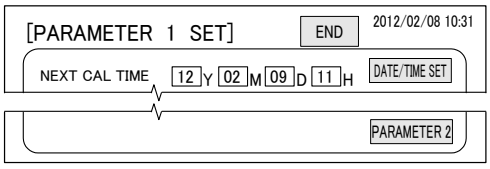
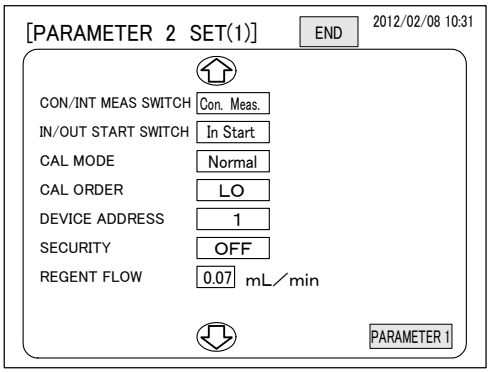
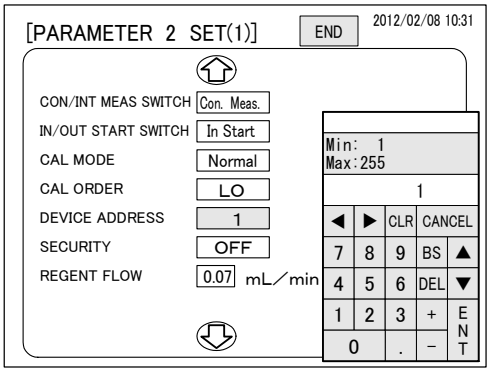
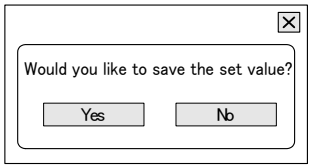
Step and operation	Screen example
①Display a screen with [PARAMETER] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[PARAMETER]** on it. **②Display the "PARAMETER 1 SET" screen.** ····· Touch **[PARAMETER]**.	 **"MEAS (MEAS)" screen**
③Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
④Check the item at "CAL ORDER". ····· Check the display of the box at the right of "CAL ORDER" in the "PARAMETER 2 SET (1)" screen. LO ····· Shows that calibration by LO calibration solution is performed first at automatic calibration. • This setting cannot be changed. **⑤End the calibration order check.** ····· Touch **[END]** in the "PARAMETER 2 SET (1)" screen. • The "MEAS (MEAS)" screen or other original screen is displayed. • When measurement was stopped, restart it, if necessary. ＞＞ 4.1(2) "Automatic measurement start"	 **"PARAMETER 2 SET (1)" screen**

(17) Device address change

(a) The device address can be switched.

(b) The device address is the device number when this equipment is managed by digital communications (Modbus).

Device Address Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 "PARAMETER 1 SET" screen
③Change the device address. ⓐ Touch the box at the right-hand side of the "DEVICE ADDRESS" in the "PARAMETER 2 SET (1)" screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 "PARAMETER 2 SET (1)" screen
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: 1 to 255 (normal: 1) • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. **④End input.** ····· Touch **[END]** in the "PARAMETER 2 SET (1)" screen. • The "Set value saving" dialog box is displayed.	 Numerical keypad dialog box
⑤Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**. **⑥Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 "Set value saving" dialog box

(18) Security set and clear

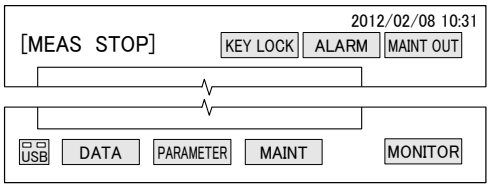
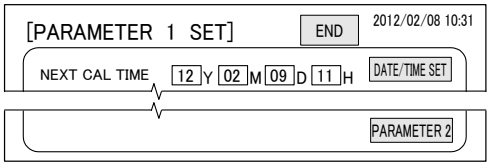
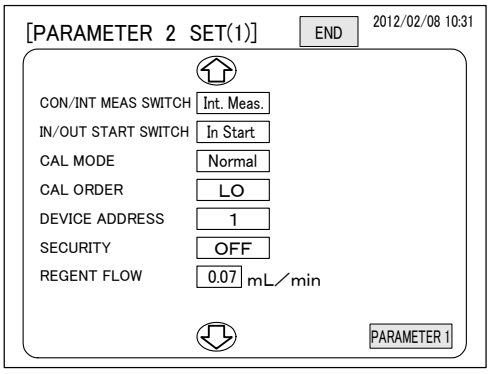
(a) Security can be set and cleared.

(b) When security is set, the "MAINT" screen is not displayed and the "PARAMETER" screen settings cannot be changed. The purpose of security is to prevent erroneous operation by unauthorized persons.

(c) The following password cannot be changed. Since it is fixed, keep it in mind when handling the equipment.

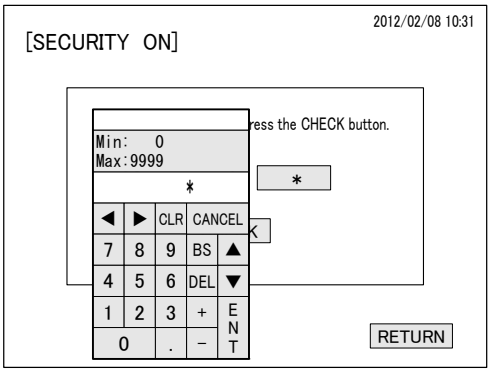
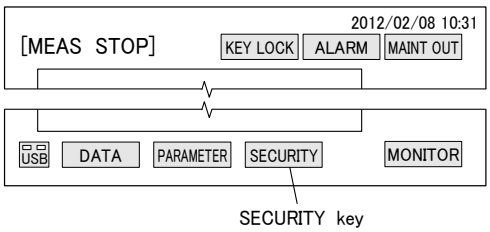
Password ····· 7144

Security Set Procedure

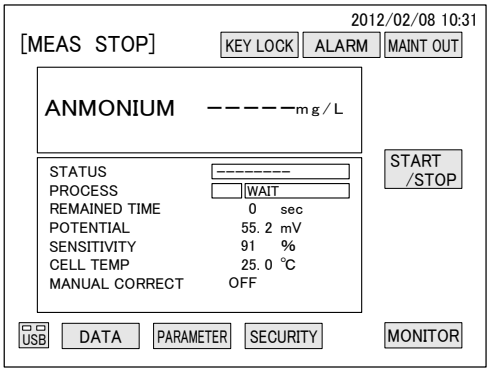
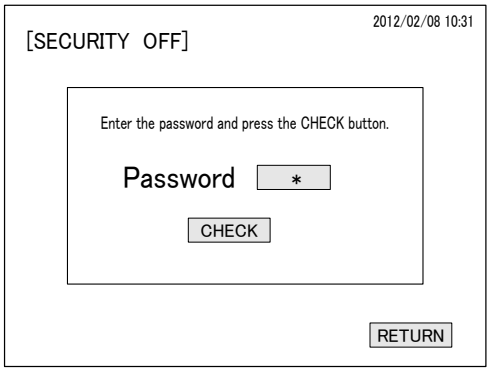
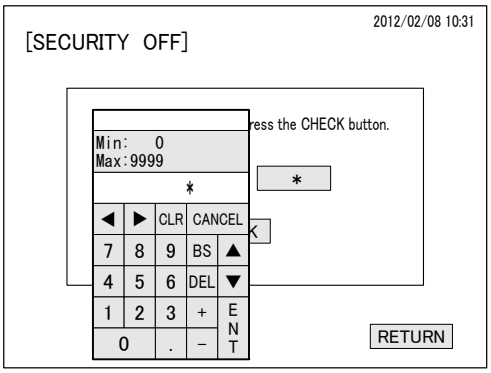
Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Display the "SECURITY ON" screen. ····· Touch the box at the right-hand side of the "SECURITY" in the "PARAMETER 2 SET (1)" screen. Setting range: OFF (normal), ON	 **"PARAMETER 2 SET (1)" screen**

(To be continued)

(Continued from previous page)

Step and operation	Screen example
④Enter the password. ⓐ Touch the box at the right-hand side of the "Password" in the "SECURITY ON" screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 **"SECURITY ON" screen**
ⓑ Enter the 4-digit password from the numerical key and touch **[ENT]**. • When **[ENT]** is touched, the numerical keypad dialog box is closed. ⓒ Touch **[CHECK]** in the "SECURITY ON" screen. • The "PARAMETER 2 SET (1)" screen is displayed. **⑤End input.** ····· Touch **[END]** in the "PARAMETER 2 SET (1)" screen. • The "MEAS (MEAS STOP)" screen is displayed.	 **Numerical keypad dialog box**
⑥Check the [SECURITY]. ····· Check that **[MAINT]** in the MEAS (MEAS STOP)" screen is switched to **[SECURITY]**. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"MEAS (MEAS STOP)" screen with [SECURITY] on it**

Security Clear Procedure

Step and operation	Screen example
①Display the "SECURITY OFF" screen. ····· Touch **[SECURITY]** in the "MEAS (MEAS STOP)" screen.	
	"MEAS (MEAS STOP)" screen with [SECURITY] on it
②Enter the password. ⓐ Touch the box at the right-hand side of the "Password" in the "SECURITY OFF" screen. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	
	"SECURITY OFF" screen
ⓑ Enter the 4-digit password from the numerical key and touch **[ENT]**. • When **[ENT]** is touched, the numerical keypad dialog box is closed. ⓒ Touch **[CHECK]** in the "SECURITY OFF "screen. • The "MEAS (MEAS STOP)" screen is displayed and **[SECURITY]** is switched to **[MAINT]**.	
③Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	**Numerical keypad dialog box**

(19) Reagent flow check

(a) The flow set value of the reagent (ionic strength adjuster) flowing to the measuring cell can be checked.

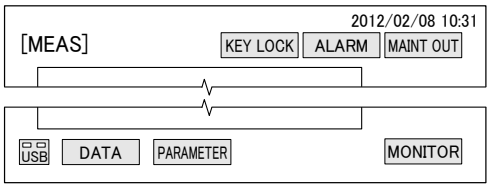
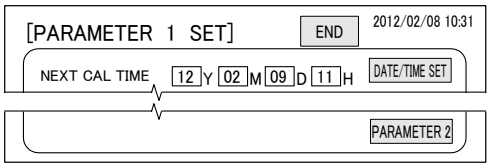
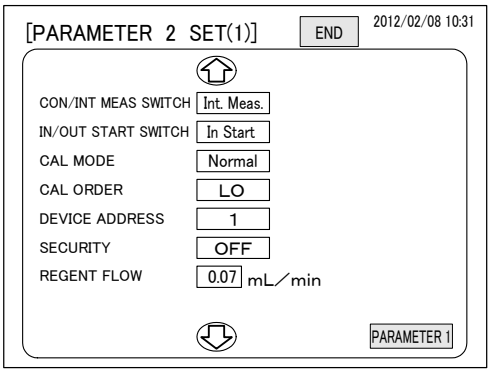
【IMPORTANT】 • Reagent flow setting is fixed and cannot be changed.

(b) The reagent flow is set to the following value. This value complies with the sample water flow (10.0 mL/min).

Reagent flow ····· 0.07 mL/min

(c) The reagent flow is controlled by the reagent pump pulse motor.

Reagent Flow Check Procedure

Step and operation	Screen example
①Display a screen with [PARAMETER] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[PARAMETER]** on it. **②Display the "PARAMETER 1 SET" screen.** ····· Touch **[PARAMETER]**.	 **"MEAS (MEAS)" screen**
③Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
④Check the item at "REGENT FLOW". ····· Check the display of the box at the right of "REGENT FLOW" in the "PARAMETER 2 SET (1)" screen. 0.07 mL/min • This setting cannot be changed. **⑤End the reagent flow check.** ····· Touch **[END]** in the "PARAMETER 2 SET (1)" screen. • The "MEAS (MEAS)" screen or other original screen is displayed. • When measurement was stopped, restart it, if necessary. ＞＞ 4.1(2) "Automatic measurement start"	 **"PARAMETER 2 SET (1)" screen**

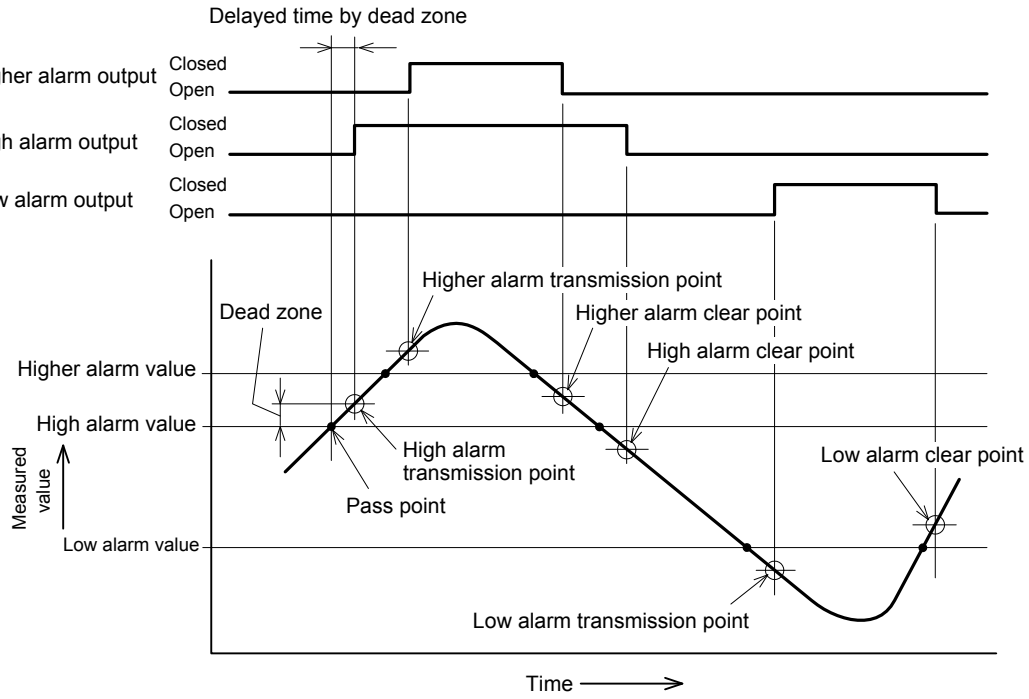
(20) Alarm value change

(a) The following alarm values to the ion concentration can be changed:

Higher alarm value

High alarm value

Low alarm value



Alarm Value and Alarm Transmission

(b) Each alarm is transmitted and cleared as shown in the figure "Alarm Value and Alarm Transmission". When an alarm is transmitted, **[ALARM]** at the top of the screen becomes red and the relevant alarm output signal is "Closed". When the alarm is cleared, the alarm output signal becomes "Open" and **[ALARM]** changes to green.

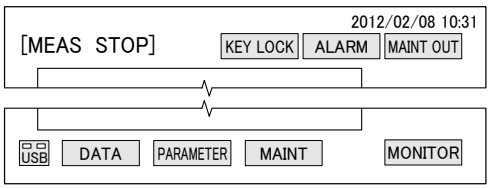
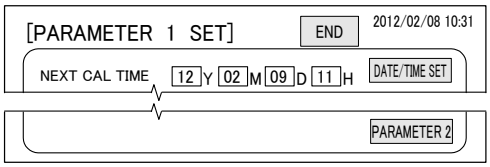
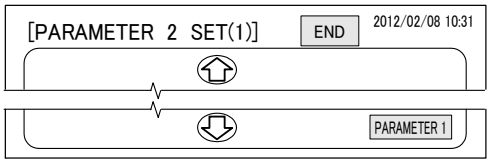
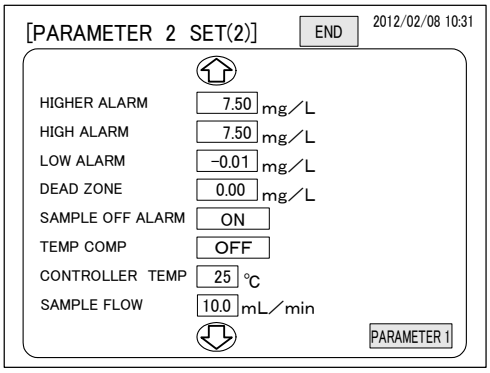
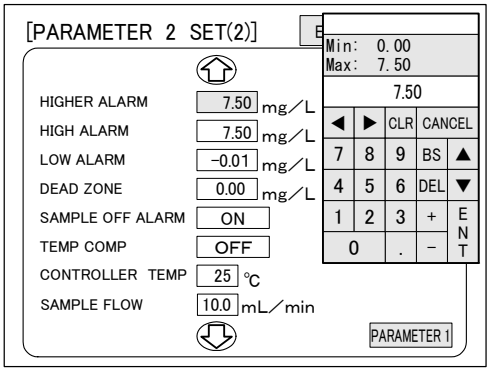
(c) When the measured value exceeds the alarm value, an alarm is transmitted. In addition, when the dead zone is set to a value exceeding 0.00 mg/L, alarm transmission is delayed by that amount.

(d) The alarm value setting range depends on the maximum scale value of the measuring range of the equipment, and is about 150% of the maximum scale value. This may be different depending on the order specifications.

Alarm value setting range (standard): -0.00 mg/L to (measuring range maximum scale value x 1.5) mg/L

(e) To disable alarm transmission, set the alarm value to -0.01 mg/L. If set to 0.00mg/L (not minus value), when the measured value becomes 0.00mg/L, the equipment will transmit an alarm.

Alarm Value Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 "PARAMETER 1 SET" screen
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (2)" screen.	 "PARAMETER 2 SET (1)" screen
④Change the alarm value. ⓐ Touch the right-hand box to be changed in the "HIGHER ALARM", "HIGH ALARM" or "LOW ALARM" of the "PARAMETER 2 SET (2)" screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 "PARAMETER 2 SET (2)" screen
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: -0.01 mg/L to (measuring range maximum scale value x 1.5) mg/L Higher: Normally 7.50 mg/L High: Normally 7.50 mg/L Low: Normally -0.01 mg/L • When -0.01 is set, alarm is not transmitted. • The maximum value of numerical keypad is the upper limit of setting range. When the input value exceeds this value, **[ENT]** is disabled. • When **[ENT]** is touched, the change of that box is fixed and the dialog box closes. ⓒ To change a second alarm, make repeat steps ⓐ and ⓑ.	 Numerical keypad dialog box

(To be continued)

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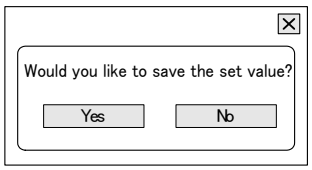
Step and operation	Screen example
⑤End input. ····· Touch **[END]** in the "PARAMETER 2 SET (2)" screen. • The "Set value saving" dialog box is displayed. **⑥Save the changed set values.** ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"Set value saving" dialog box**

(21) Dead zone change

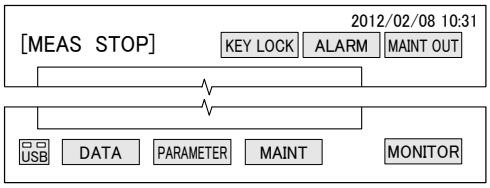
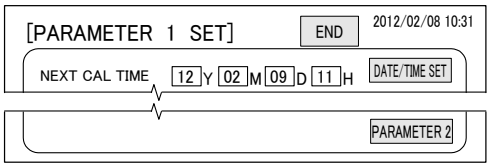
(a) When higher alarm, high alarm, or low alarm of ion concentration is transmitted, the value (mg/L) of the dead zone can be changed.

(b) For the dead zone functions, refer to the figure "Alarm Value and Alarm transmission" of 4.3(20) "Alarm value change".

(c) The dead zone setting range depends on the maximum scale value of the measuring range of the equipment, and is 20% of 1.5 times the maximum scale value. This value may be different depending on the order specifications.

Dead zone setting range (standard): 0.00 mg/L to (measuring range maximum scale value x 1.5) x 0.2 mg/L

Dead Zone Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**

(To be continued)

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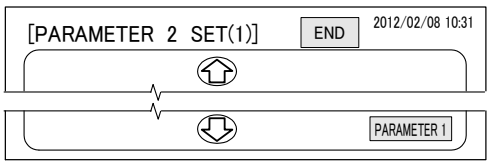
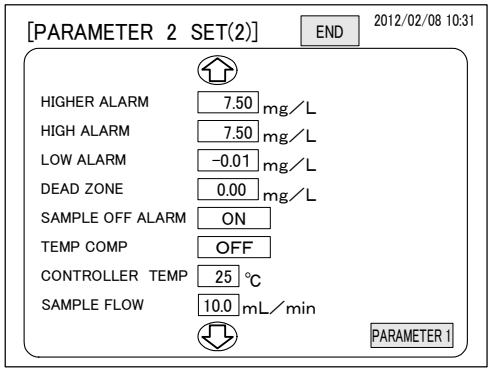
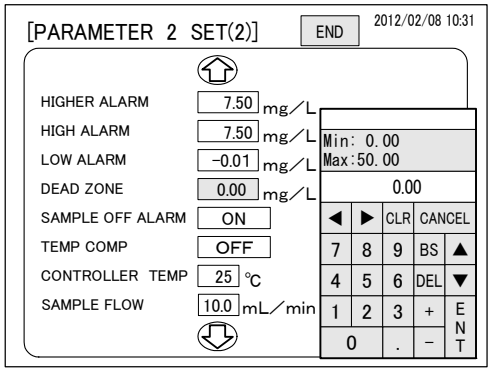
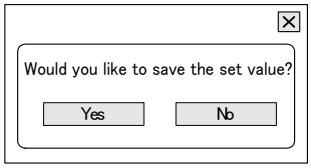
Step and operation	Screen example
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (2)" screen.	 **"PARAMETER 2 SET (1)" screen**
④Change the dead zone. ⓐ Touch the box at the right-hand side of the "DEAD ZONE" in the "PARAMETER 2 SET (2)" screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 **"PARAMETER 2 SET (2)" screen**
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: 0.00 mg/L to (measuring range maximum scale value x 1.5) x 0.2 mg/L (normal: 0.00) • The maximum value of numerical keypad is the upper limit of setting range. When the input value exceeds this value, **[ENT]** is disabled. • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed.	 **Numerical keypad dialog box**
⑤End input. ····· Touch [END] in the "PARAMETER 2 SET (2)" screen. • The "Set value saving" dialog box is displayed.	
⑥Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑦Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(22) Sample water off alarm transmission switching

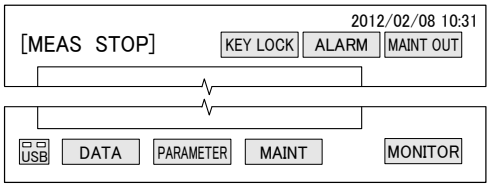
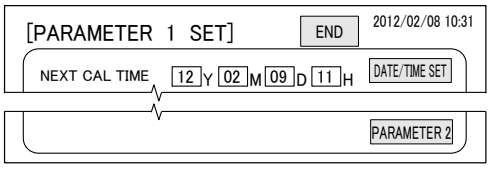
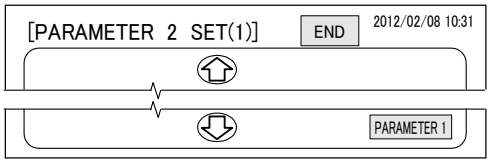
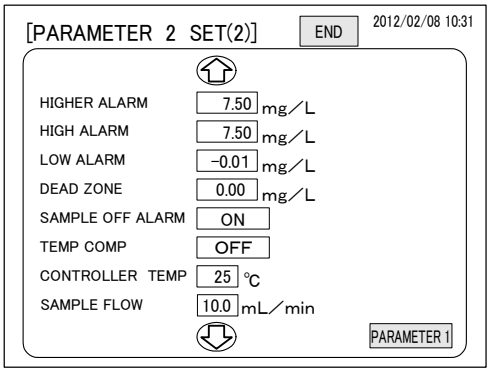
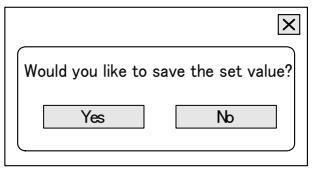
(a) Sample water off can be switched so that it is not handled as an alarm. This can be used when sample water off is not an alarm because the sample water flow is intermittent.

(b) When sample water off alarm is set to ON (Valid) ····· When the sample water level of the pre-treatment tank drops and the float switch (FS-1) is turned on, the equipment stops the sample

water pump and reagent pump. At the same time, an alarm is transmitted. **[ALARM]** on the screen blinks red and a FAILURE (MINOR) alarm (contact signal) is output to the outside.

(c) When sample water off alarm is set to OFF (Invalid) ····· If the float switch (FS-1) is turned ON, the sample water pump and reagent pump stop. However, **[ALARM]** does not blink red and FAILURE2 (MINOR) alarm is not output. Recording to the alarm log is also not performed.

Sample Water off Alarm Transmission Switching Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 "PARAMETER 1 SET" screen
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (2)" screen.	 "PARAMETER 2 SET (1)" screen
④Switch the sample water off alarm. ····· Touch the box at the right-hand side of "SAMPLE OFF ALARM" at the "PARAMETER 2 SET (2)" screen and display after switching. Setting range: ON, OFF (normal: ON) ON ··· Sets the sample water off to alarm. OFF ··· Does not set the sample water off to alarm. **⑤End switching** ····· Touch **[END]** in the "PARAMETER 2 SET (2)" screen. • The "Set value saving" dialog box is displayed.	 "PARAMETER 2 SET (2)" screen
⑥Save the switched set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 "Set value saving" dialog box

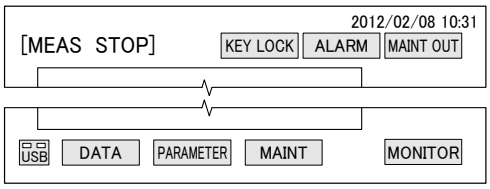
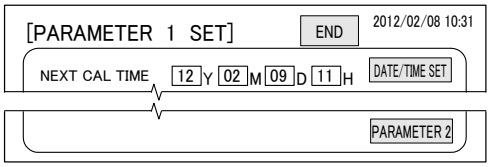
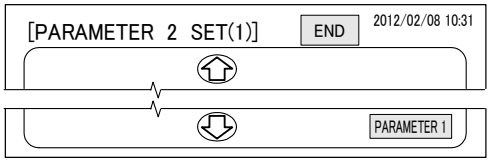
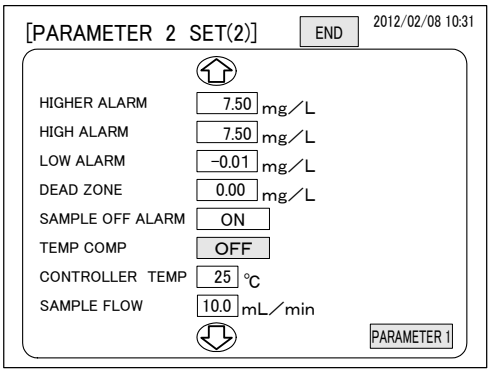
(23) Temperature compensation switching

(a) Temperature compensation can be switched to ON. Usually, since the measuring cell is temperature controlled, temperature compensation is unnecessary.

(b) Measurement is possible by turning on temperature compensation even when a temperature control heater cannot be used or the measuring cell cannot otherwise be controlled.

(c) When temperature compensation is turned ON, the measured value becomes the measured value (when 25°C) temperature compensated by measuring cell internal sample water temperature and Nernst's equation.

Temperature Compensation Switching Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (>> 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· ·Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Display the screen with the items to be changed on it. ·····Touch [↓] or [↑] in the "PARAMETER 2 SET (1)" screen and display the "PARAMETER 2 SET (2)" screen.	 **"PARAMETER 2 SET (1)" screen**
④Switch the temperature compensation. ····· Touch the box at the right-hand side of "TEMP COMP" at the "PARAMETER 2 SET (2)" screen and display after switching. Setting range: ON, OFF (normal: OFF) ON ··· Temperature compensation on OFF ··· Temperature compensation off **⑤End switching** ····· Touch **[END]** in the "PARAMETER 2 SET (2)" screen. • The "Set value saving" dialog box is displayed.	 **"PARAMETER 2 SET (2)" screen**

(To be continued)

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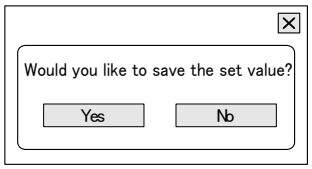
Step and operation	Screen example
⑥Save the switched set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞4.1(2) "Automatic measurement start"	 **"Set value saving" dialog box**

(24) Temperature control temperature change

(a) The temperature control temperature can be changed. The temperature control temperature is the set temperature of the thermostatic chamber for the purpose of controlling the temperature of the sample water inside the measuring cell. Normally it is set to 25°C. Do not change it unless absolutely necessary.

(b) When the ambient temperature of the equipment exceeds the specifications range (0 to 40°C), the capacity of the thermostatic chamber may be insufficient and the measurement accuracy may drop. However, when it exceeds 2 to 3°C if it is within 2 hours, measurement can be continued by changing the temperature control temperature. Perform this operation by the following procedure.

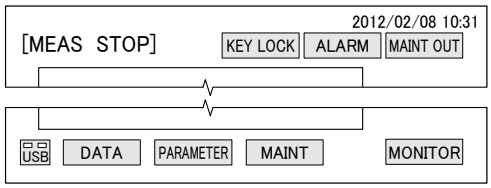
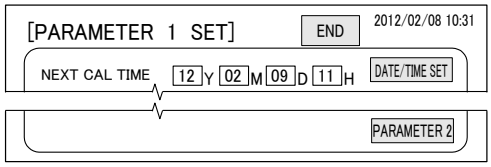
ⓐ Change the temperature control temperature to within the 28 to 30°C range. ＞＞ 4.3(24) "Temperature control temperature change"

ⓑ Check that the cell temperature of the "MEAS" screen is stable.

ⓒ Perform 2-point (LO, HI) calibration. ＞＞ 4.4(3-2) "Automatic reading calibration" or 4.4(3-3) "Manual reading calibration"

ⓓ Start the automatic measurement. ＞＞ 4.1(2) "Automatic measurement start"

Temperature Control Temperature Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**

(To be continued)

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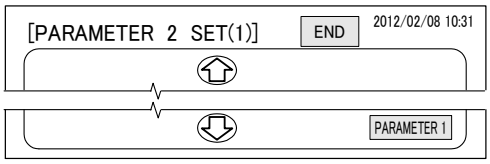
Step and operation	Screen example

③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (2)" screen.



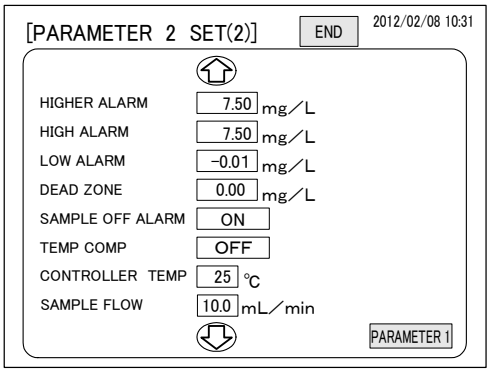
"PARAMETER 2 SET (1)" screen

④Change the temperature control temperature.

ⓐ Touch the box at the right-hand side of the "CONTROLLER TEMP" in the "PARAMETER 2 SET (2)" screen.

- The numerical keypad dialog box is displayed.

＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"



"PARAMETER 2 SET (2)" screen

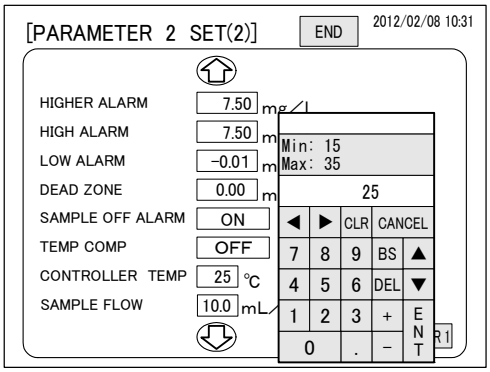
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**.

Setting range: 15 to 35°C (normal: 25)

- When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed.

⑤End input. ····· Touch [END] in the "PARAMETER 2 SET (2)" screen.

- The "Set value saving" dialog box is displayed.

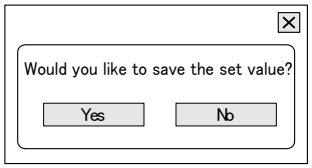


Numerical keypad dialog box

⑥Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box.

- The dialog box closes and the MEAS (MEAS STOP) screen is displayed.
- To abort the change, touch **[No]**.

⑦Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"



"Set value saving" dialog box

(25) Sample water flow check

(a) The flow set value of the sample water flowing to the measuring cell can be checked.

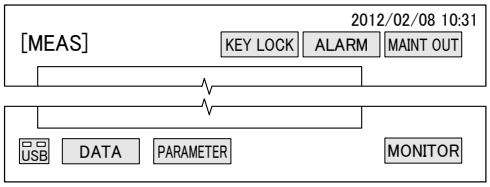
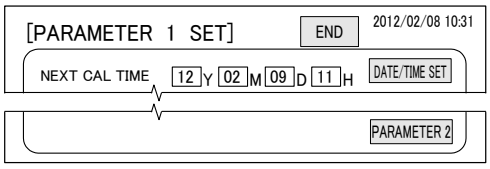
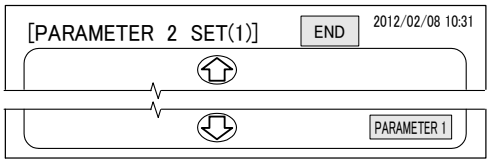
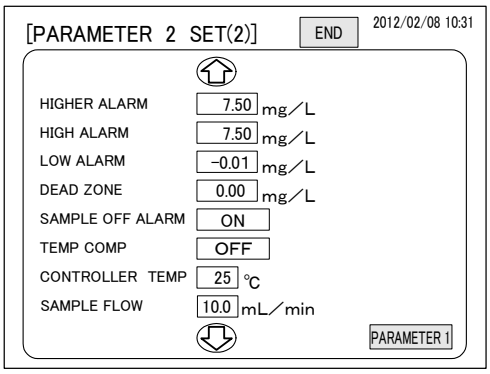
【IMPORTANT】 • Sample water flow setting is fixed and cannot be changed.

(b) The sample water flow is set to the following value. The sample water flow is equivalent to the reagent flow (0.07 mL/min).

Sample water flow ·····10.0 mL/min (fixed)

(c) The sample water flow is controlled by the reagent pump pulse motor.

Sample Water Flow Check Procedure

Step and operation	Screen example
①Display a screen with [PARAMETER] on it. ····· Display the "MEAS (MEAS)" screen or other screen with **[PARAMETER]** on it. **②Display the "PARAMETER 1 SET" screen.** ····· Touch **[PARAMETER]**.	 **"MEAS (MEAS)" screen**
③Display the "PARAMETER 2 SET (1)" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
④Display the "PARAMETER 2 SET (2)" screen. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)" screen and display the "PARAMETER 2 SET (2)" screen.	 **"PARAMETER 2 SET (1)" screen**
⑤Check the item at "SAMPLE FLOW". ····· Check the display of the box at the right of "SAMPLE FLOW" in the "PARAMETER 2 SET (2)" screen. 10.0 mL/min • This setting cannot be changed. **⑥End the sample water check.** ····· Touch **[END]** in the "PARAMETER 2 SET (2)" screen. • The "MEAS (MEAS)" screen or other original screen is displayed. • When measurement was stopped, restart it, if necessary. ＞＞ 4.1(2) "Automatic measurement start"	 **"PARAMETER 2 SET (2)" screen**

(26) Calibration solution concentration change

(a) When the concentration of the calibration solution filled in the calibration solution tank was changed, the value of relevant parameter item must be changed. This also applies when LL calibration solution (option) is used and when the concentration was changed.

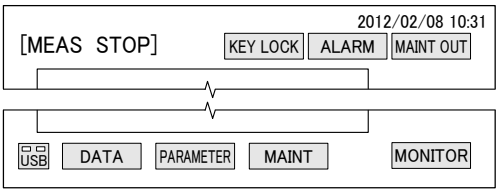
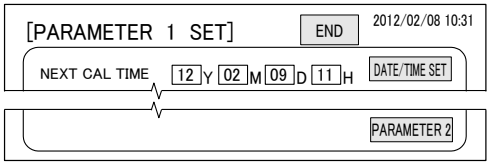
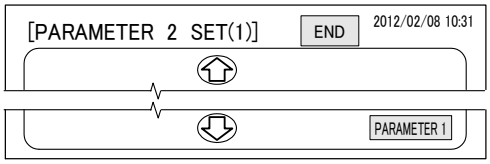
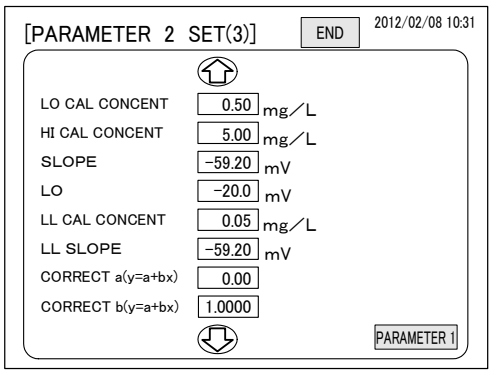
· HI calibration solution concentration ····· HI calibration solution tank

· LO calibration solution concentration ····· LO calibration solution tank

· LL calibration solution concentration (option) ····· LL calibration solution tank

(b)Usually, prepare and use a HI calibration solution equivalent to full span of the measurement range and a LO calibration solution of 1/10 of the HI calibration solution. ＞＞ 2.2(4-1) “Calibration solution key points”

Calibration Solution Concentration Change Procedure

Step and operation	Screen example
①Display the “PARAMETER 1 SET” screen. ····· Stop measurement (＞＞ 4.1(3) “Automatic measurement stop”) and touch **[PARAMETER]** in the “MEAS (MEAS STOP)” screen.	 “MEAS (MEAS STOP)” screen
②Display the “PARAMETER 2 SET” screen. ····· Touch **[PARAMETER 2]** in the “PARAMETER 1 SET” screen.	 “PARAMETER 1 SET” screen
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the “PARAMETER 2 SET (1)”screen and display the “PARAMETER 2 SET (3)” screen.	 “PARAMETER 2 SET (1)” screen
④Change concentration arithmetic expression. ⓐ Touch the box at the right-hand side of the following items to change in the “PARAMETER 2 SET (3)” screen. LO CAL CONCENT HI CAL CONCENT LL CAL CONCENT • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure “Kinds of numerical keypad keys”	 “PARAMETER 2 SET (3)” screen.

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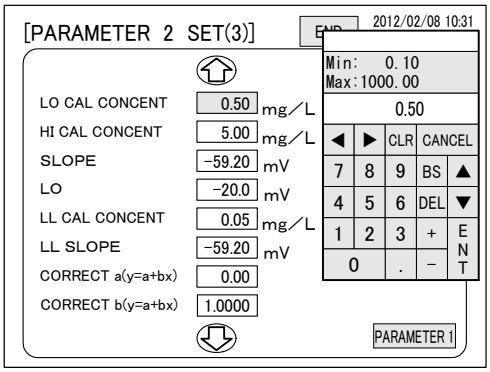
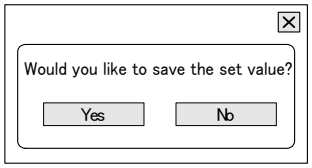
Step and operation	Screen example
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: LO calibration solution concentration: 0.10 to 1000.00 mg/L (normal: 0.50) HI calibration solution concentration: 0.10 to 1000.00 mg/L (normal: 5.00) LL calibration solution concentration: 0.01 to 10.00 mg/L (normal: 0.05) (option) • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. • Refer to the figure "Kinds of numerical keypad dialog box keys" of "4.3(4)②ⓓ". ⓒ To change the concentration of a 2nd and subsequent calibration solution, make repeat steps ⓐ and ⓑ.	 **Numerical keypad dialog box**
⑤End input. ····· Touch [END] in the "PARAMETER 2 SET (3)" screen. • The "Set value saving" dialog box is displayed.	
⑥Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑦Restart measurement. ····· If necessary, restart measurement. ＞＞4.1(2) "Automatic measurement start"	

(27) Concentration arithmetic expression check and change

(a) The value of the SLOPE, etc. of the concentration arithmetic expression obtained by calibration can be changed.

• SLOPE ····· Potential difference (mV) between solutions of 10 times concentration difference obtained by LO and HI calibration

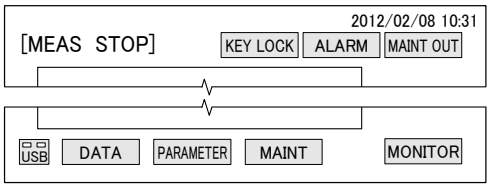
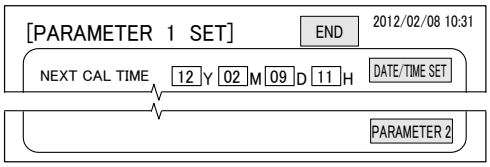
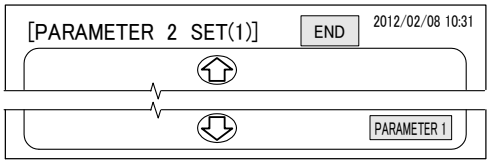
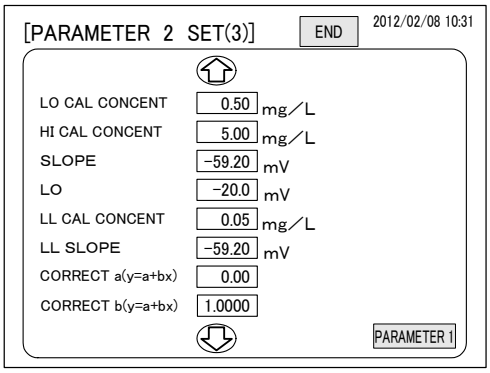
• LO ····· Electrode potential (mV) at LO calibration solution measurement

• LL SLOPE ····· Electrode potential (mv) per unit logarithmetic concentration calculated by calibration by LL calibration and LO calibration solution

(b) The value of SLOPE, LO, or LL SLOPE can be changed by screen operation, but do not change them unless absolutely necessary.

(c) When the concentration of the calibration solution was changed, make this check after performing automatic calibration or manual calibration once or more. The old concentration arithmetic expression value is displayed until calibration is performed even if the calibration conditions were changed.

Concentration Arithmetic Expression Check and Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Display a screen with the items to be checked or changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (3)" screen.	 **"PARAMETER 2 SET (1)" screen**
④Check the value. ····· Check the value of the necessary items of the following items at the "PARAMETER 2 SET (3)" screen. SLOPE LO LL SLOPE • When not changing, the touch **[END]** and go to step ⑧ after this operation **⑤Change the value.** ⓐ Touch the box at the right-hand side of the item to be changed of the following items at the "PARAMETER 2 SET(3)" screen. • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 **"PARAMETER 2 SET (3)" screen.**

(To be continued)

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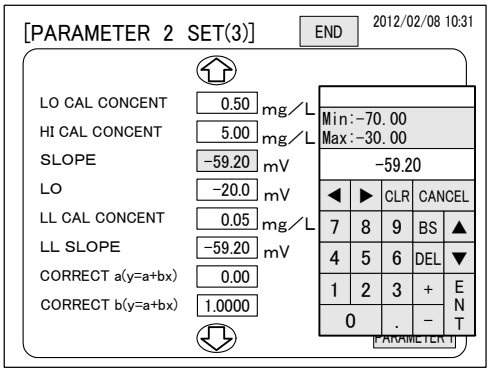
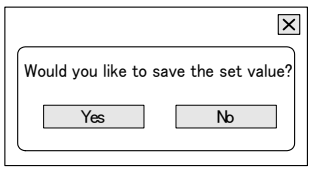
Step and operation	Screen example
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: SLOPE ··· -70.00 to -30.00 mV LO ··· ±250.0 mV LL SLOPE ··· -70.00 to -5.00 mV • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. ⓒ To change the 2nd and subsequent items, make repeat steps ⓐ and ⓑ.	 **Numerical keypad dialog box**
⑥End check and change. ····· Touch [END] in the "PARAMETER 2 SET (3)" screen. • The "Set value saving" dialog box is displayed.	
⑦Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the MEAS (MEAS STOP) screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑧Restart measurement. ····· If necessary, restart measurement. ＞＞4.1(2) "Automatic measurement start"	

(28) Correction coefficient change

(a) Usually this value is not changed. The equipment measured value can be corrected to the standard value (manual correcting value, etc.) by changing the correction coefficient.

CORRECT a (y = a + bx)

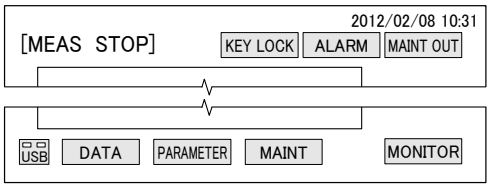
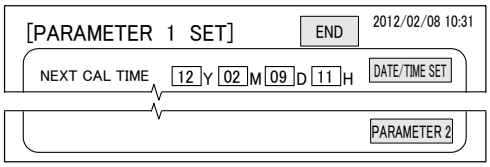
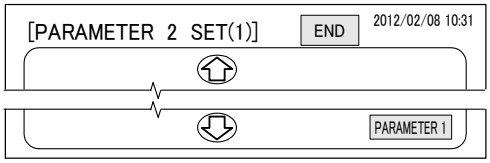
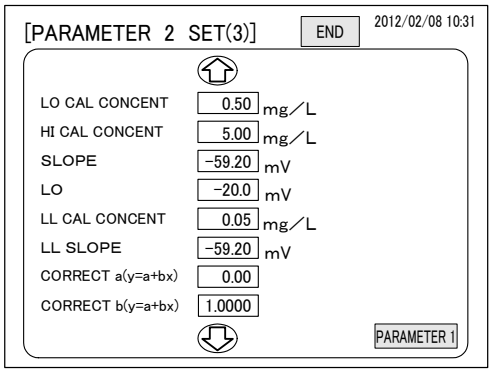
CORRECT b (y = a + bx)

(b) Alter calculating the measured value by concentration arithmetic expression, the equipment performs correction by correction expression and displays and outputs the corrected value. Segment and slope of the correction expression are displayed at the "PARAMETER 2 SET (3)" screen as "CORRECT a (y = a + bx)" and "CORRECT b (y = a + bx)" and can be changed from the numerical keypad.

y = a + bx y: Correction concentration
a: Segment
b: Slope
x: Measured value

(c) When the "manual correcting calculation" is performed, the slope "b" is automatically switched. When the correction coefficient by key input of this item is given priority, do not perform "manual correcting calculation". ＞＞ 4.4(3-4) "Manual correcting calibration"

Correction Coefficient Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop" and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (3)" screen.	 **"PARAMETER 2 SET (1)" screen**
④Change the correction coefficient. ⓐ Touch the box at the right-hand side of the item to be changed of the following items at the "PARAMETER 2 SET(3)" screen. CORRECT a (y=a+bx) CORRECT b (y=a+bx) • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 **"PARAMETER 2 SET (3)" screen.**

(To be continued)

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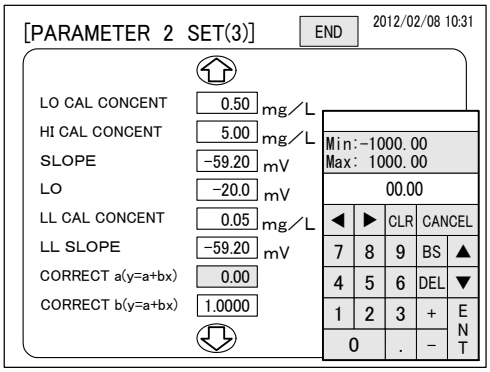
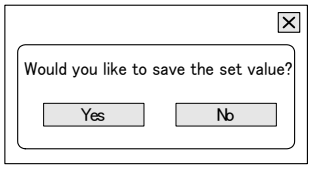
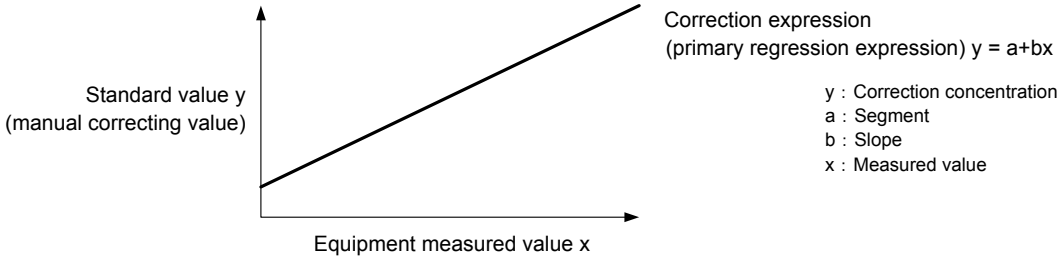
Step and operation	Screen example
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: CORRECT a (y = a + bx) ··· ±1000.00 (normal: 0.00) CORRECT b (y = a+ bx) ··· 0.0010 to 9.9999 (normal: 1.0000) • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. • Refer to the figure "Kinds of numerical keypad dialog box keys" of "4.3(4)②ⓓ". ⓒ To change the 2nd item, make repeat steps ⓐ and ⓑ.	 **Numerical keypad dialog box**
⑤End change. ····· Touch [END] in the "PARAMETER 2 SET (3)" screen. • The "Set value saving" dialog box is displayed.	
⑥Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑦Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(d)How to find the new correction coefficient



Correction Expression Graph

ⓐ Collect the data. ····· Find the measured value of a large number of actual sample waters of different concentrations using "manual correcting calculation" (however, do not perform calibration calculation) and, at the same time, request a specialist to find the ion concentration manual analyzed value.

ⓑ Calculate the new data regression expression. ····· Arrange the found data by scatter diagram and calculate the regression expression by means of the arranged data. Make the segment of this new data a_2 and make the slope b_2.

ⓒ Check the correction coefficient before the change. ····· Check the value before the change, that is, the current "CORRECT a (y = a + bx)" and "CORRECT b (y = a + bx)", at the "PARAMETER 2 SET (3)" screen.

- When "CORRECT a (y = a + bx)" is 0.00 and "CORRECT b (y = a + bx)" is 1.000, step ⓓ is unnecessary. In this case, make the segment of the new data found at ⓑ a_2 and slope b_2 as "CORRECT a (y = a + bx)" and "CORRECT b (y = a + bx)" after the change as is.
- When not pertinent to the previous item, make a note with "CORRECT a (y = a + bx)" as segment a_1 and CORRECT b (y= a + bx)" as slope b_1 of the "PARAMETER 2 SET (3)" screen. Make the segment of the new regression expression found at ⓑ a_2 and the slope b_2.

ⓓ Calculate the correction coefficient by correction expression after the change.·····The correction expression after the change and its correction coefficient become the following expressions. Substitute a_2, b_2, a_1, and b_1 at the new correction expression and calculate the segment and slope.

Correction expression after the change ····· $y = a_2 + b_2 (a_1+b_1x) = (a_2 + b_2a_1) + b_2b_1x$

Segment after the change ····· $a_2 + b_2a_1$

Slope after the change ····· b_2b_1

(Example)

Segment a_1 before the change: 1.30 Slope b_1 before the change: 1.20

Segment a_2 of the new data regression expression: 0.60 Slope b_{2of} the new data regression expression: 1.70

Segment after the change ····· 0.6＋1.7×1.3＝2.81

Slope after the change ····· 1.7×1.2＝2.0400

(29) Transmission output range check and change

(a) The measurement range of this equipment is 0.05 to 100.0 mg/L. However, one range can be selected from among the measuring ranges of the following table by order specifications. For each equipment measuring range, check the delivery specifications. The transmission output range (transmission zero and transmission span) corresponding to the measurement range is set.

Transmission zero (TRANS ZERO)

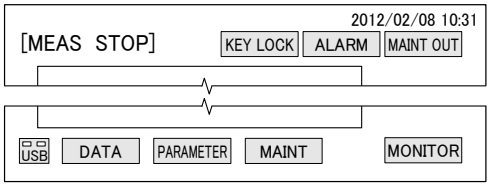
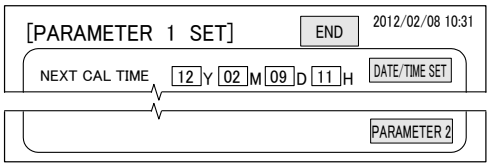
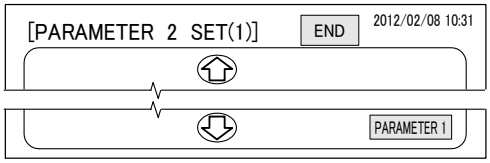
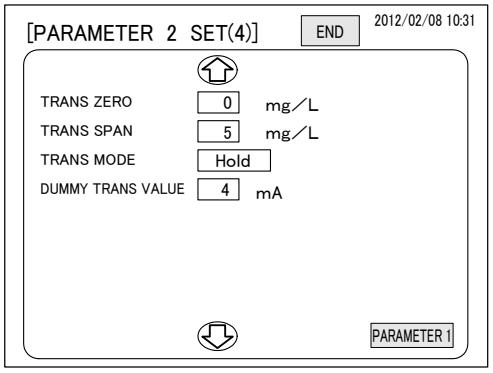
Transmission span (TRANS SPAN)

Measurement Range and Transmission Output Range

Measurement range (NH_4^+)	Transmission output range (NH_4^+)		Standard calibration solution concentration (NH_4^+)	
	Transmission zero (4mA)	Transmission span (20mA)	LO calibration solution	HI calibration solution
0.03 to 5.00 mg/L (Standard)	0 mg/L	5 mg/L	0.50 mg/L	5.00 mg/L
0.10 to 10.00 mg/L	0 mg/L	10 mg/L	1.00 mg/L	10.00 mg/L
1.0 to 100.0 mg/L	0 mg/L	100 mg/L	10.00 mg/L	100.00 mg/L

(b) Transmission can be expanded and output by changing the transmission zero and transmission span value within the measuring range of the equipment used. For example, if the transmission span of the equipment whose measuring range is 0.05 to 5.00 mg/L is changed to 2 mg/L, the 4-20 mADC output is switched from '0 to 5 mg/L' to '0 to 2 mg/L'.

Transmission Output Range Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 "PARAMETER 1 SET" screen
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (4)" screen.	 "PARAMETER 2 SET (1)" screen
④Change the transmission output value. ⓐ Touch the box at the right-hand side of the item to be changed of the following items at the "PARAMETER 2 SET(4)" screen. TRANS ZERO TRANS SPAN • The numerical keypad dialog box is displayed. ＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"	 "PARAMETER 2 SET (4)" screen

(To be continued)

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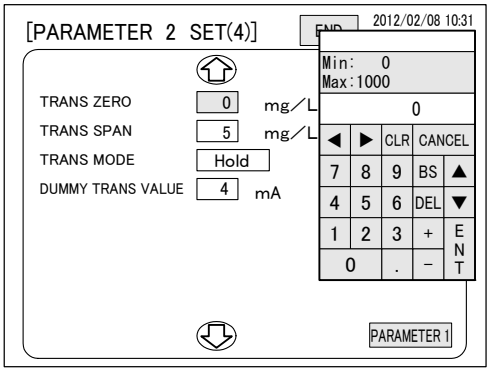
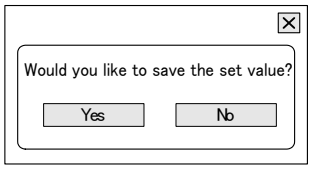
Step and operation	Screen example
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: Transmission zero ··· 0 to 1000 mg/L (normal: 0 or depending on order specifications) Transmission span ··· 0 to 1000 mg/L (normal: 5 or depending on order specifications) • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. ⓒ To change the 2nd item, make repeat steps ⓐ and ⓑ.	 **Numerical keypad dialog box**
⑤End change. ····· Touch [END] in the "PARAMETER 2 SET (4)" screen. • The "Set value saving" dialog box is displayed.	
⑥Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**.	 **"Set value saving" dialog box**
⑦Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(30) Transmission mode switching

(a) The state of the concentration signal output of the measurement in progress, calibration in progress, wash in progress, measurement preparations, measurement wait, and other unconventional measurement states can be changed.

(b) One of the following 3 can be selected:

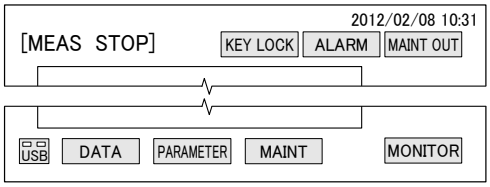
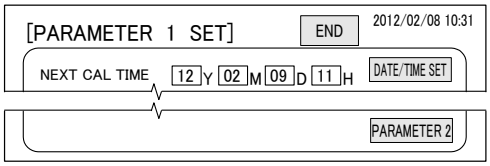
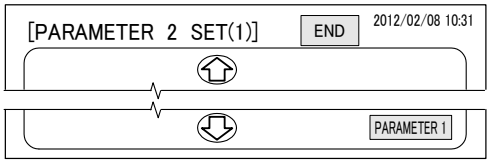
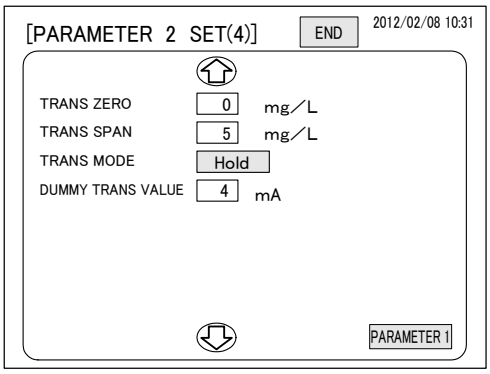
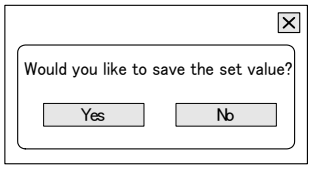
• Hold (normal) ····· Fixes and outputs the immediately preceding concentration signal output value.

• Through ····· Outputs the normal measured value unchanged even in an unconventional measurement state.

• Dummy ····· Fixes and outputs an arbitrary dummy value.

(c) At intermittent measurement, the equipment becomes the hold state during waiting regardless of the transmission mode.

Transmission Mode Switching Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (4)" screen.	 **"PARAMETER 2 SET (1)" screen**
④Switch the transmission mode. ····· Touch the box at the right-hand side of "TRANS MODE" at the "PARAMETER 2 SET (4)" screen and display after switching. Setting range: Hold (normal), Through, Dummy **⑤End switching** ····· Touch **[END]** in the "PARAMETER 2 SET (2)" screen. • The "Set value saving" dialog box is displayed.	 **"PARAMETER 2 SET (4)" screen**
⑥Save the switched set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"Set value saving" dialog box**

(31) Dummy transmission value change

(a) When switched to DUMMY by transmission mode, the dummy transmission value can be changed.

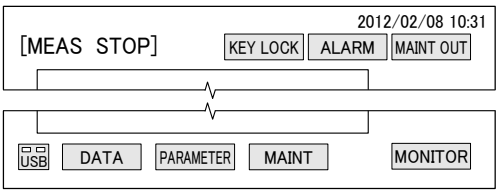
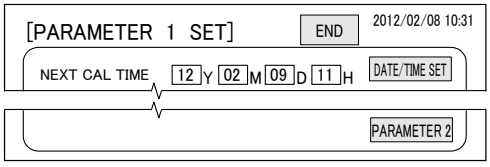
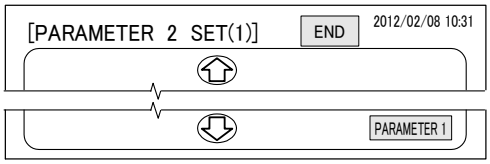
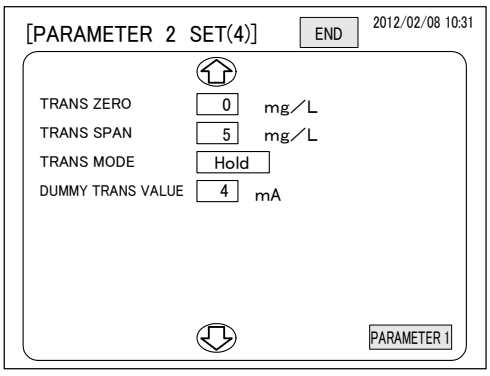
(b) The ion concentration versus dummy transmission value (mA) can be found from the following expression.

$$\text{Ion concentration converted value} = \frac{\text{Dummy transmission value - 4}}{20-4} \times (\text{Transmission span value} - \text{Transmission zero value}) + \text{transmission zero value}$$

(Example) Dummy transmission value: 12 mA transmission span value: 5 mg/L
transmission zero value: 0 mg/L

$$\text{Ion concentration converted value} = \frac{12-4}{20-4} \times (5-0) + 0 = 2.5 \text{ (mg/L)}$$

Dummy Transmission Value Change Procedure

Step and operation	Screen example
①Display the "PARAMETER 1 SET" screen. ····· Stop measurement (>> 4.1(3) "Automatic measurement stop") and touch **[PARAMETER]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "PARAMETER 2 SET" screen. ····· Touch **[PARAMETER 2]** in the "PARAMETER 1 SET" screen.	 **"PARAMETER 1 SET" screen**
③Display a screen with the items to be changed on it. ····· Touch [↓] or [↑] in the "PARAMETER 2 SET (1)"screen and display the "PARAMETER 2 SET (4)" screen.	 **"PARAMETER 2 SET (1)" screen**
④Change the transmission output value. ⓐ Touch the box at the right-hand side of "DUMMY TRANS VALUE" at the "PARAMETER 2 SET(4)" screen. • The numerical keypad dialog box is displayed. >> 4.2(2)④ Figure "Kinds of numerical keypad keys"	 **"PARAMETER 2 SET (4)" screen**

(To be continued)

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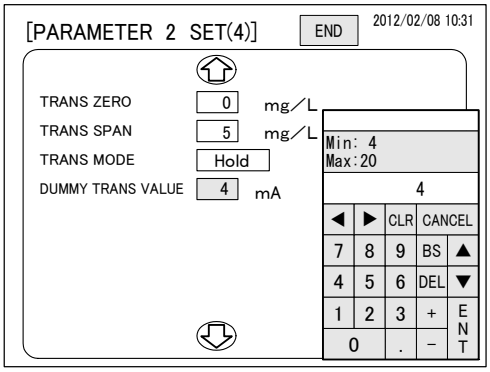
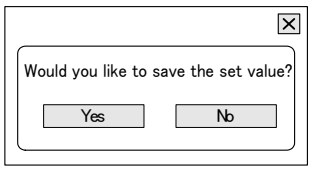
Step and operation	Screen example
ⓑ Enter the new value by numerical key at "INPUT VALUE DISPLAY" of the numerical keypad and touch **[ENT]**. Setting range: 4 to 20 mA (normal: 4) • When **[ENT]** is touched, the change of that box is fixed and the dialog box is closed. **⑤End change.** ····· Touch [END] in the "PARAMETER 2 SET (4)" screen. • The "Set value saving" dialog box is displayed.	 **Numerical keypad dialog box**
⑥Save the changed set values. ····· Touch **[Yes]** in the "Set value saving" dialog box. • The dialog box closes and the "MEAS (MEAS STOP)" screen is displayed. • To abort the change, touch **[No]**. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"Set value saving" dialog box**

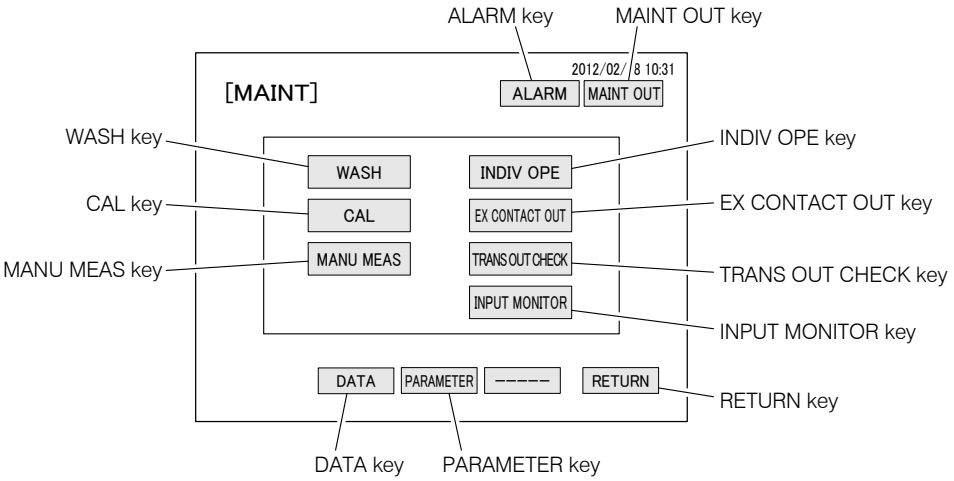
4.4 Maintenance Screen Operation

(1) Maintenance screen functions

(a) Wash, calibration, manual measurement, individual measurement, input/output check and other maintenance operations can be performed at the “MAINT” screen.

(b) The “MAINT” screen cannot be opened at the “MEAS (MEAS)” screen during measurement. Open it after stopping measurement and opening the “MEAS (MEAS STOP)” screen.

(c) Refer to the related items for a description of operation of the “MAINT” screen data keys and parameter keys. ＞＞ 4.2 “Data Screen Operation”, 4.3 “Parameter Screen Operation”



“MAINT” Screen
(Maintenance screen)

Maintenance Screen Keys

Name and notation in text	Function
Wash key **[WASH]**	• When touched, the “WASH” screen opens. Manual wash can be started and stopped at the “WASH” screen.
Calibration key **[CAL]**	• When touched, the “CAL” screen opens. “AUTO LO.HI CAL”, “MANU READ MANUAL CORRECT CAL”, etc. can be started at the “CAL” screen.
Manual measurement key **[MANU MEAS]**	• When touched, the “MANU MEAS” screen opens. LO calibration solution measurement, HI calibration solution measurement, or LL calibration solution measurement (option) can be started or stopped at the “MANU MEAS” screen.
Individual operation key **[INDIV OPE]**	• When touched, the “INDIV OPE” screen opens. The following send and drain operations can be performed at the “INDIV OPE” screen. LL calibration solution send (option) / LO calibration solution send / HI calibration solution send / acid washing solution send / sample water send / reagent send / cell drain
External contact output key **[EX CONTACT OUT]**	• When touched, the “EX CONTACT OUT” screen opens. FAILURE 1 (SERIOUS) and other external contact output tests can be performed at the “EX CONTACT OUT” screen.

(To be continued)

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Name and notation in text	Function
Transmission output check key **[TRANS OUT CHECK]**	• When touched, the “TRANS OUTPUT CHECK” screen opens. The following transmission output test values can be output at the “TRANS OUTPUT CHECK” screen. 0/25/50/75/100% of 4-20 mADC
Input monitor key **[INPUT MONITOR]**	• When touched, the “INPUT MONITOR” screen opens. The liquid level state (float switch on/off) of the LO calibration tank, etc. can be checked at the “INPUT MONITOR” screen. The state (open/closed) of the “MEAS START” and other external contact signal inputs can also be checked.
Alarm key **[ALARM]**	• ＞＞ 4.1(5) “Alarm check and clear”
Maintenance output key **[MAINT OUT]**	• ＞＞ 4.1(6) “Maintenance in progress” signal switching
Data key **[DATA]**	• ＞＞ 4.2 “Data Screen Operation”
Parameter key **[PARAMETER]**	• ＞＞ 4.3 “Parameter Screen Operation”
Return key **[RETURN]**	• When touched, the “MEAS (MEAS STOP)” screen opens.

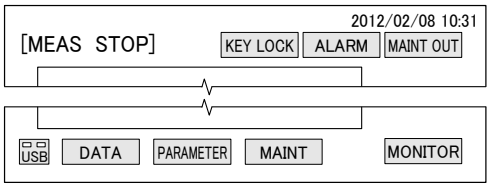
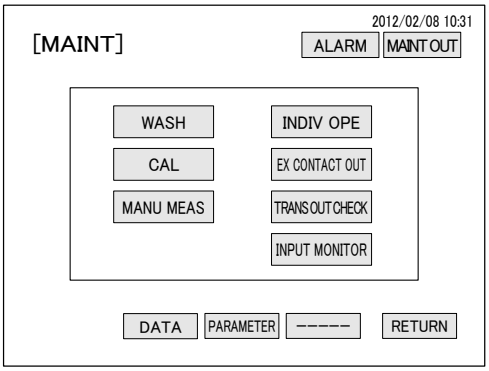
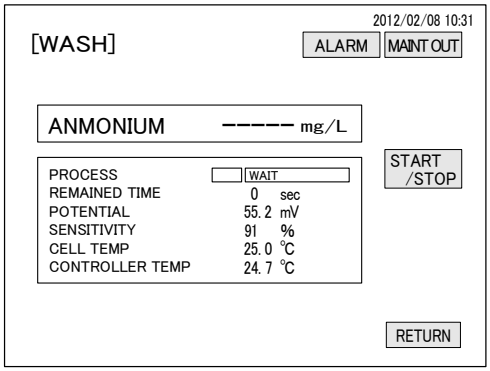
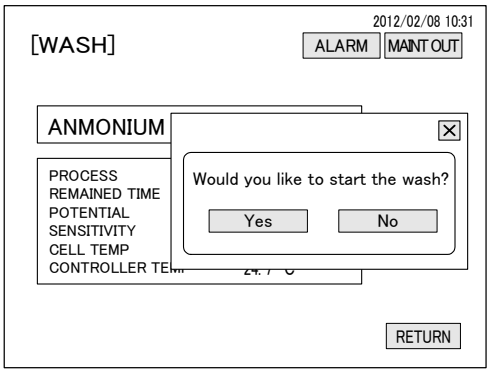
(2) Manual wash start

(a) Manual wash can be started. Manual wash is started by screen operation. The wash contents are the same as automatic wash during measurement.

(b) When manual wash starts, the equipment waits at the “WASH” screen after performing 1 interval operation (approximately 15 minutes) in accordance with the wash time chart.

(c) Manual wash can also be aborted in mid-course, but the acid washing solution remains in the measuring cell and its route. If restarting measurement, acid washing solution remaining in the route is drained automatically, so there is nothing that matters. However, when continuing maintenance operation, individual operation (simultaneous execution of “DRAIN” and “SAMPLE WATER SEND”) must be performed before the maintenance operation. Never abort manual wash in mid-course.

Manual Wash Start Procedure

Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Display the "WASH" screen. ····· Touch **[WASH]** in the "MAINT" screen.	 "MAINT" screen  "WASH" screen
③Start washing. ····· Touch **[START/STOP]** of the "WASH" screen and touch **[Yes]** of the "Washing start" dialog box. • The dialog box closes and washing starts. After about 15 minute washing stops and **[RETURN]** is displayed on the "WASH" screen. • Aborting ··· When washing must be aborted, touch **[START/STOP]** of the "WASH" screen and touch **[Yes]** in the "Washing stop" dialog box. When equipped with a waste tank (option), washing cannot be aborted. **④Return to "MEAS (MEAS STOP)" screen.** ····· Check that **[RETURN]** is reactivated at the "WASH" screen and touch it. Next, touch **[RETURN]** of the displayed "MAINT" screen. **⑤Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 "Washing start" dialog box

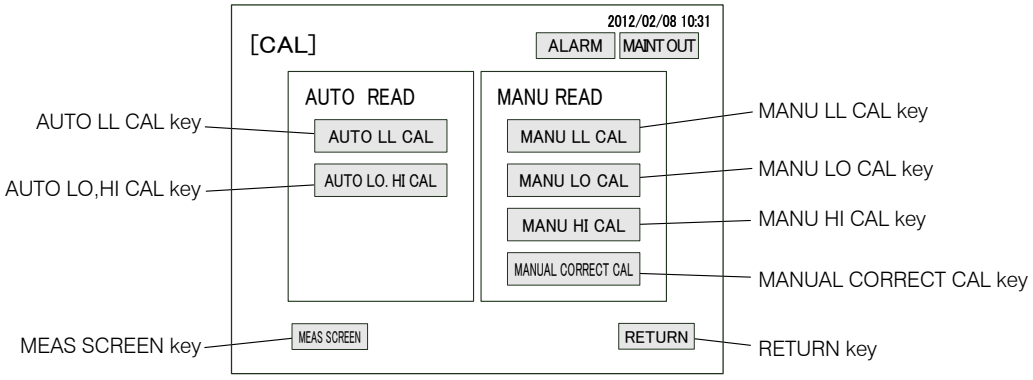
(3-1) Calibration screen functions

(a) There are keys for starting calibration of all kinds on the "CAL" screen. Calibration operation is performed almost automatically by "CAL TIME CHART".

(b) Manual calibration is divided into the following 2 methods by how the calibration value is read:

• Automatic reading calibration ····· The equipment automatically checks the stability of the indication and reads the calibration value.

• Manual reading calibration ····· The operator checks the stability of the indication and reads the calibration value. In addition, the normal calibration uses the calibration solution and the manual correcting calculation uses the sample water to be performed by manual correcting calibration, etc.



"CAL" Screen
(Calibration screen)

Calibration Screen Keys

Name and notation in text	Function
Automatic LL calibration key **[AUTO LL CAL]** (option)	• When touched, the "AUTO LL CAL" screen (option) is displayed. At the screen, automatic reading low concentration zero calibration can be started.
Automatic LO, HI calibration key **[AUTO LO, HI CAL]**	• When touched, the "AUTO LO, HI CAL" screen is displayed. At the screen, automatic reading zero/span calibration can be started.
Manual LL calibration key **[MANU LL CAL]** (option)	• When touched, the "MANU LL CAL" screen (option) is displayed. At the screen, manual reading (by operator key operation) low concentration zero calibration can be performed.
Manual LO calibration key **[MANU LO CAL]**	• When touched, the "MANU LO CAL" screen is displayed. At the screen, manual reading (by operator key operation) zero calibration can be performed.
Manual HI calibration key **[MANU HI CAL]**	• When touched, the "MANU HI CAL" screen is displayed. At the screen, manual reading (by operator key operation) span calibration can be performed.
Manual correcting calibration key **[MANUAL CORRECT CAL]**	• When touched, the "MANUAL CORRECT CAL" screen is displayed. At the screen, manual reading (by operator key operation) correcting calibration can be performed.
Return key **[RETURN]**	• When touched, the "MAINT" screen is displayed.
Measurement screen key **[MEAS SCREEN]**	• When touched, the "MEAS (MEAS STOP)" screen opens.

(3-2) Automatic reading calibration

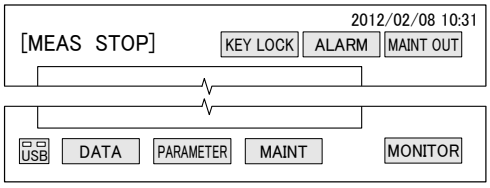
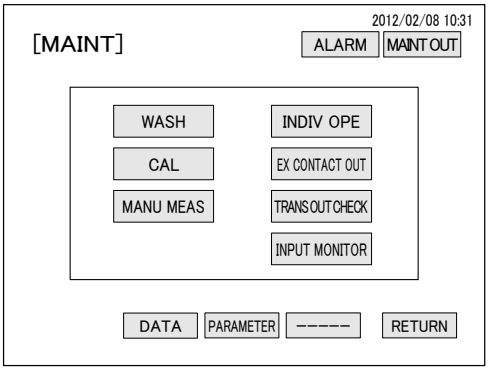
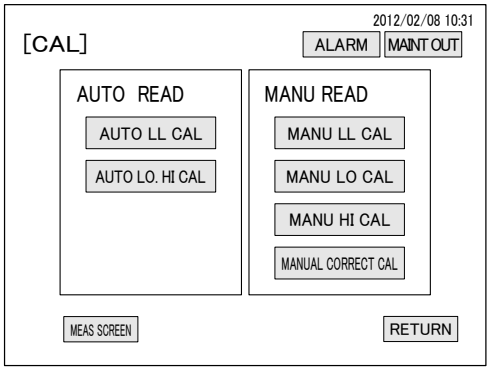
(a) Automatic reading calibration, which is one of the manual calibrations, can be started. There are the following 2 kinds of automatic reading calibration:

- Automatic reading LL calibration (option) ····· Concentration arithmetic expression (calibration curve) with separate SLOPE from LO calibration solution concentration by LL calibration solution is added. (3-point calibration) Calibration time is approximately 25 minutes.
- Automatic reading LO, HI calibration ····· Zero and span calibration by LO calibration solution and HI calibration solution (2-point calibration). Calibration time is approximately 50 minutes.

(b) When automatic reading calibration starts, the equipment performs the calibration operation of 1 process cycle in accordance with the automatic reading time chart and automatically reads the calibration value and enters the wait state.

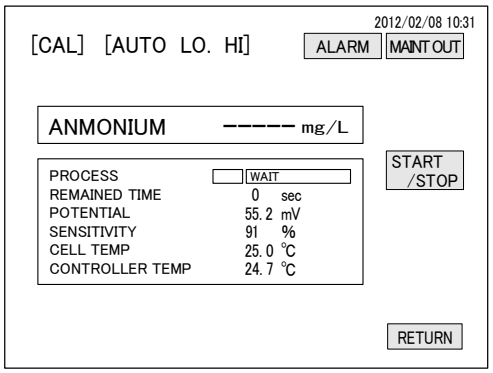
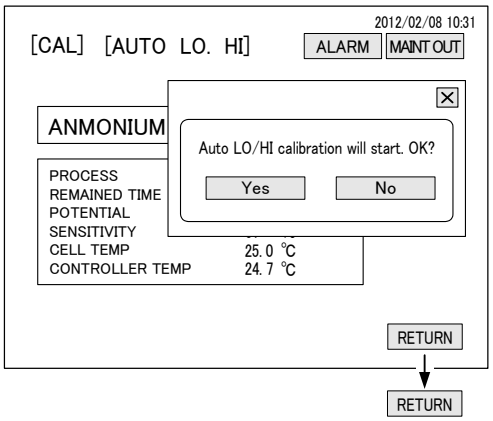
(c) Since calibration is performed by concentration set value of each calibration solution set at the "PARAMETER 2 SET (3)"screen, when the concentration of the actual calibration solution is changed, change the concentration set value of the relevant calibration solution of the same screen beforehand.

Automatic Reading Calibration Procedure

Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "CAL" screen. ····· Touch **[CAL]** in the "MAINT" screen.	 **"MAINT" screen**  **"CAL" screen**
③Open the necessary calibration screen. ····· Touch the necessary key of the following keys at the "CAL" screen. **[AUTO LL CAL]** (option) **[AUTO LO. HI CAL]**	

(To be continued)

(Continued from previous page)

Step and operation	Screen example
④Open the "Calibration start" dialog box. ····· Touch **[START/STOP]** in the "AUTO LO, HI CAL" screen or the "AUTO LL CAL" screen.	 **"AUTO LO, HI CAL" screen**
⑤Start calibration. ····· Touch **[Yes]** of the "AUTO LO, HI calibration start" dialog box or other. • The dialog box closes and the calibration starts. After calibration stops, **[RETURN]** is displayed on the screen. • Aborting ··· When the calibration must be aborted, touch **[START/STOP]** of the "AUTO LO, HI CAL" screen or other and touch **[Yes]** in the "AUTO LO, HI calibration stop" dialog box. **⑥End the automatic reading calibration.** ····· Check that **[RETURN]** is reactivated at the "AUTO LO, HI CAL" screen or other and touch it and touch **[MEAS SCREEN]** in the "CAL" screen. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"AUTO LO, HI calibration start" dialog box**

(3-3) Manual reading calibration

(a) There are the following 3 kinds of the calibration using calibration solution in the calibration by manual reading calibration (by key operation by the operator), which is one of the manual calibrations. When the indication matches the manual correcting value of the sample water, etc, refer to 4.4 (3-4) "Manual correcting calibration".

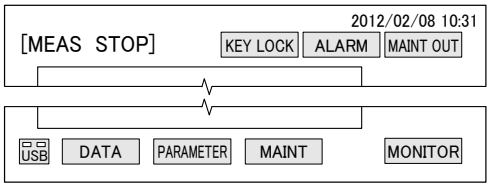
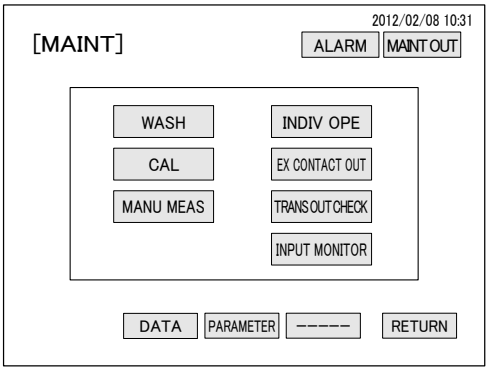
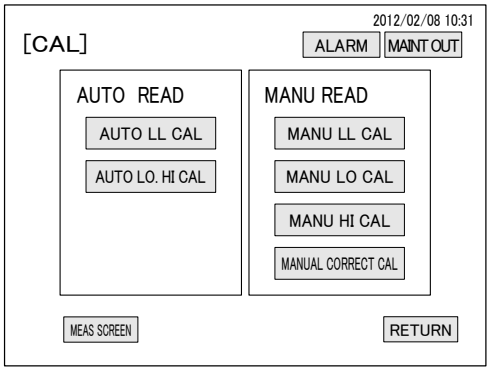
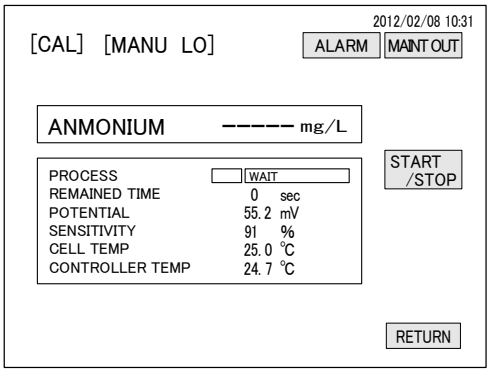
- Manual reading LL calibration (option) ····· Concentration arithmetic expression (calibration curve) having a SLOPE separate from LO calibration solution concentration is added by LL calibration solution (3-point calibration)
- Manual reading LO calibration ····· Zero calibration by LO calibration solution
- Manual reading HI calibration ····· Span calibration by HI calibration solution

(b) When manual reading calibration starts, the equipment performs the calibration operation of 1 interval by the automatic reading time chart. When **[CAL OPE]** is touched after the measured value stabilizes (approximately 25 minutes), the calibration value is read. Since this calibration possible state is held until calibration stop operation is performed, calibration can be performed any number of times. Conversely, when restarting a different calibration and measurement, this calibration must be stopped.

(c) When performing both manual reading LO calibration and manual reading HI calibration, perform manual reading LO calibration first.

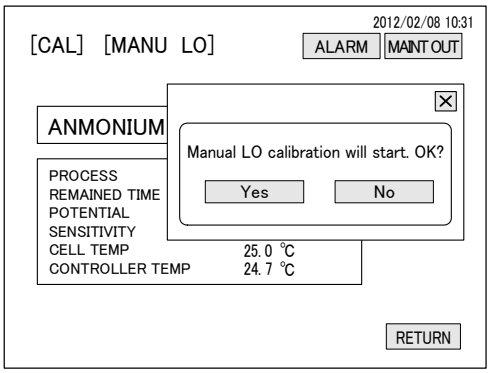
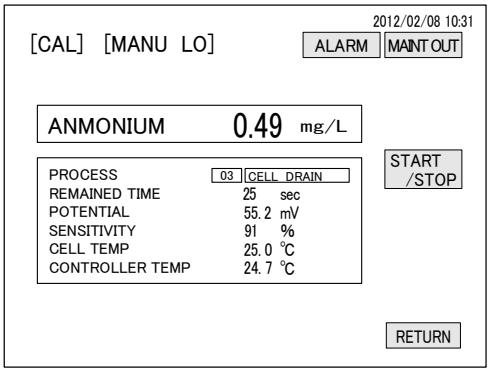
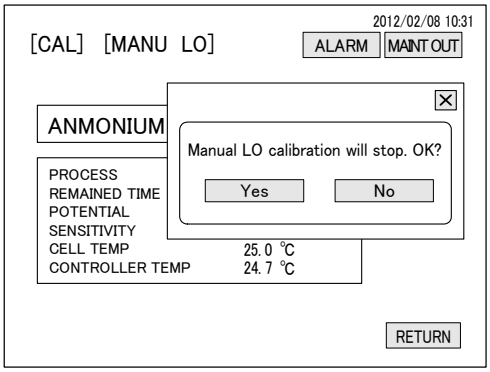
(d)Since calibration is performed by concentration set value of each calibration solution set at the "PARAMETER 2 SET (3)" screen, when the concentration of the actual calibration solution is changed, change the concentration set value of the relevant calibration solution of the same screen beforehand.

Manual Reading Calibration Procedure

Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (>> 4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "CAL" screen. ····· Touch **[CAL]** in the "MAINT" screen.	 **"MAINT" screen**  **"CAL" screen**
③Open the necessary calibration screen. ····· Touch the necessary key of the following keys at the "CAL" screen. **[MANU LL CAL]** (option) **[MANU LO CAL]** **[MANU HI CAL]** **④Open the "Calibration start" dialog box.** ····· Touch **[START/STOP]** in the "MANU LO CAL" screen or other.	 **"MANU LO CAL" screen**

(To be continued)

(Continued from previous page)

Step and operation	Screen example
⑤Start calibration. ····· Touch **[Yes]** of the "MANU LO calibration start" dialog box. • The dialog box closes and the calibration starts. After about 25 minutes **[CAL OPE]** is displayed on the screen. • Aborting ··· When the calibration must be aborted, touch **[START/STOP]** of the "MANU LO CAL" screen or other and touch **[Yes]** in the "MANU LO calibration stop" dialog box.	 **"MANU LO calibration start" dialog box**
⑥Execute calibration operation. ····· Check that the indication in the "MANU LO CAL" screen or other is stable and then touch **[CAL OPE]** for more than 2 seconds. • This one-time manual calibration is ended, but the equipment is in the manual calibration state. **⑦Open the "Calibration stop" dialog box.** ····· Touch **[START/STOP]** in the "MANU LO CAL" screen or other.	 **"MANU LO CAL" screen** **Manual LO calibration screen with [CAL OPE] on it.**
⑧Stop calibration operation. ····· Touch **[Yes]** of the "Manual LO calibration stop" dialog box or other. • The dialog box closes and the calibration stops. **⑨End the manual reading calibration.** ····· Touch **[RETURN]** at the "MANU LO CAL" screen or other and touch **[MEAS SCREEN]** in the displayed "CAL" screen. **⑩Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"MANU LO calibration stop" dialog box**

(3-4) Manual correcting calibration

(a) Calibration that corrects the measured value to the manual correcting value can be performed. This calibration is a function which corrects the value so that the equipment indication matches the manual correcting value of the sample water, etc. In this method, it does not change the concentration arithmetic expression (calibration curve) created by automatic LO, HI calibration and use it as it is, and then adds the correction to it.

(b) This calibration returns the "CORRECT a (y = a + bx)" value to its 0.00 and the "CORRECT b (y = a + bx)" value to its 1.00 initial value and then sets a new "CORRECT b (y = a + bx)" value to match the manual correcting value.

【IMPORTANT】 • When the measurement is continued by this calibration, do not change "CORRECT a (y = a + bx)" or "CORRECT b (y = a + bx)" of the "PARAMETER 2 SET (3)" screen.

(c) After manual correcting calibration started and the measured value stabilized (approximately 10 minutes), when the manual correcting calibration solution concentration is keyed in and **[CAL OPE]** is touched for more than 2 seconds, the calibration value is read. Since this calibration possible state is held until the calibration stop operation is performed, calibration can be performed any number of times. The "CORRECT b (y = a +b x)" value is rewritten at the time the calibration stop operation was performed.

(d) Sample water replacement ····· Before this "Manual correcting calibration" procedure, the sample water in the pre-treatment tank must be replaced with the same sample water as the manual correcting sample water. Furthermore, after calibration, returning the pre-treatment tank to the original status is necessary.

ⓐ Open the bypass valve of the sample water line provided outside the equipment and close the valve BV1 inside the equipment.

ⓑ Remove the pre-treatment tank top cover and pull out the partition plate. After draining the sample water inside the pre-treatment tank, return the partition plate.

ⓒ Fill the pre-treatment tank with the same sample water as the manual correcting sample water and install the pre-treatment tank top cover.

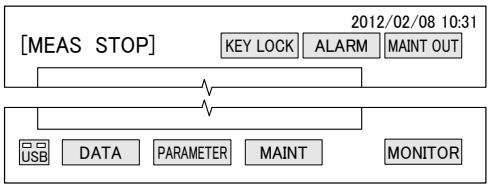
ⓓ Perform the "manual correcting calibration" procedure. However, perform step ⑪ "Restart measurement" after the sample water line returns to its normal state.

ⓔ After removing the pre-treatment tank top cover, pulling out the partition plate, and draining the sample water inside the pre-treatment tank, return the partition plate. Also return the pre-treatment tank top cover to its original state.

ⓕ Open BV1 and adjust the bypass valve.

ⓖ After filling the pre-treatment tank with sample water, go to step ⑪ "Restart measurement" and perform the following operations:

Manual Correcting Calibration Procedure

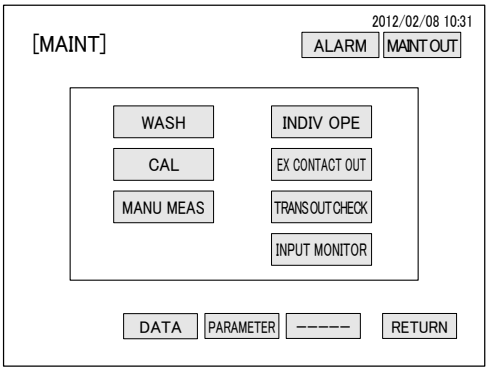
Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (>> 4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**

(To be continued)

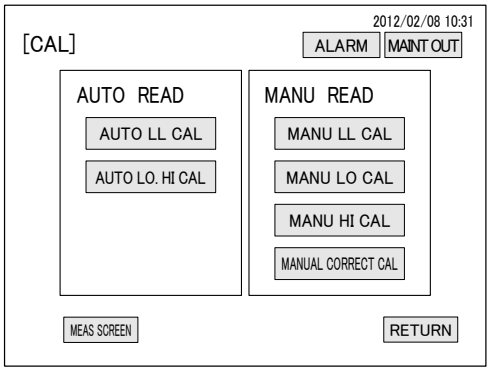
(Continued from previous page)

Step and operation	Screen example

②Display the "CAL" screen. ····· Touch **[CAL]** in the "MAINT" screen.



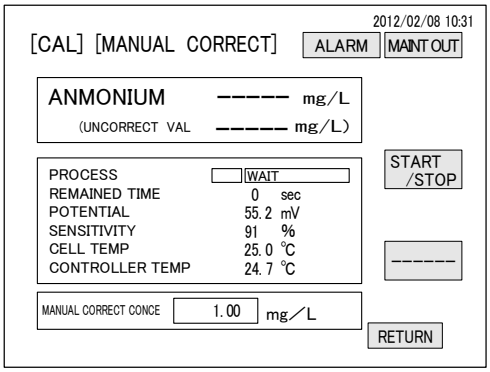
"MAINT" screen



"CAL" screen

③Open the "MANUAL CORRECT CAL" screen. ·····Touch **[MANUAL CORRECT CAL]** in the "CAL" screen.

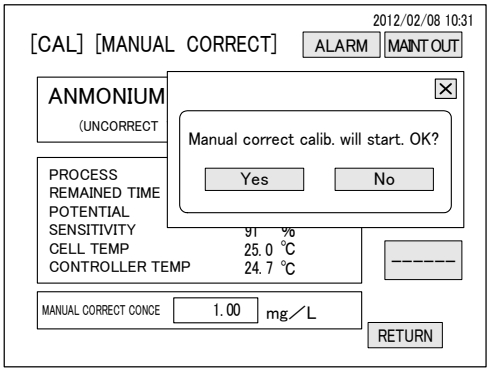
④Open the "Manual correcting calibration start" dialog box. ····· Touch **[START/STOP]** in the "MANUAL CORRECT CAL" screen.



"MANUAL CORRECT CAL" screen

⑤Start calibration. ····· Touch **[Yes]** of the "Manual correcting calibration start" dialog box.

- The dialog box closes and the calibration starts. After approximately 10 minutes, **[CAL OPE]** appears on the screen.
- Aborting ··· When the calibration must be aborted, touch **[START/STOP]** of the "MANUAL CORRECT CAL" screen and touch **[Yes]** in the "Calibration stop" dialog box.



"Manual correcting calibration start" dialog box

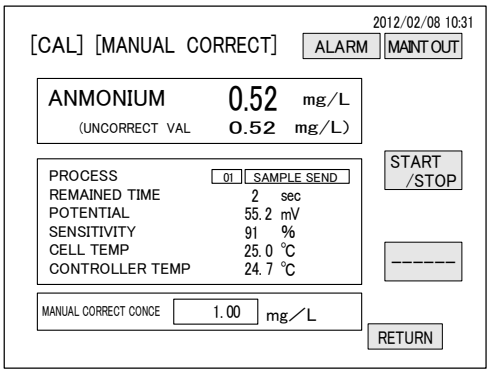
(To be continued)

(Continued from previous page)

Step and operation	Screen example

⑥Open numerical keypad dialog box. ····· Touch the box at the right-hand side of "MANUAL CORRECT CONCE" at the "MANUAL CORRECT CAL" screen.

＞＞ 4.2(2)④ Figure "Kinds of numerical keypad keys"

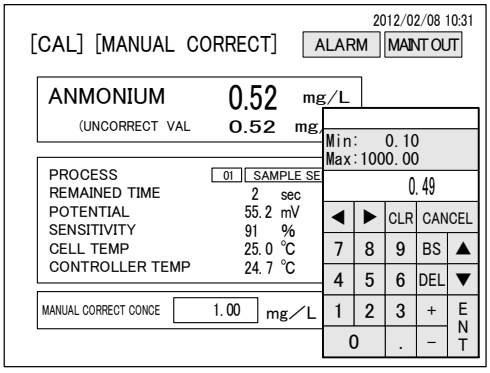


Operating "MANUAL CORRECT CAL" screen

⑦Enter the manual correcting calibration solution concentration. ····· Enter the manual correcting result of sample water in the pre-treatment tank into the "INPUT VALUE DISPLAY" of numerical keypad by numerical key and touch **[ENT]**

Setting range: 0.10 to 1000.00 mg/L

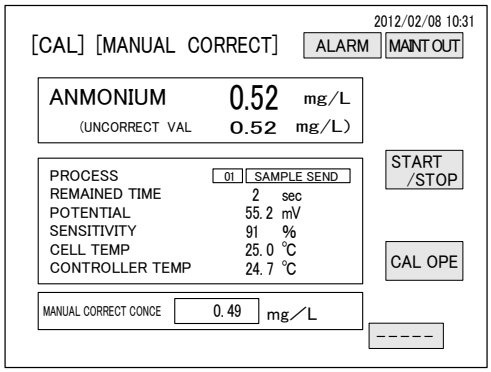
- When **[ENT]** is touched, the input value is fixed and the dialog box is closed.



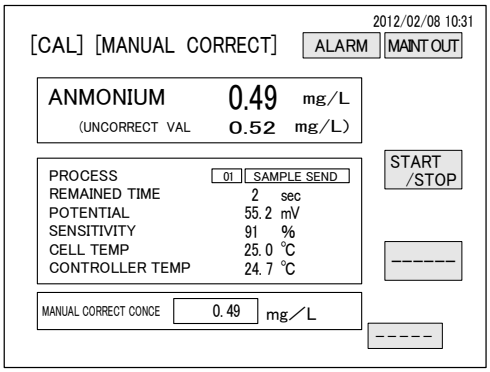
Numerical keypad dialog box

⑧Execute calibration operation. ····· When **[CAL OPE]** is displayed approximately 10 minutes after ⑤ "Start calibration", check that the ion concentration indication of the "MANUAL CORRECT CAL" screen is stable and then touch **[CAL OPE]** for more than 2 seconds.

- The calibration value is fixed and the ion concentration indication becomes the same value as "MANUAL CORRECT CAL CONCE" at the bottom of the screen.
- This one-time calibration is ended, but the equipment is in the "MANUAL CORRECT CAL" state, steps ⑥ to ⑧ can be repeated.



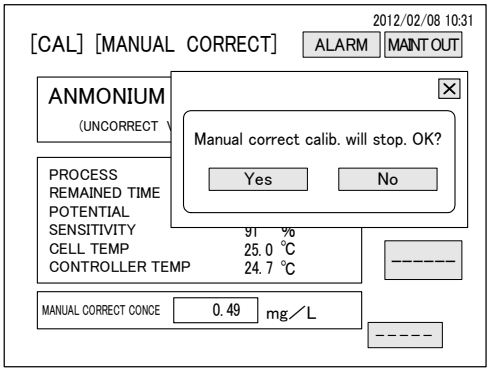
Screen with [CAL OPE] on it



Screen after the calibration operation

(To be continued)

(Continued from previous page)

Step and operation	Screen example
⑨**Stop this calibration.** ····· Touch **[START/STOP]** in the "MANUAL CORRECT CAL" screen and touch **[Yes]** of the opened "Manual correcting calibration stop" dialog box. ⑩**End the manual correcting calibration.** ····· Touch **[RETURN]** at the "MANUAL CORRECT CAL" screen and touch **[MEAS SCREEN]** in the displayed "CAL" screen. ⑪**Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"Manual correcting calibration stop" dialog box**

(4) Manual measurement

(a) The calibration solution in each tank can be continuously measured at the "MANU MEAS" screen. There are the following 3 kinds of measurement:

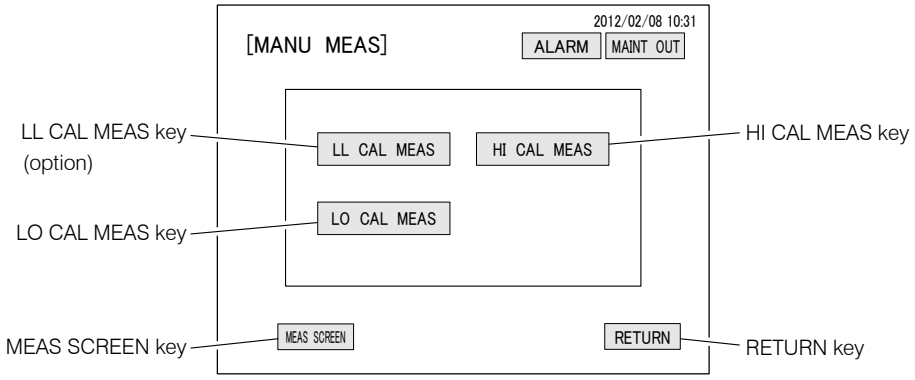
LL calibration solution measurement (option)

LO calibration solution measurement

HI calibration solution measurement

(b) When this measurement starts, the equipment measures the selected calibration solution and displays the result. Measurement is continued until the stop operation is performed. Since the calibration solution is consumed, check the remaining solution so that the problem does not occur at the next measurement.

(c) The transmission output during this calibration solution measurement becomes the state (hold, through, dummy) selected at "TRANS MODE" of the "PARAMETER 2 SET" screen.

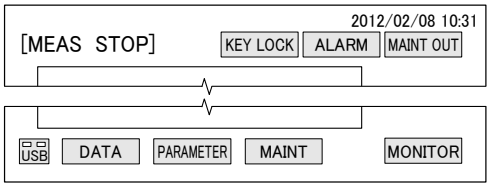
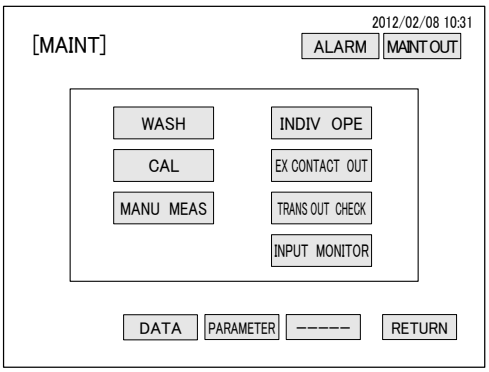
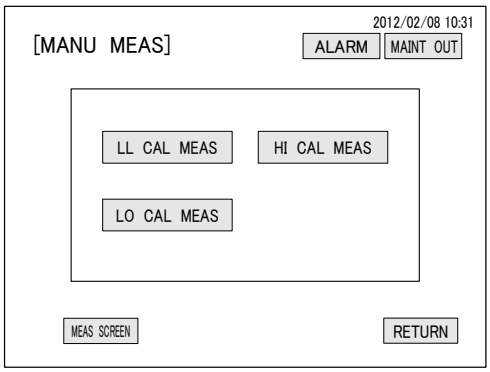


"MANU MEAS" Screen (Manual measurement screen)

Manual Measurement Screen Keys

Name and notation in text	Function
LL calibration solution measurement key **[LL CAL MEAS]** (option)	• When touched, the “LL CAL MEAS” screen (option) is displayed. • When **[START/STOP]** is touched at the “LL CAL MEAS” screen, the “Manual measurement start” dialog box opens and measurement can be started.
LO calibration solution measurement key **[LO CAL MEAS]**	• When touched, the “LO CAL MEAS” screen is displayed. • When **[START/STOP]** is touched at the “LO CAL MEAS” screen, the “Manual measurement start” dialog box opens and measurement can be started.
HI calibration solution measurement key **[HI CAL MEAS]**	• When touched, the “HI CAL MEAS” screen is displayed. • When **[START/STOP]** is touched at the “HI CAL MEAS” screen, the “Manual measurement start” dialog box opens and measurement can be started.
Return key **[RETURN]**	• When touched, the “MAINT” screen is displayed.
Measurement screen key **[MEAS SCREEN]**	• When touched, the “MEAS (MEAS STOP)” screen opens.

Manual Measurement Procedure

Step and operation	Screen example
①Display the “MAINT” screen. ····· Stop measurement (>> 4.1(3) “Automatic measurement stop”) and touch **[MAINT]** in the “MEAS (MEAS STOP)” screen.	 “MEAS (MEAS STOP)” screen
②Display the “MANU MEAS” screen. ····· Touch **[MANU MEAS]** in the “MAINT” screen.	
 “MAINT” screen	 “MANU MEAS” screen

(To be continued)

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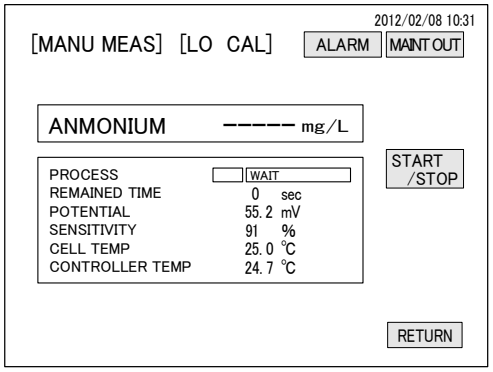
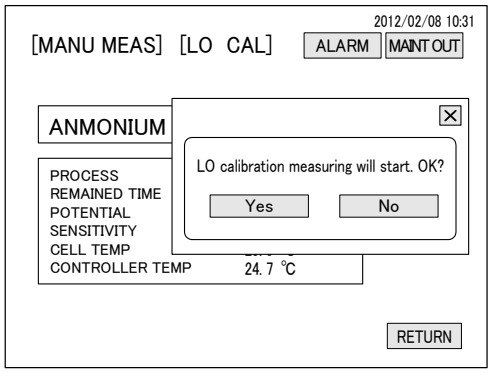
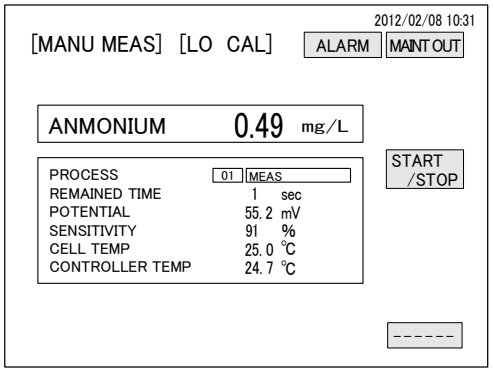
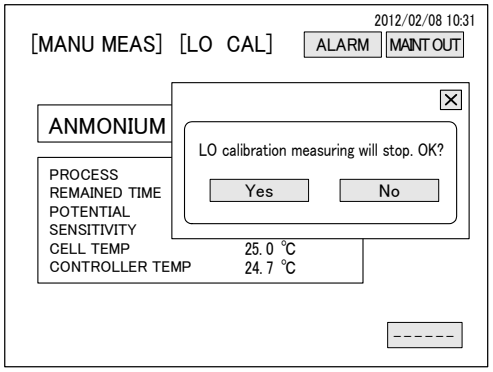
Step and operation	Screen example
③Open the necessary measurement screen. ····· Touch the necessary key of the following keys at the "MANU MEAS" screen. **[LL CAL MEAS] (option)** **[LO CAL MEAS]** **[HI CAL MEAS]** **④Open the "Measurement start" dialog box.** ····· Touch **[START/STOP]** in the "LO CAL MEAS" screen or other.	 **"LO CAL MEAS" screen**
⑤Start manual measurement. ····· Touch **[Yes]** of the "LO calibration solution measurement start" dialog box or other. • The dialog box closes and the manual measurement starts. Measurement is continued until stop operation is performed.	 **"LO calibration solution measurement start" dialog box**
⑥Open the "Manual measurement stop" dialog box. ····· Touch **[START/STOP]** in the "LO CAL MEAS" screen or other.	 **"LO CAL MEAS" screen**

(To be continued)

(Continued from previous page)

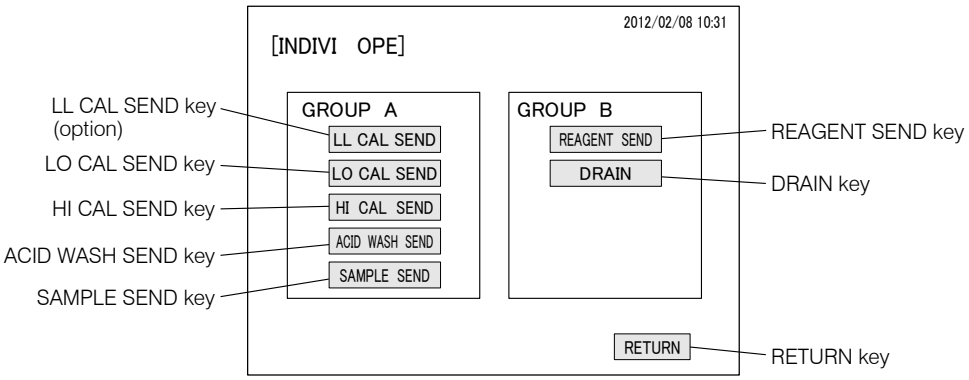
Step and operation	Screen example
⑦Stop manual measurement. ····· Touch **[Yes]** of the "LO calibration solution measurement stop" dialog box or other. • The dialog box closes. **⑧End the manual measurement operation**. ····· Touch **[RETURN]** at the "LO CAL MEAS" screen or other and touch **[MEAS SCREEN]** in the displayed "MANU MEAS" screen. **⑨Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"LO calibration solution measurement stop" dialog box**

(5) Individual operation

(a) "LO CAL SEND" and other individual operations can be performed at the "INDIVI OPE" screen. This can be used in draining the solution remaining inside the measuring cell and piping and other maintenance work.

(b) The items of GROUP A and GROUP B can be executed simultaneously. However, items in the same group cannot be executed simultaneously. At "SAMPLE SEND" and "REAGENT SEND", the flow is twice the normal flow. This function is valid at test run starting and reagent replacement.

(c) When [RETURN] is touched at this screen while an individual operation is executing, the individual operation also stops.

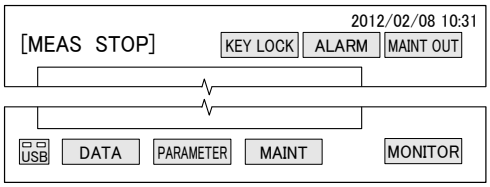
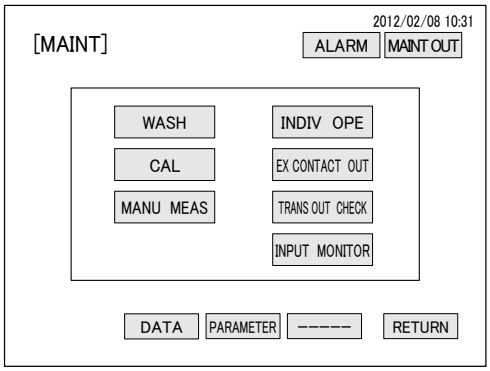
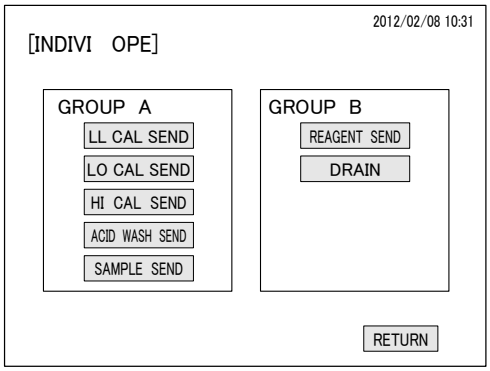


"INDIVI OPE" Screen
(Individual operation screen)

Individual Operation Screen Keys

Name and notation in text	Function
LL calibration solution send key **[LL CAL SEND]** (option)	• When this key is white ····· When touched, this key turns red and the send pump operates and the LL calibration solution (option) is sent. • When this key is red ····· When touched, this key turns white and the send pump stops.
LO calibration solution send key **[LO CAL SEND]**	• When this key is white ····· When touched, this key turns red and the send pump operates and the LO calibration solution is sent. • When this key is red ····· When touched, this key turns white and the send pump stops.
HI calibration solution send key **[HI CAL SEND]**	• When this key is white ····· When touched, this key turns red and the send pump operates and the HI calibration solution is sent. • When this key is red ····· When touched, this key turns white and the send pump stops.
Acid wash send key **[ACID WASH SEND]**	• When this key is white ····· When touched, this key turns red and the send pump operates and the acid wash solution is sent. • When this key is red ····· When touched, this key turns white and the send pump stops.
Sample send key **[SAMPLE SEND]**	• When this key is white ····· When touched, this key turns red and the send pump operates and the sample water is sent. The sample water is twice the normal flow rate. • When this key is red ····· When touched, this key turns white and the send pump stops.
Reagent send key **[REAGENT SEND]**	• When this key is white ····· When touched, this key turns red and the reagent pump operates and the reagent is sent. The reagent is twice the normal flow rate. • When this key is red ····· When touched, this key turns white and the reagent pump stops.
Drain key **[DRAIN]**	• When this key is white ····· When touched, this key turns red and the sample water inside the cell is drained. • When this key is red ····· When touched, this key turns white and the drain stops.
Return key **[RETURN]**	• When touched, the “MAINT” screen is displayed.

Individual Operation Procedure

Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "INDIV OPE" screen. ····· Touch **[INDIV OPE]** in the "MAINT" screen.	 **"MAINT" screen**
③Execute necessary individual operation. ····· Touch the necessary keys such as **[REAGENT SEND]** or other at the "INDIVI OPE" screen. • The items of GROUP A and GROUP B can be executed simultaneously. Items in the same group cannot be executed simultaneously. • When touched during white, this key turns red and the send pump operates. When touched again, the key returns to white and the operation stops. **④End individual operation.** ····· Touch **[RETURN]** in the "INDIVI OPE" screen. • Even if red key is displayed, all operations of individual operation stop by touching **[RETURN]** in this screen. • The "MAINT" screen is displayed. **⑤Return to "MEAS (MEAS STOP)" screen.** ····· Touch **[RETURN]** in the "MAINT" screen. **⑥Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"INDIVI OPE" screen**

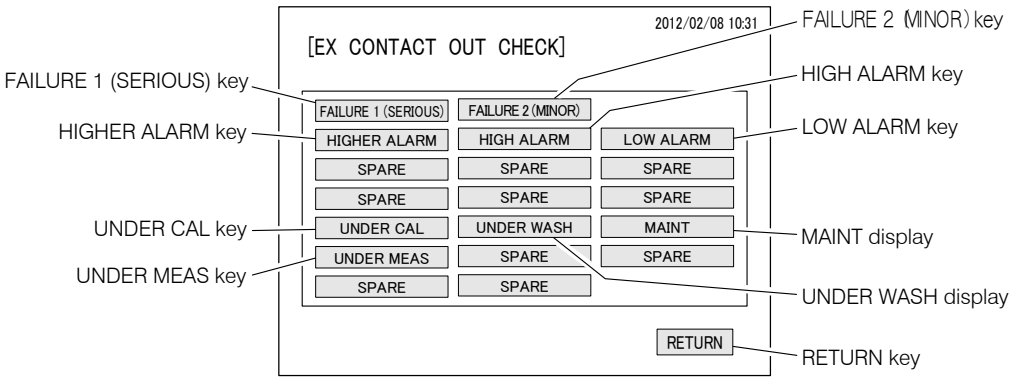
(6) External contact output check

(a) The external contact outputs (alarm output and status output) can be tested at the "EX CONTACT OUT CHECK" screen.

(b) If [RETURN] is touched at the "EX CONTACT OUT CHECK" screen while an external contact signal is being output (key is red, contact "closed"), this screen closes and the test output is cleared (contact "Open").

(c) When checking at the output terminals of this equipment, prepare a multimeter, etc. beforehand. When already wired, there is also a method of performing the check at the receiver side.

(d) Power off (terminals 30-31) cannot be checked by this screen operation. Check that the contacts are “Closed” for power off and “Open” for power on.

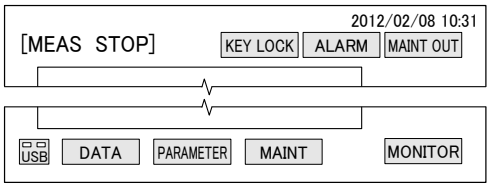
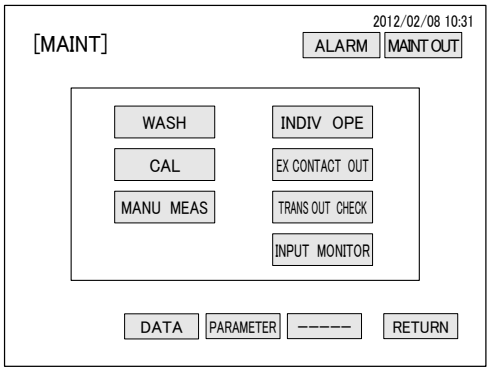
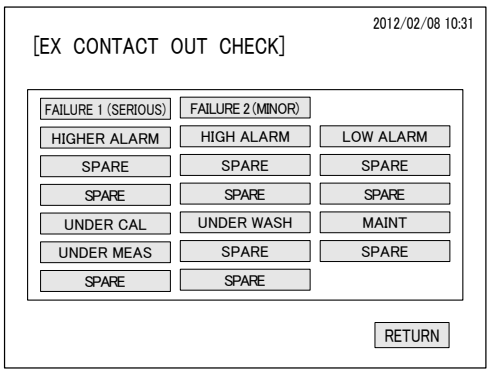


“EX CONTACT OUT CHECK” Screen
(External contact output check screen)

External Contact Output Check Screen Keys

Name and notation in text	Function
FAILURE 1 (SERIOUS) key **[FAILURE 1 (SERIOUS)]**	• When this key is white, “FAILURE 1 (SERIOUS) SIGNAL” (terminals 32-33) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
FAILURE 2 (MINOR) key **[FAILURE 2 (MINOR)]**	• When this key is white, “FAILURE 2 (MINOR) SIGNAL” (terminals 34-35) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
Higher alarm key **[HIGHER ALARM]**	• When this key is white, “HIGHER ALARM SIGNAL” (terminals 36-37) contacts “Closed”. When touched, this key turns red and the output is switched to “Open”. When touched again, the key returns to white “Open”.
High alarm key **[HIGH ALARM]**	• When this key is white, “HIGH ALARM SIGNAL” (terminals 38-39) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
Low alarm key **[LOW ALARM]**	• When this key is white, “LOW ALARM SIGNAL” (terminals 40-41) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
Calibration in progress key **[UNDER CAL]**	• When this key is white, “UNDER CAL SIGNAL” (terminals 42-43) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
Wash in progress key **[UNDER WASH]**	• When this key is white, “UNDER WASH SIGNAL” (terminals 44-45) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
Maintenance in progress key **[UNDER MAINT]**	• When this key is white, “UNDER MAINT SIGNAL” (terminals 46-47) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
Measurement in progress key **[UNDER MEAS]**	• When this key is white, “UNDER MEAS SIGNAL” (terminals 48-49) contacts “Open”. When touched, this key turns red and the output is switched to “Closed”. When touched again, the key returns to white “Open”.
Return key **[RETURN]**	• When touched, the “MAINT” screen is displayed.

External Contact Output Check Procedure

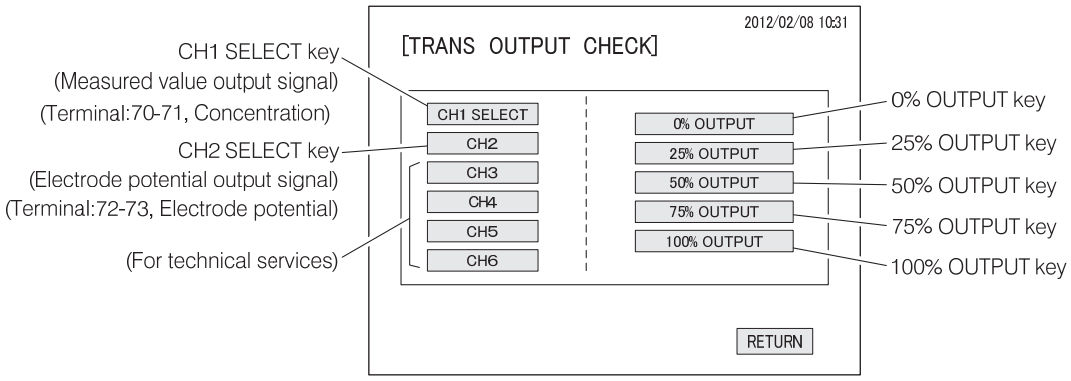
Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 "MEAS (MEAS STOP)" screen
②Display the "INDIV OPE" screen. ····· Touch **[EX CONTACT OUT]** in the "MAINT" screen.	 "MAINT" screen
③Execute necessary check. ····· Touch the necessary keys and check the relevant terminal open and closed. • When the key is white, contact output "Open". When touched, this key turns red and the contacts "Closed". When touched again, the key returns to white and the contacts "Open". • 2 or more keys can be turned red (closed) at the same time. **[FAILURE 1 (SERIOUS)]** ··· Terminals 32-33 **[FAILURE 2 (MINOR)]** ··· Terminals 34-35 **[HIGHER ALARM]** ··· Terminals 36-37 **[HIGH ALARM]** ··· Terminals 38-39 **[LOW ALARM]** ··· Terminals 40-41 **[UNDER CAL]** ··· Terminals 42-43 **[UNDER WASH]** ··· Terminals 44-45 **[MAINT]** ··· Terminals 46-47 **[UNDER MEAS]** ··· Terminals 48-49	 "EX CONTACT OUT CHECK" screen
④End check. ····· Touch **[RETURN]** in the "EX OUTPUT OUT CHECK" screen. • Even if red key is displayed, all external contact outputs "Open" by touching **[RETURN]** in this screen. • The "MAINT" screen is displayed.	
⑤Return to "MEAS (MEAS STOP)" screen. ····· Touch **[RETURN]** in the "MAINT" screen.	
⑥Restart measurement. ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	

(7) Transmission output check

(a) The measured value and electrode potential (4 to 20 mADC) can be tested at the "TRANS OUT CHECK" screen.

(b) The channel 1 select key (CH1 SELECT) at the top left-hand side of the screen corresponds to the measured value output (terminals 70-71, concentration) and the channel 2 select key (CH2) corresponds to the electrode potential output (terminals 72-73, electrode potential). Since the CH3 to CH6 keys are for technical service, do not operate them.

(c) When checking at the output terminals of this equipment, prepare a multimeter, etc. beforehand. When already wired, there is also a method of performing the check at the receiver side.



"TRANS OUTPUT CHECK" Screen
(Transmission output check screen)

Transmission Output Check Screen Keys

Name and notation in text	Function
Channel 1 select key **[CH1 SELECT]**	• When this key is white, the measured value output check function is invalid. When touched, the key turns red and the function becomes valid. When touched again, the key returns to white and the function becomes invalid.
Channel 2 select key **[CH2]**	• When this key is white, the electrode potential output check function is invalid. When touched, the key turns red and the function becomes valid. When touched again, the key returns to white and the function becomes invalid.
0% output key **[0% OUTPUT]**	• When **[CH1 SELECT]** is red and this key is touched, the key turns red and the measured value output (terminals 70-71, concentration signal) becomes 0% output (4mADC). When other keys are touched, this key returns to white. • When **[CH2]** is red, the electrode potential output (terminals 72-73, electrode potential signal) becomes 0% output (4 mADC).
25% output key **[25%OUTPUT]**	• When **[CH1 SELECT]** is red and this key is touched, the key turns red and the measured value output (terminals 70-71, concentration signal) becomes 25% output (8mADC). When other keys are touched, this key returns to white. • When **[CH2]** is red, the electrode potential output (terminals 72-73, electrode potential signal) becomes 25% output (8 mADC).
50% output key **[50%OUTPUT]**	• When **[CH1 SELECT]** is red and this key is touched, the key turns red and the measured value output (terminals 70-71, concentration signal) becomes 50% output (12 mADC). When other keys are touched, the value outputs at the percent of the touched key and this key returns to white. • When **[CH2]** is red, the electrode potential output (terminals 72-73, electrode potential signal) becomes 50% output (12 mADC).

(To be continued)

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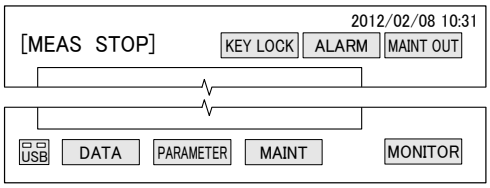
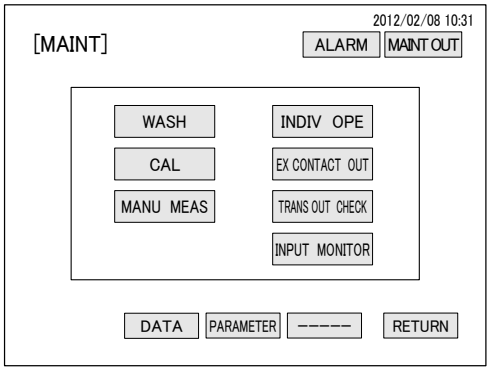
Name and notation in text	Function
75% output key **[75%OUTPUT]**	• When **[CH1 SELECT]** is red and this key is touched, the key turns red and the measured value output (terminals 70-71, concentration signal) becomes 75% output (16 mADC). When other keys are touched, the value outputs at the percent of the touched key and this key returns to white. • When **[CH2]** is red, the electrode potential output (terminals 72-73, electrode potential signal) becomes 75% output (16 mADC).
100% output key **[100%OUTPUT]**	• When **[CH1 SELECT]** is red and this key is touched, the key turns red and the measured value output (terminals 70-71, concentration signal) becomes 100% output (20 mADC). When other keys are touched, the value outputs at the percent of the touched key and this key returns to white. • When **[CH2]** is red, the electrode potential output (terminals 72-73, electrode potential signal) becomes 100% output (20 mADC).
Return key **[RETURN]**	• When touched, the "MAINT" screen is displayed.

Transmission Output Check Procedure

Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (＞＞ 4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "TRANS OUT CHECK" screen. ····· Touch **[TRANS OUT CHECK]** in the "MAINT" screen.	 **"MAINT" screen**

(To be continued)

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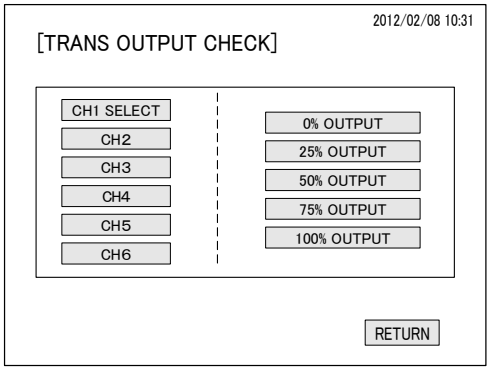
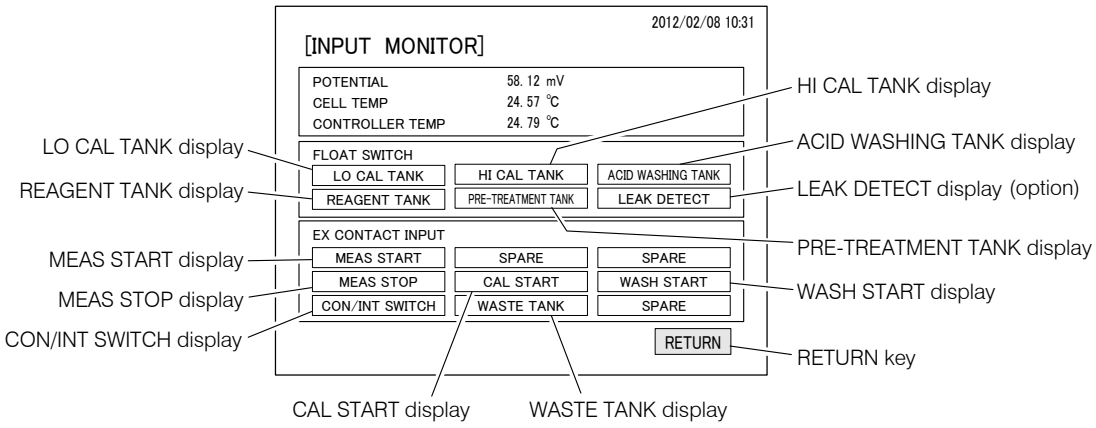
Step and operation	Screen example
③Select the necessary output. ····· Touch **[CH1 SELECT]** or **[CH2]** in the "TRANS OUTPUT CHECK" screen to turn it red. Then touch the necessary key at the right-hand side of the screen to turn it red. • 2 or more keys cannot be turned red at the same time. **[0% OUTPUT]** ··· 4 mADC output **[25% OUTPUT]** ··· 8 mADC output **[50% OUTPUT]** ··· 12 mADC output **[75% OUTPUT]** ··· 16 mADC output **[100% OUTPUT]** ··· 20 mADC output **④Check transmission output.** ····· Check that red key value is output from the following terminal. Measured value output terminal〔70(+), 71(-)〕 (Concentration signal) Electrode potential output terminal〔72(+), 73(-)〕 (Potential signal) **⑤End check.** ····· Touch **[RETURN]** in the "TRANS OUT CHECK" screen. • Even if red key is displayed, the test output is disable by touch **[RETURN]** in this screen. • The "MAINT" screen is displayed. **⑥Return to "MEAS (MEAS STOP)" screen.** ····· Touch **[RETURN]** in the "MAINT" screen. **⑦Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"TRANS OUTPUT CHECK" screen**

(8) Check by input monitor

(a) The state of the float switch (FS) which shows the liquid level of each tank and the state of the contact inputs from the outside can be checked at the "INPUT MONITOR" screen.



"INPUT MONITOR" Screen

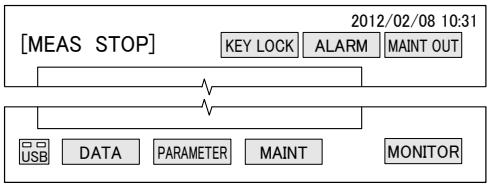
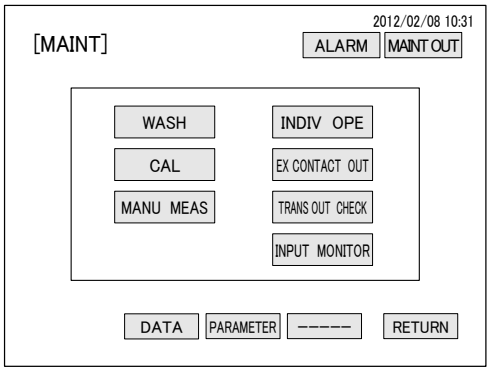
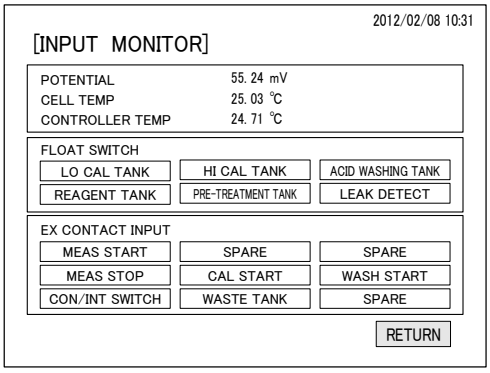
(b) If the “FLOAT SWITCH” display is white, the liquid level is normal. Red display indicates low liquid level or other abnormality. If abnormal, inspect and take countermeasures such as refilling the tank.

(c) If the “EX CONTACT INPUT” display is white, the contact signals from the outside are opened. If the display is red, the contacts are closed. “EX CONTACT INPUT” is valid in the case of external start. It can be used at loop check.

Input Monitor Screen Display and Keys

Name and notation in text	Function
LO calibration solution tank display **[LO CAL TANK]**	• White display ····· LO calibration solution tank liquid level is normal. • Red display ····· LO calibration solution tank liquid level is low. (FS “Closed”)
HI calibration solution tank display **[HI CAL TANK]**	• White display ····· HI calibration solution tank liquid level is normal. • Red display ····· HI calibration solution tank liquid level is low. (FS “Closed”)
Acid washing tank display **[ACID WASH TANK]**	• White display ····· Acid washing solution tank liquid level is normal. • Red display ····· Acid washing solution tank liquid level is low. (FS “Closed”)
Reagent tank display **[REAGENT TANK]**	• White display ····· Reagent tank (ionic strength adjuster) liquid level is normal. • Red display ····· Reagent tank (ionic strength adjuster) liquid level is low. (FS “Closed”)
Pre-treatment tank display **[PRE-TREATMENT TANK]**	• White display ·····Pre-treatment tank sample water level is normal. • Red display ····· Pre-treatment tank sample water level is low. (FS “Closed”)
Leak detect display (option) **[LEAK DETECT]**	• White display ····· No leak • Red display ····· Leak (FS “Closed”)
Measurement start display **[MEAS START]**	• White display ····· Measurement start signal input is “Open” (terminals 50-51). • Red display ····· Measurement start signal input is “Closed”.
Measurement stop display **[MEAS STOP]**	• White display ····· Measurement stop signal input is “Open” (Terminals 52-53). • Red display ····· Measurement stop signal input is “Closed”.
Calibration start display **[CAL START]**	• White display ····· Calibration start signal input is “Open” (Terminals 54-55) • Red display ····· Calibration start signal input is “Closed”.
Wash start display **[WASH START]**	• White display ····· Wash start signal input is “Open” (Terminals 56-57) • Red display ····· Wash start signal input is “Closed”.
Continuous/intermittent switching display **[CON/INT SWITCH]**	• White display ····· Shows that the continuous/intermittent switching signal input is “Open” and the equipment is under continuous operation, (Terminals 58-59) • Red display ····· Continuous/intermittent switching signal input is “Closed” and the equipment is under intermittent operation.
Waste tank display **[WASTE TANK]**	• White display ····· Shows the waste tank signal input is “Open” and that there is a margin in the waste tank liquid level. (Terminals 60-61) • Red display ····· Shows that the waste tank signal input is “Closed” and the liquid level in the tank has reached a fixed level.
Return key **[RETURN]**	• When touched, the “MAINT” screen is displayed.

Check by Input Monitor Procedure

Step and operation	Screen example
①Display the "MAINT" screen. ····· Stop measurement (＞＞4.1(3) "Automatic measurement stop") and touch **[MAINT]** in the "MEAS (MEAS STOP)" screen.	 **"MEAS (MEAS STOP)" screen**
②Display the "TRANS OUT CHECK" screen. ····· Touch **[INPUT MONITOR]** in the "MAINT" screen.	 **"MAINT" screen**
③Check display. ····· Check "FLOAT SWITCH" and "EX CONTACT INPUT" displays in the "INPUT MONITOR" screen. When red key is displayed, inspect and implement a countermeasure. White display ··· Normal Red display ··· Abnormal **④End check.** ····· Touch **[RETURN]** in the "INPUT MONITOR" screen. • The "MAINT" screen is displayed. **⑤Return to "MEAS (MEAS STOP)" screen.** ····· Touch **[RETURN]** in the "MAINT" screen. **⑥Restart measurement.** ····· If necessary, restart measurement. ＞＞ 4.1(2) "Automatic measurement start"	 **"INPUT MONITOR" screen**

5. Maintenance

5.1 Maintenance Items List

(a) To operate the product normally on a continuous basis and maintain its specified performance, understand its function, etc. thoroughly and perform maintenance work periodically.

【IMPORTANT】 • Operating the analyzer without performing periodical maintenance and inspection can result in a failure.

(b) The "Maintenance cycle" described in the following table is based on the standard condition (conditional states to satisfy items such as the ones in 9.2 "Installation Conditions"). Since the maintenance cycle differs depending on the installation condition, modify the maintenance cycle according to the operating condition after operating the analyzer more than several months.

(c) For technical services such as repairs, selling office. A specialist who is qualified for the technical certification system in our company or a person who has technical skills equivalent to that certification system must perform technical services such as repairs.

Standard Maintenance Items List

No.	Subject	Contents	Maintenance cycle								Execution method, etc.
			Start up	Day	1 week	2 weeks	1 month	3 months	6 months	1 year	2 years or more	
1	Sampling route and pre-treatment tank	Route inspection for soiling, clogging, leaking, and disconnection	○		○							＞＞ 5.4 "Sampling Route and Pre-treatment Tank Maintenance"
		Sample water flow check	○		○							
		Pre-treatment tank cleaning			△							＞＞ 5.4 (2) "Pre-treatment tank cleaning and parts replacement", 7.1 (3) "Sample water filter with air cleaning function"
		Replacement of sample water filter and replacement of tube between pre-treatment tank and sample water pump								□		
2	Flow path	Leaking, clogging, breaking, disconnection inspection.	○		○							Inspect the piping flow path inside the equipment and if there are any abnormalities, restore to original state or replace the part.
		Cleaning or replacement of flow path tube for equipment internal sample, reagent, city water, etc.					△			□		

(To be continued)

○: Inspection for abnormalities, execution of prescribed work, adjustment of prescribed value, etc.
△: Cleaning and washing of specified points.
□: Parts replacement, etc. to maintain performance.

(Continued from previous page)

No.	Subject	Contents	Maintenance cycle									Execution method, etc.
			Start up	Day	1 week	2 week	1 month	3 months	6 months	1 year	2 years or more	
3	Reagent tank	Tank interior inspection and cleaning				○		△				＞＞ 5.5 “Solution Addition and Replacement”
		Reagent addition or replacement					□					
4	Acid washing tank	Tank interior inspection and cleaning				○		△				
		Reagent addition or replacement					□					
5	Calibration solution tank	Tank interior inspection and cleaning.				○	△					
		Calibration solution replacement				□						
6	Solenoid valve	Operation and clogging and leakage inspection.	○			○						＞＞ 5.6 “Solenoid Valve Maintenance”
		Solenoid valve replacement									□ 3 years	
7	Sample water pump	Tube breakage and leakage inspection				○						＞＞ 5.7 “Pump Tube Replacement”
		Tube replacement							□			
8	Reagent pump	Tube breakage and leakage inspection				○						
		Tube replacement							□			
9	Measuring cell	Measuring cell inspection and cleaning				○ △						＞＞ 5.8 (2) “Measuring cell cleaning”
		Ion electrode membrane and internal solution replacement					□ 2-3 months					＞＞ 5.8 (3) “Membrane and internal solution replacement”
		Ion electrode replacement							□			＞＞ 5.8 (4) “Ion electrode replacement”
		Stirring motor inspection and replacement	○							□		＞＞ 5.8 (5) “Stirring motor replacement”
		Stirring bar inspection and replacement	○								□	＞＞ 5.8 (6) “Stirring bar and rubber cap replacement”
		Ammonia rubber cap replacement									□	

(To be continued)

○: Inspection for abnormalities, execution of prescribed work, adjustment of prescribed value, etc.
△: Cleaning and washing of specified points.
□: Parts replacement, etc. to maintain performance.

(Continued from previous page)

No.	Subject	Contents	Start up	Maintenance cycle								Execution method, etc.
				Day	1 week	2 week	1 month	3 months	6 months	1 year	2 years or more	
10	Mixing chamber	Mixing chamber inspection and replacement				○ △						＞＞ 5.9 (1)“Mixing chamber cleaning”
		Stirring bar inspection and replacement	○								□	＞＞ 5.9 (2)“Mixing chamber parts replacement”
		Stirring motor inspection and replacement	○							□		
		O-ring replacement								□		
11	Controller temperature	Thermostatic chamber tube replacement								□		＞＞ 5.10 “Thermostatic Chamber Tube Replacement”
12	Air pump (Option)	Operation and abnormal sound inspection.				○						Visual and sound check
		Filter replacement								□		＞＞ 7.1 (2) “Air pump maintenance”
		Pump replacement									□ 3 years	
13	Waste solution tank (Option)	•Replacement with vacant tank •Tube inspection for clogging, breaking, etc.		○								＞＞ 7.2 (2) “Waste solution tank maintenance”
		Tube replacement								□		

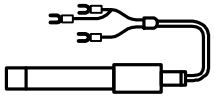
○: Inspection for abnormalities, execution of prescribed work, adjustment of prescribed value, etc.
△: Cleaning and washing of specified points.
□: Parts replacement, etc. to maintain performance.

5.2 Accessories and Spare Parts

(1) Standard accessories

These accessories differ depending on the product's specifications. In addition, the accessories are subject to change without notice.

Standard Accessories List

No.	Code	Part name	Sketch view	Qty	Note
1		Instruction manual		1	
2		Inspection record		1	
3	ELX009	Ammonia electrode (Ammonia ion electrode)		1	
4	116D255	Sample water pump tube (Norprene tube 49NR)		1	0.5 m
5	116D253	Reagent pump tube (Norprene tube 08NR)		1	0.5 m
6	116D302	PFA tube ϕ2×3		1	1.0 m
7	116D303	PFA tube ϕ4×6		1	1.0 m
8	XC883025	Sodium hydroxide solution NaOH 20 w/v%		1	10 L plastic tank
9	143C336	Acid washing solution Nitric acid 3% w/v		1	10 L plastic tank
10	143A041	Ammonium ion standard solution (NH4-1000 ion standard solution)		1	1000 mg/L, 500 mL
11	–	USB memory		2	

(To be continued)

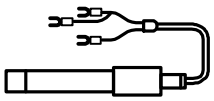
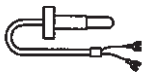
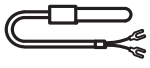
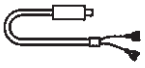
(Continued from previous page)

No.	Code	Part name	Sketch view	Qty	Note
12	131A271	Recording chart 15 pcs		1	(Option)
13	136C025	Waste solution tank		1	20 L plastic tank (Option)
14	125B184	Tubing key		1	Pump tube replacement tool

(2) Spare parts

These spare parts differ depending on the product's specifications. In addition, the spare parts are subject to change without notice.

Spare Parts List

No.	Code No.	Part name	Sketch view	Q'ty			Replacement cycle	Note
				Consumables		Spare Parts		
1	ELX009-P	Ammonia electrode (Ammonia ion electrode)		2		1	6 months	Membrane (No.AECT235B) 4 pcs Internal solution (No. 143F242) 50 mL
2	73022600	Ammonia rubber cap		1		1		For ammonia electrode
3	7301260K	Temperature electrode assembly				1	3 years	
4	115A579	Temperature electrode packing (EPDM)		1		1		
5	EL2066BF	Solution ground electrode				1	3 years	
6	7264150K	Stirring motor assembly LN22-P41N1B		2		1		Measuring cell, mixing chamber

(To be continued)

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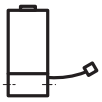
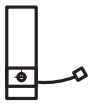
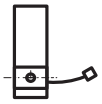
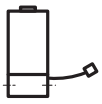
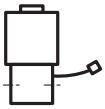
No.	Code No.	Part name	Sketch view	Q'ty			Replacement cycle	Note
				Consumables		Spare Parts		
7	107D040	Stirring bar		2				Measuring cell, mixing chamber
8	115A862	O-ring		1				For mixing chamber
9	116D255	Sample water pump tube (Norprene tube 49NR)		1.0 m			6 months	
10	116D253	Reagent pump tube (Norprene tube 08NR)		1.0 m			6 months	
11	125B774	Sample water pump head 7015-20(49H)				1	3 years	
12	125B182	Reagent pump head 7013-20(08H)				1	3 years	
13	7264160K	2-way solenoid valve assembly				1	3 years	SV7 SV4, 5 (Option)
14	7264170K	3-way solenoid valve assembly				1	3 years	For SV1, 3
15	7264180K	3-way solenoid valve assembly				1	3 years	3 years V2, V9 (Option)
16	7264190K	2-way solenoid valve assembly				1	3 years	SV6
17	7264200K	2-way solenoid valve assembly				1	3 years	SV8 (Option)

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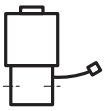
No.	Code No.	Part name	Sketch view	Q'ty			Replacement cycle	Note
				Consumables		Spare Parts		
18	7264210K	2-way solenoid valve assembly				1	3 years	SV10 (Option)
19	7264220K	Air pump assembly				1	3 years	P3 (Option)
20	131A031	Pen cartridge (red) 5 pcs		2				For recorder (Option), 4 months
21	131A271	Recording chart 15 pcs		1				For recorder (Option)
22	53192800	Air pump filter		1				P3 (Option)
23	72407200	Sample water filter		1				
24	73119700	Sample water filter		1				For air cleaning function added (Option)
25	126D573	Pressure reducing valve RA0821KZ				1	3 years	
26	116D302	PFA tube ϕ2×3		5.0 m				Thermostatic chamber, sample water line
27	116D303	PFA tube ϕ4×6		2.0 m				Drain water, city water line
28	117B001	Sleeve ϕ3 PP		6		20		
29	117K041	Sleeve ϕ6 PP		14		20		

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No.	Code No.	Part name	Sketch view	Q'ty			Replacement cycle	Note
				Consumables		Spare Parts		
30	XC883025	Sodium hydroxide solution NaOH 20 w/v%		6			2 months	10 L plastic tank
31	143C336	Acid washing solution Nitric acid 3% w/v		12				10 L plastic tank
32	143A041	Ammonium ion standard solution (NH4-1000 ion standard solution)		1				100 mg/L, 500 mL
33	136C025	Plastic tank 20L		1				Replacement waste solution tank (Option)
34	116E022	Tube ϕ7×11		1				For recovery of waste solution (Option)

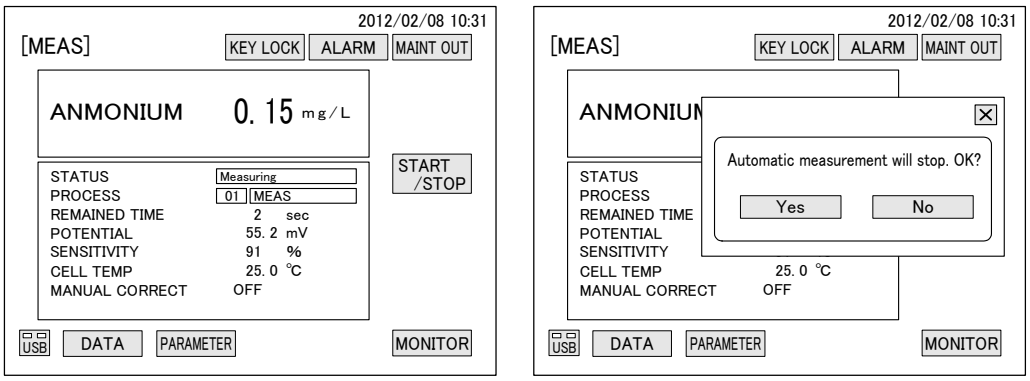
5.3 Operation before and after Maintenance

(1) Operation before maintenance

Normally, perform the following operations before maintenance work. This procedure is common to all maintenance operations.

①**Stop measurement.** ····· Touch **[START/STOP]** of the "Measurement (MEAS)" screen and touch **[Yes]** at the displayed Measurement stop dialog box.

- "Measurement (MEAS STOP)" screen appears.



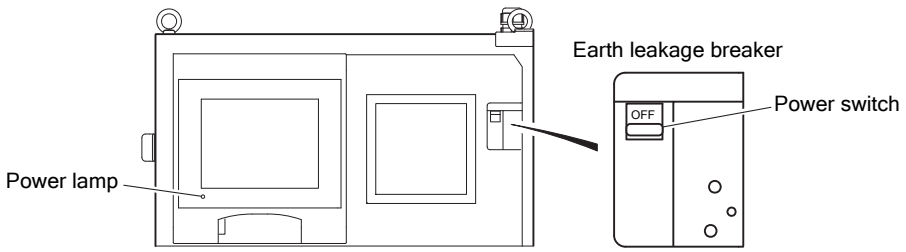
Measurement (MEAS) Screen and Measurement Stop Dialog Box

②**Set the "Maintenance in progress" signal to "Closed".** ····· Touch **[MAINT OUT]** at the top right-hand corner of the "Measurement (MEAS)" screen to turn it yellow.

- The "Maintenance in progress" signal (terminals 46-47) is set to "Closed" and the monitoring station, etc. can be informed that the equipment is "Maintenance in progress".

[Power off for maintenance work]

Set the power switch (leakage breaker) to OFF. In addition, when touching the power system, turn off the power at the supply source.



Power Switch

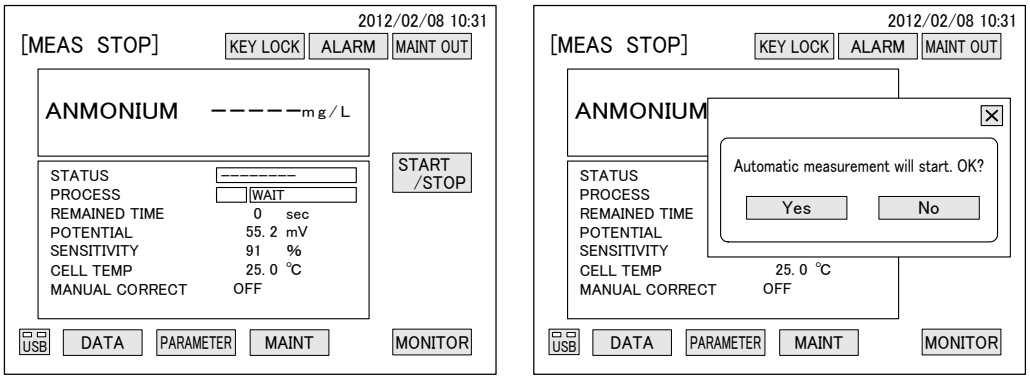
(2) Operation after maintenance

Perform the following operations after maintenance work.

①Turn on the power. ····· When maintenance operation was performed by turning off the power, set the power switch to ON.

②Restart automatic measurement. ····· Touch **[START/STOP]** of the "Measurement (MEAS STOP)" screen and touch **[YES]** at the displayed Measurement start dialog box.

- After measurement preparations operation was performed, the equipment enters the automatic measurement mode.



Measurement (MEAS STOP) Screen and Measurement Stop Dialog Box

③Set the "Maintenance in progress" signal to "Open". ····· When **[MAINT OUT]** is yellow, touch it and confirm that it turns to yellow-green.

④Check for alarms. ····· Check that "ALARM" display in the "Measurement (MEAS)" screen is not red.

- When an alarm was recognized, check the alarm contents of the "Alarm log" screen and take action according to 6.2 "Alarm Handling for items".

The automatic measurement starts after these operations.

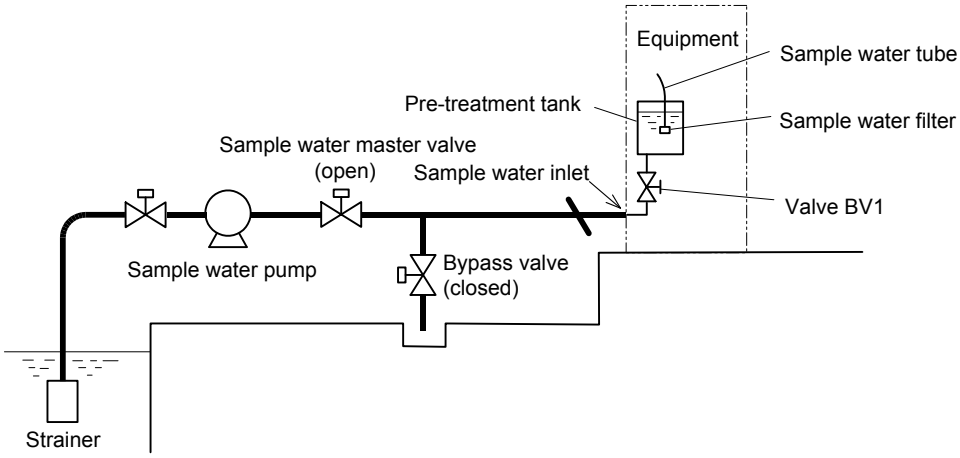
5.4 Sampling Route and Pre-treatment Tank Maintenance

(1) Sampling route inspection

(a) The sample water sampled by the sample water pump is introduced into the equipment from the sampling water inlet. Check that there are no abnormalities at the external sample water pump, sample water master valve, sample water piping, etc.

(b) Check that the specified sample water flow is supplied to the equipment.

(c) Check that the piping from sample water inlet to sample water tube (including piping, valve and sample water filter) is not dirty, clogged, leaking, or disconnected.



Sampling Route and Pre-treatment Tank

(2) Pre-treatment tank cleaning and parts replacement

Perform pre-treatment tank interior cleaning, sample water filter cleaning and tube and filter replacement as follows:

①Prepare the parts to be replaced.

- Sample water filter ····· 1 (No. 72407200) (When air cleaning function added, see 7.1(3) “Sample water filter with air cleaning function”.)
- Sample water PFA tube (ϕ2 × ϕ3) ····· 1 (No. 116D302)

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① “Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③Turn off the power. ····· Set the power switch to OFF.

④Empty the pre-treatment tank.

ⓐ Stop the sample water pump and set the sample water master valve to “Closed”.

ⓑ Set the valve BV1 in the equipment to “Closed”.

⑤Clean.

ⓐ Remove the pre-treatment tank top cover and pull up the partition plate to drain the sample water remaining inside the pre-treatment tank.

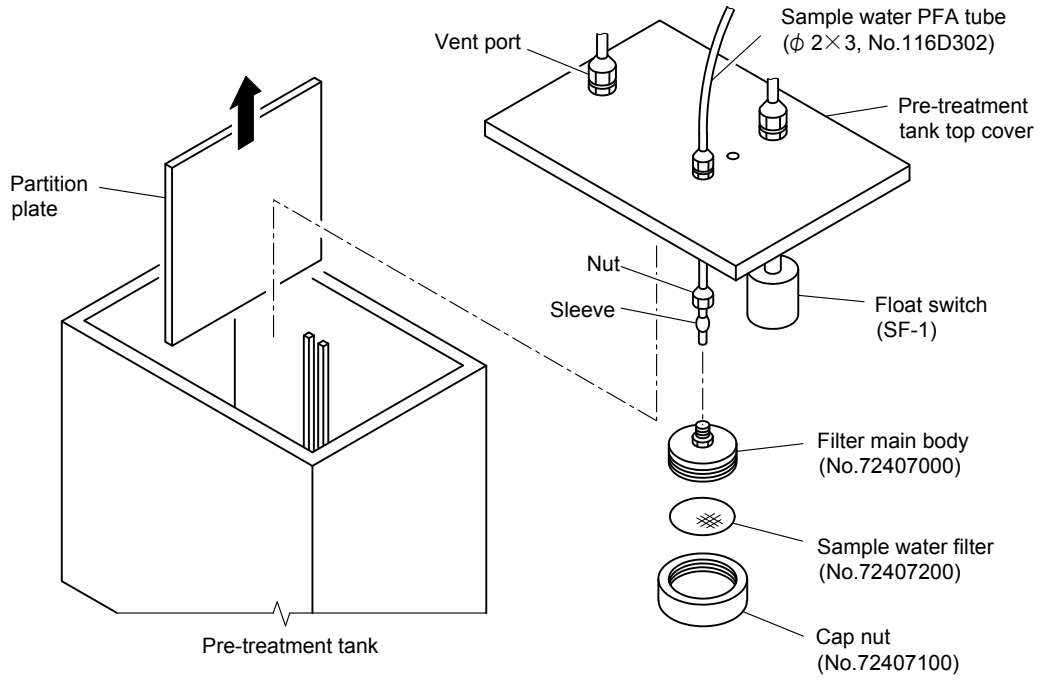
ⓑ Remove the dirt inside the tank and on the sample water filter and thoroughly wash with city water, etc.

⑥Replace the sample water filter. ····· If necessary, replace with a new sample water filter (100 mesh).

- When air cleaning function (option) is added, see 7.1 (3) "Sample water filter with air cleaning function". Form and tube connection is different.

⑦Replace the tube. ····· If necessary, replace the following tube between filter body and solenoid valve SV3.

- Sample water PFA tube (ϕ2×3, No.116D302)



Replacing the Sample Water Filter

⑧Insert the pre-treatment tank top cover. ····· Insert the partition plate at the pre-treatment tank and return the pre-treatment tank top cover to its original state.

⑨Supply the sample water. ····· Set the sample water control valve to "Open", adjust the sample water valve (BV1) inside the equipment, and make the sample water flow approximately 1 to 3 L/min.

⑩Perform the operations after maintenance. ····· >> 5.3(2) "Operation after maintenance"

5.3(2) ① "Turn on the power"

5.3(2) ② "Restart automatic measurement"

5.3(2) ③ "Set the "Maintenance in progress" signal to "Open"

5.3(2) ④ "Check for alarms

5.5 Solution Addition and Replacement

(a) Solution addition and replacement depends on the operating conditions, but the cycle is normally as follows:

Lo, HI calibration solution ····· 2 to 4 weeks

Reagent and acid washing solution ····· approximately 1 month

Solution Type

Solution	Tank and capacity	Reagent used
Reagent (Replacement)	Reagent tank (10 L)	2.2 (2) “Filling of reagent (sodium hydroxide solution)”
Acid washing solution (Addition)	Acid washing tank (10 L)	2.2 (3-1) “Filling of acid washing solution
LO calibration solution (Replacement)	LO calibration solution tank (5 L)	2.2 (4-3) “Preparation and filling of LO calibration solution”
HI calibration solution (Replacement)	HI calibration solution tank (5 L)	2.2 (4-2) “Preparation and filling of HI calibration solution”
LL calibration solution (Replacement) (Option)	LL calibration solution tank (1 L)	2.2 (4-4) “Preparation of LL calibration solution”

(b) Even during measurement, whether the liquid level of each tank is normal (OK) or abnormal (NG) can be checked by the Monitor dialog box displayed by touching **[MONITOR]**.

(c) Do not add LO calibration solution, HI calibration solution and LL calibration solution, just replace them. In other words, dispose of the remaining solution and fill the tanks with new solution.

- The acid washing solution can be added.

⚠ WARNING

Hazardous Materials

- The following solutions to be used are toxic. Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling them.
  - Reagent (20w/v% sodium hydroxide solution)
  - Acid washing solution (3W/V% nitric acid solution)
  - Ammonium ion standard solution (1000 mg/L)
- Do not mix the ammonium ion standard solution and each calibration solution with the alkaline solution. They may react and generate ammonia gas.

①Prepare the solution. ····· Prepare the solution to be added or replaced. ＞＞ 2.2 “Solution Preparation and Filling”

- The acid washing solution can be added. Check the liquid level of tank and decide the solution amount to be prepared.

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① “Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③Turn off the power. ····· Set the power switch to OFF.

④Remove the tank. ····· Remove the reagent tank from the equipment and remove the cover with tube.

【IMPORTANT】
- The acid washing solution is corrosive. If it gets inside or around the product, immediately wipe it off and thoroughly clean the contaminated parts with city water, etc.

⑤Replace or add the solution.

- Reagent・HI calibration solution・LO calibration solution・LL calibration solution ····· Transfer the reagent remaining in the tank to the waste solution management site and if the inside of the tank is dirty, wash it and rinse it out with clean water. Fill the tank with new calibration solution.
- Acid washing solution ····· Fill tank with the prepared solvent.

⑥ Return the tank to its original state. ····· Install the cover with tube of each tank and return the tanks to their original positions.

【IMPORTANT】
- Do not bend the tube, etc.
- Store the reagent (sodium hydroxide solution) in a tightly covered container at cold dark place.

⑦Perform the operations after maintenance. ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

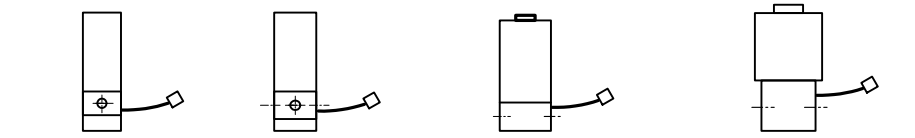
5.3(2) ④ “Check for alarm

5.6 Solenoid Valve Maintenance

Solenoid valves shown below table are used. When a solenoid valve malfunctions or is leaking or clogged, replace it.

Solenoid Valves Used List

No.	Code No.	Manufacturer model No.	Type	Where used, etc.
SV1	7264170K	C328-H416C	3-way solenoid valve	Sample and calibration solution switching
SV2	7264180K	AV2302	3-way solenoid valve	LO calibration solution and HI calibration solution switching
SV3	7264170K	C328-H416C	3-way solenoid valve	Sample water and acid washing solution switching
SV4	7264160K	SV-201-2.5	2-way solenoid valve	Introduction of cleaning water to filter (option)
SV5	7264160K	SV-201-2.5	2-way solenoid valve	Introduction of air to filter (option)
SV6	7264190K	SVC-201-4S	2-way solenoid valve	Measuring cell drain
SV7	7264160K	SV-201-2.5	2-way solenoid valve	Introduction of cleaning water to sample water line
SV8	7264200K	C0260-86A	2-way solenoid valve	Waste solution recovery (option)
SV9	7264180K	AV2302	3-way solenoid valve	LL calibration solution switching (option)
SV10	7264210K	C0260-86AT	2-way solenoid valve	Waste solution recovery (option)



3-way solenoid valve For SV1, SV3 (C328-H416C)

3-way solenoid valve For SV2, SV9 (AV2302)

2-way solenoid valve For SV4, SV5, SV7 (SV-201-2.5) For SV6 (SVC-201-4S)

2-way solenoid valve For SV8 (C0260-86A) For SV10 (0260-86AT)

Solenoid Valve Type

①Prepare the solenoid valve. ····· Prepare the solenoid valve to be replaced.

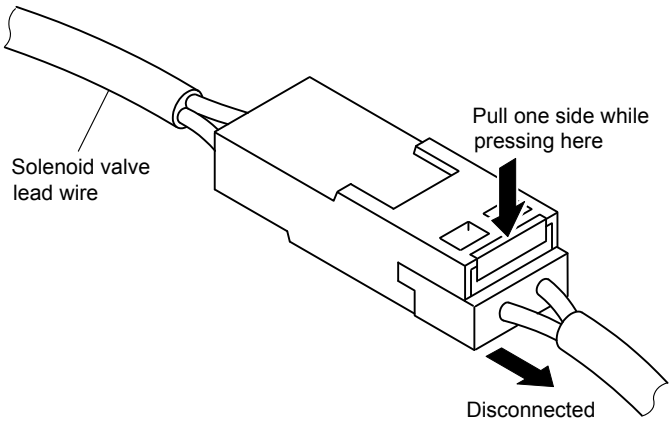
②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① **“**Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③Turn off the power. ····· Set the power switch to OFF.

④Disconnect the lead wire and tube. ····· Disconnect the solenoid valve lead wire at the connector part and remove the installed tube.



Connector Part of Lead Wire

⑤Remove the mounting plate. ····· Remove the solenoid valve with mounting plate from the equipment.

⑥Replace the solenoid valve. ····· Loosen the mounting screw of the used solenoid valve and remove the solenoid valve from the mounting plate and install the new solenoid valve in the same direction (do not mistake IN and OUT).

⑦Return the solenoid valve to its original position. ····· Return the solenoid valve with mounting plate to its original position.

⑧Connect the tube and lead wire. ····· Connect the tube and lead wire to their original state.

⑨Perform the operations after maintenance. ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

5.3(2) ④ “Check for alarms

5.7 Pump Tube Replacement

The tube of the sample water pump and reagent pump become deteriorated gradually. Replace it periodically.

①Prepare the pump tube. ····· Prepare the pump tube to be replaced.

- Reagent pump ····· Thin tube (No.116D253)
- Sample water pump ····· Thick tube (No.116D255)

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① “Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

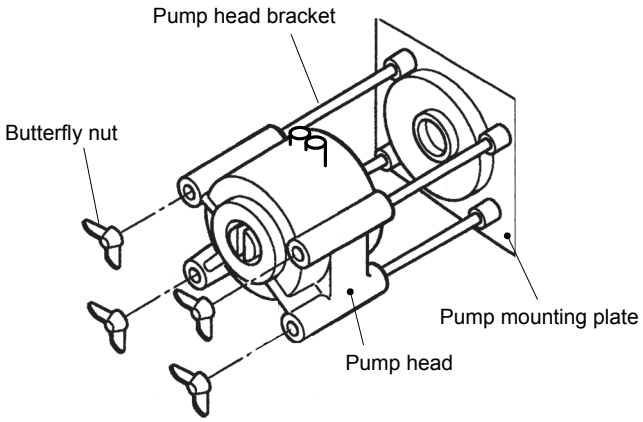
③Disconnect the pump joint. ····· Disconnect the pump joint at the suction side.

④Drain the solution from inside the tube. ····· Drain the solution from inside the tube by fast feeding the pump. ＞＞ 4.4(5) “Individual operation”.

⑤Drain the solution inside the measuring cell. ····· Drain the solution inside the measuring cell. ＞＞ 4.4(5) “Individual operation”.

⑥Turn off the power. ····· Set the power switch to OFF.

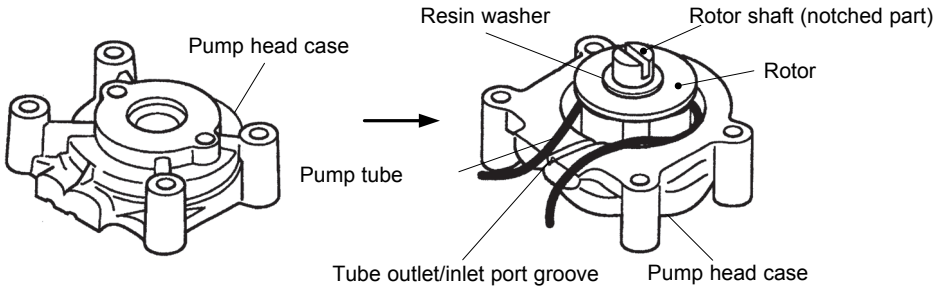
⑦Remove the pump head ····· Disconnect the pump joint at the discharge side and loosen the butterfly nuts (4 places) and remove the pump head by pulling it forward.



Removing the Pump Head

⑧Split the pump head. ····· Split the pump head at which the pump tube is to be replaced into top and bottom two parts and remove the used pump tube.

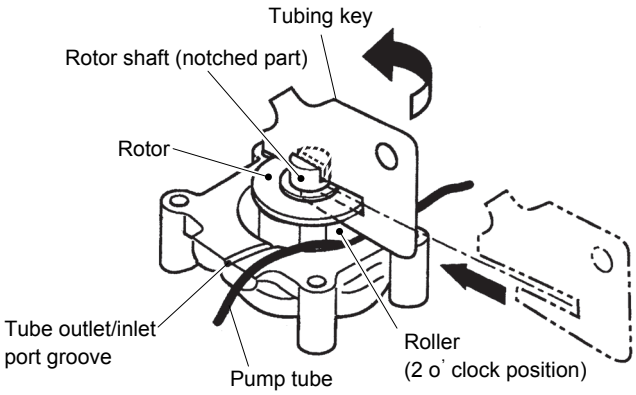
【IMPORTANT】 • At this time, do not drop the resin washer on the top of the rotor.



Splitting the Pump Head into Two Parts

⑨Install the new pump tube. ····· Install the new pump tube to the pump head.

- Reagent ····· Thin tube
- Sample water ····· Thick tube



Installing the New Pump Tube

ⓐ Set the rotor. ····· Set the rotor as follows:

- Hold the rotor with the concave portion of the rotor shaft at the top.
- Rotate the rotor so that one of the 3 rollers is at the center of the tube out/in groove.

ⓑ Insert the tube. ····· Set the tube as follows:

- Prepare a new tube of the same length as the tube removed at step ②.
- Press with your thumb so that about half of the length of the tube protrudes from the tube out/in groove.
- Insert the tube from the tube inlet/output groove between the rotor and case up to the 2nd roller in the counterclockwise direction.

ⓒ Insert the tube. ····· Insert the accessory tubing key between the rotor shaft and the roller at the 2 o'clock position while making sure that the tube does not protrude.

ⓓ Install the tube. ····· While pressing the end of the tube with your thumb, turn the inserted tubing key counterclockwise while forcefully pressing it against the rotor.

ⓔ Pull out the tubing key. ····· Pull both ends of the installed tube a little to take up the slack. While pressing both ends of the tube so that the tube is not dislodged, gently pull out the tubing key.

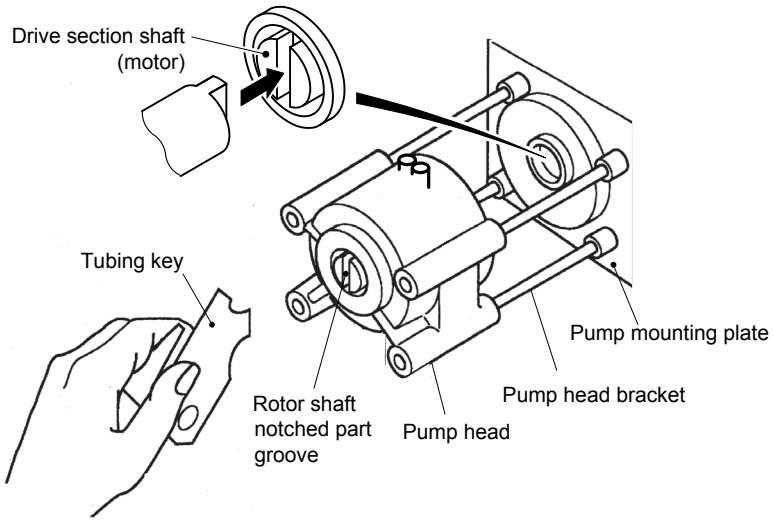
ⓕ Cover the pump head. ····· Cover one side of the pump head removed previously.

【IMPORTANT】 • At this time, set so that there is no gap so that the tube is not pinched between the top and bottom of the pump head.

⑩**Install the pump head.** ····· Set the pump head as follows:

ⓐ Fit the convex portion of the pump head rotor to the pump drive section.

ⓑ Turn the groove of the concave portion with the tubing key and interlock it to the drive section shaft.



Installing the Pump Head

⑪**Tighten the butterfly nuts.** ····· Check that the shaft is interlocked and there is no gap between the case and the pump head and sequentially tighten the butterfly nuts (4 pcs) in the diagonal line direction finger-tight.

【IMPORTANT】 • When tightening the butterfly nuts, do not use a tool. If the torque outside the allowable range is applied, the drive section and pump head may be damaged. Always tighten the butterfly nuts finger-tight.

⑫**Return the tube to its original state.** ····· Connect the reagent and sample water tubes.

⑬**Perform the operations after maintenance.** ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

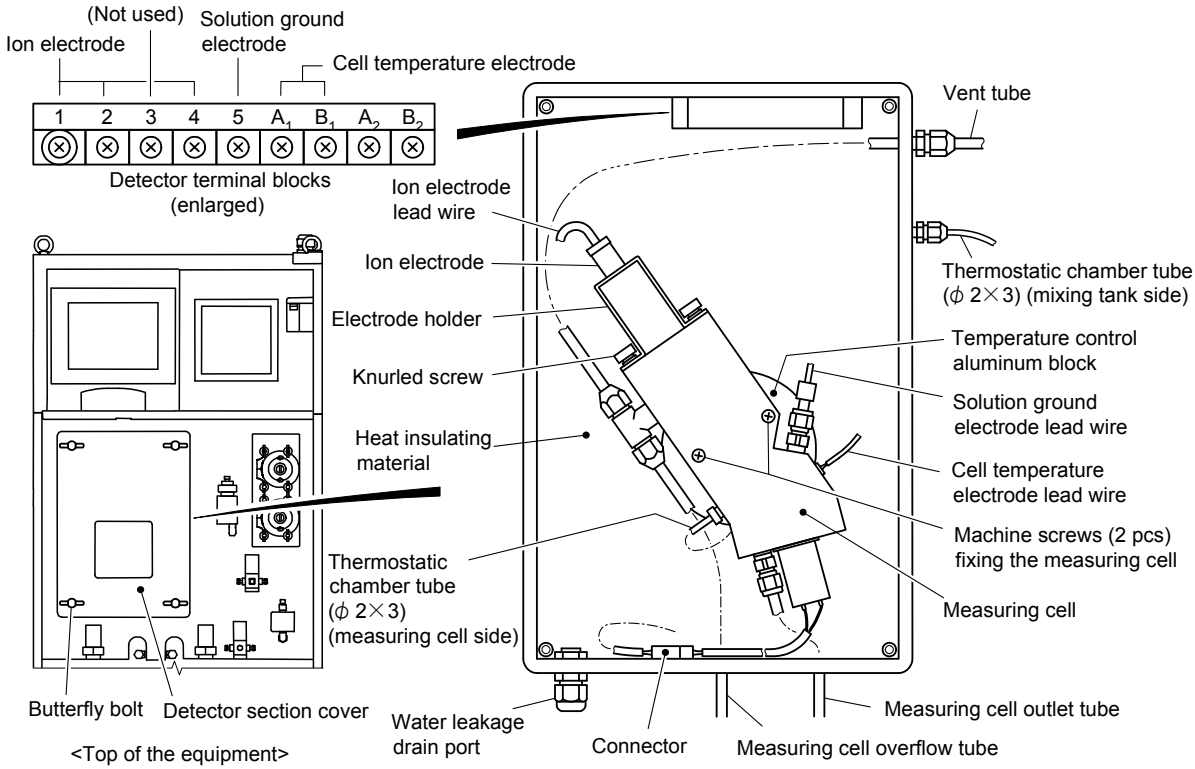
5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

5.3(2) ④ “Check for alarms

5.8 Measuring Cell Maintenance

(1-1) Measurement stop and ion electrode removal

When removing the ion electrode from measuring cell for the maintenance work, proceed as follows:



Detector Section

①Stop measurement. ····· Touch **[START/STOP]** of the "Measurement (MEAS STOP)" screen and touch **[YES]** at the displayed Measurement start dialog box.

②Set the "Maintenance in progress" signal to "Closed". ····· Touch **[MAINT OUT]** at the top right-hand corner of the "Measurement (MEAS)" screen to turn it yellow.

③Drain the solution inside the measuring cell. ····· Drain the solution inside the measuring cell. ＞＞ 4.4(5) "Individual operation".

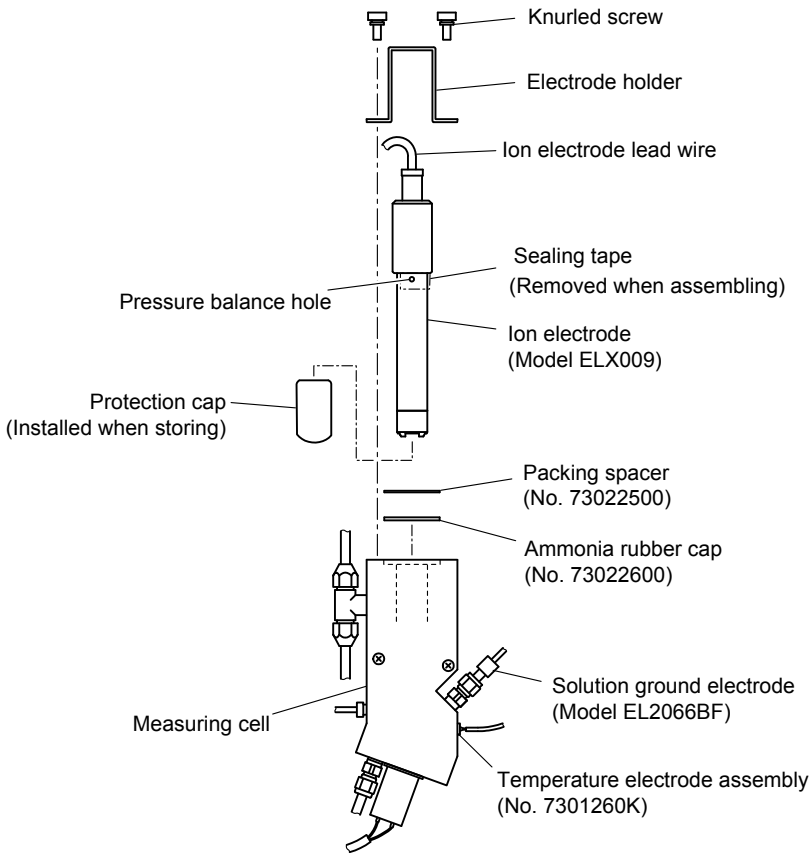
④Turn off the power. ····· Set the power switch to OFF.

⑤Remove the detector section cover. ····· Loosen the butterfly bolt and remove the detector section cover.

⑥Remove the ion electrodes. ····· Remove the 2 knurled screws, and remove the ion electrode from the measuring cell.

【IMPORTANT】
- At this time, remove the ion electrode carefully so that the packing spacer and ammonia rubber cap, and knurled screws assembled to the top of the cell do not get lost.
- Do not touch the membrane at the end of the ion electrode. If it is dirty or damaged, the membrane and internal solution must be replaced.

⑦Install the protection cap. ····· Install the stored protection cap to the end of the ion electrode.



Removing the Ion Electrode

⑧Disconnect the end of the electrode lead wire. ····· If necessary for working such as replacing the ion electrode, disconnect the end of the electrode lead wire from the terminal block.

【IMPORTANT】 • Protect the ion electrode connection connector section or the reference electrode lead wire terminal so that they are not exposed to water drops and dirt.

(1-2) Ion electrode assembling and measurement restart

When assembling the removed (or new) ion electrode or reference electrode and restarting measurement, proceed as follows:

①Check the packing spacer and rubber cap. ····· Check that there is a packing spacer and ammonia rubber cap at the ion electrode mounting hole of the measuring cell.

②Insert the ion electrode. ····· Remove the protection cap and slowly insert the ion electrode into the mounting hole.

③Fix the ion electrode with the electrode holder. ····· Pass the electrode holder to the top of the ion electrode and fix it with the 2 knurled screws.

④Connect the lead wire terminals. ····· When the end of the ion electrode lead wires was disconnected from the terminal block, reconnect them to the terminal block in the order of lead wire (1, 2, and 4).

⑤Install the detector section cover. ····· Install the detector section cover to its original position.

【IMPORTANT】 • When the detector section cover is loose, outside air may enter the detector section and condense on the aluminum block may cause trouble.

⑥**Turn on the power.** ····· Set the power switch to ON.

⑦**Restart the automatic measurement.** ····· Touch **[START/STOP]** in the "MEAS (MEAS)" screen and touch **[Yes]** in the displayed measurement start dialog box.

⑧ **Set the "Maintenance in progress" signal to "Open".** ····· When **[MAINT OUT]** turns yellow, touch it and check that it becomes yellowish green.

⑨**Check for alarms.** ····· Check that the alarm display in the "MEAS (MEAS)" screen is not red.

- When an alarm was confirmed, check the alarm contents in the "ALARM LOG" screen and process the alarm according to 6.2 "Alarm Handling for items".

(2) Measuring cell cleaning

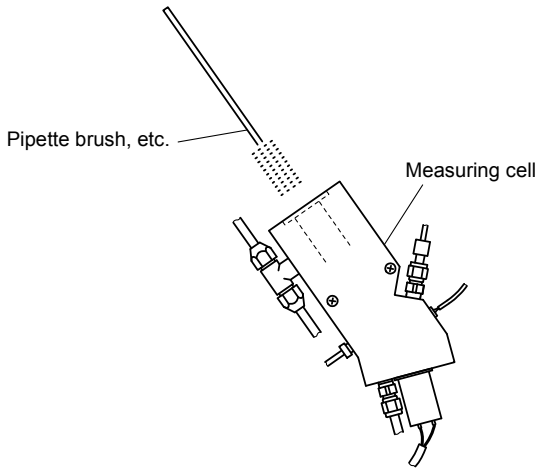
(a) If the bottom of the cell is dirty, stirring may not be performed well.

(b) The washing cycle depends on the sample water. Consider a suitable cycle.

①**Stop measurement and remove the electrode.** ····· ＞＞ 5.8 (1-1) "Measurement stop and ion electrode removal"

② **Clean the cell.** ····· Clean the inside of the cell with a brush, etc.

- The solution remaining in the measuring cell after cleaning is displaced by the sample water at the start of automatic measurement.



Cleaning the Measuring Cell

③**Assemble the electrode and restart measurement.** ····· ＞＞ 5.8 (1-2) "Ion electrode assembling and measurement restart"

(3) Membrane and internal solution replacement

(a) Replace the ion electrode membrane periodically, or as required. At the same time, also replace the internal solution.

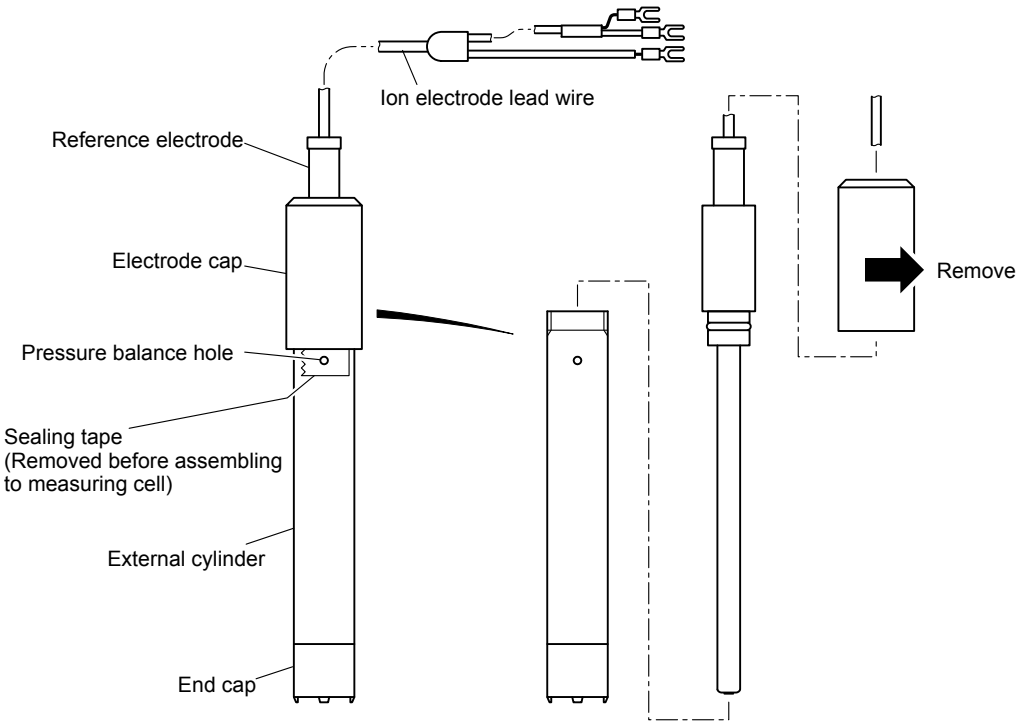
(b) Since the replacement period is different depending on the state of the sample water, replace them at a suitable period from the empirical value.

①Prepare the membrane and internal solution. ····· Prepare the membrane, etc. supplied with the electrode.

- Membrane ····· 1 (No.AECT235B)
- Internal solution. ····· 1 (No.143F242)
- Syringe ····· 1 pc

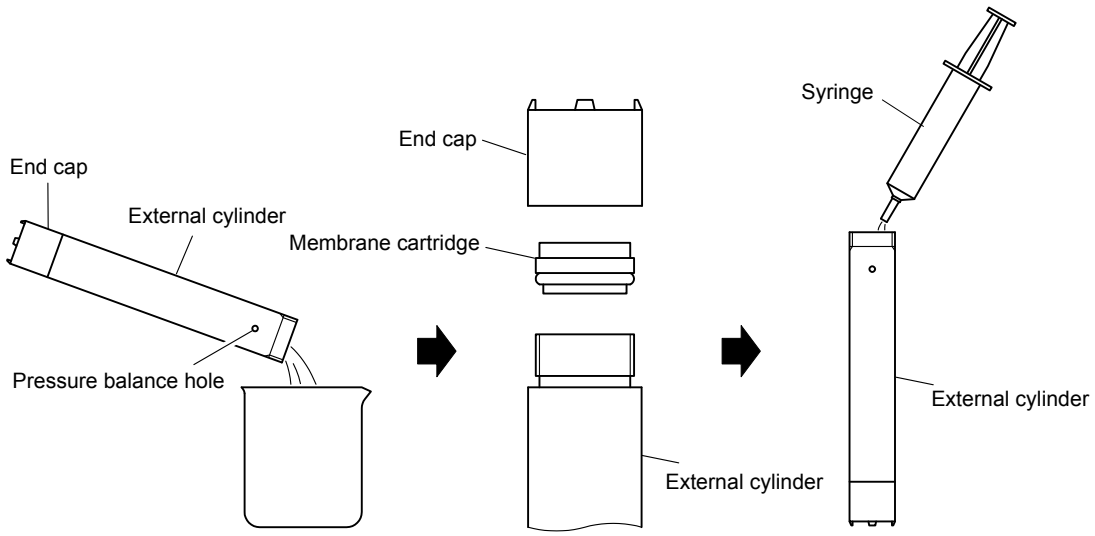
②Stop measurement and remove the ion electrode. ····· ＞＞ 5.8 (1-1) “Measurement stop and ion electrode removal”

③Removing the reference electrode from the ion electrode. ····· Turn the electrode cap (counterclockwise direction viewed from the top) and pull out the reference electrode from the external cylinder by rotating it slowly.



Removing the Reference Electrode from the Ion Electrode

【IMPORTANT】 • Do not touch the end of the reference electrode with your hand. Dirt or scratches on the response area of the reference electrode may degrade the characteristics of the ion electrode.



Replacing Membrane and Internal Solution

④Replace the membrane and internal solution. ····· Replace the membrane cartridge and the internal solution by the following procedure.

ⓐ Transfer the used internal solution remaining in the external cylinder to another container.

ⓑ Remove the end cap, and remove the used membrane cartridge.

- If the membrane mounting section is dirty, etc. wash it with pure water and wipe off the water drops with absorbent paper.

ⓒ Set the new membrane cartridge and fix it with the end cap.

ⓓ Rinse the inside of the external cylinder with new internal solution and transfer that solution to another container.

ⓔ Collect 7mL of new internal solution with the syringe and inject it into the external cylinder.

⑤Assemble the ion electrode and restart measurement. ····· ＞＞ 5.8 (1-2) “Ion electrode assembling and measurement restart”

(4) Ion electrode replacement

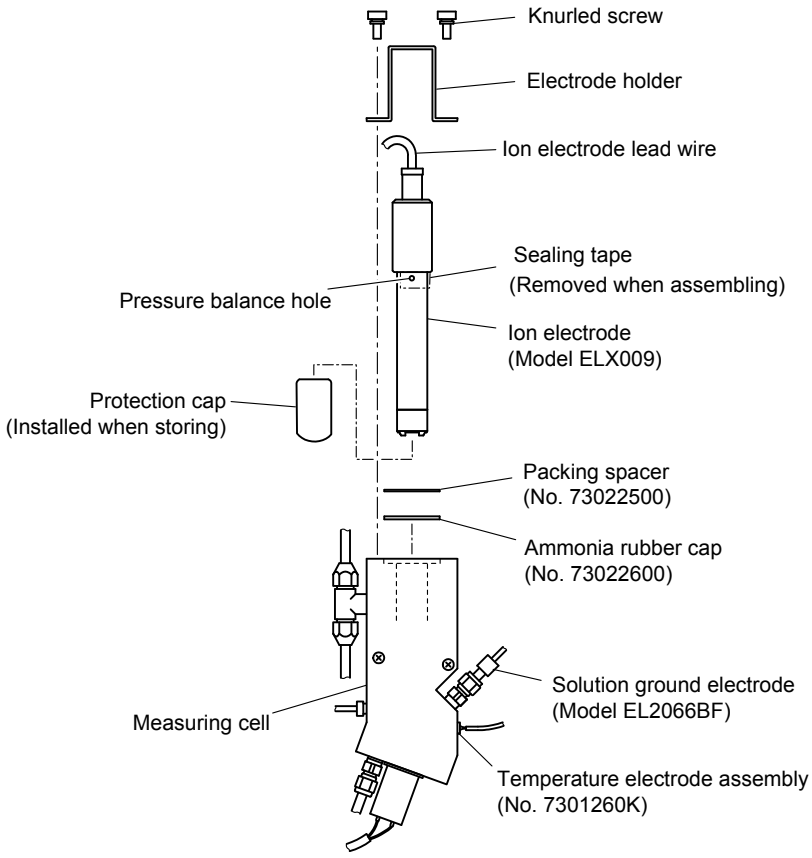
(a) The recommended ion electrode replacement period is 6 months to 1 year, but is different depending on the sample water.

(b) If the replacement period elapses without the ion electrode being replaced, the response may be slow, the electrode sensitivity may drop, etc. and good measurements may become impossible.

①Prepare a new ion electrode.

- Ammonia electrode ····· 1 (Model ELX009)

② Stop measurement and remove the used ion electrode. ····· ＞＞ 5.8 (1-1) “Measurement stop and ion electrode removal”



Removing and Assembling the Ion Electrode

③Remove the seal tape, etc. ····· Remove the new ion electrode from the box and remove the seal tape and protection cap from the electrode. Store the protection cap because it will be installed when storing the ion electrode.

【IMPORTANT】
- Do not touch the membrane at the end of the ion electrode. If the end of the ion electrode gets dirty or damaged, the membrane and internal solution will have to be replaced.
- If the ion electrode is assembled and measurement is started without removing the seal tape, the indication may become unstable.
- Be sure that water drops or dirt do not get onto the end of the ion electrode lead wires. If they do, wash the end of the lead wires with alcohol and dry them with absorbent paper.

④ Assemble the ion electrode and restart measurement. ····· ＞＞ 5.8 (1-2) “Ion electrode assembling and measurement restart”

(5) Stirring motor replacement

Periodically replace the measuring cell stirring motor.

①Prepare new stirring motor.

- Stirring motor assembly ····· 1 (No.7264150K)

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

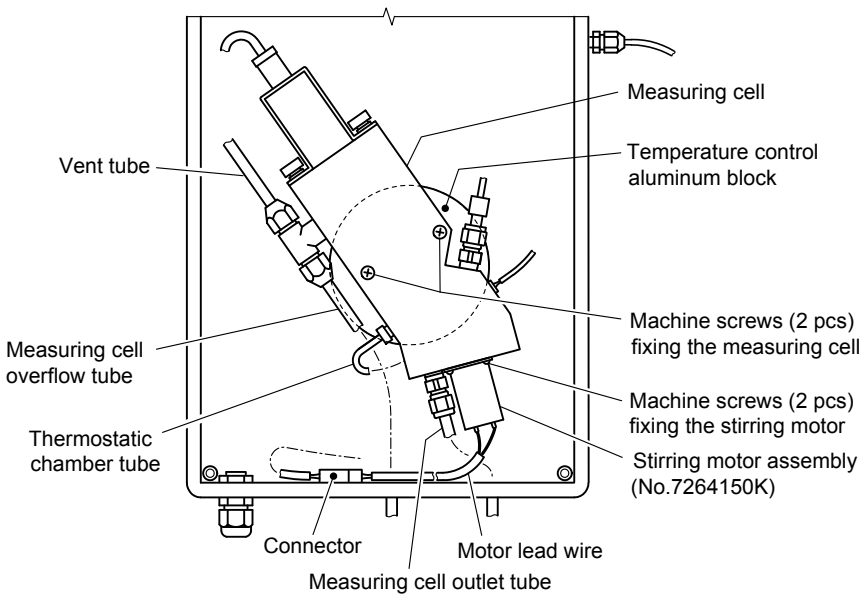
5.3(1) ① **“**Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③Drain the solution from the measuring cell ····· Drain the solution from the measuring cell. ＞＞ “4.4(5) Individual operation”.

④Turn off the power. ····· Set the power switch to OFF.

⑤Remove the detector section cover. ····· Loosen the butterfly bolt and remove the detector section cover.



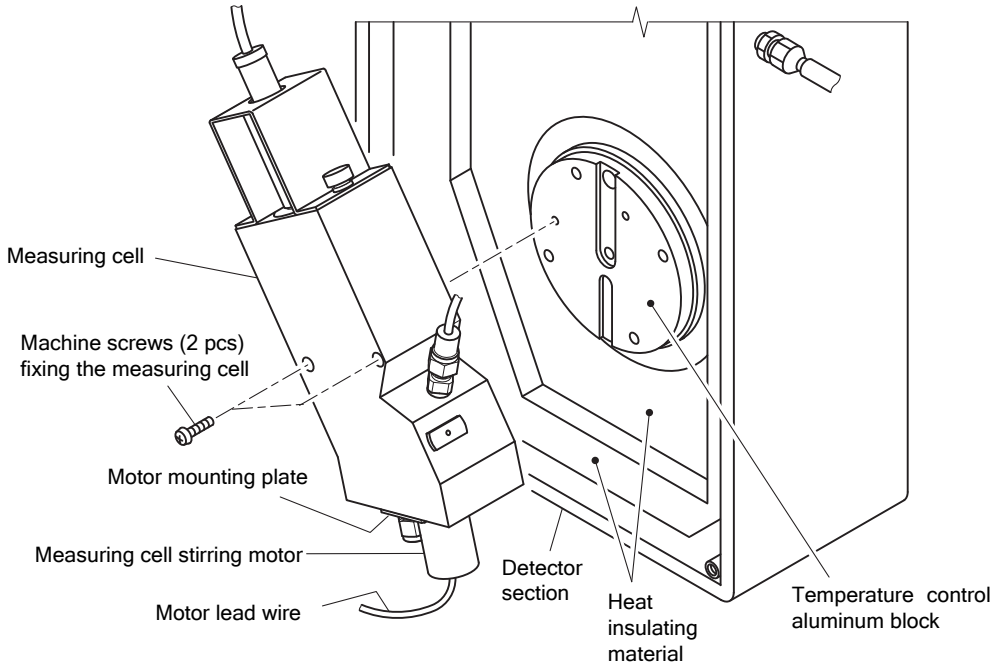
Measuring Cell at Detector Section

⑥Disconnect the measuring cell piping. ····· Disconnect the following tubes from measuring cell. If it is difficult to take out the measuring cell, disconnect the thermostatic chamber tube and measuring cell drain port tube together.

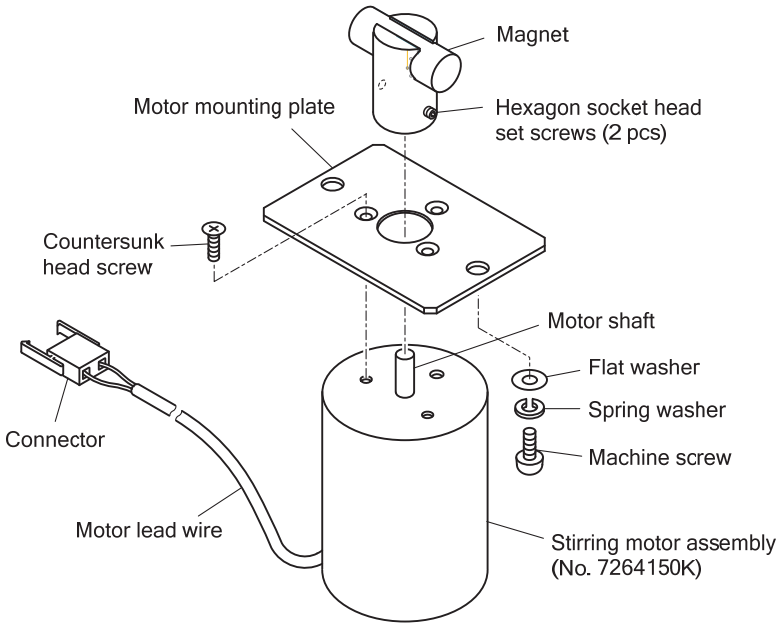
- Measuring cell overflow tube
- Measuring cell drain port tube

⑦Disconnect the motor lead wire. ····· Disconnect the used stirring motor lead wire at connector part.

⑧Remove the measuring cell. ····· Remove the machine screws (2 pcs) fixing the measuring cell and remove the measuring cell from the temperature control aluminum block.



Removing the Measuring Cell



Stirring Motor and Magnet

⑨**Remove the motor mounting plate.** ····· Remove the machine screws (2 pcs) and remove the motor mounting plate mounting the used stirring motor from the bottom of the measuring cell.

⑩**Remove the magnet.** ····· Loosen the hexagon socket head set screws (2 pcs) and remove the magnet installed to the used stirring motor from the motor shaft.

⑪**Remove the used motor.** ····· Remove the countersunk head screws (3 pcs) and remove the stirring motor from the stirring motor mounting plate.

⑫**Install the new motor.** ····· Install the new stirring motor to the motor mounting plate with the countersunk head screws. Next, install the magnet to the motor shaft and fix it with the hexagon socket head set screws (2 pcs).

⑬**Install to the measuring cell.** ····· Install the motor mounting plate mounting the new stirring motor to the bottom of the measuring cell with the machine screws (2 pcs).

⑭**Install the measuring cell.** ····· Install the measuring cell to the temperature control aluminum block and connect the motor lead wire connector.

⑮**Connect the piping.** ····· Connect the disconnected piping to its original state.

⑯**Return the detector section cover.** ····· Return the detector section cover to its original state.

【IMPORTANT】 • If the detector section cover is loose, outside air will enter the detector section and condense on the aluminum block may cause trouble.

⑰**Perform the operations after maintenance.** ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

5.3(2) ④ “Check for alarms

(6) Stirring bar and rubber cap replacement

Periodically replace the measuring cell stirring bar and ammonia rubber cap.

①**Prepare new parts.** ····· Prepare the parts to be replaced.

- Stirring bar ····· 1 (No.107D040)
- Ammonia rubber cap ····· 1 (No.73022600)

②**Stop measurement and remove the used ion electrode.** ····· ＞＞ 5.8 (1-1) “Measurement stop and ion electrode removal”

③**Replace the stirring bar or rubber cap.**

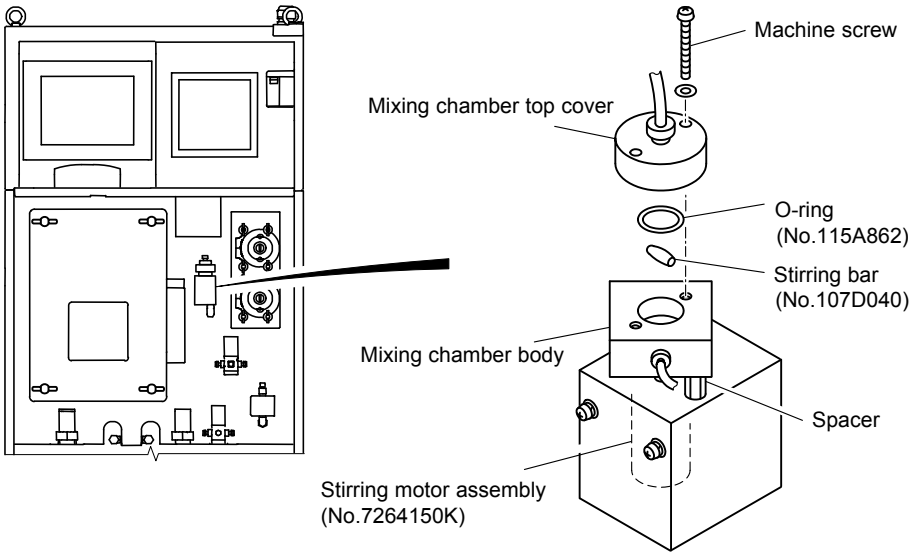
- Stirring bar ····· Remove the used stirring bar in the measuring cell using tweezers, etc. and insert the new stirring bar.
- Ammonia rubber cap ····· Remove the used ammonia rubber cap under the packing spacer and insert the new cap.

④**Assemble the ion electrode and restart measurement.** ····· ＞＞ 5.8 (1-2) “Ion electrode assembling and measurement restart”

5.9 Mixing Chamber Maintenance

(1) Mixing chamber cleaning

When the mixing chamber gets dirty, clean it.



Mixing Chamber

①Perform the operations before maintenance. ····· ＞＞ 5.3(1) "Operation before maintenance"

5.3(1) ① "Stop the measurement"

5.3(1) ② "Set the "Maintenance in progress" signal to "Closed"

②Turn off the power. ····· Set the power switch to OFF.

③Remove the top cover of the mixing chamber. ····· Remove the machine screw (2 pcs) fixing the cover of the mixing chamber and remove the top cover.

④Clean the mixing chamber. ····· Remove the stirring bar and wipe the inside of the mixing chamber with tissue paper, etc.

【IMPORTANT】 • Handle the stirring bar carefully so as not to lose it.

⑤Install the mixing chamber cover. ····· Insert the stirring bar into the mixing chamber and fix the top cover with the machine screw.

⑥Perform the operations after maintenance. ····· ＞＞ 5.3(2) "Operation after maintenance"

5.3(2) ① "Turn on the power"

5.3(2) ② "Restart automatic measurement"

5.3(2) ③ "Set the "Maintenance in progress" signal to "Open"

5.3(2) ④ "Check for alarms

(2) Mixing chamber parts replacement

Replace the stirring bar, O-ring, and stirring motor of mixing chamber by the following procedure.

①Prepare the parts to be replaced.

- Stirring bar ····· 1 (No.107D040)
- O-ring ····· 1 (No.115A862)
- Stirring motor assembly ····· 1 (No.7264150K)

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① “Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③Turn off the power. ····· Set the power switch to OFF.

④Disconnect the mixing chamber piping. ····· Disconnect the mixing chamber piping.

⑤Remove the mixing chamber. ····· Remove the machine screw fixing the mixing chamber and remove it together with mounting fixture. Next, pull out the stirring motor lead wire and disconnect the connector at the end of the wire.

⑥Replace the parts.

- Stirring motor ····· Remove the used stirring motor from the mixing chamber, and install a new stirring motor.
- O-ring····· Remove the mixing chamber top cover, and replace the O-ring with a new one.
- Stirring bar ····· Remove the mixing chamber top cover, and replace the stirring bar with a new one.

⑦Install the top cover of the mixing chamber. ····· Fix the top cover of the mixing chamber with the machine screw.

⑧Install the mixing chamber. ····· Install the mixing chamber to the product body. Return the disconnected piping and lead wire to its original state.

⑨Perform the operations after maintenance. ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

5.3(2) ④ “Check for alarms

5.10 Thermostatic Chamber Tube Replacement

(a) Periodically replace the tube wrapped around the temperature control aluminum block of the thermostatic chambers.

(b) The recommended replacement cycle is 1 year, but is may be different depending on the sample water. When the sample water flow is not good, earlier replacement is recommended.

①Prepare thermostatic chamber tube.

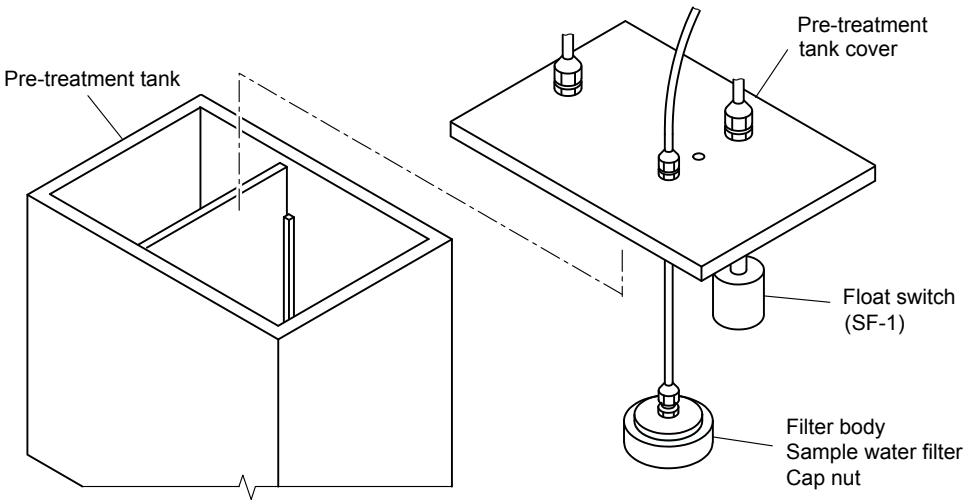
- PFA tube ····· 1 (1m) (No.116D302)

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① **“**Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③Drain the inside of the tube. ····· Remove the pre-treatment tank cover and pull out the sample water filter from the sample water. In this state feed the sample water. (＞＞ 4.4(5) “Individual operation”) Drain the tube until air bubbles appear at the measuring cell (until there is no more liquid in the tube).



Pulling Out the Sample Water Filter

④Drain the solution from the measuring cell ····· Drain the solution from the measuring cell. ＞＞ 4.4(5) “Individual operation”.

⑤Turn off the power. ····· Set the power switch to OFF.

⑥Remove the detector section cover. ····· Loosen the butterfly bolt and remove the detector section cover.

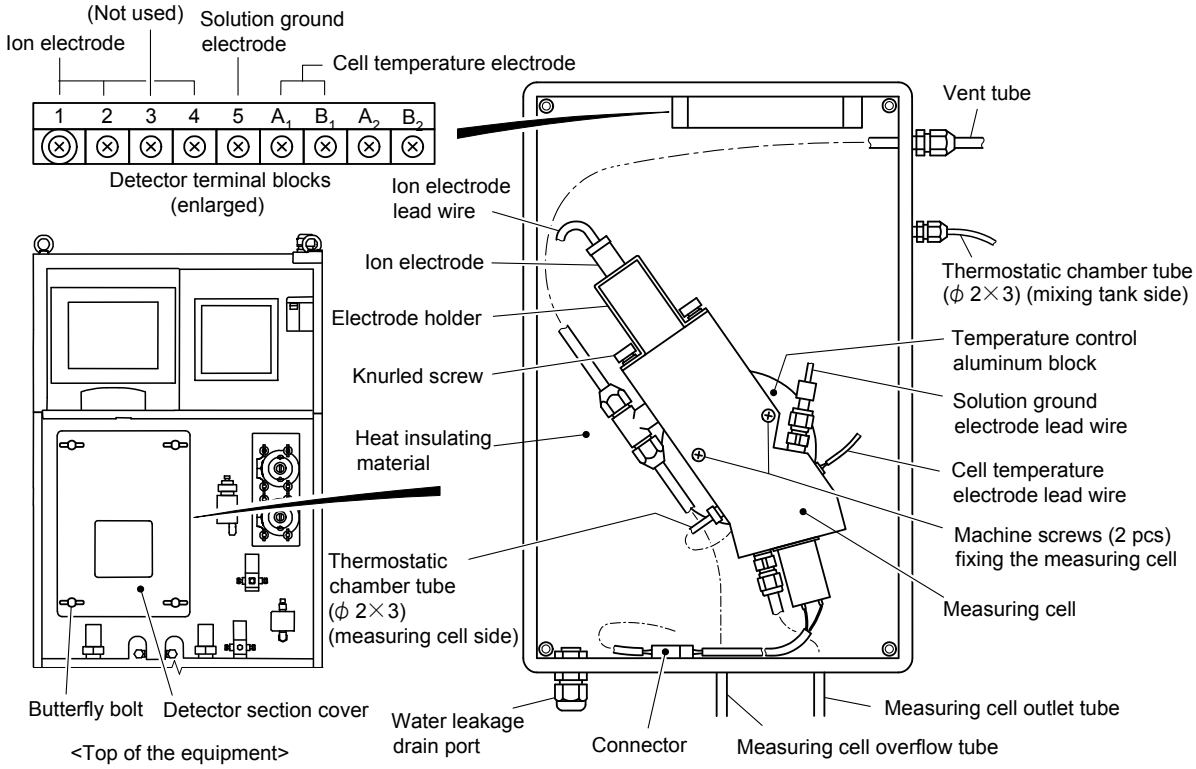
⑦Disconnect the lead wires of electrode. ····· Disconnect the following lead wires from the detector terminal blocks.

- Ion electrode lead wire
- Solution ground electrode lead wire
- Cell temperature electrode lead wire

⑧Disconnect the measuring cell piping. ····· Disconnect the following lead wires from measuring cell.

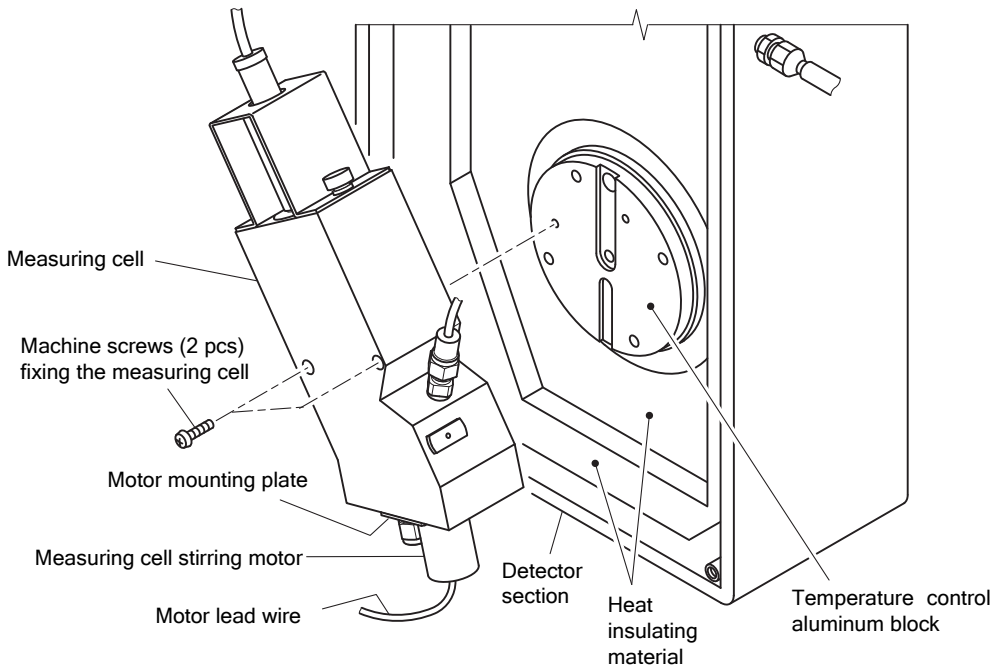
- Thermostatic chamber tube ·····sample water inlet
- Measuring cell overflow tube ····· sample water overflow tube

- Measuring cell outlet tube ····· measuring cell drain port
- Vent tube ····· measuring cell vent



Detector Section

⑨Remove the measuring cell. ····· Remove the machine screws (2 pcs) fixing the measuring cell and remove the measuring cell from the temperature control aluminum block.

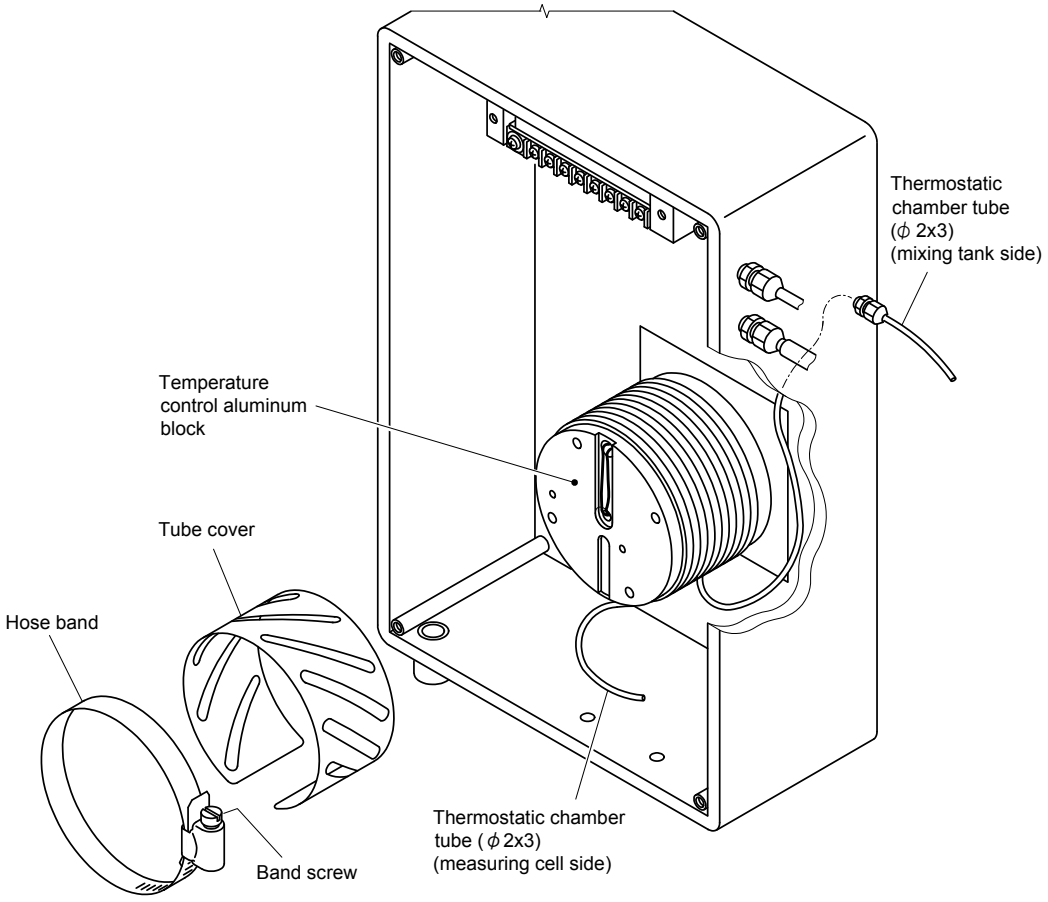


Remove the Measuring Cell

⑩**Remove the heat insulating material.** ····· Remove the heat insulating material around the temperature control aluminum block.

⑪**Remove the tube cover.** ····· When the heat insulating material is removed, the temperature control aluminum block can be accessed. Its tube cover is fixed by a hose band. Remove the hose band and remove the tube cover.

⑫**Replace the tube.** ····· When the mixing chamber outlet tube is removed, the tube wrapped around the temperature control block can be removed. Wrap new tube along the groove of the temperature control block.
Install the tube cover and fix it with the hose band. Connect one side of the thermostatic chamber tube to the mixing chamber outlet.



Replacing the Thermostatic Chamber Tube

⑬**Return the heat insulating material.** ····· Return the removed heat insulating material to its original state.

⑭**Return the measuring cell.** ····· Return the measuring cell to its original state.

⑮**Connect the measuring cell piping.** ····· Connect the disconnected piping.

⑯**Connect the lead wire of electrode.** ····· Connect the lead wire of each electrode so that the lead wire mark numbers and terminal block numbers match.

⑰**Return the detector section cover.** ····· Return the detector section cover to its original state.

【IMPORTANT】 • When the detector section cover is loose, outside air may enter the detector section and condense on the aluminum block may cause trouble.

⑱ **Perform the operations after maintenance.** ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

5.3(2) ④ “Check for alarms

6. Troubleshooting

6.1 Alarm Items and Transmission

(1) Alarm types and transmission method

(a) When a failure occurs in the equipment, **[ALARM]** of the "Measurement screen" lights red and alarm signal output and other alarm transmission is performed.

(b) There are 4 kinds of alarm types in accordance with the following table; failure 1 (serious), failure 2 (minor), measured value error, and power off alarm.

Alarm Types and Transmission Method

Transmission method, others	Failure 1 (serious)	Failure 2 (minor)	Measured value failure	Power off
1. **[ALARM]** lights red Can be confirmed at **[ALARM]** on the "Measurement screen", etc.	○	○	○ Automatically cleared at reset	–
2. Listed in the alarm dialog. Listed in the alarm dialog which is opened by touching **[ALARM]**	○	○	○ Automatically erased at reset	–
3. Listed in "Alarm log" screen. Listed in "Alarm log" screen which is opened by "DATE" screen	○	○	○	–
4 Listed in "Operation log" screen. Listed in "Operation log" screen which is opened by "DATE" screen	–	–	–	○
5. Alarm output Contact signal is output from the external connection terminals.	○ Terminal: 32-33	○ Terminal: 34-35	○ Terminal: 36-37, 38-39, 40-41	○ Terminal: 30-31
Others	Measurement stops	Measurement may stop	Measurement continued	Automatic reset if power interrupted during measurement

○: Relevant –: Irrelevant

(2) Analyzer failures

(a) When a failure occurs in the equipment, the equipment judges it an analyzer failure and transmits an alarm. A contact closed signal is output to the outside from the analyzer failure 1 (serious) output terminal or analyzer failure 2 (minor) output terminal. The analyzer failure alarm items and their contents are shown in the following table.

- Whether or not sample water off is an analyzer failure can be selected. >> 4.3(22) "Sample water off alarm transmission switching"

(b) Analyzer failure 1 (serious) is a comparatively serious failure. When analyzer failure 1 (serious) is generated, automatic measurement stops. Alarm transmission is not automatically cleared even if the error is removed.

(c) Analyzer failure 2 (minor) is a comparatively minor failure. Measurement continues except sample water off. If the error is removed, alarm transmission is cleared (automatic reset). However, calibration error, manual correcting error, and electrode sensitivity error alarm items must be cleared manually.

(d) Analyzer failure generation can be checked by Alarm dialog box and "Alarm log" screen.
＞＞ 4.1(5) "Alarm check and clear", 4.2(6) "Alarm log check and initialize"

(e) When an analyzer failure occurred, process it based on 6.2 "Alarm Handling for Items".

Alarm Items of Analyzer Failures

Alarm items	Display example	Transmission conditions	Operation during transmission	Alarm output
Communication error	**ALM1_COMU**	A communication error was generated between internal units.	Measurement stops. Contact your dealer.	Failure 1 (serious) (Terminal 32-33)
A/D error	**AL1_A/D**	An error was generated at the A/D unit.	Measurement stops. Contact your dealer.	Failure 1 (serious) (Terminal 32-33)
EEPROM error	**AL1_EEPROM**	An error was generated at the internal memory.	Measurement stops. Contact your dealer.	Failure 1 (serious) (Terminal 32-33)
Cell temperature error	**AL1_CELL_T**	The measuring cell temperature exceeded the -5 to 50°C range.	Measurement stops. Contact your dealer.	Failure 1 (serious) (Terminal 32-33)
Controller temperature error	**AL1 _BLOCK_T**	The controller temperature exceeded the -5 to 50°C range.	Measurement stops. Contact your dealer.	Failure 1 (serious) (Terminal 32-33)
Ion electrode error	**AL1_SENSOR**	The -1000 to 1000 mV range was exceeded during measurement.	Measurement stops. Reset after clearing by clear key after ion electrode replacement, fault repair, etc.	Failure 1 (serious) (Terminal 32-33)
Temperature control error	**AL1_TEMP_CTL**	The ±1°C range relative to the set temperature was exceeded and continued for 10 minutes 60 minutes after the start of measurement.	Measurement stops. Contact your dealer.	Failure 1 (serious) (Terminal 32-33)
Leak detection (Option)	**AL1_LEAK**	Leak was detected at the pan.	Measurement stops. Reset by alarm clear operation after handling.	Failure 1 (serious) (Terminal 32-33)
Calibration error	**AL2_CALIB**	The electrode potential fell outside the range during calibration.	(An alarm is transmitted at the same time as Electrode sensitivity error.) Automatic measurement is continued without updating the calibration curve (arithmetic expression). Automatic calibration is not started. Reset by alarm clear operation after handling. For ACAS mode, reset by last calibration interval.	Failure 2 (minor) (Terminal 34-35)
Manual correcting error	**AL2_CALIB_CP**	The electrode potential fell outside the range during manual correcting calibration.	Corrected value is not changed. Reset by alarm clear operation after handling.	Failure 2 (minor) (Terminal 34-35)

(To be continued)

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Alarm items	Display example	Transmission conditions	Operation during transmission	Alarm output
Sample water off error	**AL2_SAMPLE**	The pre-treatment tank solution level drops and FS1 was turned on.	Measurement is stopped. Automatically reset by turning off FS1 after sample water is supplied. When sample water off alarm transmission is off, an alarm is not transmitted and measurement stops.	Failure 2 (minor) (Terminal 34-35)
LO calibration solution off error	**AL2_CALIB_L**	The LO calibration solution level drops and FS2 was turned on.	Calibration is not started. Automatically reset by turning off FS2 after calibration solution is replaced.	Failure 2 (minor) (Terminal 34-35)
HI calibration solution off error	**AL2_CALIB_H**	The HI calibration solution level drops and FS3 was turned on.	Calibration is not started. Automatically reset by turning off FS3 after calibration solution is replaced.	Failure 2 (minor) (Terminal 34-35)
Reagent off error	**AL2_REAGENT**	The reagent solution level drops and FS4 was turned on.	Measurement continues. Automatically reset by turning off FS4 after reagent is replaced.	Failure 2 (minor) (Terminal 34-35)
Acid washing solution off error	**AL2_WASH**	The acid washing solution level drops and FS5 was turned on.	Washing is not started. Automatically reset by turning off FS5 after acid washing solution is added.	Failure 2 (minor) (Terminal 34-35)
Electrode sensitivity error	**AL2_SENS**	Electrode sensitive less than 20%	(An alarm is transmitted at the same time as calibration error.) Automatic measurement is continued without updating the calibration curve (arithmetic expression). Automatic calibration is not started. Reset by alarm clear operation after handling. For ACAS mode, reset by last calibration interval.	Failure 2 (minor) (Terminal 34-35)
Waste solution tank full error (Option)	**AL2_EFFLU**	The waste solution tank became full and the waste solution level switch (FS6) was turned on.	Automatic calibration and automatic washing are not started. Measurement continues, but next measurement does not start. Automatically reset by turning off FS6 after waste solution tank is replaced.	Failure 2 (minor) (Terminal 34-35)

(3) Measured value error

(a) When the measured value exceeds the alarm value (or drops for the lower limit alarm value) set for each alarm item, the equipment judges it a measured value error and transmits an alarm. A contact closed signal is output to the outside from the higher limit alarm output terminal, etc. The alarm items and their contents of measured value error are shown in the table below.

Alarm Items of Measured Value Error

Alarm items	Display example	Transmission conditions	Operation during transmission	Alarm output
Higher limit alarm	**ALM_ H H**	The sample water measured value exceeded the higher limit alarm value.	Alarm displayed and measurement continued. Automatically reset by returning to the alarm value or less.	Higher limit alarm (Terminal 36-37)
High limit alarm	**ALM_ H**	The sample water measured value exceeded the high limit alarm value.	Alarm displayed and measurement continued. Automatically reset by returning to the alarm value or less.	High limit alarm (Terminal 38-39)
Low limit alarm	**ALM _ L**	The sample water measured value dropped below the low limit alarm value.	Alarm displayed and measurement continued. Automatically reset by returning to the alarm value or more.	Low limit alarm (Terminal 40-41)

(b) Automatic measurement continues even if a measured value error alarm is transmitted. If the measured value returns to the alarm value or less (or more for low limit alarm), alarm transmission is automatically cleared. When the dead zone value exceeds 0.00mg/L, transmission or clearing are delayed by that amount.

(c) Measured value errors are entered in the “Alarm dialog” and “Alarm log” screen. If the measured value returns to the alarm value or less (or more for low limit alarm), the Alarm dialog box entry is automatically erased. The entry in the “Alarm log” screen is not erased.

(4) Power off alarm

(a) When the equipment power supply enters the OFF state or the power switch is set to OFF, a contact close signal is output at the power off terminal of the external connection terminals. The alarm items and their contents of power off alarm are shown in the table below.

Alarm Items of Measured Value Error

Alarm items	Display example	Transmission conditions	Operation during transmission	Alarm output
Power off	**PW_OFF**	Power off was generated at the equipment.	Measurement stops.	Power off output (Terminal 30-31)
Power reset	**PW_ON**	When power recovered.	During measurement ····· Measurement continued after measurement preparations During calibration and cleaning ····· Calibration and cleaning are aborted and measurement is continued. During measurement stop ····· Measurement stop continued. Manual operation aborted.	

(b) This alarm transmission is automatically cleared after the power recovers. When the power is turned off during automatic measurement, immediately after the power recovers, the measurement preparation process is performed and the equipment enters the automatic measurement mode.

(c) This alarm transmission is recorded in the operation log. It is not recorded in the “Alarm dialog” and on the “Alarm log” screen.

6.2 Alarm Handling for Items

(a) When an alarm was transmitted, after checking the date and time of transmission and the alarm contents in the “Alarm dialog” and “Alarm log” screen, handle the alarm in accordance with the following table. ＞＞ 4.1(5) “Alarm check and clear”, 4.2(6) “Alarm log check and initialize”

(b) When alarm handling is complete, clear the alarm by “Alarm dialog box”. This operation is unnecessary for alarm items that are automatically reset. ＞＞ 4.1(5) “Alarm check and clear”

Alarm Handling for Items

Alarm items	Handling methods	Reference item, etc.
Calibration error (AL2_CALIB) Electrode sensitivity error (AL2_SENS)	• Calibration solution inspection and adjustment • Reagent inspection and adjustment • Solenoid valve (SV1, SV2) inspection • Sample water and reagent pump inspection • Measuring cell inspection	5.5 “Solution Addition and Replacement” 5.6 “Solenoid Valve Maintenance” 5.7 “Pump Tube Replacement” 5.8 “Measuring Cell Maintenance”
Sample water off error (AL2_SAMPLE)	• Sampling route inspection and cleaning • Pre-treatment tank float switch (FS1) operation check	5.4 “Sampling Route and Pre-treatment Tank Maintenance”
LO calibration solution off error (AL2_CALIB_L)	• LO calibration solution level check and replacement • LO calibration solution tank float switch (FS2) operation check	5.5 “Solution Addition and Replacement”
HI calibration solution off error (AL2_CALIB_H)	• HI calibration solution level check and replacement • HI calibration solution tank float switch (FS3) operation check	5.5 “Solution Addition and Replacement”
Reagent off error (AL2_REAGENT)	• Reagent level check and replacement • Reagent tank float switch (FS4) operation check	5.5 “Solution Addition and Replacement”
Washing solution off error (AL2_WASH)	• Washing solution level check and addition • Acid washing solution tank float switch (FS5) operation check	5.5 “Solution Addition and Replacement”
Waste solution tank full error (AL2_EFFLU)	•Waste solution tank (option) replacement • Waste solution level switch (FS6) operation check	7.2 (2) “Waste Solution Tank Maintenance”
Communication error 1・2・3 (AL1_I2C)	• Turn off the power switch and stop supply of the city water and sample water and contact your dealer.	
A/D error (AL1_A/D) EEPROM error (AL1_EEPROM)	• Turn off the power switch and stop supply of the city water and sample water and contact your dealer.	
Cell temperature error (AL1_CELL_T)	•Temperature electrode connection inspection • Turn off the power switch and stop supply of the city water and sample water and contact your dealer.	

(To be continued)

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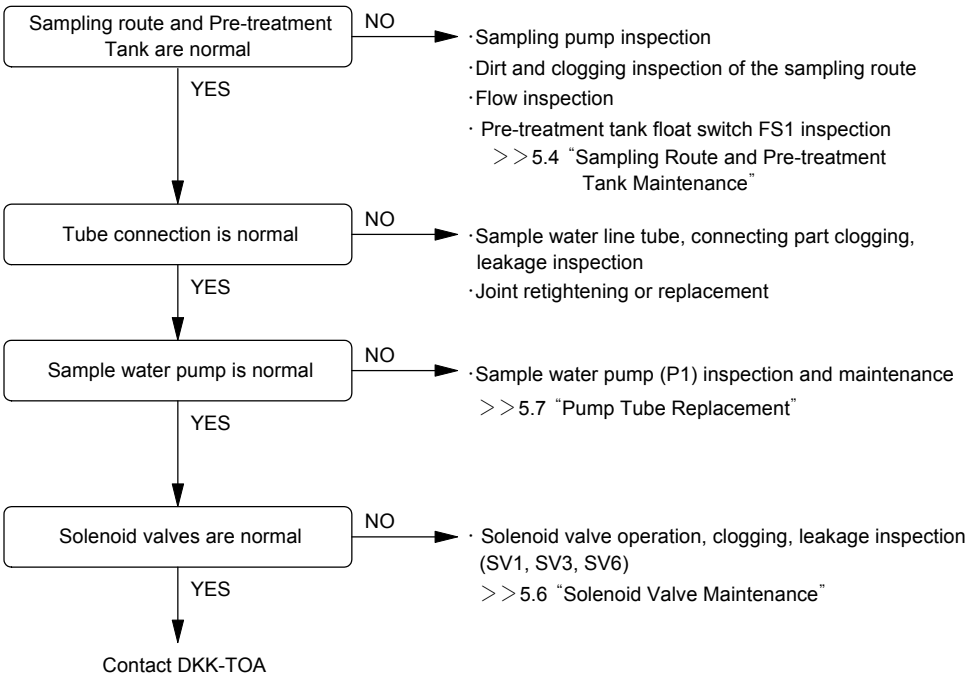
Alarm contents	Processing contents	Reference item, etc.
Controller temperature error (AL1_BLOCK_T)	• Temperature electrode connection inspection • Turn off the power switch and stop supply of the city water and sample water and contact your dealer.	
Ion electrode error (AL1_SENSOR)	• Measuring cell inspection • Ion electrode connection inspection and replacement	5.8 “Measuring Cell Maintenance”
Temperature control error (AL1_TEMP)	• Turn off the power switch and stop supply of the city water and sample water and contact your dealer.	
Leak detect error (AL1_LEAK)	• Turn off the power switch and investigate the causes to handle it.	7.3 (2) “Reset processing after leak generation”

6.3 Troubleshooting

(a) Refer to 6.1 “Alarm Items and Transmission”, 8.2(2) “Flow sheet”, and 8.2(3) “Time chart” and perform troubleshooting.

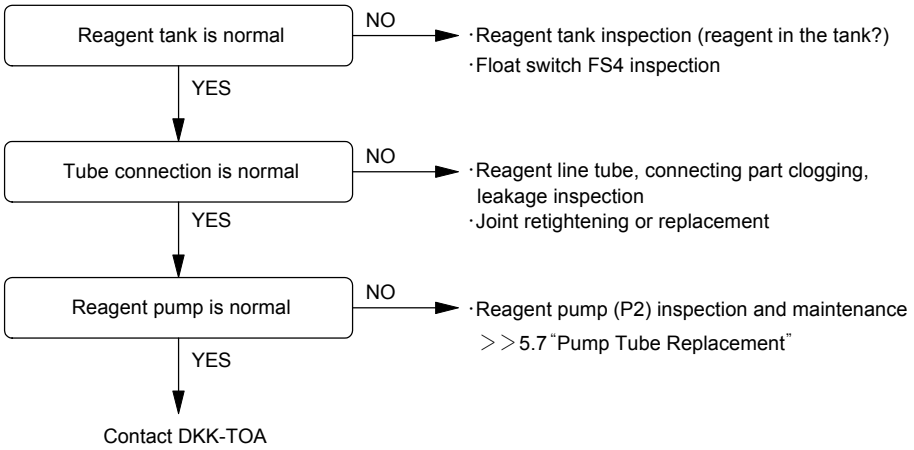
(b) When there are no abnormalities at each part as a result of troubleshooting, since a control circuit, etc. is probably faulty, contact dealer.

(1) Sample water is not fed



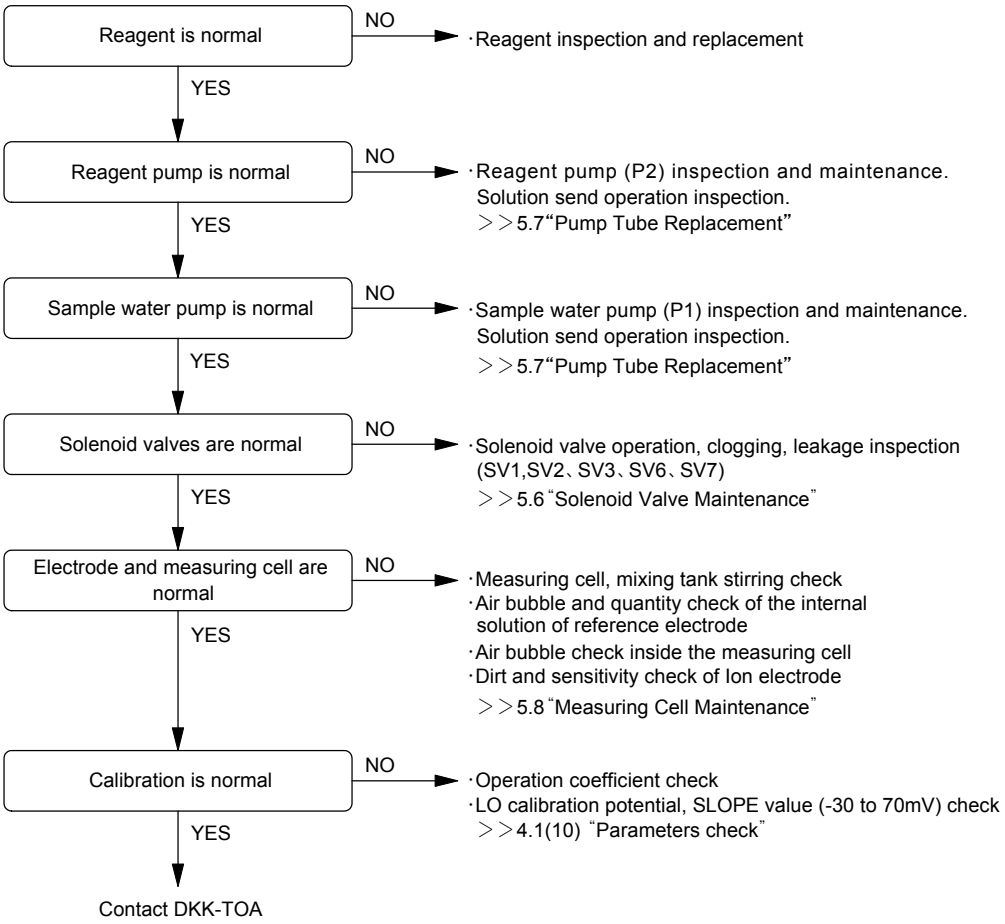
Correspondence When Sample Water Is Not Fed

(2) Reagent is not fed



Correspondence When Reagent Is Not Fed

(3) Measured value is abnormal



Correspondence When Measured Value Is Abnormal

●Repair contact

If a repair is required, please contact your sales representative, our sales office, or our service department. In this case, let us know the following information on the product nameplate:

Model name (MODEL)

Serial number (SER. No.)

Manufacturing date (DATE)

7. Additional Functions

7.1 Air Cleaning

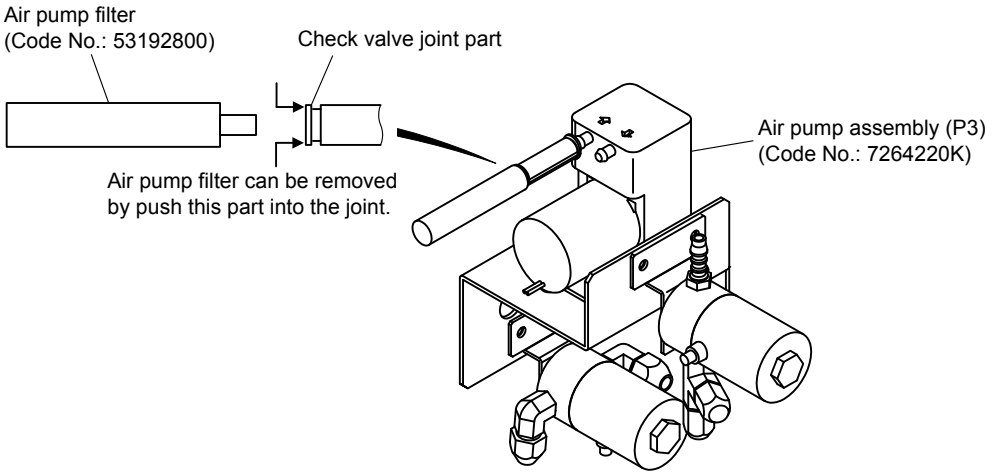
(1) Air cleaning function

(a) An air cleaning function is added depending on order specifications. This function increases the cleaning effect by reversing the air flow using the air pump together with the washing solution, when cleaning the sample water line (sample water filter).

(b)See operations SV4, SV5, and P3 of the acid washing time chart (1/2). ＞＞ 8.2(3)(e) “Time chart for acid cleaning”.

(2) Air pump maintenance

Replace the air pump filter or air pump (P3) at the cycle given in 5.1 “Maintenance Items List”.



Air Pump

①Prepare the parts to be replaced.

Air pump filter ····· Code No.:53192800

Air pump ····· Air pump assembly, Code No.:7264220K

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① **“**Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③Turn off the power. ····· Set the power switch to OFF.

④Replace.

[Air pump filter replacement]

ⓐ While pushing in the air pump (P3) check valve joint part (one-touch joint), remove the used air pump filter.

ⓑ Insert the new air pump filter until it stops.

[Air pump replacement]

ⓐ Disconnect the lead wire of the used air pump at the connector (P3) part.

ⓑ Disconnect the tube connected to the air pump.

ⓒ Loosen the machine screws (2) and remove the mounting plate mounting the air pump and pull it out toward you.

ⓓ Remove the rubber feet (4) of the used air pump from the mounting plate.

ⓔ Insert the rubber feet of the new air pump into the mounting plate holes.

ⓕ Reconnect the disconnected tube, and fix the mounting plate to the panel using the machine screws (2).

ⓖ Connect the lead wire connector of the new air pump.

⑤ Perform the operations after maintenance. ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

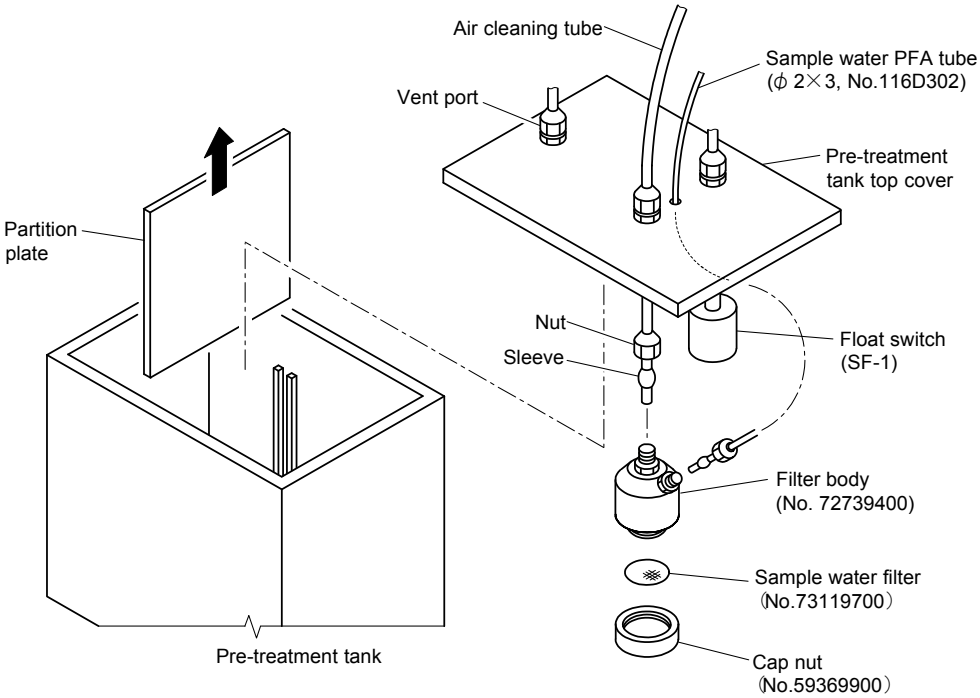
5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

5.3(2) ④ “Check for alarms

(3) Sample water filter with air cleaning function

(a) When the air cleaning function is added, the sample water filter is shown in the figure below. The tubing is also different from general tubing.

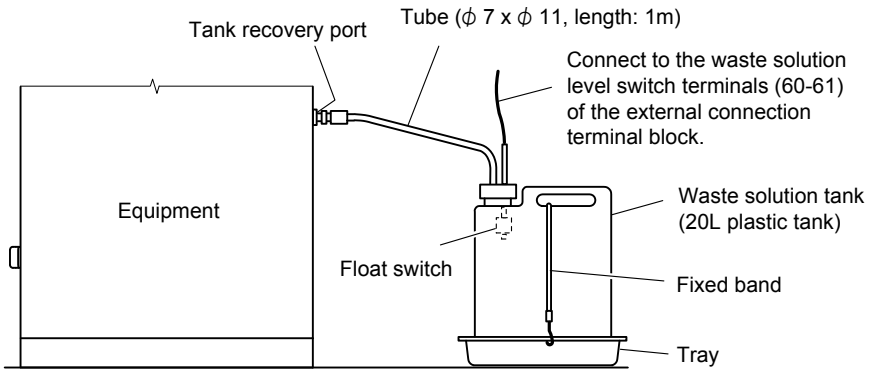
(b) For the replacement procedure of sample water filter, see 5.4 (2) “Pre-treatment tank cleaning and parts replacement”.



Sample Water Filter with air Cleaning Function

7.2 Waste Solution Recovery

(1) Recovery function and connection by waste solution tank



Connection of Waste Solution Tank

(a) The waste solution recovery function including waste solution tank is provided depending on the order specifications. The used calibration solution can be recovered to the waste solution tank.

(b) The used calibration solution is discharged from the tank recovery port only when this waste solution recovery function is provided. When the waste solution recovery function is not provided, the used calibration solution is discharged from the measurement cell outlet.

(c) Piping ····· Connect the tube connected waste solution tank to the tank recovery port.

Piping port: Tank recovery port Rc1/2

Piping material: ϕ7×11 tube (length: 1m)

Pressure at the end of tube: piping not standing up

【IMPORTANT】 • If the end of the tube rises, recovery may be hindered because the tube enters a water seal state.

Waste solution amount: Automatic calibration (LO, HI) ····· 210 mL / 1 time,
(also applies to manual automatic reading LO, HI calibration)

Automatic wash ····· 70 mL / 1 time (also applies to manual wash)

(d) Wiring ····· Connect the waste solution tank float switch lead wire (length: Approx. 3m) to the waste solution level switch terminals (60-61, waste solution tank full) of the external connection terminal block. This becomes the generation source of the “Monitor dialog box” waste solution tank level judgment display and “Waste solution tank full error (analyzer failure 2)”.

(2) Waste solution tank maintenance

(a) The measuring cell drain after calibration is alkaline solution including ammonium ion. Replace the waste solution tank with a spare tank in accordance with the procedure before the waste solution tank becomes full.

【IMPORTANT】 • When the waste solution tank becomes full, an analyzer failure 2 (minor) “Waste solution tank full error” is generated and automatic calibration and automatic wash stop. However, automatic measurement continues.

(b) Waste solution tank full can be checked at the “Monitor dialog box”. When the tank becomes full, the [NG] (red lamp) appears at the liquid level judgment display of “Waste solution tank”. At the same time, **[MONITOR]** turns red.

(c) When changing the waste solution tank, inspect the tube for breakage, leakage, etc. Replace the tube at the cycle given in 5.1 “Maintenance Items List”.

①Prepare an empty waste solution tank. ·····Prepare the empty plastic tank contained in the spare parts or replacement waste solution tank. When replacing the tube, also prepare the tube.

- Waste solution plastic tank (20 L) ····· 1 (No.136C025)
- Tube (ϕ7 x ϕ11, length：1m) ····· 1 (No.116E022)

②Perform the operations before maintenance. ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① “Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

③ Turn off the power. ····· Set the power switch to OFF.

- When the “STATUS” display in the “MEAS (MEAS)” screens is the following display and this state continues obviously until maintenance work is ended, waste solution tank maintenance can be performed during automatic measurement.

  Status displays that allow waste solution tank maintenance ····· Measurement, Wait (intermittent measurement)

【IMPORTANT】
- When the status display is “Measurement preparation”, “HI calibration”, “LO calibration”, or “Wash”, or the equipment may enter that state during maintenance work, never perform the waste solution tank maintenance operation. Otherwise, waste solution may be discharged.

⚠ WARNING

Hazardous material

- Do not mix the waste solution (alkaline solution including ammonium ion) with other alkaline solution. They may react and generate ammonia gas.

④ Remove the cover with float switch. ····· Remove the cover with float switch from the tank containing the waste solution and catch the drops in a plastic beaker, etc. so that they do not get on the surroundings.

⑤ Install the cap to the tank containing the waste solution. ····· Remove the cap from the empty waste solution tank and install it securely to the tank containing the waste solution.

⑥ Install the cover with float switch to the empty tank. ····· Place the empty tank at the specified position and securely install the cover with float switch.

⑦ Inspect the tube. ····· Set the empty tank at the specified position of the equipment and visually inspect the tube between the waste solution tank and tank recovery port for the following items.

No breakage, deformation, leakage, etc.

There are standing up parts in the tube

Unreasonable force is not applied

- When not replacing the tube, go to step ⑨ after this operation.

⑧ **Replace the tube.** ····· If necessary, replace the tube between the waste solution tank and the tank recovery port with a new tube.

⑨ **Transfer the waste solution tank to the storage site.** ····· Transfer the tank containing the waste solution to the storage site and have it processed by a specialist as necessary.

⑩ **Perform the operations after maintenance.** ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

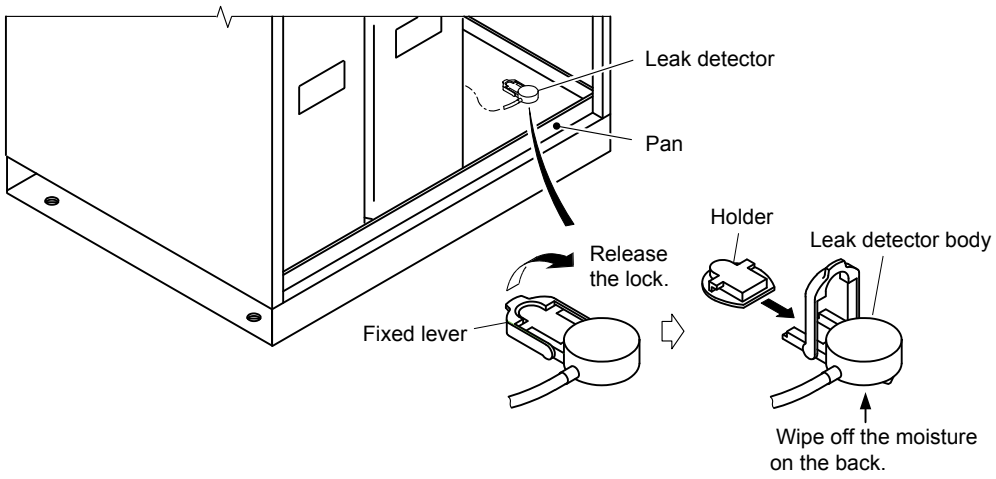
5.3(2) ④ “Check for alarms

7.3 Leak Detection

(1) Leak detection function

(a) A leak detector is added depending on order specifications.

(b) A pan with drain is added and there is a leak detector at the front right-hand side of the pan. When water is detected, automatic measurement stops and an analyzer failure 1 (serious) “Leak (AL1_LEAK)” error is transmitted.



Leak Detector

(2) Reset processing after leak generation

When a “Leak (AL1_LEAK)” error was transmitted, reset it as follows:

① **Perform the operations before maintenance.** ····· ＞＞ 5.3(1) “Operation before maintenance”

5.3(1) ① **“**Stop the measurement”

5.3(1) ② “Set the “Maintenance in progress” signal to “Closed”

② **Turn off the power.** ····· Set the power switch to OFF.

③ **Investigate and remove the cause.** ····· Investigate the cause of leak and repair it.

⚠ WARNING

Hazardous material

- The solutions used are toxic with the exception of a few. Since the leaking water may contain hazardous materials, check the Material Safety Data Sheet (MSDS) and wear protective gear when handling it.

④ **Remove the leak detector body.** ····· Raise the fixing lever, and pull out the leak detector body from the holder.

⑤ **Wipe off the moisture of the leak detector body.** ····· In particular, wipe off the moisture on the back of the leak detector body fully.

⑥ **Clean the pan.** ····· Drain the water remaining in the pan, and clean the pan.

⑦ **Install the leak detector body.**····· Insert the leak detector body into the holder, and set the fixing handle to the horizontal position.

- The leak detector body is locked to the holder.

⑧ **Perform the operations after maintenance.** ····· ＞＞ 5.3(2) “Operation after maintenance”

5.3(2) ① “Turn on the power”

5.3(2) ② “Restart automatic measurement”

5.3(2) ③ “Set the “Maintenance in progress” signal to “Open”

5.3(2) ④ “Check for alarms

7.4 Other Added Functions

(1) Recorder

(a) A recorder is added depending on order specifications. It is a 1-pen, 100 mm wide (length 16m) chart type.

(b) It is set to match the order specifications measurement range. When changing the setting, refer to the accessory “Recorder inspection manual”.

(2) Low concentration calibration (low concentration 3-point calibration)

(a) LL calibration function is added depending on order specifications.

(b) This is a 3-point calibration function with a concentration arithmetic expression with different slope added to the low concentration region.
Use it to measure low concentrations at a higher accuracy.

(c) Automatic calibration is impossible with this calibration. When calibrating, prepare the LL calibration solution and pour it into the accessory LL calibration solution tank and perform “Automatic reading LL calibration” or “Manual reading LL calibration”. ＞＞ 4.4 (3-2) “Automatic reading calibration”, 4.4(3-3) “Manual reading calibration

(d) Prepare the LL calibration solution according to the LO calibration solution to match the sample water for measuring at low concentration.

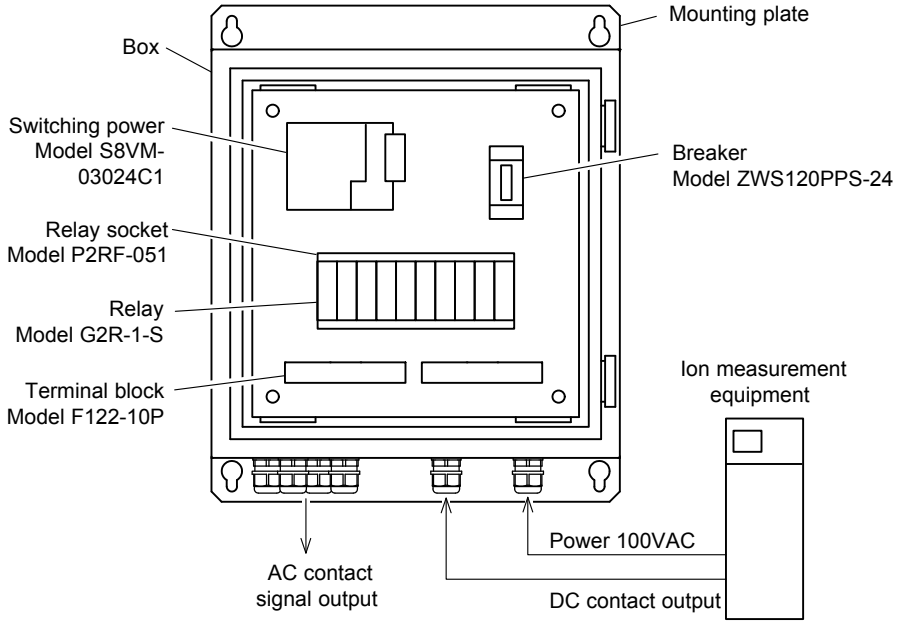
(3) Junction box (contact output AC compatible)

(a) A junction box is added depending on order specifications.

(b) The capacity of the contacts of this equipment is 30 VDC. When the junction box is used, 100 VAC 2A contacts can be used.

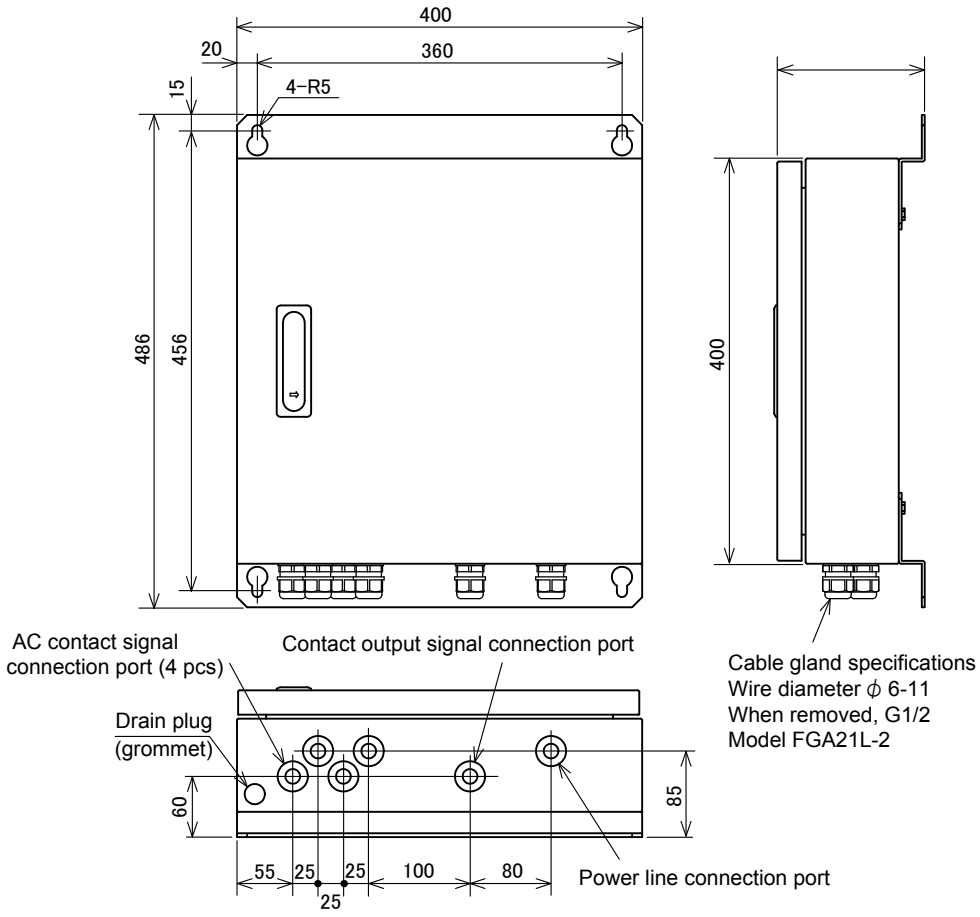
(c) This box can be used when using 100 VAC contacts such as interchanging existing analyzers.

【IMPORTANT】 • For safety, do not supply power when wiring. Supply power in accordance with 3.1 “Test Run and Adjustment Procedure”.



Junction Box

(d) The junction box is the wall mounted type. Its outline dimensions are shown in the figure. It cannot be installed to the equipment.



Junction Box Outline Dimensions

8. Specifications and Operational Explanation

8.1 Specifications

Product name	:	Ammonium ion monitor
Model name	:	NHMS-4* (*···(S) for special specifications)
Measurement objective	:	Ammonium ion concentration in effluent, river water, and lake water
Measurement method	:	Ammonium ion electrode method (alkali solution mixing system)
Measuring range	:	Measuring range: 0.05 to 100.0 mg/L Range: 0.05 to 5.00 mg/L 0.10 to 10.00 mg/L 1.0 to 100.0 mg/L (Measurement accuracy may not be satisfied depending on the composition of the sample water.) * For convenience, transmission output is output from 0 mg/L.
Measurement period	:	Continuous or intermittent (1 to 99 hours)
Measurement route	:	1 route
Repeatability	:	Read value ±10% (by calibration solution)
Response	:	Within 15 minutes at 90% response (after pre-treatment tank)
Temperature compensation	:	Constant temperature measurement method
Installation site	:	(1) Indoors or in a cubicle, place where there is little vibration and shock and where maintenance space can be secured (2) Avoid direct sunlight (3) Place away from noise sources (drive, etc.) (4) When the environment is corrosive, install a ventilation fan, etc. in the building.
Ambient temperature and humidity	:	0 to 40°C, 85% (RH) or less, no condensation
Sample water conditions	:	Temperature·····2 to 40°C Pressure ·····0.01 to 0.05 MPa {0.1 to 0.5 kg/cm^2} Flow ·····1 to 3L/min pH·····pH5 to 9 SS ·····50 mg/L or less
Wash water	:	Pressure ·····0.1 to 0.5 MPa Consumption·····Approx. 5L/time Temperature ·····2 to 40°C Properties ·····Like city water, turbidity less than 2FTU (formazin turbidity unit), color less than 2 degree
Measurement cell outlet	:	Measurement drainage, washing water, etc. discharged
Tank recovery	:	High concentration calibration solution

Reagent : Alkali solution

Standard flow···Approx. 0.07 mL/min

Tank capacity···10L (0.07 mL/min continuous measurement consumption approx. 4L/month)

Communication function : RS485 1 point (max. cable length: 1.2 km)

Protocol: Modbus/RTU

Address: (n=1 to 255)

Input signal : Contact input: 6 points

No-voltage contact input

On resistance within 50 Ω, max. short circuit current 10 mA

Open voltage 12 VDC

① Measurement start, ② Measurement stop, ③ Calibration start,
④ Wash start, ⑤ Continuous/intermittent switching,
⑥ Waste solution level switch

* ①to④ Enabled by pulse closed contact input of longer than 0.1 sec

⑤: Intermittent measurement when “Closed” and continuous measurement when “Open”
⑥: Option. Waste solution tank use only. Closed contact input when tank full.

Output signal : 1. Transmission output, 2 points

CH1: Concentration

CH2: Electrode potential (-250 to 250 mV)

4 to 20 mADC isolated type

Load resistance Less than 600Ω

2. Contact output: 10 points (NO contacts 9, NC contact 1)

Capacity: 30 VDC, 0.1 A resistance load

① Power off (NC contact), ②Failure 1 (serious)*1
③ Failure 2 (minor)*2,
④ Concentration higher limit alarm,
⑤ Concentration high limit alarm,
⑥ Concentration low limit alarm, ⑦ Calibration in progress,
⑧ Wash in progress, ⑨ Under maintenance,
⑩ Measurement in progress

(*1) Failure1 (serious) contents
Cell temperature error, temperature controller temperature error, ion electrode error, communication error, EEPROM error, A/D error, temperature control error, leak detection (option)

(*2) Failure 2 (minor) contents
Calibration error, sample water off (selective), LO calibration solution off, HI calibration solution off, reagent off, washing solution off, waste solution tank full (option correspondence)

Power supply : 100 VAC ± 10%, 50/60 Hz (Available for overseas voltage by the

specifications at the time of purchase.)

Power consumption	:	Max. approx. 240VA, average Approx. 120 VA (at 25°C room temperature)
Piping connection ports	:	Sample water inlet ····· Rc1/2
		Pre-treatment tank outlet ····· Rc1
		Wash water inlet ····· Rc1/2
		Waste solution outlet ····· Rc1/2 (Option)
		Measurement cell outlet ····· Rc1/2
		Pan outlet ····· Rp1/2
Wiring connection ports	:	Outside dia. ϕ7 to 12 mm cable gland × 6 places (G1/2 when cable gland removed)
Display	:	Touch panel
		With 7 inch LCD touch panel, Japanese or English digital display
Recording	:	Equipment memory···1 month worth of sampling each minute
		USB memory···1 year worth
		Recorder (1 pen) 100 mm wide chart, length 16m (option)
Calibration	:	2-point or 3-point calibration by ammonium ion calibration solution
		Periodic and automatic setting calibration based on ACAS (Automatic Calibration Interval Adapting System), calibration by external start and manual calibration (3rd point is manual calibration only)
Construction	:	Indoors self-standing cabinet
Weight	:	Approx. 100 kg (excluding reagent)
Color of finish	:	Controller: Black metallic
		Analyzer: Munsell 5PB 8/1 or equivalent

8.2 Operational Explanation

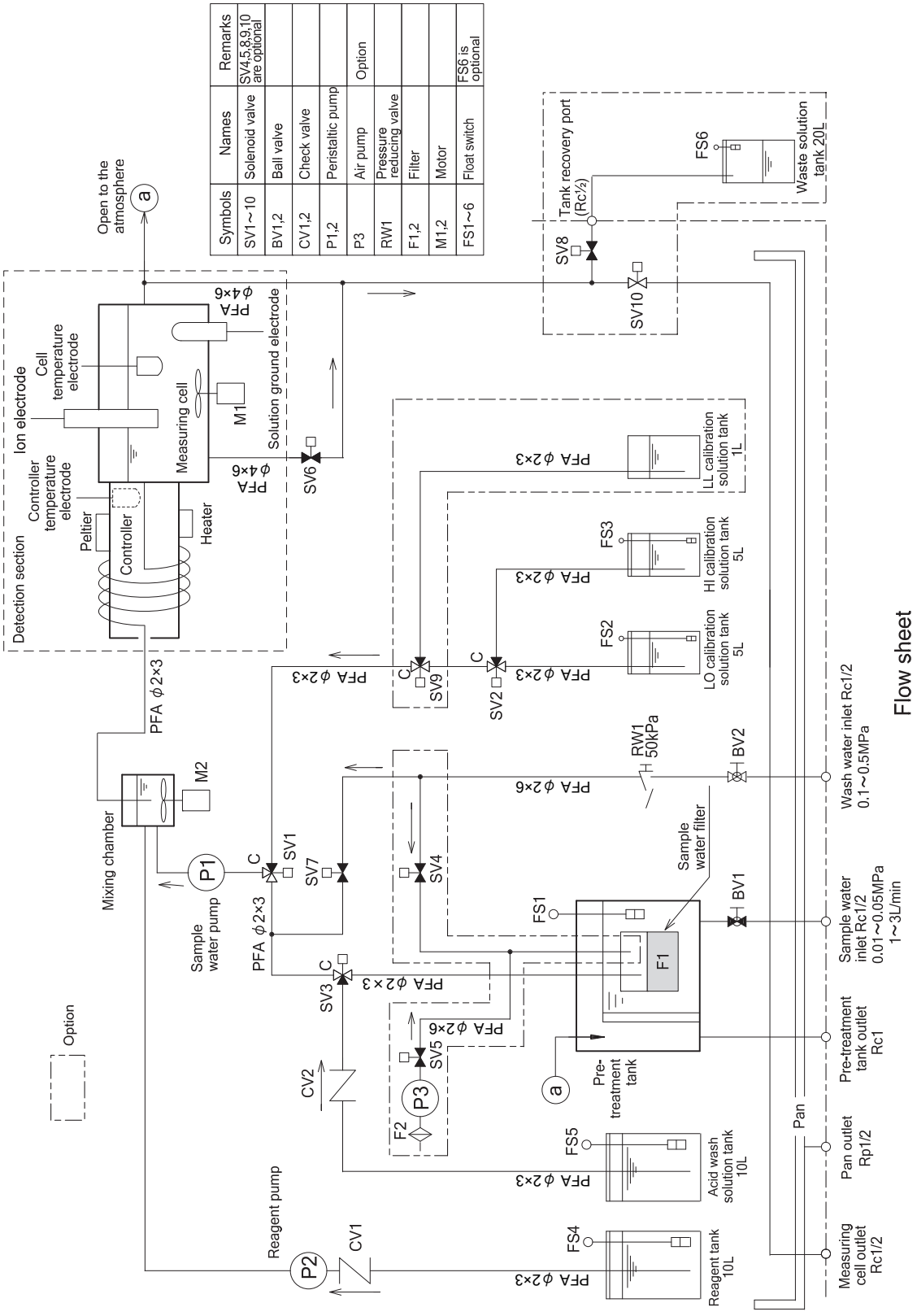
(1) Measuring principle

This equipment changes ammonium ions to ammonia gas by changing the pH to 12 or more by adding an alkaline solution to the sample. It uses the ion electrode method which uses an ammonium ion electrode as the indicator electrode and measures the change of the electrode potential (electromotive force) caused by ammonia passed through a membrane.

The ammonium ion concentration logarithm and electrode potential have a linear relationship. This linear relationship is generally called a calibration curve.

The calibration curve is found by means of 2 kinds of calibration solution (LO, HI) and the ammonium ion concentration is quantified. In addition, the sample water is kept at a constant temperature of 25°C to reduce the effect of temperature.

(2) Flow sheet


Symbols | Names | Remarks
SV1~10 | Solenoid valve | SV4,5,8,9,10 are optional
BV1,2 | Ball valve
CV1,2 | Check valve
P1,2 | Peristaltic pump
P3 | Air pump | Option
RW1 | Pressure reducing valve
F1,2 | Filter
M1,2 | Motor
FS1~6 | Float switch | FS6 is optional
Flow sheet
Open to the atmosphere
Detection section
Ion electrode
Cell temperature electrode
Controller temperature electrode
Peltier
Controller
Heater
Measuring cell
M1
Solution ground electrode
PFA φ4×6
SV6
Tank recovery port (Rc1/2)
SV8
SV10
FS6
Waste solution tank 20L
LL calibration solution tank 1L
HI calibration solution tank 5L
LO calibration solution tank 5L
FS3
FS2
SV9
SV2
PFA φ2×3
RW1 50kPa
BV2
Wash water inlet Rc1/2 0.1~0.5MPa
Mixing chamber
M2
PFA φ2×3
P1
Sample water pump
SV1
SV7
SV4
Sample water filter
BV1
FS1
F1
Sample water inlet Rc1/2 0.01~0.05MPa 1~3L/min
SV3
SV5
PFA φ2×6
Pre-treatment tank
Pre-treatment tank outlet Rc1
Option
CV2
P3
F2
FS5
Acid wash solution tank 10L
Pan
Pan outlet Rp1/2
Reagent pump
P2
CV1
FS4
Reagent tank 10L
Measuring cell outlet Rc1/2

(3) Time chart

(a) Operation flow at continuous measurement

Operation flow at continuous measurement

Operation(input signal)		Power ON	←Measurement start *1			←Calibration start (internal timer)				←Wash start (internal timer)				← Measurement stop
Screen name		Operation stop	Automatic operation			Automatic calibration		Automatic operation		Automatic wash	Automatic operation			Operation stop
Status		Wait	Preparation	Measurement		LO calibration	HI calibration	Preparation	Measurement	Wash	Preparation	Measurement		Wait
Processing time(Sec)		———		———								———		
Remarks														
Preparation														
Measurement														
LO calibration														
HI calibration														
Wash														
Pre-treatment tank level switch	FS1		ON at start, no MEAS. ON during MEAS, wait and MEAS after reset.					ON at start, no MEAS. ON during MEAS, wait and MEAS after reset.		ON at start, no WASH, ON during WASH and WASH continues.				
LO CAL solution level switch	FS2					ON at start, no CAL, ON during CAL and CAL continues.				ON at start, no WASH, ON during WASH and WASH continues.				
HI CAL solution level switch	FS3					ON at start, no CAL, ON during CAL and CAL continues.								
Reagent level switch	FS4		At start, MEAS as is even if turned ON during MEAS.			At start, CAL as is even if turned ON during CAL.		At start, MEAS as is even if turned ON during MEAS.		At start, ON during WASH and WASH continues.				
Cleaning liquid level switch	FS5													
Waste solution tank level switch	FS6					ON at start, no CAL, ON during CAL and CAL stops.				ON at start, no WASH, ON during WASH and WASH continues.				
Measured value output		Transmission mode	Transmission mode	Measured value		Transmission mode		Transmission mode	Measured value	Transmission mode	Transmission mode	Measured value		Transmission mode
Status contact output			Measurement	Measurement		Calibration			Measurement	Wash	Measurement	Measurement		

*1 Execute measurement preparation sequence at automatic operation start.
Execute measurement preparation sequence after automatic calibration/automatic wash of automatic operation.
Execute the same measurement preparation sequence when recover from power off (measurement, calibration and wash) during automatic operation.
Contact output remains in the measurement wait state when sample water off. Execute measurement preparation sequence when recover from from sample water off.
Precede calibration and execute it, then perform wash at next wash time when calibration interval overlaps with wash interval.
Output alarm when reagent off and continue measurement.

(b) Operation flow at intermittent measurement

Operation flow at intermittent measurement

Operation(input signal)		Power ON	←Measurement start *2				←Calibration start (internal timer)			←Measurement start (internal timer)			←Wash start (internal timer)		←Measurement start (internal timer)			←Measurement stop
Screen name		Operation stop	Automatic operation				Automatic calibration		Automatic operation	Automatic operation			Automatic wash	Automatic operation	Automatic operation			Operation stop
Status		Wait	Preparation	Measure-ment	Wait		LO calibration	HI calibration	Wait	Preparation	Measure-ment	Wait	Wash	Wait	Preparation	Measure-ment	Wait	Wait
Process																		
Processing time(Sec)				———							———					———		———
Remarks			Repeat by internal timer							Repeat by internal timer					Repeat by internal timer			
Preparation																		
Measurement																		
LO calibration																		
HI calibration																		
Wash																		
Pre-treatment tank level switch(FS1)	FS1		ON at start, no MEAS. ON during MEAS. wait and MEAS at NEXT MEAS TIME after reset.						ON at start, no MEAS. ON during MEAS. wait and MEAS at NEXT MEAS TIME after reset.				ON at start, no WASH, ON during WASH and WASH continues.		ON at start, no MEAS. ON during MEAS. wait and MEAS at NEXT MEAS TIME after reset.			
LO CAL solution level switch(FS2)	FS2						ON at start, no CAL, ON during CAL and CAL continues.						ON at start, no WASH, ON during WASH and WASH continues.					
HI CAL solution level switch(FS3)	FS3						ON at start, no CAL, ON during CAL and CAL continues.											
Reagent level switch(FS4)	FS4		At start, MEAS as is even if turned ON during MEAS.				At start, CAL as is even if turned ON during CAL.			At start, MEAS as is even if turned ON during MEAS.			At start, WASH as is even if turned ON during WASH.		At start, MEAS as is even if turned ON during MEAS.			
Cleaning liquid level switch(FS5)	FS5																	
Waste solution tank level switch(FS6)	FS6						ON at start, no CAL, ON during CAL and CAL stops.						ON at start, no WASH, ON during WASH and WASH continues.					
Measured value output		Transmission mode	Transmission mode	Measured value	Transmission mode		Transmission mode		Transmission mode	Transmission mode	Measured value	Transmission mode	Transmission mode	Transmission mode	Transmission mode	Measured value	Transmission mode	Transmission mode
Status contact output		None	Measure-ment	Measure-ment	Measure-ment		Calibration		Measure-ment	Measure-ment	Measure-ment	Measure-ment	Wash	Measure-ment	Measure-ment	Measure-ment	Measure-ment	None

*2 Execute measurement preparation sequence at intermittent measurement.
Execute measurement preparation sequence when recover from power off (measurement, calibration and wash) during operation.
Display automatic operation during intermittent measurement wait.
Contact output remains in the measurement wait state when sample water off. Execute measurement preparation sequence when recover from from sample water off.
In order of precedence: Calibration, wash, measurement when overlap.

(c) Time chart for measurement

Time chart for measurement

Operation(input signal)		Automatic operation												[Measure-ment]
Status		[Preparation]												
Process		01 SAMPLE SEND	02 CELL DRAIN	03 CELL DRAIN	04SAMPLE SEND (x2)	05SAMPLE SEND (x2)	Process No. 2 to 5	06 CELL DRAIN	07 CELL DRAIN	08SAMPLE SEND (x2)	09SAMPLE SEND (x2)	10 AGITATE	11 SAMPLE SEND	Measurement
Processing time(Sec)		2	(2)	(25)	(30)	(60)	351	2	25	30	60	2	300	
SV (sample/calibration solution)	SV1													
SV (L and H calibration solution)	SV2													
SV (sample/cleaning liquid)	SV3													
SV for introducing wash water to filter	SV4													
SV for introducing pump air to filter	SV5													
SV for flow cell drain solution	SV6													
SV for introducing wash water to sample line	SV7													
SV for waste solution tank recovery (NC)	SV8	*1												
SV for introducing LL calibration solution	SV9													
SV for waste solution tank recovery (NO)	SV10	*1												
Sample send pump	P1		P×2	P×2	P×2	P×2		P×2	P×2	P×2	P×2			
Reagent send pump	P2		P×2	P×2	P×2	P×2		P×2	P×2	P×2	P×2			
Air pump for wash	P3													
Stir inside measuring cell	M1													
Stir inside mixing tank	M2													
Pre-treatment tank level switch	FS1	ON at start, no operation, ON during this process and operation stops. Turned OFF and restarted from the beginning as measurement in progress wait.												
LO CAL solution level switch	FS2													
HI CAL solution level switch	FS3													
Reagent level switch	FS4	At start, not stopped even if ON during the process. Alarm is output.												
Cleaning liquid level switch	FS5													
Waste solution tank level switch	FS6													
Transmission output														
				T1		T2	Repeat 3 times		T1		T2		Change according to stability wait time	

*1: If there is SV1 operation history, execute (ON) and delete the history before measurement preparation. If there is no history, do not execute (OFF).
NOTE : P×2 SEND pump (x2)

(d) Time chart for LO, HI calibration

Time chart for LO/HI calibration

Operation(input signal)		←Calibration start																			
Status		[Calibration][Automatic LO/HI]										[Calibration][Automatic LO/HI]									
Process		01 LO SEND	02 CELL DRAIN	03 CELL DRAIN	04 LO SEND (x2)	05 LO SEND (x2)	Process No. 2 to 5	06 LO SEND (x2)	07 LO SEND	08 LO CAL	01 HI SEND	02 CELL DRAIN	03 CELL DRAIN	04 HI SEND (x2)	05 HI SEND (x2)	Process No. 2 to 5	06 HI SEND (x2)	07 HI SEND	08 HI CAL
Processing time(Sec)		2	(2)	(25)	(30)	(60)	468	300	600	35	2	(2)	(25)	(30)	(60)	468	300	600	35
SV (sample/calibration solution)	SV1																		
SV (L and H calibration solution)	SV2																		
SV (sample/cleaning liquid)	SV3																		
SV for introducing wash water to filter	SV4																		
SV for introducing pump air to filter	SV5																		
SV for flow cell drain solution	SV6																		
SV (wash water to sample line)	SV7																		
SV for waste solution tank recovery (NC)	SV8																		
SV for introducing LL calibration solution	SV9																		
SV for waste solution tank recovery (NO)	SV10																		
Sample send pump	P1		P×2	P×2	P×2	P×2		P×2				P×2	P×2	P×2	P×2		P×2		
Reagent send pump	P2		P×2	P×2	P×2	P×2		P×2				P×2	P×2	P×2	P×2		P×2		
Air pump for wash	P3																		
Stir inside measuring cell	M1																		
Stir inside mixing tank	M2																		
Calibration operation										CAL									CAL
Pre-treatment tank level switch	FS1																		
LO CAL solution level switch	FS2	ON at start, no CAL, ON during CAL and CAL continues.																	
HI CAL solution level switch	FS3										ON at start, no CAL, ON during CAL and CAL continues.								
Reagent level switch	FS4	ON at start, no CAL, ON during CAL and CAL continues.									ON at start, no CAL, execute CAL while ON during CAL.								
Cleaning liquid level switch	FS5																		
Waste solution tank level switch	FS6	ON at start, no CAL, ON during CAL and CAL stops.									ON at start, no CAL, ON during CAL and CAL stops.								
				T1		T2	Repeat 4 times	T3	T*				T1		T2	Repeat 4 times	T3	T*	

NOTE : P×2 SEND pump (x2)

(e) Time chart for acid cleaning

Time chart for acid cleaning (1/2)

(To be continued)

Operation(input signal)		←Wash start														
Status		[Wash]														
Process		01 SAMPLE SEND	02 CELL DRAIN	03 CELL DRAIN	04 SAMPLE SEND (x2)	05 SAMPLE SEND (x2)	Process No. 2 to 5	06 CELL DRAIN	07 CELL DRAIN	08 WASH WATER SEND	09 WASH WATER SEND	10 WASH WATER SEND	11 ACID SEND	12ACID SEND (x2)	13 ACID CLEANING
Processing time(Sec)		2	(2)	(25)	(30)	(60)	234	2	10	2	40	2	2	300	180
SV (sample/calibration solution)	SV1														
SV (L and H calibration solution)	SV2														
SV (sample/cleaning liquid)	SV3														
SV for introducing wash water to filter	SV4														
SV for introducing pump air to filter	SV5														
SV for flow cell drain solution	SV6														
SV (wash water to sample line)	SV7														
SV for waste solution tank recovery (NC)	SV8														
SV for introducing LL calibration solution	SV9														
SV for waste solution tank recovery (NO)	SV10														
Sample send pump	P1		P×2	P×2	P×2	P×2								P×2	
Reagent send pump	P2														
Air pump for wash	P3														
Stir inside measuring cell	M1														
Stir inside mixing tank	M2														
Pre-treatment tank level switch	FS1	ON at start, no WASH, ON during WASH and WASH continues.													
LOCAL solution level switch	FS2	ON at start, no WASH, ON during WASH and WASH continues.													
HICAL solution level switch	FS3														
Reagent level switch	FS4	ON at start, ON during WASH and WASH continues.													
Cleaning liquid level switch	FS5	ON at start, no WASH, ON during WASH and WASH continues.													
Waste solution tank level switch	FS6	ON at start, no WASH, ON during WASH and WASH continues.													
				T1		T2	Repeat twice				T4			T5	T7

(Continued from previous page)

Time chart for acid cleaning (2/2)

Operation(input signal)															
Status		[Wash]													
Process		14 CELL DRAIN	15 CELL DRAIN	16 CELL DRAIN	17 SAMPLE SEND (x2)	18 SAMPLE SEND (x2)	Process No. 15 to 18	19 CELL DRAIN	20 CELL DRAIN	21 LO SEND	22 CELL DRAIN	23 CELL DRAIN	24 LO SEND (x2)	25 LO SEND (x2)	Process No. 22 to 25
Processing time(Sec)		2	(2)	(25)	(30)	(60)	351	2	10	2	(2)	(25)	(30)	(60)	234
SV (sample/calibration solution)	SV1														
SV (L and H calibration solution)	SV2														
SV (sample/cleaning liquid)	SV3														
SV for introducing wash water to filter	SV4														
SV for introducing pump air to filter	SV5														
SV for flow cell drain solution	SV6														
SV (wash water to sample line)	SV7														
SV for waste solution tank recovery (NC)	SV8														
SV for introducing LL calibration solution	SV9														
SV for waste solution tank recovery (NO)	SV10														
Sample send pump	P1		P×2	P×2	P×2	P×2					P×2	P×2	P×2	P×2	
Reagent send pump	P2										P×2	P×2	P×2	P×2	
Air pump for wash	P3														
Stir inside measuring cell	M1														
Stir inside mixing tank	M2														
Pre-treatment tank level switch	FS1														
LO CAL solution level switch	FS2														
HI CAL solution level switch	FS3														
Reagent level switch	FS4														
Cleaning liquid level switch	FS5														
Waste solution tank level switch	FS6														
				T1		T2	Repeat a times					T1		T2	Repeat b times
a,b : Standard specification is set to once															

(f) Time chart for individual operation

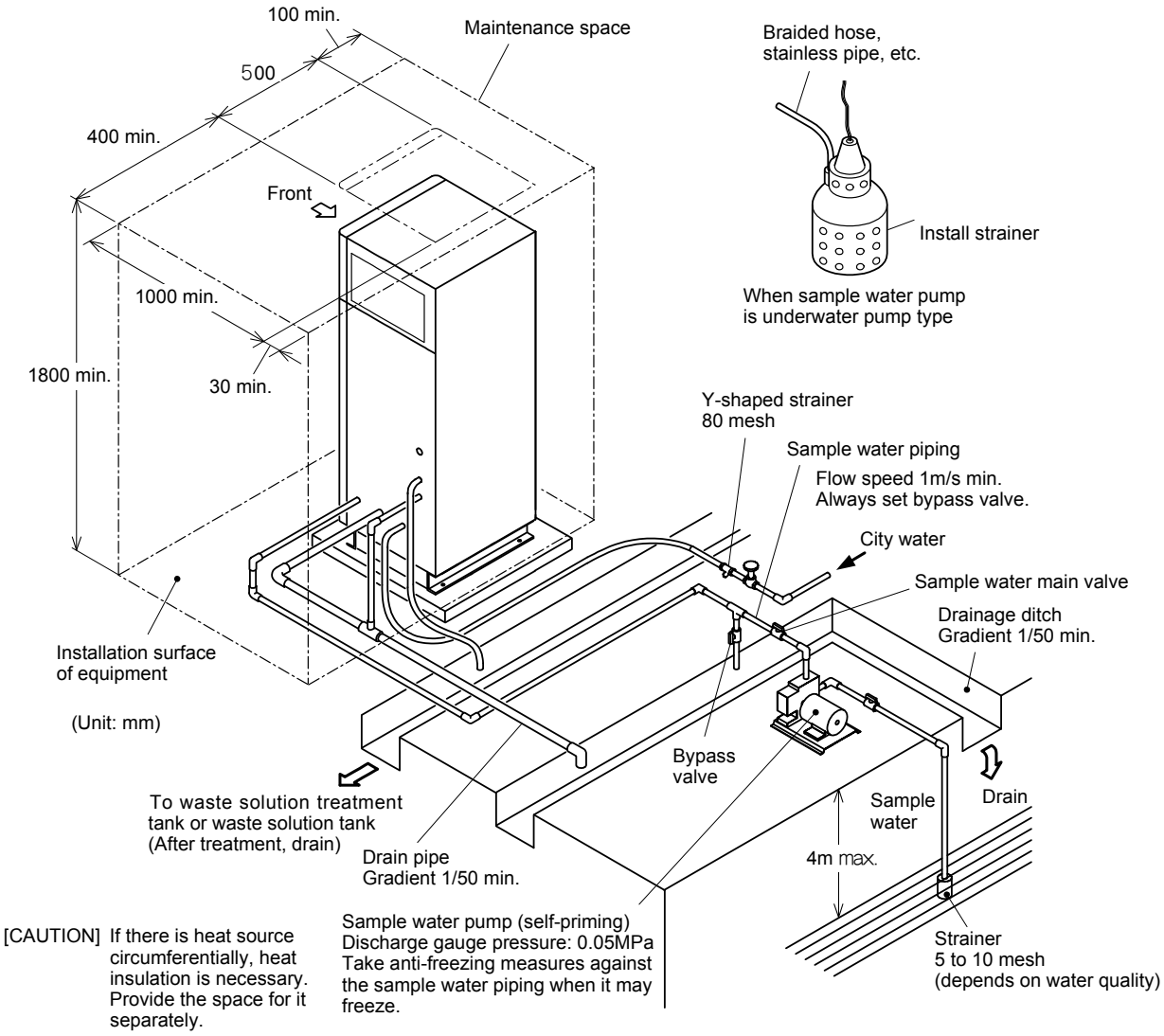
Time chart for individual operation

Operation(input signal)		←LL SEND start	←LO SEND start	←HI SEND start	←ACID SEND start	←REAGENT SEND start	←SAMPLE SEND start	←CELL DRAIN start
Status		[LL CAL SEND] (option)	[LO CAL SEND]	[HI CAL SEND]	[ACID WASH SEND]	[REAGENT SEND]	[SAMPLE SEND]	[CELL DRAIN]
Process		LL CAL SEND (x2)	LO CAL SEND (x2)	HI CAL SEND (x2)	ACID WASH SEND (x2)	REAGENT SEND (x2)	SAMPLE SEND (x2)	CELL DRAIN
Processing time(Sec)		*1	*1	*1	*1	*1	*1	*1
SV (sample/calibration solution)	SV1							
SV (L and H calibration solution)	SV2							
SV (sample/cleaning liquid)	SV3							
SV for introducing wash water to filter	SV4							
SV for introducing pump air to filter	SV5							
SV for flow cell drain solution	SV6							
SV (wash water to sample line)	SV7							
SV for waste solution tank recovery (NC)	SV8							
SV for introducing LL calibration solution	SV9							
SV for waste solution tank recovery (NO)	SV10							
Sample send pump	P1	P×2	P×2	P×2	P×2		P×2	
Reagent send pump	P2					P×2		
Air pump for wash	P3							
Stir inside measuring cell	M1							
Stir inside mixing tank	M2							
Pre-treatment tank level switch	FS1							
LO CAL solution level switch	FS2							
HI CAL solution level switch	FS3							
Reagent level switch	FS4							
Cleaning liquid level switch	FS5							
Waste solution tank level switch	FS6	ON at start, no operation, ON during operation and stops.						

*1 : Continue this process until the operation to stop is performed. Executed until stopped without providing a limiter.
P×2 SEND pump (x2)
Operation continues while a level switch of FS1 to FS5 is ON.
One of group A (left row) and one of group B (right row) of "Individual Operation" screen can be executed simultaneously.

9. Installation

9.1 Installation Example



Installation Example

(a) The figure "Installation Example" is a standard example combining various peripheral devices. The system composition may be a little different depending on the installation site conditions.

【IMPORTANT】
- Always provide a strainer (80 mesh) like that shown in the figure in the city water piping. Also remove dirt, etc. by brushing the inside of the piping before connecting it to the equipment. Dirt inside the piping will clog the solenoid valves.
- Check with your local authorities about the city water connection.
- Be sure that the underwater pump is under water even at the lowest liquid level and separate it from the bottom so that sludge, pebbles, etc. are not sucked in.

(b) The product does not include the sampling pump, waste solution tank (or treatment tank), piping, and wiring. They should be provided by the customer.

(c) Drain with reagent (sodium hydroxide solution) added to the sample water, calibration solution drain during calibration, and cleaning liquid drain during acid washing flow from the measuring tank drain port. The figure “Installation Example” is an example of merging of the drains (sample water) from the pre-treatment tank, but there are also examples which introduce it from the pre-treatment tank drain port to a waste solution treatment tank, etc.

9.2 Installation Conditions

(1) Sample water sampling point conditions

Sample water sampling for water quality measurement is important in governing the reliability of the measured value. Select it according to the following conditions:

- Sample water sampling point is not a special point and is an average quality part typical of the water quality.
- Near the equipment installation site where manual analysis sample water can be easily taken.
- Water depth that allows insertion of the sample water sampling pipe even when the water level is low.
- Others, no causes (mixing of obstruction components, danger, etc.) which obstruct measurement.

(2) Installation site conditions

When selecting the installation site, take the following into account:

- Installation site is near the sample water sampling point, and the time lag can be made short by making the piping short.
- The ambient temperature and humidity are within the 8.1 “Specifications” range. In particular, the city water and reagent do not freeze.
- Can be protected against direct sunlight and wind and rain.
- Ample space is provided for wiring and maintenance work. ＞＞ 9.1 “Installation Example”
- Electric power and city water are available.
- Vibration and shock are sufficiently small.
- The product is not exposed to water and chemicals.
- Flat, strong floor.
- There is a drain facility.
- Power source voltage and frequency fluctuations are small.
- There is no electromagnetic induction equipment, equipment that generates sparks, or other noise generation sources nearby.
- Lightning countermeasures can be taken in necessary regions.

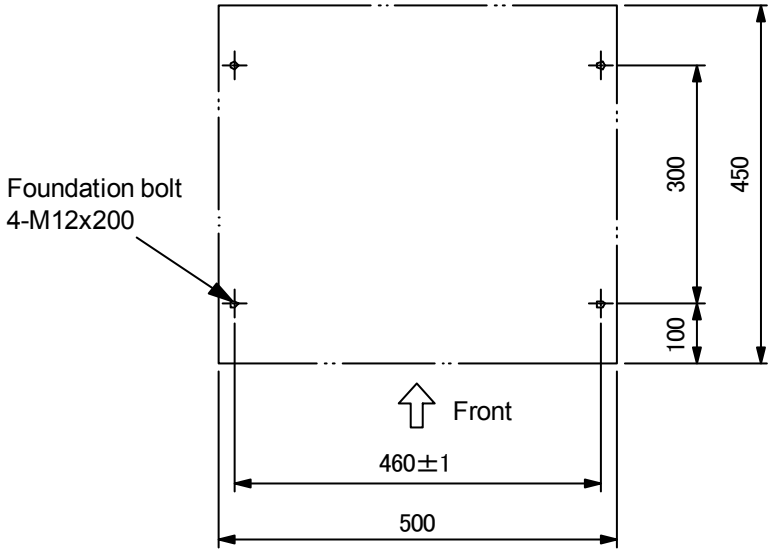
⚠ WARNING

Hazardous Gasses

- Do not use the product in an area where explosive gas, flammable gas exists. Using the product in any of these areas can cause explosion or fire.

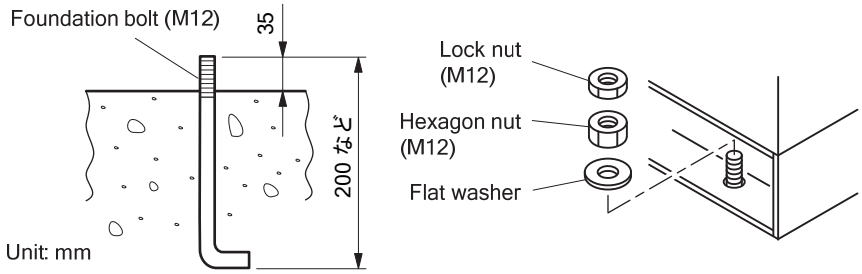
9.3 Installation

(a) Refer to the figure “Foundation Bolt Positions” and provide an installation foundation with 4 embedded foundation bolts (M12 x 200, etc.).

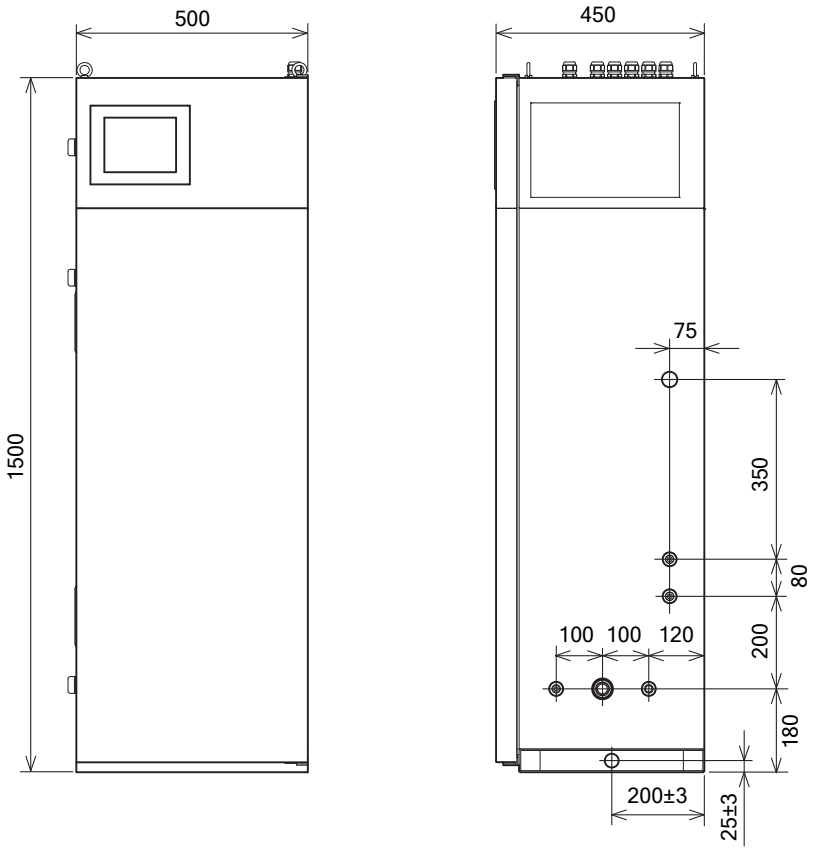


Foundation Bolt Positions

(b) Securely fix the equipment using flat washer, hexagon nut, and lock nut.



Fixing with Foundation Bolts

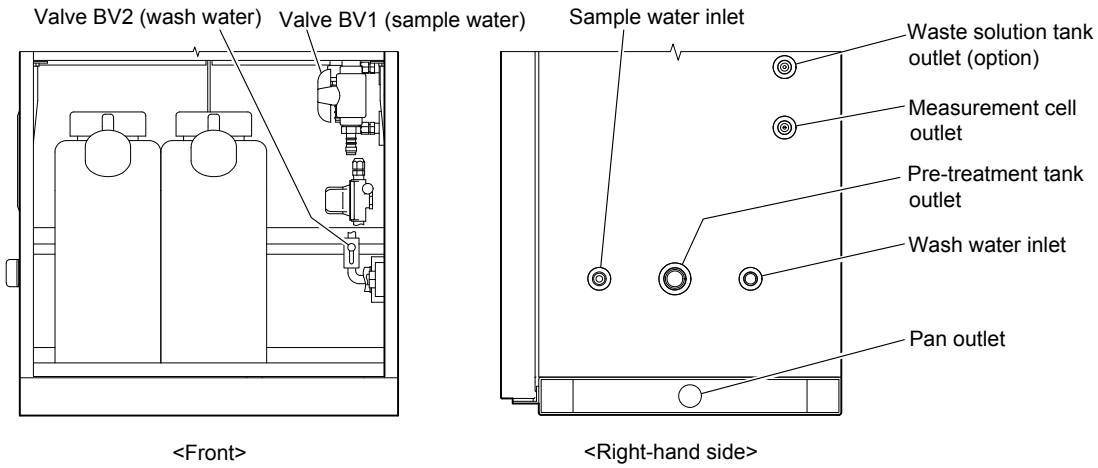


Outline Dimensions

9.4 Piping

(1) Piping port specifications

Check the specifications of each piping and perform piping.



Piping Port

⚠ WARNING

Hazardous Materials

- The drain from the measurement cell outlet contains the hazardous materials such as the reagent (sodium hydroxide solution) and acid washing solution (nitric acid solution). Always check the Material Safety Data Sheet (MSDS) and wear protective gear when handling it.

Piping Port Specifications

Names	Specifications	Essentials
Sample water inlet	Piping port: Rc1/2 (pipe use taper screw) Pipe material: VP13 or VP16 Pressure: 0.01 to 0.05 MPa Flow rate: 1 to 3 L/min Sample water temperature: 2 to 40°C	・Transparent pipe material allows monitoring of soiling inside the pipe, but sunlight promotes the grown of algae. Select the pipe material to match the quality of the sample water.
Pre-treatment tank outlet	Piping port: Rc1 Pipe material: VP25 or more Piping end pressure: Open to the atmosphere, piping not rising	・Since it is pre-treatment tank overflow (sample water), introduce it to a drainage ditch. ・Natural fall is a condition. Slope it, do not rise the pipe, and open the end of the pipe to the air.

(To be continued)

(Continued from previous page)

Names	Specifications	Essentials
Wash water inlet	Piping port: Rc1/2 Pipe material: VP13 or VP16 Pressure: 0.1 to 0.5 MPa Flow rate: 0.5 to 3 L/min Consumption: Approx. 5 L / 1 measurement	・Always provide a stop valve outside the equipment. It is necessary for maintenance work. ・Provide a Y-type strainer (approx. 80 mesh) in the piping. ・Remove dirt and chips inside the piping by flushing the piping for about 5 minutes before piping. ・When connecting the city water, check with your local authorities.
Tank outlet (option)	Piping port: Rc1/2	・When the outdoor waste solution recovery function is added, perform piping. ＞＞ 7.2(1) “Recovery function and connection by waste solution tank”
Measurement cell outlet	Piping port: Rc1/2 Pipe material: VP13 or VP16 Piping end pressure: Open to the atmosphere, piping not rising Drain amount: Approx. 10 mL/min	・The solution is discharged from the measuring cell after measurement and washing. It is a mixed solution of sample water, reagent (sodium hydroxide solution), acid washing solution (nitric acid solution) and calibration solution. Processing is necessary after recovery. ・When the waste solution recovery function is added, the calibration solution is discharged from tank recovery port and this discharged water does not contain it. ・Natural fall is a condition. Slope it, do not rise the pipe, and open the end of the pipe to the air.
Pan outlet	Piping port: Rp1/2 Piping end pressure: Open to the atmosphere, piping not rising	・This is the pan outlet (Rp1/2) at the bottom of the equipment. Pipe it after fixing the equipment. ・Usually it is not drained. When leaking, etc. are generated inside the equipment, it is drained. ・Natural fall is a condition. Slope it, do not rise the pipe, and open the end of the pipe to the air.

(2) Sampling pump installation essentials

(a) Select underwater pump or self-priming pump of a suitable capacity according to the water quality characteristics and amount of sample water necessary, the actual lift (the height where water can be lifted), horizontal pull length, etc.

(b) When using an underwater pump, take the following into account:

- Install the pump where it is submerged even when the water level is low.
- Separate the pump from the bottom so that sludge, pebbles, etc. are not sucked in.
- Use sufficiently protected power cable and hose.
- The underwater pump strainer is usually 5 to 10 mesh.

9.5 Wiring

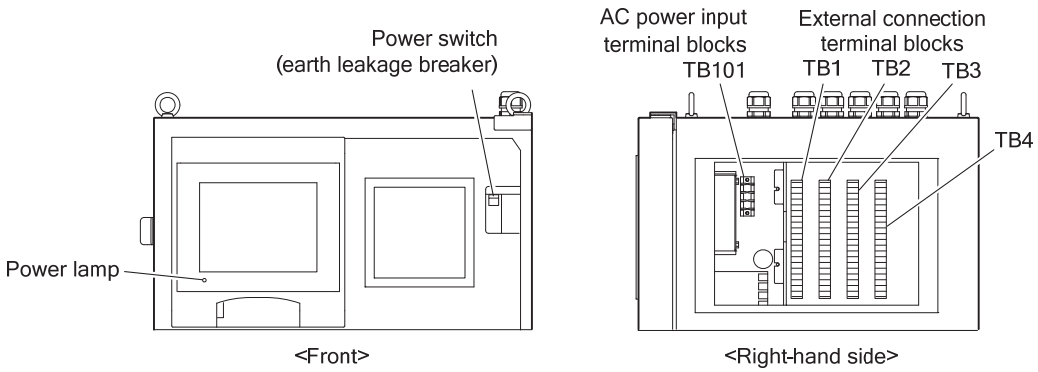
⚠ WARNING

Electric Shock

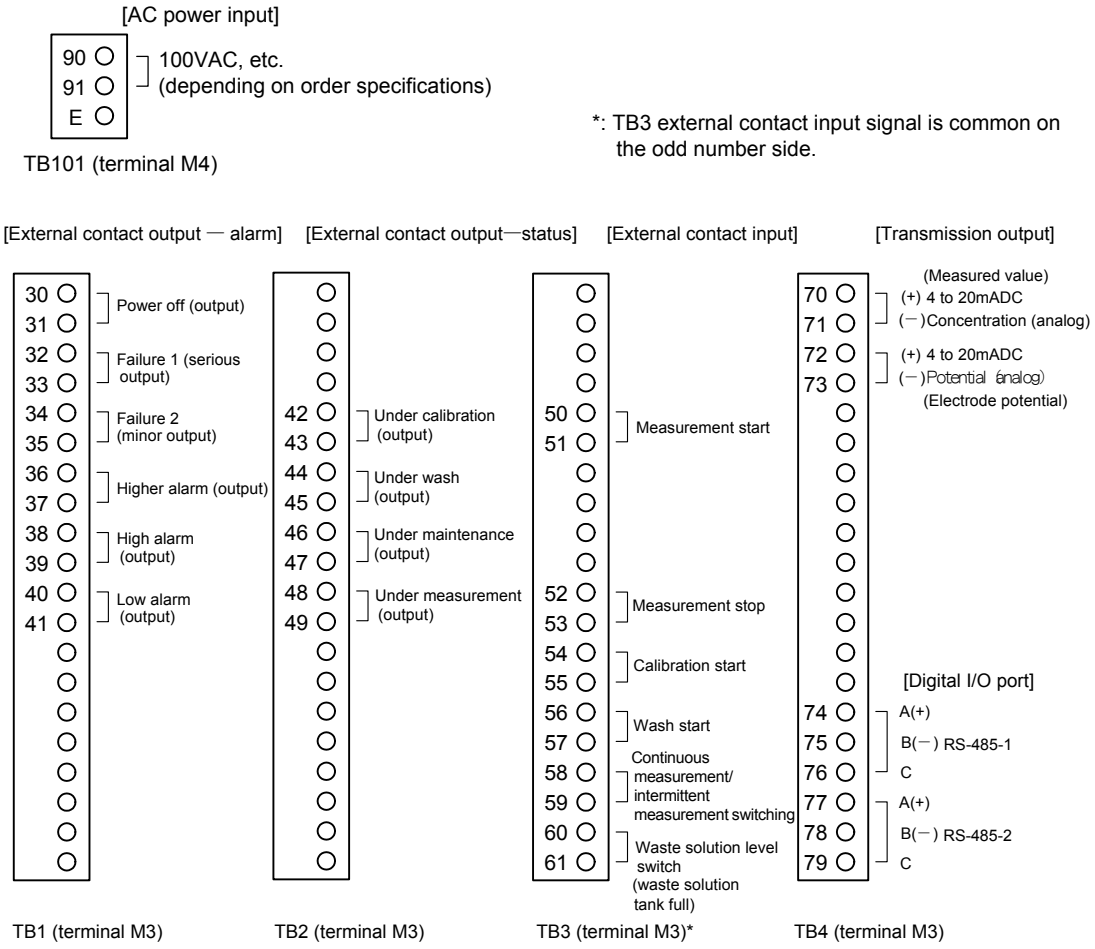
- Do not touch the terminals inside the equipment while power is applied. Touching the terminals may cause electric shock.

(1) External connection terminals

For the operation contents of each terminal, see 3.4 (1) “External input/output list”.



Position of External Connection Terminal Blocks



External Connection Terminals

(2) Junction box wiring (option)

Perform wiring by referring to the “Junction box outline drawing” and “Wiring example” at 7.4 (3) figures “Junction Box”.

【IMPORTANT】 • For safety, do not supply power when performing wiring work. Supply power in accordance with 3.1 “Test Run and Adjustment Procedure”.

(3) AC power input terminal wiring

(a) AC power input terminal specifications are as follows:

Power supply voltage: 100 VAC ± 10%, etc. (depending on order specifications)

Power supply frequency: 50/60 Hz

Power consumption: Max. Approx. 240 VA, average 120 VA (at 25°C room temperature)

Wire material: Cabtyre cable more than 1.25sq×3c

(b) Procure the power supply matched to the specifications entered on the equipment nameplate.

【IMPORTANT】 • For safety, do not supply power here. Supply power in accordance with 3.1 “Test Run and Adjustment Procedure”.

(c) Use a noise-free power supply with little voltage fluctuations. In addition, provide lightning countermeasures where the power is easily affected by lightning.

(d) Introduce the cable from the signal line and connect it to the AC power (90-91) input terminal.

(4) Ground wiring

(a) Ground wiring specifications are as follows:

Wire: Cabtyre cable more than 1.25 sq×2c

Ground: D class grounding work (ground resistance less than 100 Ω).

(b) Ground the ground terminal (E) to a ground separate from drive use ground.

(c) For safety, always ground the equipment.

⚠ WARNING

Electric Shock

● The ground terminal must be grounded. If the terminal is not grounded and a problem occurs in the power supply system, electric shock may result.

(5) Input/output wiring

(a) Input/output wiring specifications are as follows:

Wire: Cabtyre cable more than 0.75sq×2c, with shield

Measured value output: 4 to 20 mADC (load resistance less than 600 Ω) isolated. 4 to 20 mADC corresponding to the measurement range is output and is held until the next measured value is output.

【IMPORTANT】 • Separate the measured value output signal cable from the power line cable. If it is near the power cable, it will cause noise.

(b) The wiring specifications other than transmission output are as follows:

Wire: Cabtyre cable more than 0.75sq×2c

(c) Connect the input/output signal cables to the external connection terminals block. Refer to 9.5(1) “External connection terminals” for information on the external connection terminal block.

(d) Perform loop check during 3.1 “Test Run and Adjustment Procedure”. ＞＞ 3.4 “External Input/Output and Loop Check”.

10. Communication Functions

10.1 Overview of Communication Functions

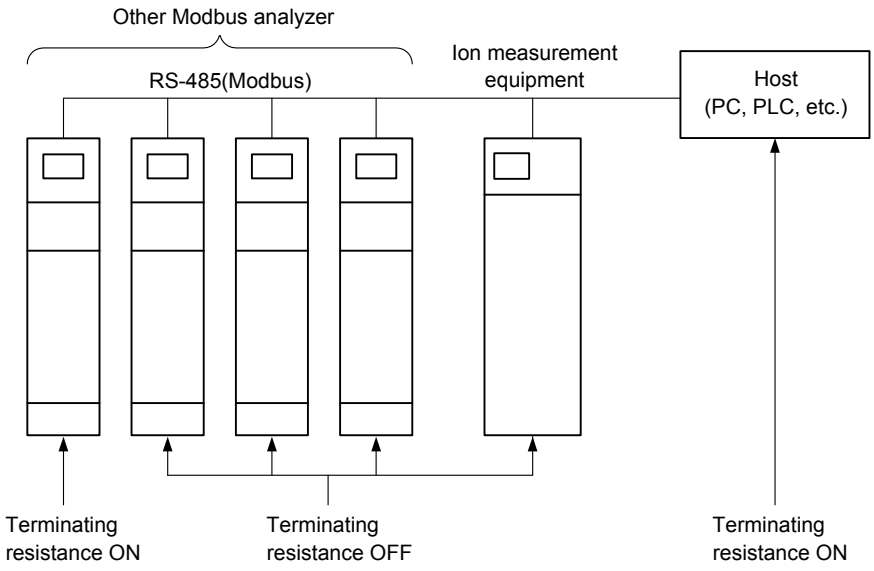
(1) Main functions

This equipment uses RS-485 as the communication rules and has the following functions:

- Multi-drop network architecture
- Connection to multiple instruments and Modbus (serial communication protocol) receiver, etc.
- Network extension (max. up to 1.2 km)
- Remote monitoring and remote maintenance system architecture

〔NOTE〕 • The specific remote monitoring items are as follows:
Measured value, alarm value, analyzer error, contact information, etc.
• The specific remote maintenance items are as follows:
Calibration command, wash command, alarm setting

- Connection to network incorporating other Modbus compatible instruments, controllers, etc.



Communication System Example

- The terminating resistance is turned on at the factory. To turn off the terminating resistance, remove the cover of the external connection terminals section and turn off the SW2 switch between TB4 and TB3 of the terminal board at below the protective cover.

【IMPORTANT】 • Terminate the two places, the most distant transmitter and host side. Do not terminate intermediate instruments.

(2) Communication specifications and others

(a) Communication specifications

Physical layer : RS-485 (isolation type)

Protocol : Modbus/RTU

Communication speed : 9600 bps (or depending on order specifications) It can be changed at test run adjustment by our technical staff.

Data length : 8 bits

Parity : Selected from among NONE, ODD, EVEN

Stop bit : 1 bit

Data order : BIG ENDIAN

Broadcast : None

(b) Address definition

With this transmitter, 1 to 255 addresses can be set.

【IMPORTANT】 • Connection of up to a maximum of 255 units is possible, but communications takes some time.

(c) Command function code

The following command function codes are provided:

Command Function Code

Code	Function	Remarks
3(0x03)	Set value, etc. read	Reads measured values, etc.
6(0x06)	Set value write	Writes only 1 word
8(0x08)	Self-check	Only echo back function provided
16(0x10)	Set value write	Collects and writes data of more than 1 word

( ): Hexadecimal

(d) Command variables

(i) Variables are represented as follows:

- 8bit values ····· BYTE
- 16bit values ····· WORD
- 32bit values ····· FLOAT

(ii) Write and read commands only use WORD units. For FLOAT data, write or read by connecting 2 words.

10.2 Command Function Details

(1) Set value read

[Function code: 3(0x03)]

(a) Function

- Device information read
- Various set data read
- Measurement data read

(b) Data format

(i) Inquiry (host → instrument)

① Opposite exchange number address	1Byte
② Function code	1Byte···0x03
③ Read start address	2Bytes···0x0000 – 0xffff
④ Read data count (N)	2Bytes···0x01 – 0x7d(1-125)
⑤ CRC check code	2Bytes···0x0000 – 0xffff

(ii) Response (instrument → host)

① Local exchange number address	1Byte
② Function code	1Byte···0x03
③ Read byte count (N bytes)	1Byte···X=N×2
④ Read data (N)	2Bytes···N contiguous bytes
⑤ CRC check code	2Bytes···0x0000 – 0xffff

(iii) Communication example (when current time was read: 6 words)

- Inquiry

01	03	1F A4	00 06	** **
①	②	③	④	⑤

- Response

01	03	0C	07 DA	00 05	00 1B	00 09	00 30	00 3B	** **
①	②	③	④						⑤

6 words

** **: Depends on the data contents

(2) Set value write

[Function code: 6(0x06)]

(a) Function

- Write various set data in 1 WORD units.
- Execute various controls (on/off control, etc.)

(b)Data format

(i) Inquiry (host → instrument)

① Opposite exchange number address	1Byte
② Function code	1Byte···0x06
③ Write address	2Bytes···0x0000 – 0xffff
④ Write data	2Bytes···0x0000 – 0xffff
⑤ CRC check code	2Bytes···0x0000 – 0xffff

(ii) Response (instrument → host)

① Local exchange number address	1Byte
② Function code	1Byte···0x06
③ Write complete address	2Byte···0x0000 – 0xffff
④ Write complete date	2Bytes···0x0000 – 0xffff
⑤ CRC check code	2Bytes···0x0000 – 0xffff

(iii) Communication example (starts calibrations)

- Inquiry

01	06	1F 74	00 01	** **
①	②	③	④	⑤

- Response

01	06	1F 74	00 01	** **
①	②	③	④	⑤

(3) Self-check

[Function code: 8(0x08)]

(a)Function

- Returns the received frame as is.
- Used in communication opening check, etc. (Function code: 0x0000)

(b)Data format

(i) Inquiry (host → instrument)

① Opposite exchange number address	1Byte
② Function code	1Byte···0x08
③ Sub function code	2Bytes···0x0000
④ Check data	2Bytes···0x0000
⑤ CRC check code	2Bytes···0x0000 – 0xffff

(ii) Response (instrument → host)

① Local exchange number address 1Byte
② Function code 1Byte···0x08
③ Sub function code 2Byte···0x0000
④ Check data 2Bytes···0x0000
⑤ CRC check code 2Bytes···0x0000 – 0xffff

(iii) Communication example (checks the communication opening)

- Inquiry

01	08	00 00	00 00	** **
①	②	③	④	⑤

- Response

01	08	00 00	00 00	** **
①	②	③	④	⑤

(4) Contiguous data write

Collects more than 1 word and up to 120 words

[Function code: 16(0x10)]

(a) Function

- Write contiguous multiple word data

(b) Data format

(i) Inquiry (host → instrument)

① Opposite exchange number address 1Byte
② Function code 1Byte···0x10
③ Write start address 2Bytes···0x0000 – 0xffff
④ Write word count (N) 2Bytes···0x0001 – 0x0078
⑤ Total byte count 1Bytes···2×N
⑥ Write data 2Bytes···0x0000 – 0xffff
⑦ CRC check code 2Bytes···0x0000 – 0xffff

(ii) Response (instrument → host)

① Local exchange number address 1Byte
② Function code 1Byte···0x10
③ Write start address 2Byte···0x0000-0xffff
④ Write word count 2Bytes···0x0000 – 0x0078
⑤ CRC check code 2Bytes···0x0000-0xffff

(iii) Communication example (when date and time were written)

- Inquiry

01	10	1F A4	00 06	0C	07 DB	00 06	00 14	00 0D	00 00	00 00	** **
①	②	③	④	⑤	⑥						⑦

6 words

- Response

01	08	00 00	00 00	** **
①	②	③	④	⑤

(5) Exception function response

[Exception function valve]

(a) Function

- Response when an exception function valve was received.

(b) Data format

(i) Response (instrument → host)

① Local exchange number address	1Byte
② Function code	1Byte···Exception function valve + 0x80
③ Sub code	1Bytes···0x01 – 02
④ CRC check code	2bytes···0x0000 – 0xffff

(ii) Communication example (when function code was incorrect at "(d) Write set value": 0x11)

- Inquiry

01	11	1F A4	00 06	0C	07 DB	00 06	00 14	00 0D	00 00	00 00	** **
①	②	③	④	⑤	⑥						⑦

6 words

- Response

01	91	01	** **
①	②	③	④

Other Examples

Example	Contents	Cause
1	Illegal function command received.	Command other than 0x03, 0x06, 0x08, 0x10 was used.
2	Illegal address received.	Illegal address, function code, data count, diagnostic code was used.

10.3 Registers

(1) Registered that can be referenced

(a) Collect information by access based on the following address table.

(b) Use the address set at the instrument side as the global address. FLOAT is a 4 bytes floating decimal point valve and WORD is 2 bytes.

Table1 Addresses

No.	Address (hexadecimal)	Address (decimal)	Variable type	Contents
1	1F48H	8005	FLOAT	Outputs the measured concentration (mg/L).
2	1F47H	8007	FLOAT	Outputs the electrode potential (mV).
3	1F49H	8009	FLOAT	Outputs the electrode sensitivity (%).
4	1F4BH	8011	FLOAT	Outputs the cell temperature (°C).
5	1F40H	8000	WORD	Outputs the wash, calibration, and other operation states by bit. (For details, see the table 3.)
6	1F68H	8040	WORD	Outputs the number corresponding to detector measurement item. (For details, see the table 4.)
7	1F44H	8004	WORD	Outputs the detector higher alarm, high/low alarm generation state, etc. by bit. (For details, see the table 5.)
8	1F41H 1F42H 1F43H	8001 8002 8003	WORD	Outputs the failure contents by bit. (For details, see the table 5.)

〔NOTE〕 The contents of vacant address numbers are already reserved.

(2) Registers that can be referenced and executed

(a) Remote maintenance is possible by accessing based on the following address table.

(b) Use the address set at the instrument as the global address.

(c) Referencing is possible in any state, but set value can be changed only when measurement is stopped.

(d) For the operation sequence of No. 1 to 5, “Communication start” is necessary as the starting method. They are not performed at “Internal start” and “External start”.

Table 2 Addresses

No.	Address (hexadecimal)	Address (decimal)	Variable type	Contents
1	1F72h	8050	WORD	Measurement start (0: Nothing, 1: Start measurement)
2	1F73Hh	8051	WORD	Wash start (0: Nothing, 1: Start wash)
3	1F74h	8052	WORD	Calibration start (0: Nothing, 1: Start calibration)
4	1F75h	8053	WORD	Measurement stop (0: Nothing, 1: Stop measurement)
5	1F7Ch	8060	WORD	Continuous measurement/intermittent measurement switching (0: Continuous, 1: Intermittent) *
6	1F7Dh	8061	FLOAT	Higher alarm Settings below the range minimum value and range maximum value are ignored.
7	1F7Fh	8063	FLOAT	High alarm Settings below the range minimum value and range maximum value are ignored.
8	1F81h	8065	FLOAT	Low alarm Settings below the range minimum value and range maximum value are ignored.
9	1FA4h	8100	WORD	Current year read and set Year: 2008 to 2099
10	1FA5h	8101	WORD	Current month read and set Month: 1 to 12
11	1FA6h	8102	WORD	Current day read and set Day: 1 to 31
12	1FA7h	8103	WORD	Current time and hour read and set Time: 0 to 23
13	1FA8h	8104	WORD	Current time and minute read and set Minute: 0 to 59
14	1FA9h	8105	WORD	Current time and second read and set When setting, second is fixed to 0.

〔NOTE〕 *: Intermittent or continuous switching requires that DIITEMC be set to NONE at INTERMITTENCE (intermittent measurement mode) + REMOTE_I (remote operation).

Table 3 Operation Status
(bit definition, 1 when ON)

BIT#	Address (decimal) 8000 Address (hexadecimal) 1F40h
15	Maintenance
14	
13	
12	
11	
10	Under manual wash
9	Under manual calibration
8	Under manual measurement
7	
6	
5	
4	Under automatic measurement wash
3	Under automatic measurement calibration
2	Under automatic measurement wait
1	Under automatic measurement preparation
0	Under automatic measurement

Table 4 Measurement Items

Measurement item	Address (decimal) 8040 Address (hexadecimal) 1F68h
Fluoride	0
Ammonium	1
Cyanide	2

Table 5 Alarms (Bit definition, 1 when ON)

	Failure 1 (Serious 1) (bit definition, 1 when ON)	Failure 1 (Serious 2) (bit definition, 1 when ON)	Failure 2 (Minor 1) (bit definition, 1 when ON)	Alarm (higher, high, low) (bit definition, 1 when ON)
BIT#	Address (decimal) 8001 Address (hexadecimal) 1F41h	Address (decimal) 8002 Address (hexadecimal) 1F42h	Address (decimal) 8003 Address (hexadecimal) 1F43h	Address (decimal) 8004 Address (hexadecimal) 1F44h
15	–	–	–	–
14	–	–	–	–
13	–	–	–	–
12	–	–	Manual analysis calibration error (AL2_CALIB_FP)	–
11	–	–	LL solution calibration error (AL2_CALIB_3P)	–
10	–	–	HI solution calibration error (AL2_CALIB_2P)	–

(To be continued)

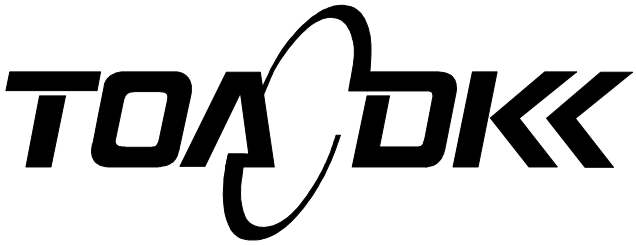
(Continued from previous page)

	Failure 1 (Serious 1) (bit definition, 1 when ON)	Failure 1 (Serious 2) (bit definition, 1 when ON)	Failure 2 (Minor 1) (bit definition, 1 when ON)	Alarm (higher, high, low) (bit definition, 1 when ON)
BIT#	Address (decimal) 8001 Address (hexadecimal) 1F41h	Address (decimal) 8002 Address (hexadecimal) 1F42h	Address (decimal) 8003 Address (hexadecimal) 1F43h	Address (decimal) 8004 Address (hexadecimal) 1F44h
9	–	–	LO solution calibration error (AL2_CALIB_1P)	–
8	Temperature control error (AL1_TEMP_CTL)	–	Electrode sensitivity error (AL2_SENS)	–
7	Fluoride ion electrode error (AL1_SENSOR)	12C－7 communication error (AL1_I2C)	Calibration stability check error (AL2_STB)	–
6	Leak detection (AL1_LEAK)	12C－6 communication error (AL1_I2C)	Sample water off error (AL2_SAMPLE)	–
5	Temperature controller temperature error (AL1_BLOCK_T)	12C－5 communication error (AL1_I2C)	HI calibration solution off (AL2_CALIB_H)	–
4	Cell temperature error (AL1_CELL_T)	12C－4 communication error (AL1_I2C)	LO calibration solution off (AL2_CALIB_L)	–
3	Data board communication error (AL1_I2C)	12C－3 communication error (AL1_I2C)	–	–
2	Main board communication error (AL1_I2C)	12C－2 communication error (AL1_I2C)	Acid washing solution off error (AL2_WASH)	Low error
1	Data board hardware error (AL1_EEPROM)	12C－1 communication error (AL1_I2C)	Reagent off error (AL2_REAGENT)	High error
0	Main board hardware error (AL1_EERROM)	12C－0 communication error (AL1_I2C)	Waste solution tank full error (AL2_EFFLU)	Higher error

Revision History

Instruction Manual No. NHM-IB55100E	11/03/2013 (JJ)	New Version in English (RW1 Sugawara, DEC Honda)
NHM-IB55101E	25/04/2014 (JJ)	(DSA Masuko, DEC Shimada)

RW1



DKK-TOA CORPORATION
Head Office Address: 29-10, 1-Chome, Takadanobaba, Shinjuku-Ku, Tokyo, 169-8648 Japan
Telephone: +81-3-3202-0225 Facsimile: +81-3-3202-5685
URL http://www.toadkk.co.jp/