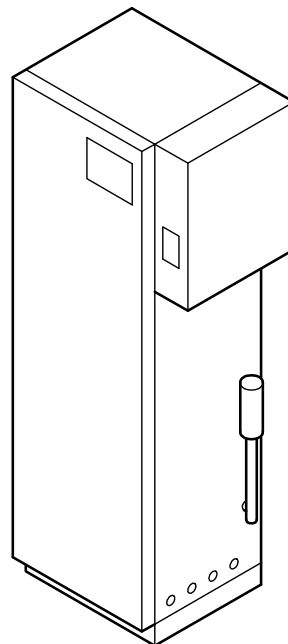




TOTAL NITROGEN CONCENTRATION MONITOR

MODEL TNC-250




- 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.

Introduction

- (a) Thank you for purchasing the Total Nitrogen Concentration Monitor TNC-250 (hereafter referred to as the “product”). This product is designed to automatically measure the concentration of total nitrogen in water.
- (b) This product measures the total nitrogen concentration in water used for or discharged from processes in a denitrogenation plant through contact heat decomposition and the chemiluminescence method conforming to the JIS K 0102 Total Nitrogen Measurement Method. This product is intended for the control and monitoring of water quality.
- (c) The measurement range is as follows: a minimum of 0 to 20 mg/L and a maximum of 0 to 1000 mg/L. The measurement cycle is a minimum of 5 minutes and a maximum of 120 minutes. For other specifications, see section 7.1 “Standard Specifications”.
- (d) This product has the following characteristics;
- There are two types—the single-stream type and the double-stream type—depending on the order specification, and the screen differs in some points.
 - Select from the following start methods:
 - Internal startup: The product starts the measurement, calibration, and cleaning based on the built-in timer (clock function) and preset operation conditions to perform continuous operation.
 - External startup: Contact signals for the start of the measurement start are sent from the control room or the like to the product to start continuous operation. The internal timer is disabled.
 - Select a method for measurement, calibration, cleaning, and operation stop.
- (e) 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.
- (f) Since important items are described in “Safety Information”, read the contents carefully.
- (g) 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 Substances

- Wear protective gear when handling the chemicals or the solutions which are prepared based on it. Also always check the Material Safety Data Sheet (MSDS).

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 in the analyzer 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.
-



Heavy Object Falling

- Fix the product with foundation bolts or other means. This product is heavy (approx. 120kg) and if the product falls, the falling product can cause human and/or property 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 becomes too difficult to read or lost, 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) For easier comprehension, 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.
- (e) Intellectual property right of the manual belongs to DKK-TOA. All or part of the manual must not be reproduced without permission.

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 WARRANTY 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, OR 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 appropriate chapters of the manual for proper understanding and use of the product. The circles below indicate reference items and the enclosed numbers indicate the order.

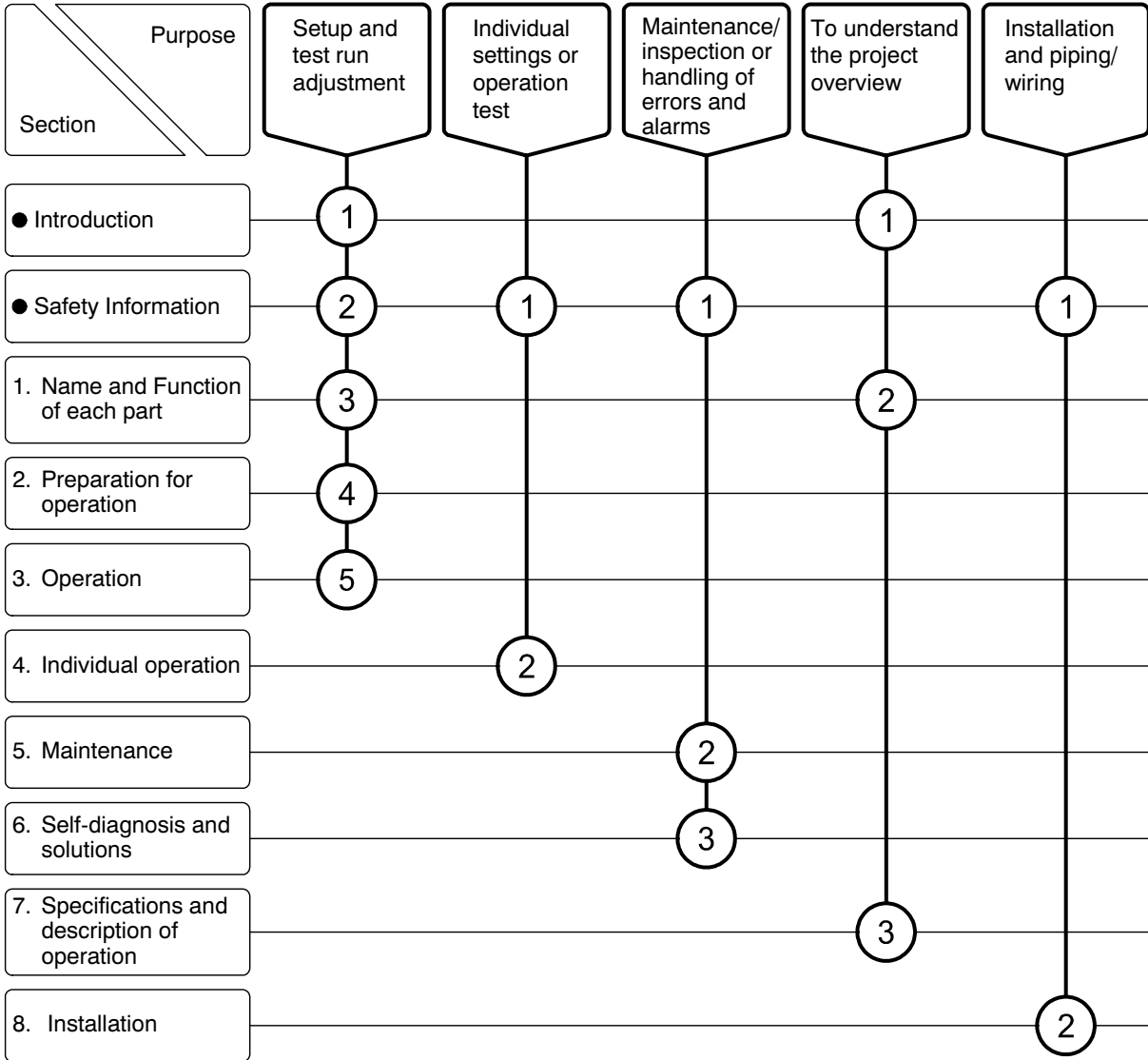


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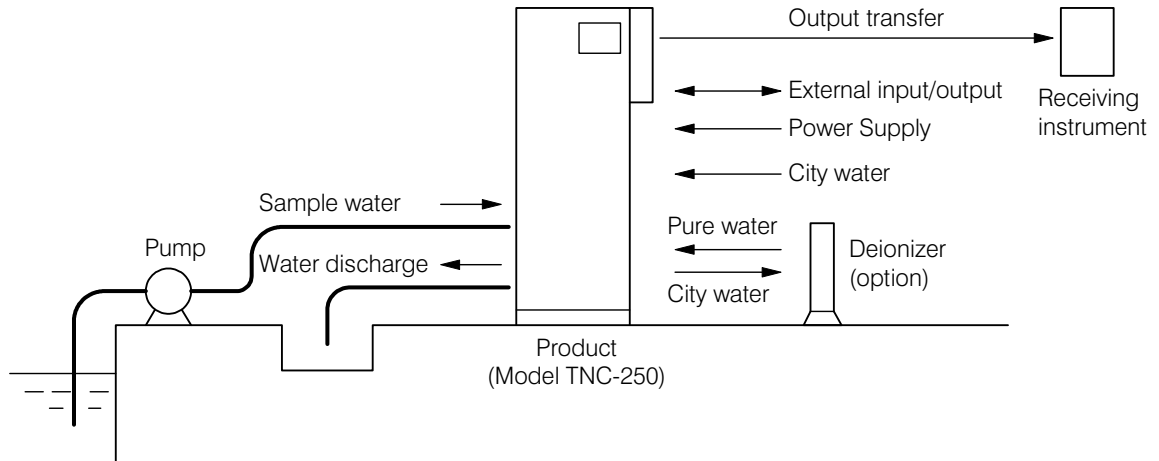
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1. Name and Function of Each Part

1.1 Name of Each Part

(1) Typical configuration of the measurement system

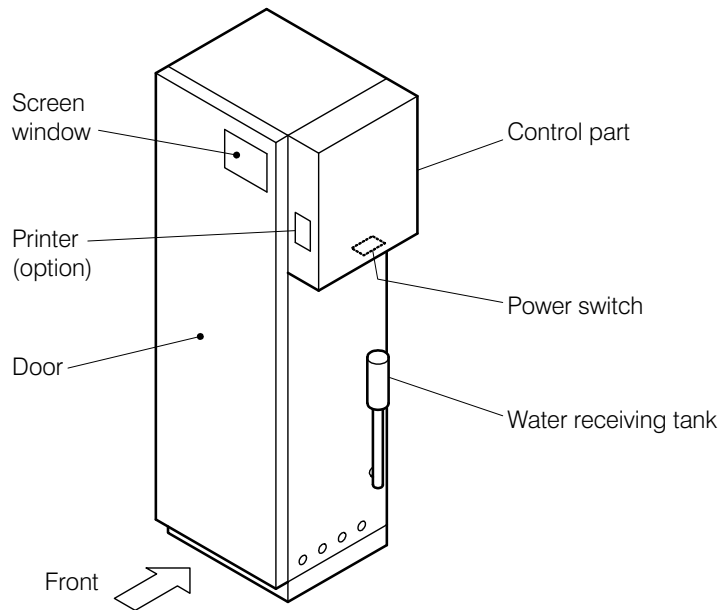
Configuration of a typical total-nitrogen measurement system, with this product as the center, is shown in the picture. If there is any pure-water supply function at the installation site, no deionizer is necessary.



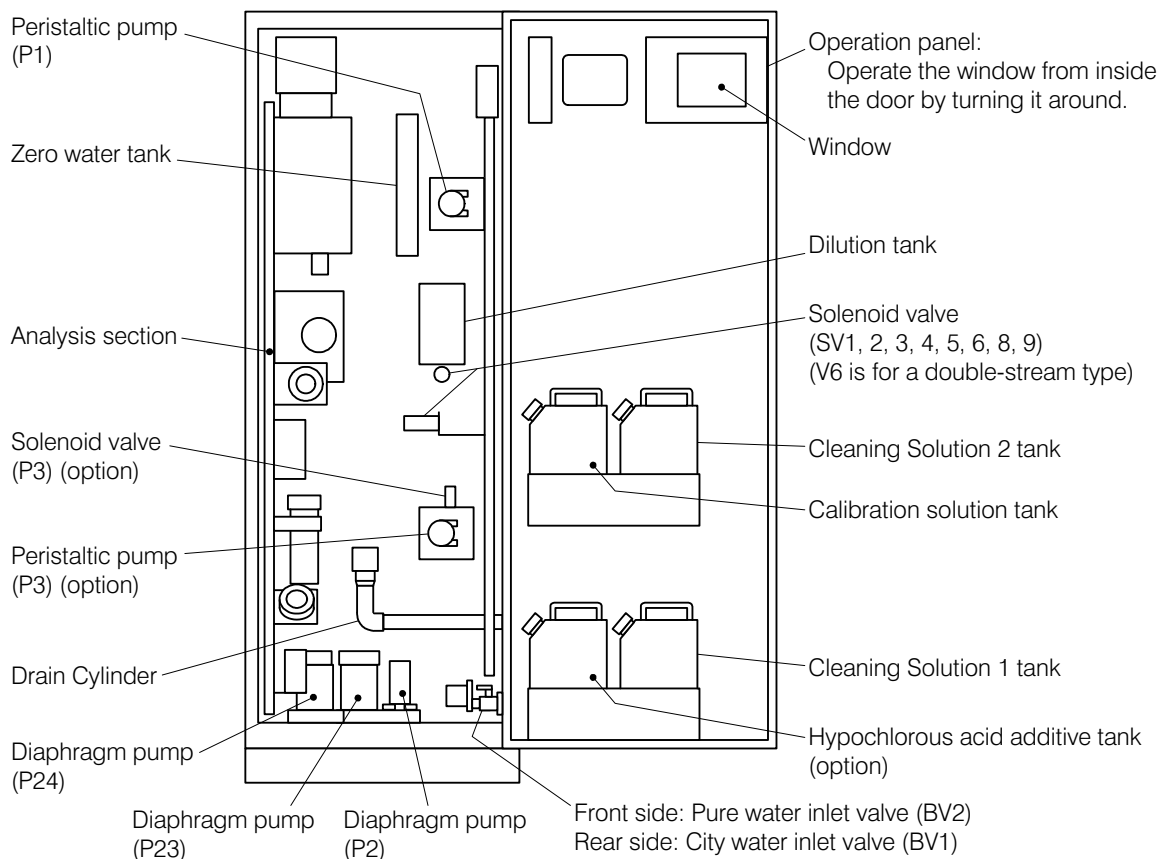
Typical Measurement System

(2) Name of the main parts

The names of the outer and inner parts are as shown in the figure. For the names of accessories, see section 5.2 (1) “Standard accessories”.

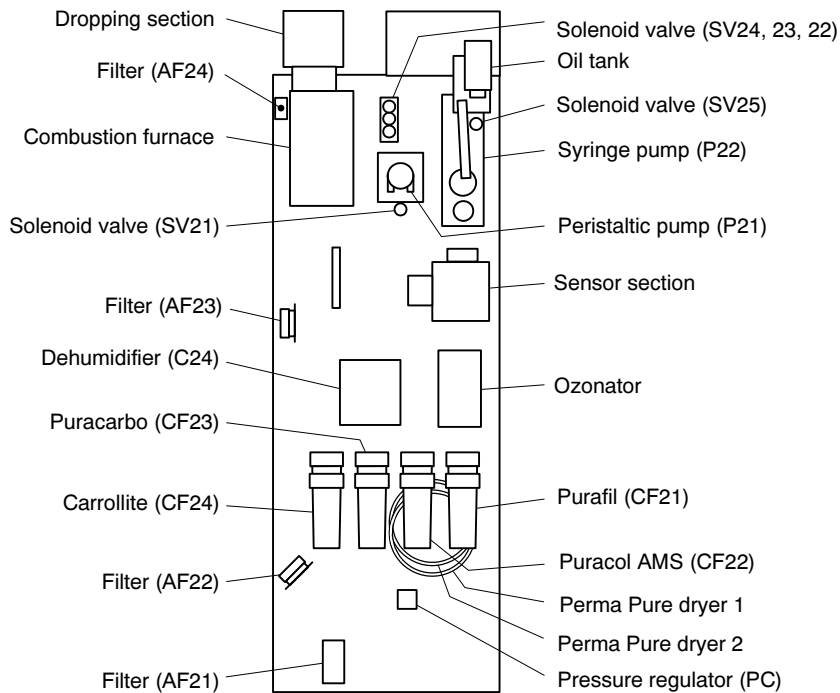


Appearance and Names



Name of the Inner Parts

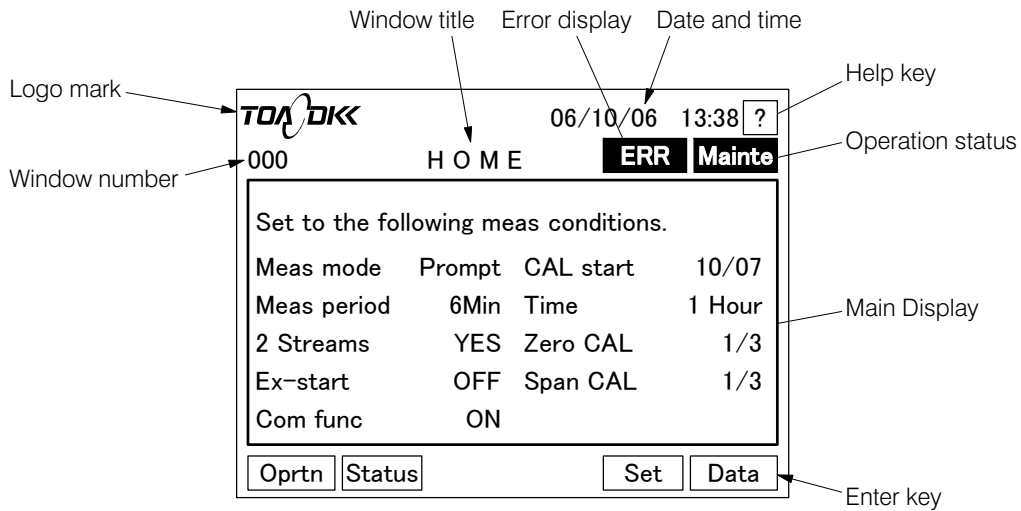
【IMPORTANT】 • Before pulling out the analysis section, pull out the tube inserted in the Drain Cylinder, together with the cap, in receiving the liquid from the tip with a container. After putting back the analysis section, be sure to put the tube back with its inner cap into the Drain Cylinder.



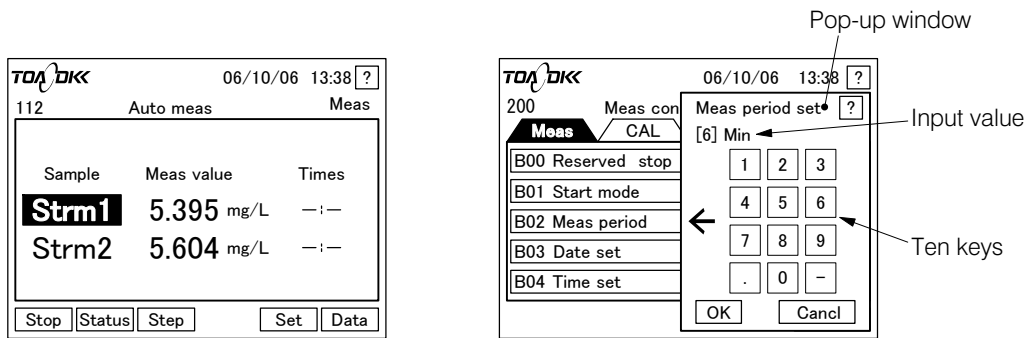
Name of the Analysis Section Parts

1.2 Windows and Key Functions

Measured values and messages are displayed in the window. Press (touch) a key displayed in the window, such as the Enter key or Help key, to switch the window to the relevant window.



< Typical screenshot of 000: Home Window >



< Typical screenshot of 112: Automatic Measurement Window for Double-Stream >

< Typical screenshot of B02: Measurement Cycle Window >

Typical Screenshots

Functions of the Main Items

Item Name (descriptive name)	Functions
Logo mark	Logo mark of our company. Pressing and holding this section (3 seconds or longer) will turn on/off the locking function of the window operation. Logo mark is omitted in the other screenshots.
Window number	Identification number of the window.
Window title	Title expressing the contents of the main display. Indicates the group name for the window.
Date and time	Shows the current date and time. ➤ Sections 4.4 (4) “Date adjustment” and 4.4 (5) “Time adjustment”
Help key	Press this key to display the description of the window.

(To be continued)

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





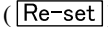
Item Name (descriptive name)	Functions																
Error display	Shows that the product is in an abnormal status. Press this display while it is lighted to display the “010: Error Information Window”. If you enable (turn ON) “B06: Error Display”, error information is displayed automatically at the same time as the error display lights.																
Main display	Indicates the contents of each window, including measurement values. Also displays the item-selection keys and line-feed key.																
Pop-up window	Window to change settings and the range of the display. Also displays the entered values, ten-key pad, selection items, and the scroll key.																
Operation status	<table border="1"> <tbody> <tr> <td>Maintenance in Progress</td> <td> <ul style="list-style-type: none"> • Outputs the status for the Maintenance-in-Progress signal. Maintenance includes manual measurement, manual calibration, and manual cleaning. Specifically, it refers to the status before pressing Start in the “110: Automatic Measurement Start window”, where no other operation status display, including On Standby, is shown. • Press and hold Mainte (3 seconds or longer) to switch the window as follows. Another long press will return it to the Maintenance in Progress display. During manual measurement Measurement in Progress During manual calibration Calibration in Progress Other than above (including manual cleaning) On Standby </td> </tr> <tr> <td>On Standby</td> <td> <ul style="list-style-type: none"> • Status where the maintenance signal stopped and no operation is performed. • Press and hold Mainte as described in the previous section to switch the display to this window. </td> </tr> <tr> <td>Measurement in Progress</td> <td> <ul style="list-style-type: none"> • During automatic measurement. Specifically, the status after Start is pressed on “110: Automatic Measurement Start Window”, without any display of Cleaning, Calibration, Reservation M, or Reservation C. • Or, press Mainte for a long time during manual measurement. </td> </tr> <tr> <td>Cleaning in Progress</td> <td> <ul style="list-style-type: none"> • Displayed when automatic cleaning starts during automatic measurement. </td> </tr> <tr> <td>Calibration in Progress</td> <td> <ul style="list-style-type: none"> • Displayed when automatic calibration starts during automatic measurement. • Or, press Mainte for a long time during automatic calibration. </td> </tr> <tr> <td>Reservation M</td> <td> <ul style="list-style-type: none"> • Displayed when start of automatic measurement is reserved by input of the measurement start signal during automatic measurement, automatic calibration, or automatic cleaning. </td> </tr> <tr> <td>Reservation C</td> <td> <ul style="list-style-type: none"> • Displayed when automatic calibration is reserved by input of the calibration start signal during automatic measurement or automatic cleaning </td> </tr> <tr> <td>Reservation W</td> <td> <ul style="list-style-type: none"> • Displayed when automatic cleaning is reserved by input of the cleaning start signal during automatic measurement or automatic cleaning </td> </tr> </tbody> </table>	Maintenance in Progress	<ul style="list-style-type: none"> • Outputs the status for the Maintenance-in-Progress signal. Maintenance includes manual measurement, manual calibration, and manual cleaning. Specifically, it refers to the status before pressing Start in the “110: Automatic Measurement Start window”, where no other operation status display, including On Standby, is shown. • Press and hold Mainte (3 seconds or longer) to switch the window as follows. Another long press will return it to the Maintenance in Progress display. During manual measurement Measurement in Progress During manual calibration Calibration in Progress Other than above (including manual cleaning) On Standby 	On Standby	<ul style="list-style-type: none"> • Status where the maintenance signal stopped and no operation is performed. • Press and hold Mainte as described in the previous section to switch the display to this window. 	Measurement in Progress	<ul style="list-style-type: none"> • During automatic measurement. Specifically, the status after Start is pressed on “110: Automatic Measurement Start Window”, without any display of Cleaning, Calibration, Reservation M, or Reservation C. • Or, press Mainte for a long time during manual measurement. 	Cleaning in Progress	<ul style="list-style-type: none"> • Displayed when automatic cleaning starts during automatic measurement. 	Calibration in Progress	<ul style="list-style-type: none"> • Displayed when automatic calibration starts during automatic measurement. • Or, press Mainte for a long time during automatic calibration. 	Reservation M	<ul style="list-style-type: none"> • Displayed when start of automatic measurement is reserved by input of the measurement start signal during automatic measurement, automatic calibration, or automatic cleaning. 	Reservation C	<ul style="list-style-type: none"> • Displayed when automatic calibration is reserved by input of the calibration start signal during automatic measurement or automatic cleaning 	Reservation W	<ul style="list-style-type: none"> • Displayed when automatic cleaning is reserved by input of the cleaning start signal during automatic measurement or automatic cleaning
Maintenance in Progress	<ul style="list-style-type: none"> • Outputs the status for the Maintenance-in-Progress signal. Maintenance includes manual measurement, manual calibration, and manual cleaning. Specifically, it refers to the status before pressing Start in the “110: Automatic Measurement Start window”, where no other operation status display, including On Standby, is shown. • Press and hold Mainte (3 seconds or longer) to switch the window as follows. Another long press will return it to the Maintenance in Progress display. During manual measurement Measurement in Progress During manual calibration Calibration in Progress Other than above (including manual cleaning) On Standby 																
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Measurement in Progress	<ul style="list-style-type: none"> • During automatic measurement. Specifically, the status after Start is pressed on “110: Automatic Measurement Start Window”, without any display of Cleaning, Calibration, Reservation M, or Reservation C. • Or, press Mainte for a long time during manual measurement. 																
Cleaning in Progress	<ul style="list-style-type: none"> • Displayed when automatic cleaning starts during automatic measurement. 																
Calibration in Progress	<ul style="list-style-type: none"> • Displayed when automatic calibration starts during automatic measurement. • Or, press Mainte for a long time during automatic calibration. 																
Reservation M	<ul style="list-style-type: none"> • Displayed when start of automatic measurement is reserved by input of the measurement start signal during automatic measurement, automatic calibration, or automatic cleaning. 																
Reservation C	<ul style="list-style-type: none"> • Displayed when automatic calibration is reserved by input of the calibration start signal during automatic measurement or automatic cleaning 																
Reservation W	<ul style="list-style-type: none"> • Displayed when automatic cleaning is reserved by input of the cleaning start signal during automatic measurement or automatic cleaning 																

Functions of the Main Keys

Key (descriptive name)	Functions
Operation key ([Oprtn])	Opens the “100: Measurement Screen window”.
Status key ([Status])	Opens the “101: Internal Analysis Status window”.
Setup key ([Set])	Opens the “200: Measurement Conditions Setting window”.
Data key ([Data])	Opens the “300: Data Menu window”.
Clear key ([Clear])	Clears error information and cancels alarm output signals. This key exists only in the “010: Error Information window”.
Home key ([HOME])	Opens “000: Home window”.
Standard solution volume check key ([CAL soln vol])	Opens the “106: Calibration Solution window”. This key is located in the “101: Internal Analysis Status window”.
Back key ([Back])	Returns to the previously displayed screen.
Start key ([Start])	Starts the target operation, such as automatic measurement.
Stop key ([Stop])	Opens the “180: Measurement Stop window”.
Step key ([Step])	Opens the “140: Single-Stream Process Status window” or “141: Double-Stream Process Status window”.
Stop after restore key ([Stop after R])	Press [OK] after selecting this key to start the emergency stop and open the “182: Stop after restore window”. This key is located in the “180: Measurement Stop window”.
Stop now key ([Stop now])	Press [OK] after selecting this key in the “180: Measurement Stop window” to force termination and to open the “181: Forced Termination window”. Press this key in the lower right section of the “182: Emergency Stop window” to force termination immediately and to open the “181: Forced Termination window”.
Card Removal key ([CF card remove])	Opens the CF Card Removal window. This key is in the “300: Data Menu window”.
Print key ([Print])	Opens a window to execute printing of a daily report.
Graph key ([Graph])	Opens the “312: Stream 1 Measurement Value Graph window” or “313: Stream 2 Measurement Value Graph window”.
Stream-2 key ([Strm2])	Opens the “311: Stream 2 Automatic Measurement Detailed Data window”. This key is located in the “310 Stream 1 Automatic Measurement Detailed Data window”.
Stream-1 key ([Strm1])	Opens the “310: Stream 1 Automatic Measurement Detailed Data window”. This key is located in the “311 Stream 2 Automatic Measurement Detailed Data window”.

(To be continued)

(Continued from previous page)

Key (descriptive name)	Functions
Leftward movement key ()	Displays a graph of measured values for the step on the left.
Quad-speed leftward movement key ()	Displays a graph of measured values for the 4th step on the left.
Rightward movement key ()	Displays a graph of measured values for the step on the right.
Quad-speed rightward movement key ()	Displays a graph of measured values for the 4th step on the right
Upward movement key ()	Displays a graph of measured values for the line above.
Downward movement key ()	Displays a graph of measured values for the line below.
Resetting key ()	Opens a window where you can set the range again.

2. Preparation for Operation

Preparation for operation (setup) is necessary before supplying power to the product, such as verification of installation, flushing, and mounting of tubes.

2.1 Verification of Installation and Flushing

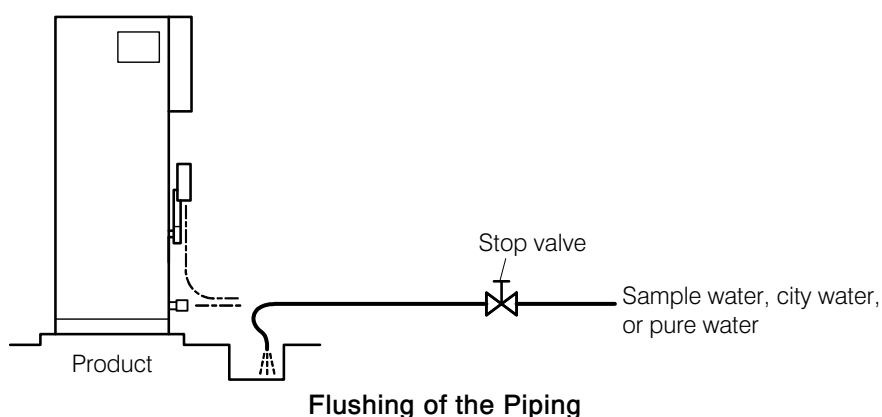
(1) Verification of installation

Check the following items according to the installation layout.

- (a) Installation: The product is properly installed with a sufficient space for maintenance.
 - ▷ Section 8.2 “Installation”.
- (b) Piping: Piping for samples (including the pump), city water, pure water, discharge water, and discharge air are properly provided. ▷ Section 8.3 “Piping”.
- (c) Wiring: Wires and cables for power, grounding, output transmission, and input/output signals are properly provided. ▷ Section 8.4 “Wiring”.
- (d) Accessories: All the accessories are on hand ▷ Section 5.2 (1) “Standard accessories”
- (e) Power Supply Specification: Check that the power supplied to the product is as per the description on the nameplate (inside the door).
- (f) Valve open/closed status: Check that the following valves for the product are in the appropriate status:
 - City water inlet valve (BV1) Closed (located on the right side of the product, lower section)
 - Pure-water inlet valve (BV2) Closed (located on the right side, lower section)
 - Zero water tank discharge valve (BV3) Closed (located under the zero water tank)
 - Water-receiving tank 1, discharge valve (BV4) Closed (located on the bottom side of the water-receiving tank 1)
 - Water-receiving tank 2, discharge valve (BV5) (for Stream 2) Closed (located on the bottom side of the water-receiving tank 2)

(2) Flushing of the piping

In order to remove any remaining foreign matter or rust from the piping for the sample water, city water, or pure water, flush the pipe as follows:



- ① **Cut off the supply.** Close the stop valve near the product for the piping to be flushed.
 - If a deionizer is connected, manipulate the deionizer to cut off the supply.
- ② **Disconnect the pipe.** Detach the pipe from the product connecting port, and put the pipe end into a drain.
- ③ **Flush.** Repeat the procedure of fully opening and then fully closing the stop valve. Perform this until no more rust, welding slug, or other foreign matter appears in the water coming from the pipe end, and then close the stop valve.
- ④ **Connect the pipe.** Connect the pipe end to the connection port.
- ⑤ **Check for leakage.** Open the stop valve fully to check that there is no leak, and then keep the stop valve closed until the start of operations.

2.2 Mounting of the Combustion Tube

For prevention of the combustion tube made of silica glass during transportation, it is shipped from the factory as a part of accessories, without being incorporated in the product. Mount combustion tubes as follows:

-
- 【IMPORTANT】**
- This section describes the work before supplying power to the product. In case the power is on for any reason, the combustion furnace may be very hot. Wait until the combustion furnace temperature drops to around room temperature before conducting the following operation.
 - Handle the combustion tube with gloves in order to prevent attachment of fat and burn injury due to heat.
-

- ① **Prepare the combustion tube.** Remove one combustion tube assembly set from the accessories.
Combustion tube assembly (Code No.: 6952130K)
- ② **Remove the packing.** Hold a new combustion tube, with the side of the antistatic mesh facing to the ceiling, and remove the antistatic mesh at the inlet of the tube and the packing (2 types) behind it using a pair of tweezers.

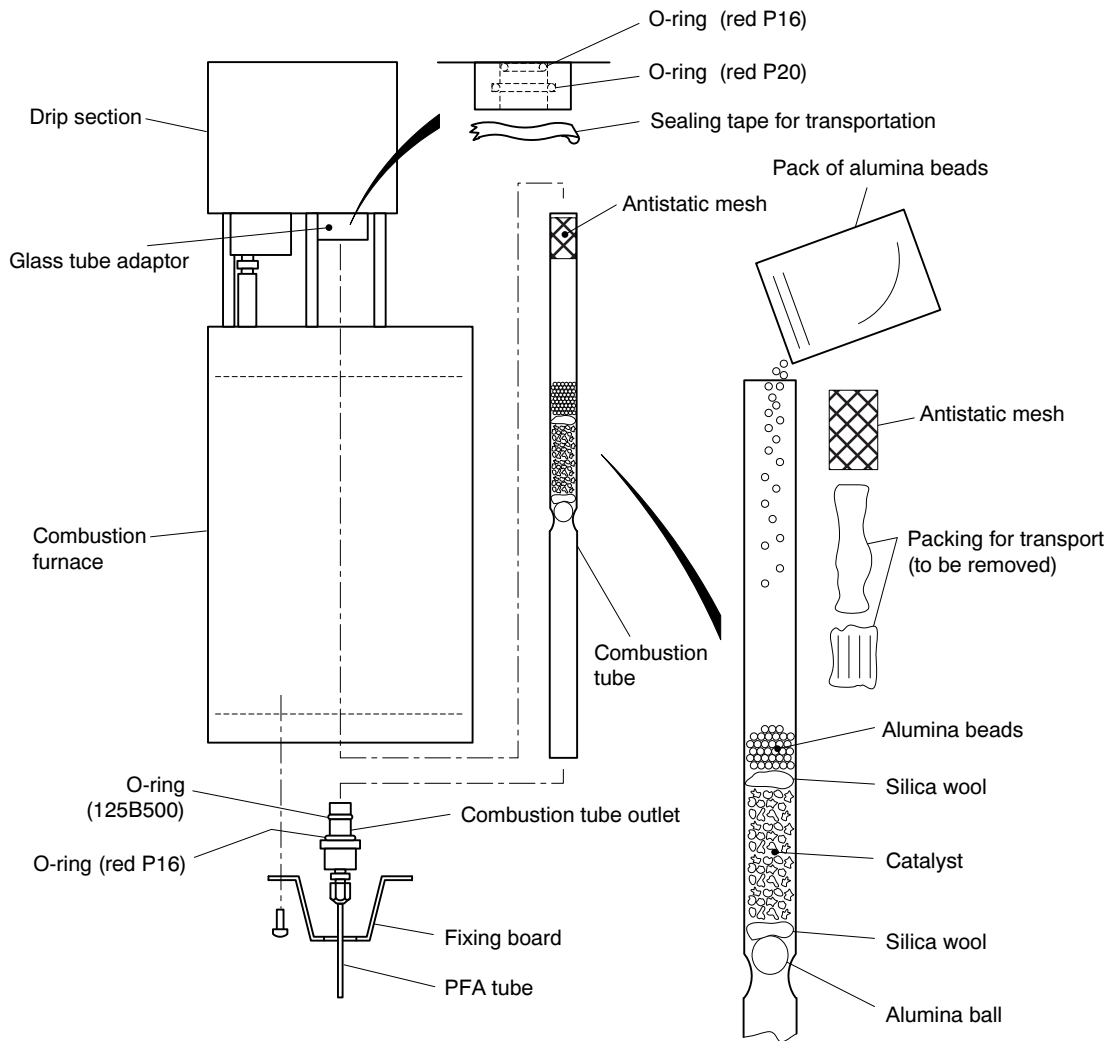
⚠ CAUTION

Injury

- Breakage of a combustion tube made of silica glass may cause injury from broken pieces. Be careful when handling it to avoid breakage.

③ **Fill alumina beads.** Fill the tube with all of the alumina beads delivered with it from the top of the tube, tap the tube with a screwdriver handle to settle them, and insert the antistatic mesh.

- Do not put the transport packing (of two types) back into the tube.



Mounting of the Combustion Tube

④ **Detach the fixing board.** Detach the fixing board in the lower section of the combustion furnace, and remove the combustion tube outlet.

- 【IMPORTANT】**
- When handling the fixing, pay attention to avoid touching and removing any silicon grease on the O-ring attached to the other section, resulting in an insufficient quantity on the O-ring.

- ⑤ **Remove the sealing tape for transport.** …… A glass-tube adaptor is located on the bottom side of the drip section. Remove the sealing tape for transport and check that an O-ring (red P16) is attached to the ceiling.
- If the O-ring (red P16) is out of position, insert it into an appropriate place.
 - The O-ring (red P20) is mounted in the groove of the inner wall of the glass tube adaptor.
- ⑥ **Mount the combustion tube.** …… Set the combustion tube outlet into the lower side of the combustion tube, insert the tube from the lower section of the combustion furnace, and push it into the glass-tube adaptor at the top.
- ⑦ **Set the fixing board.** …… Attach the fixing board into the original location.

2.3 Filling of Span Calibration Solution

(1) Key points on filling the span calibration solution

- (a) Before test run adjustment, prepare span calibration solution and pour it into the calibration solution tank inside the door. After initial filling, check the remaining rate of the solution in the 106: Calibration Solution Check window regularly and replenish before it runs short.
▷ Section 4.3 (6) “Check of the calibration solution volume”.
- (b) First, prepare and store nitrogen standard solution in order to make the span calibration solution from diluting it, whenever filling becomes necessary. This method will avoid changes in the concentration from evaporation or commingling of gas from the atmosphere. ▷ Section 2.3 (2) “Preparation of Nitrogen Standard Solution” and section 2.3 (3) “Preparation and Filling of span Calibration Solution”.
- (c) Span calibration solution consumption per automatic/manual calibration can be calculated using the equation below:
- This represents an example where the measurement range is within 0 to 20 mg/L (i.e. no diluting). For a measurement range outside this (i.e. if diluting is necessary), span calibration solution consumption decreases in inverse proportion to the diluting ratio.

$$\text{Span calibration solution consumption per calibration} = \text{number of span calibration measurements} \times 100 \text{ ml}$$

Number of span calibration measurements: Number of measurements of span calibration solution per calibration (▷ Section 4.5 (4) “Changing the span calibration times”)

Span calibration solution consumption per calibration (max) …… 100mL

(Example) If the number of span calibrations is 3,
 Span calibration solution consumption per calibration = $3 \times 100\text{mL} = 300\text{mL}$

(d)Based on the consumption calculated in the previous item, the interval of span calibration solution replenishment can be calculated as follows:

For irregular manual calibration, the replenishment interval is accordingly shorter.

(Example) Number of span calibrations = 3, Calibration interval 14 days
 Span calibration solution consumption per calibration (max) 100mL
 Quantity of prepared span calibration solution 2000mL
 Ineffective residue within the tank 200mL
 Effective quantity: $2000 - 200 = 1800$ (mL)
 Number of possible calibrations with a tank-full of solution = $1800 / (3 \times 100) = 6.0$
 Expected replenishment interval = 14 days \times 6 times = 84 days (about 2.8 months)

(2) Preparation of nitrogen standard solution

Select one of the following nitrogen standard solution concentration, depending on the measurement range set for the product (measurement range of Stream 1 in case of double-stream unit):

▷ Section 4.4 (18) “Changing the measurement range for stream 1”

In case of measurement range of 0–20 mg/L to 0–50 mg/L Nitrogen Standard Solution 1
 (1000mgN/L)

In case of measurement range above 0–50mg/L..... Nitrogen Standard Solution 2
 (10000mgN/L)

① **Desiccate potassium nitrate.** Desiccate potassium nitrate of the quantity shown in the table below at $105 \pm 2^\circ\text{C}$ for two hours, and cool in a desiccator.

Potassium Nitrate Quantity

Nitrogen Standard Solution (NSS) to be prepared	Potassium Nitrate Quantity	
	Quantity subjected to desiccation	Weigh in
NSS 1 (1000 mgN/L)	About 8 g	7.22g
NSS 2 (10000 mgN/L)	About 80 g	72.20g

② **Measure potassium nitrate.** Measure out the correct amount of potassium nitrate as per the table.

③ **Solve it.** Use a measuring flask to prepare the solution when adding pure water to the weighed potassium nitrate so as to make the total quantity of just 1000mL.

④ **Keep it.** Put it in a plastic tank and store in a dark place of 0°C to 10°C .

(3) Preparation and filling of the span calibration solution

(a)Prepare span calibration solution of the concentration (80% of measurement range) in accordance with the measurement range set for the product (measurement range of Stream 1 in case of double-stream unit). The measurement range can be checked in section B21: “Measurement Range” in the “200: measurement conditions setting window”. ▷ Section 4.4 (18) “Changing the measurement range for stream 1”.

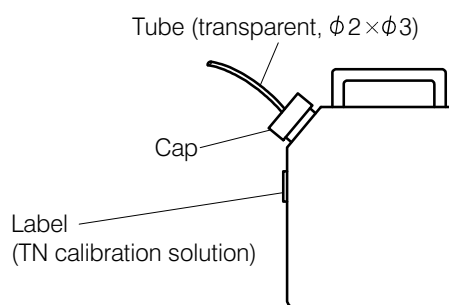
【IMPORTANT】 • If a change in the measurement range is necessary, contact the dealer.
The relevant set values should be also changed.

(b)The explanation here assumes that 2L of span calibration solution was prepared. Should the quantity change, increase/decrease the nitrogen standard solution extraction quantity in the same proportion.

NSS Extraction Quantity and Span Calibration Solution Concentration
(when preparing solution of 2 L)

Measurement range (mg/L)	Span Calibration Solution Concentration (mgN/L)	Extraction(mL)	
		NSS 1	NSS 2
0 to 20	16.0	32	—
0 to 50	40.0	80	—
0 to 100	80.0	—	16
0 to 200	160	—	32
0 to 500	400	—	80
0 to 1000	800	—	160

- ① **Check the quantity of standard nitrogen solution.** Check the quantity of standard nitrogen solution against the above table based on the measurement range set for the product (measurement range of Stream 1 in case of double-stream unit).
- ② **Measure standard nitrogen solution.** Correctly measure out standard nitrogen solution in the quantity checked in ①.
- ③ **Dilute it.** Add pure water to the standard nitrogen solution measured out in ② immediately preceding so as to make the total quantity 2000mL with a measuring flask.
 - Span calibration solution is now ready.
- ④ **Take out the tank.** Open the door, take out the calibration solution tank located on the door rear side, and remove the cap.



Calibration Solution Tank

- Put down the cap, paying attention not to stain the connected tube.
- Empty any remainder of the span calibration solution in the tank prepared previously into another container to dispose of it in accordance with the applicable law.

-
- 【IMPORTANT】**
- Be sure to dispose of any remainder span calibration solution before refilling the new one.
 - Dispose of span calibration liquid in accordance with the applicable laws.
-

- ⑤ **Replenishment.** Pour all of the span calibration solution prepared in ③ into the calibration solution tank 2L, and attach the cap.
- Attach the cap so that the end of the connected tube (transparent, $\phi 2 \times \phi 3$) comes to the bottom of the calibration solution tank.
- ⑥ **Store.** Put the calibration solution tank in the pocket on the door rear side.
- Make sure that the tube is not bent and that no unnecessary force is applied to it.

2.4 Filling of Cleaning Solution

(1) Preparation and filling of cleaning solution 1

- (a) Cleaning solution 1 to be filled in the cleaning solution 1 Tank (2L) is 10% oxalic dehydrate solution. In the actual cleaning process, cleaning solution 1 is used after being diluted to 1% oxalic dehydrate solution.



Hazardous Substances

- Oxalic dehydrate solution is a hazardous substance. Order a material safety data sheet (MSDS) from the supplier to ensure safe handling in accordance with the instructions.
-

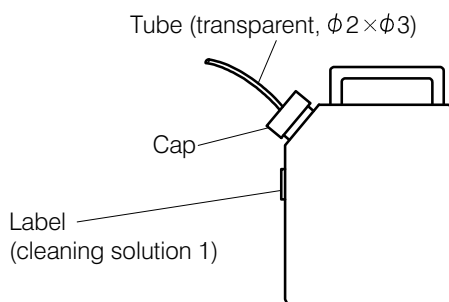
- (b) Consumption of the cleaning solution per automatic cleaning is 9.0mL. The expected interval for replenishment is as follows. However, if manual cleaning 1 or manual cleaning 3 (consumption: 9.0mL/time for both) is performed, the liquid consumption is expedited by that much.

(Example) Extractable effective quantity 1800mL
 Automatic cleaning cycle 24 hours
 $(1800/9.0) / (24/24) = 200$ days
 Expected replenishment interval is 6 months.

Quantity to be Prepared and Quantity of Chemicals for Cleaning Solution 1

	Cleaning Solution 1 to be prepared			
	2000mL	1800mL	1000mL	500mL
Quantity of oxalic dehydrate	200g	180g	100g	50g
Total quantity with pure water	2000mL	1800mL	1000mL	500mL

- ① **Decide on the preparation amount.** Open the door, take out the cleaning solution 1 tank, and check the remaining quantity of cleaning solution 1 to determine how much to prepare.
- ② **Measure out the chemicals.** Measure out oxalic dehydrate according to the quantity to be prepared, and put it in a 1000mL measuring flask.



Cleaning Solution-1 Tank

- ③ **Dilute.** Add pure water, mix, and add again to make the specified total quantity.
 - Now cleaning solution 1 (10% oxalic dehydrate solution) is ready.
- ④ **Refill the tank.** Remove the cap of the cleaning solution-1 tank and refill or replenish the tank with the cleaning solution-1 and replace the cap.
 - Place the cap down paying attention not to stain the connected tube.
 - Attach the cap so that the end of the connected tube (transparent, $\phi 2 \times \phi 3$) comes to the bottom of the cleaning solution 1 tank.
- ⑤ **Store.** Put the cleaning solution 1 tank in the pocket on the door rear side.
 - Make sure that the tube is not bent and that no unnecessary force is applied to it.

(2) Preparation and filling of cleaning solution 2

- (a) Prepare and fill cleaning solution 2 right before manual cleaning 2 or 3, when such cleaning becomes necessary (as-needed basis preparation).

【IMPORTANT】 • Do not use any cleaning solution 2 that is three days old or older. The chlorine concentration in the solution decreases gradually after preparation to deteriorate the cleaning effect.

- (b) Cleaning solution 2 for filling the cleaning solution 2 tank is 50ppm hypochlorous acid solution. In the actual cleaning process, cleaning solution 2 is used after being diluted to 5ppm hypochlorous acid solution.

⚠ WARNING

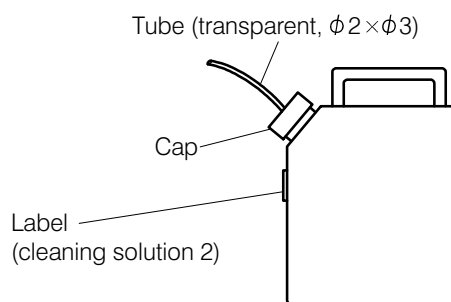
Hazardous Substances

- Hypochlorous acid solution is hazardous. Handle carefully in accordance with the description on the material container.
-

(c) Consumption of cleaning solution 2 per manual cleaning 2 or 3 is 9.0mL. Cleaning 10 times uses about 0.1L. Any liquid that has been not used 2 to 3 days after preparation should be disposed of properly.

- ① **Measure out the material.** Measure out 1mL of bleaching agent for clothes without any surface-active agent (such as the hiter chlorine bleach from kao corp) and put it into a 1000mL measuring cylinder.
- ② **Dilute.** Add pure water to make the total quantity 1000mL.
 - Now Cleaning Solution 2 (50ppm hypochlorous acid solution) is ready.
- ③ **Take out the tank.** Take out the cleaning solution 2 tank from the pocket on the door rear side and remove the cap.
 - Place the cap down, paying attention not to stain the connected tube.
 - Empty any remaining solution in the tank into another container to dispose of it in accordance with the applicable law.

【IMPORTANT】 • Be sure to dispose of any remaining cleaning solution 2 before refilling with new cleaning fluid.



Cleaning Solution 2 Tank

- ④ **Refill the tank.** Refill the cleaning solution 2 tank with cleaning solution 2, and replace the cap.
 - Attach the cap in such a manner that the end of the connected tube (transparent, $\phi 2 \times \phi 3$) comes to the bottom of the cleaning solution 2 tank.
- ⑤ **Store.** Put the cleaning solution 2 tank in the pocket on the door rear side.
 - Be sure that the tube is not bent and that no unnecessary force is applied to it.

2.5 Preparation and Filling of Hypochlorous Acid Solution for Supplementation

This optional function adds hypochlorous acid to the city water when city water cannot be supplied at the installation site or when the chloride concentration in the city water is 0.1mg/L or less.

(1) Preparation of Hypochlorous Acid Solution for Supplementation

(a) The hypochlorous acid solution for supplementation is used in washing the dilution tank at each measurement.



Hazardous Substances

- Hypochlorous acid solution is hazardous. Handle it carefully in accordance with the description on the material container. Furthermore, never mix the hypochlorous acid solution with acid because it will generate chlorine.
-

(b) Since the amount of hypochlorous acid solution consumed differs depending on the raw water used, after addition, the concentration must be measured and the changed. Measure the hypochlorous acid concentration by the absorptiometry method of DPD method. Prepare the hypochlorous acid solution so that the chlorine concentration is about 0.5 to 1mg/L.

(c) Perform the method of sampling the water after addition by referring to the following procedure.

- ① **Go to Service mode.**..... Refer to section “3.1(2)⑤” and go to Service mode.
- ② **Open the “541: Port window”.** Refer to section “3.1(2)⑥” and open the “541: Port window”.
- ③ **Open the solenoid valve.** Press and on the 1/3 page of the “541: Port window” and highlight it.
- ④ **Run the pump.** Press on the 2/3 page of the “541: Port window” and highlight it. Fill the dilution tank with the water after hypochlorous acid addition.
- ⑤ **Moving parts and stop** When the water has flowed for about 1 minute, press at the bottom right-hand side. It returns to Service Menu.
- ⑥ **Disconnect the piping.** Disconnect the piping running from the drain port to the drain pipe and insert it into the container to be sampled.
- ⑦ **Open the “541: Port window”.** Refer to section “3.1(2)⑥” and open the “541: Port window” again.
- ⑧ **Open the solenoid valve.** Press on the 1/3 page of the “541: Port window” and highlight it.
- ⑨ **Return to “000: Home window”.** Refer to section 3.1(2)⑤ and return the display to the “000 Home window”.

(2) Filling of Hypochlorous Acid Solution for Supplementation

(a) Solution for filling the tank for supplemental hypochlorous acid (2L, option) is hypochlorous acid solution of about 3500ppm.

⚠ WARNING

Hazardous Substances

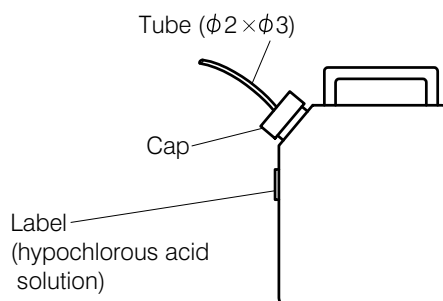
- Hypochlorous acid solution is hazardous. Handle it carefully in accordance with the description on the material container.
-

(b) Prepare supplemental hypochlorous acid solution right before filling to fill only new solution.

- 【IMPORTANT】** ● Chlorine in the solution is unstable and easily affected by light, and if you keep it open to the room atmosphere, it diffuses in the air to gradually decrease the concentration. The effective life of supplemental hypochlorous acid solution is one month after preparation.
-

(c) The additive amount of supplemental hypochlorous acid solution is 0.16mL at one time. Consumption in a month is about 1400mL. Replace it, however, every month.

- ① **Measure out the material.** Measure out approx. 120mL of bleaching agent for clothes without any surface-active agent (chlorine bleach) and put it into a 2000mL measuring flask. (▷ Section 2.5(1) “Preparation of Hypochlorous Acid Solution for Supplementation” (b))
- ② **Dilute.** Add pure water to make the total quantity 2000mL.
 - Now supplemental hypochlorous acid solution (3500ppm hypochlorous acid solution) is ready.
- ③ **Take out the tank.** Take out the tank for supplemental hypochlorous acid solution (2L, option) from the pocket on the door rear side, and remove the cap.
 - Empty any remaining solution in the tank into another container to dispose of it.

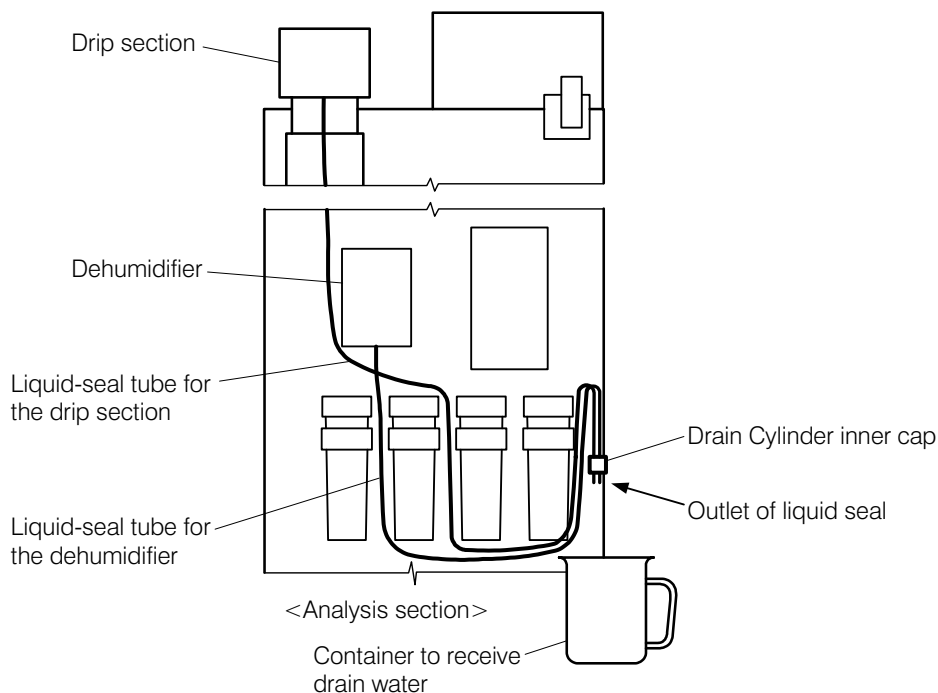


Tank for Supplemental Hypochlorous Acid Solution

- ④ **Refill the tank.** Fill the tank for supplemental hypochlorous acid solution with the solution prepared in ②, and replace the cap.
 - Attach the cap in such a manner that the end of the connected tube (transparent, $\phi 2 \times \phi 3$) comes to the bottom of the tank for supplemental hypochlorous acid solution.
 - If there is any remaining liquid in the tank, which was prepared previously, empty it into another container to dispose of it in accordance with the applicable law
- ⑤ **Store.** Put the tank in the pocket on the door rear side.
 - Be sure that the tube is not bent and that no unnecessary force is applied to it.

2.6 Filling Pure Water into the Liquid-seal Tubes

Fill the liquid-seal tubes in the analysis section with pure water. There is a liquid-seal tube for the drip section and one for the dehumidifier, respectively, both of which are connected to the Drain Cylinder.



Filling of Pure Water into the Liquid Seal Tubes

- ① **Provide pure water.** Prepare pure water in a cleaning bottle or some other easy-to-fill container. The necessary quantity is 150mL.
- ② **Pull out the liquid-seal tubes from the drain cylinder.** Pull out the analysis section, and pull out the liquid-seal tubes together with the Drain Cylinder inner cap from the Drain Cylinder, after setting a container to receive drain from the liquid-seal outlet.
- ③ **Pour pure water into the liquid-seal tube.** Hold the liquid-seal outlet at the same height as the Drain Cylinder end, with the outlet side facing to the ceiling, and slowly pour pure water into each liquid-seal tube until just before overflow. Upon completion, insert the liquid-seal tubes together with the Drain Cylinder inner cap into the Drain Cylinder.
- ④ **Put the analysis section back into its original position.** Remove the container to receive drain water and return the analysis section back into its original position.

3. Operation

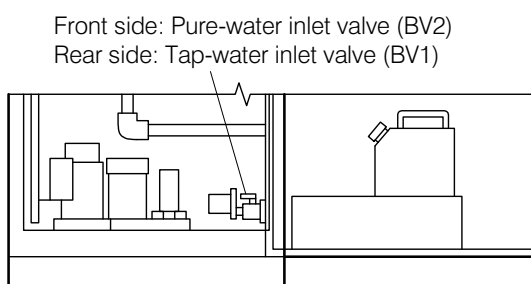
After completion of section 2: “Preparation for Operation,” the product is ready for the test run adjustment. Place the product in normal mode by proceeding with the steps in accordance with section 3.1 (1) “Procedures for test run adjustment”.

3.1 Test Run Adjustment

(1) Procedures for test run adjustment

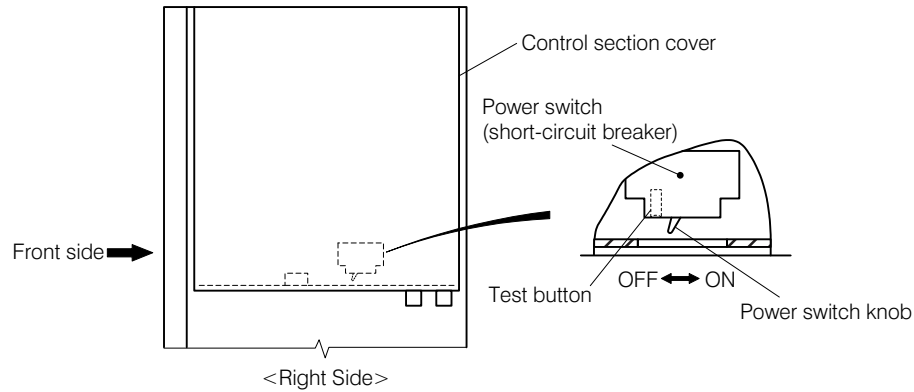
Place the product in normal mode by proceeding with the steps described in the following procedures. Because the procedures for internal startup and external startup differ, both methods are introduced separately. ▷ Section 3.3 (1) “Selection of startup method”

- ① **Start collecting sampling water.** First, close the sample-water adjustment valve on the water-sampling line, start the water-collection pump, and check that the sample water supplied to the product meets the requirements defined by the specifications.
- ② **Adjust the sample water flow rate.** Open the sample-water adjustment valve, and adjust the flow rate with it to let the sample water overflow in the water-receiving tank.
- ③ **Run tap water.** Open the tap-water inlet valve (BV1), and check that the tap water supplied to the product meets the requirements defined by the specifications before opening the valve of the system to supply the water.



Tap-water Inlet Valve (BV1) and Pure-water Inlet Valve (BV2)

- ④ **Run pure water.** Open the pure-water inlet valve (BV2), close the zero-water tank valve (BV3), and then supply pure water, which meets the requirements defined by the specifications for the product.
 - The zero-water tank is filled with water.
 - Start the deionizer, if connected.



Power Switch

- ⑤ **Supply power to the product.** Turn OFF the power switch (circuit breaker) (turn the knob toward the front side) from under the control section, and supply power according to product specifications.

⚠ WARNING

Electric Shock

- Do not touch the terminals inside the product while the power is on. There is a risk of electric shock.
-

- ⑥ **Perform a short-circuit test.** The procedures are as follows:

- [a] Turn off the power to the equipment in the same system: Turn off power to any equipment that is connected to the same electrical system as the product.

[IMPORTANT] • Because other equipment may be influenced by the breaker test, turn off the power if a high-speed breaker is used in the switchboard.

- [b] Start the product: Turn on the switch (turn the knob on the rear of the product).

- The product is now started but is not in operating (measurement, calibration, or cleaning) mode.

- [c] Perform a test: Push the power switch test button.

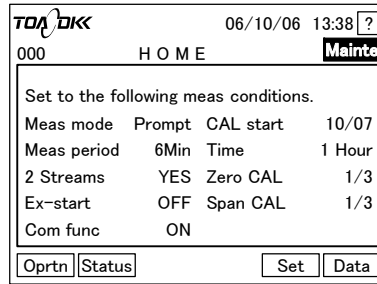
- Check that the power switch knob moves to the OFF position (to the product front side) immediately.

- [d] Turn on the power for any equipment in the same system: Recover the power for any other equipment that was cut in [a].

- [e] Start the product: Turn on the power switch.

- ⑦ **Check the screen.** Check that the “000: Home window” opens within several seconds after turning on the power switch.

- The operating conditions indicated in this window are only a part of the settings related to measurement, calibration, and cleaning.



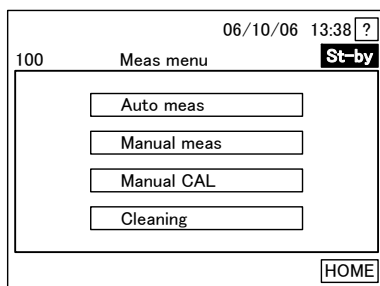
Home Window

- ⑧ Fill silicon oil. ▷ Section 3.1 (2) “Filling of silicon oil”
- ⑨ Load roll paper into the printer. ▷ Section 3.1 (3) “Loading of roll paper”
- ⑩ Check the operating conditions. ▷ Section 3.1 (4) “Check of operating conditions”
 - Disable (turn off) the B12: External Starting function for the purpose of this section.
 - ▷ Section 4.4 (13) “Enabling the external starting”
- ⑪ Check the status of internal analysis. After one hour or more from product startup, check that each item of the status of internal analysis, including inner temperature, is normal.
 - ▷ Section 4.3 (5) “Check of the internal analysis status”.
 - If any value is abnormal, wait until it becomes a normal value before proceeding to step ⑭.

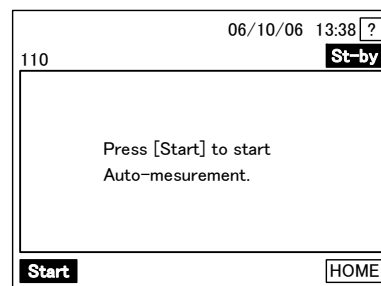
【IMPORTANT】

- Do not start measurement or calibration before the inner temperature is stabilized.
- Keep the door closed before and during measurement and calibration. If the door is open, the inner temperature becomes unstable, which may result in an incorrect measurement.

- ⑫ Start test run of automatic measurement. Press **Oprtn** in the “000: Home window” to open the “100: Measurement Menu window”, and press **Auto meas**. Then, press **Start** in the “110: Automatic Measurement Start window” which opens next.



100: Measurement Menu Window



110: Automatic Measurement Start Window

- It opens either “111: Automatic Measurement Start for single-stream window” or “112: Automatic Measurement Start for double-stream window”, and automatic measurement starts.
- If **ERR** is displayed on the second line of the screen, refer to section 6.1 “Alarm by Self-diagnosis”.

06/10/06 13:38 ?		
111	Auto meas	Meas
Sample	Meas value	Times
Strm 1	5.395 mg/L	--

Stop Status Step Set Data

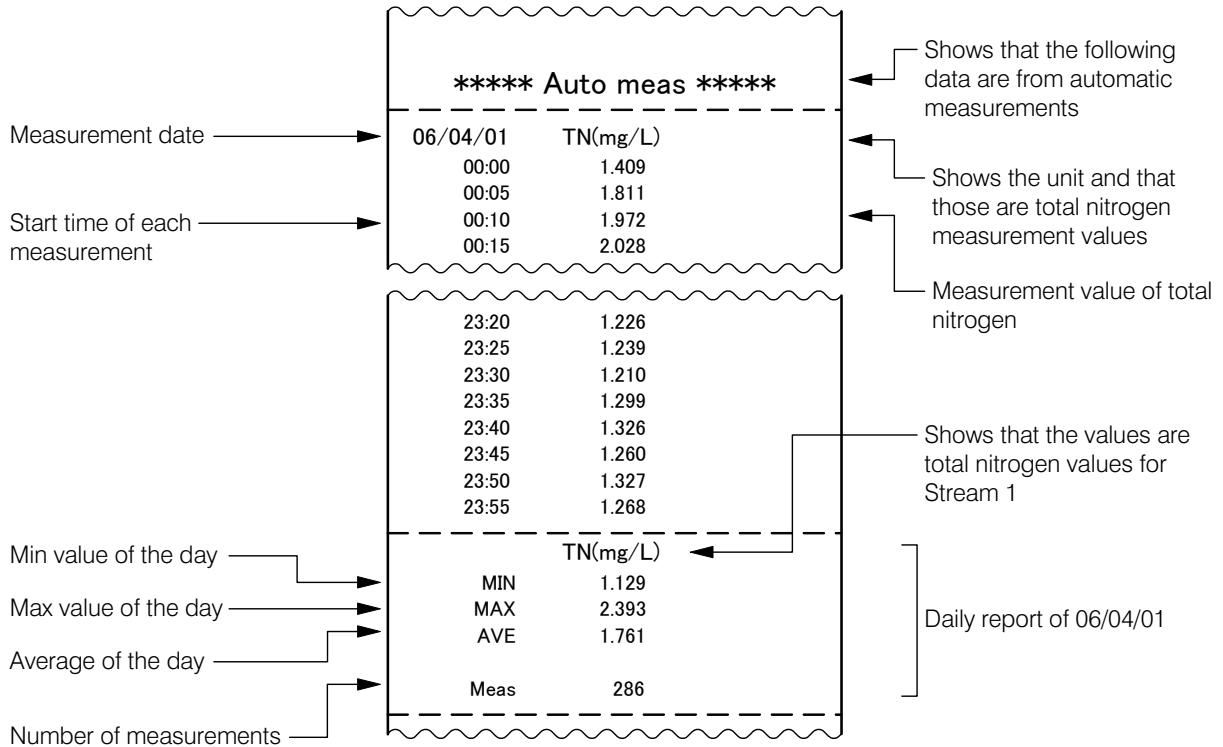
111: Automatic Measurement Start for Single-stream Window

06/10/06 13:38 ?		
112	Auto meas	Meas
Sample	Meas value	Times
Strm1	5.395 mg/L	--
Strm2	5.604 mg/L	--

Stop Status Step Set Data

112: Automatic Measurement Start for Double-stream Window

- ⑬ **Finish test run of automatic measurement.** Stop automatic measurement after one hour or longer from the start of automatic measurement. ▷ Section 4.4 (1) “Reservation of operation stop” or section 4.3 (8) “Emergency stop of the operation”
- ⑭ **Perform manual calibration.** ▷ Section 4.3 (3) “Start of manual calibration”
- “000: Home window” opens upon completion of manual calibration.
 - Overview of the calibration is explained in a different section. ▷ Section 3.3 (3) “Selection of the calibration method”
- ⑮ **Enable external starting.** If you operate by means of internal starting, this is not necessary. Go to the next item. ▷ Section 4.4 (13) “Enabling the external starting”
- ⑯ **Perform a loop check.** For internal starting, no check of “contact input” is necessary. ▷ Section 3.2 “External Input/Output Signals and Loop Check”
- ⑰ **Print out the measurement and calibration condition list.** ▷ Section 3.1 (4) “Check of operating conditions”
- If you print out measurement conditions before automatic measurement, it may serve as a check of documents in case of problems.
- ⑱ **Start automatic measurement.** Press **Oprtn** in “000: Home window” to open “100: Measurement Menu window”, and press **Auto meas** there. Then, press **Start** in the “110: Automatic Measurement start window”, which opens next.
- See the typical screenshot in ⑫.
 - Internal starting: Now the product is in automatic measurement mode.
 - External starting: Now the product is ready to receive contact input for external starting. Start input of measurement start signal from the control room.
- ⑲ **Check the automatic measurement status.** After 10 to 30 minutes, check that normal measurement values are displayed in “111: Automatic Measurement Start for single-stream window” or “112: Automatic Measurement Start for double-stream window”.
- If **ERR** is displayed on the second line of the screen, see section 6 “Errors and Measures”.
 - In case of internal starting, operation of ⑳ is not necessary.
 - For a unit with a printer (option), check that normal measurement results are printed on the roll paper.



Typical Printout on the Roll Paper

② **Input contact signals.** For external starting, input necessary signals among the following contact input signals from the control room to the product. ▷ Section 3.2 (4) “Contact input and loop check”.

Measurement start signal: When the next automatic measurement should be started

Calibration start signal: When automatic calibration should be started

Stream selection signal: When the stream should be switched for a double-stream unit

External unit busy signal: Cancels other contact signals

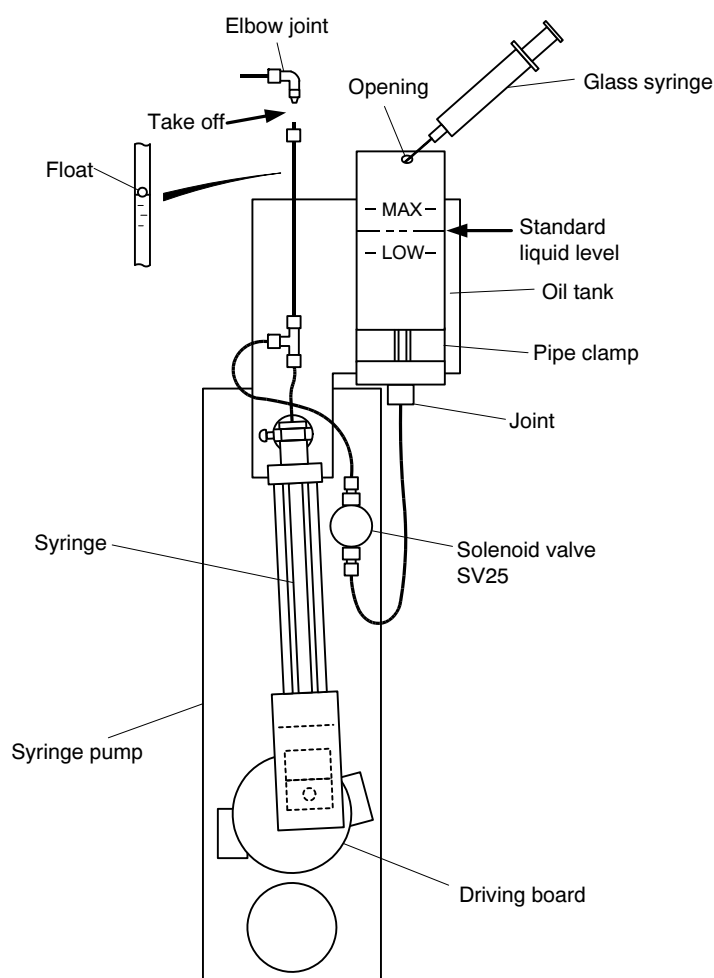
Cleaning start signal: When automatic cleaning should be started

Measurement stop signal: When an emergency stop is necessary

【IMPORTANT】 • Do not use the Measurement Stop Signal, unless necessary. After an emergency stop triggered by this signal, external control is disabled, until **Start** is pressed in the “110: Automatic Measurement start window” after going to the installation site of the product.

(2) Filling of silicon oil

The oil tank for the syringe pump is empty when shipped from the factory. Fill it with the delivered silicon oil up to the standard liquid level, following the procedure below.



Syringe Pump and Oil Tank

① **Bring the syringe to atmospheric pressure.** Disconnect the tube from the elbow joint in the upper part of the syringe pump.

【IMPORTANT】 • Keep the end of the disconnected tube higher than the oil tank upper side. If not, oil may overflow when oil is added.

② **Draw silicon oil with the glass syringe.** Attach an injection needle to the glass syringe delivered with the product, and draw a sufficient amount of silicon oil.

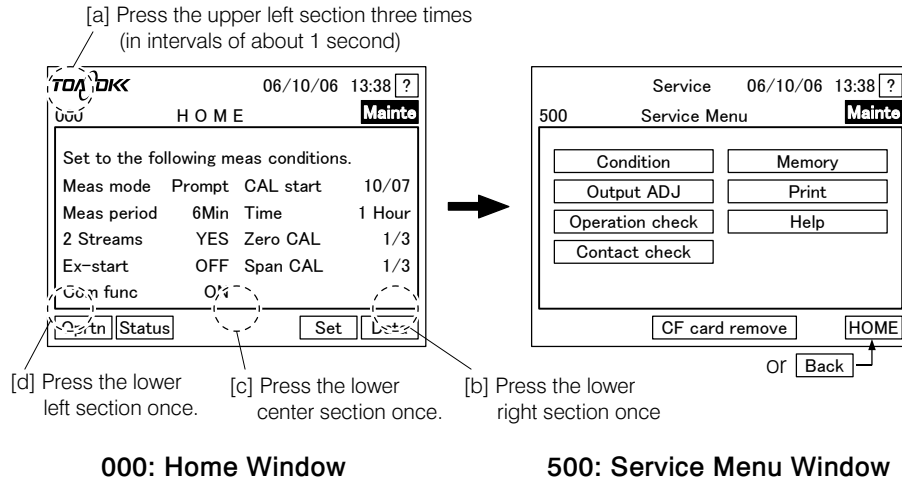
③ **Fill the oil tank.** Insert the injection needle to the opening of the oil tank, and inject silicon oil in the glass syringe.

④ **Fill to just below the standard liquid level.** Repeat procedures ② and ③ to fill the oil tank with silicon oil within the permissible range of the oil tank.

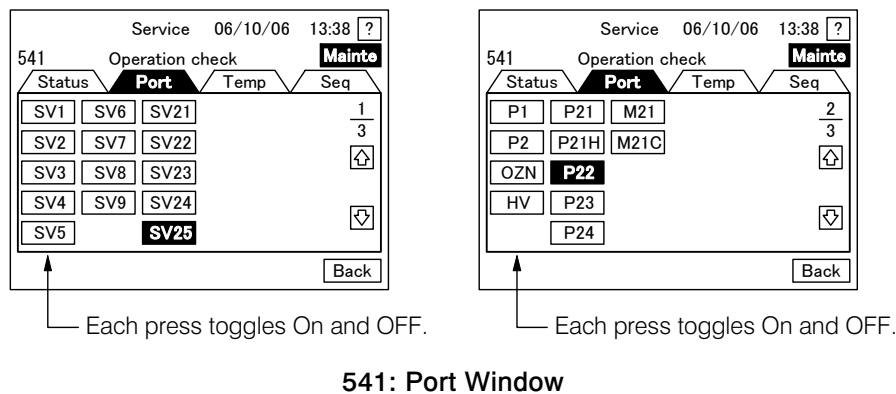
⑤ **Go to Service mode.** Press the upper left section of the “000: Home window” three times (in intervals of about 1 second), then the lower right, lower center, and lower left sections once each in that order.

- The “500: Service Menu window” will open.

【IMPORTANT】 • All windows in Service Mode are for technical service. Do not perform any operations except as explained here. If a setting is changed, correct measurement can no longer be performed.



⑥ Open the 541: Port window. Press **Operation check** in “500: Service Menu window”, and when the “540: Status window” opens, press **Port**.



⑦ Open the solenoid valve. Press **SV25** on the 1/3 page of the “541: Port window”, and highlight it (**SV25** , ON, open) by pressing.

- On/off setting in the “541: Port window” is cancelled automatically when moving to another window.

⑧ Run the syringe pump. Open 2/3 Page of the “541: Port window” by pressing **↓** on the 1/3 Page, and press **P22** to highlight it (**P22** , ON).

- The syringe pump starts operation to accelerate the purging of bubbles in silicon oil.

⚠ WARNING

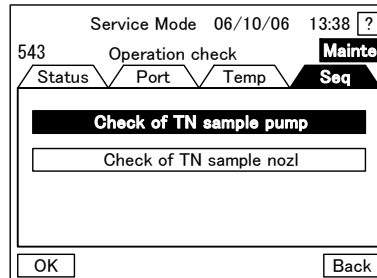
Injury

- Do not touch moving parts during the syringe pump operation. Fingers may be caught and injured.

⑨ **Check that there are no bubbles.** Check that there are no bubbles in the tube from the oil tank to syringe pump as well as within the syringe.

- Bubbles may deteriorate reproducibility of the syringe pump.

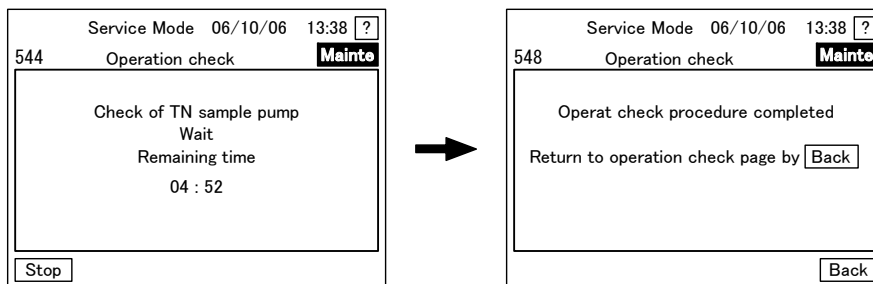
⑩ **Perform operation check of the syringe pump.** Open the “543: Sequence window” by pressing **Seq** in “541: Port window”, and press **Check of TN sample pump**.



543: Sequence Window

⑪ **Check completion of operation check.** Check that the “548: Operation check Completed window” is opened.

- The drive board of the syringe pump stops at the home position.



544: Operation Check in Progress Window 548: Operation Check Completed Window

⑫ **Open/close the solenoid valve.** Press **Back** on “548: Operation check Completed window” to open the “543: Sequence window”, press **Port**, and press **SV25** once on the 1/3Page of “541: Port window” to go back to the normal display (white background, dark blue letters). Press it again to highlight it (**SV25**, ON, Open).

⑬ **Adjust the liquid level.** Inject silicon oil with a glass syringe so as to adjust the liquid level in the oil tank within the permissible range:

【IMPORTANT】 • Do not set the oil tank liquid level higher than the maximum position. Otherwise, silicon oil flows out excessively.

⑭ **Check the float and reconnect the tube.** Check that the float in the tube goes up and down at the almost same height as the oil tank liquid level. Then, connect the tube to the elbow joint in a higher section of the syringe pump as was originally connected.

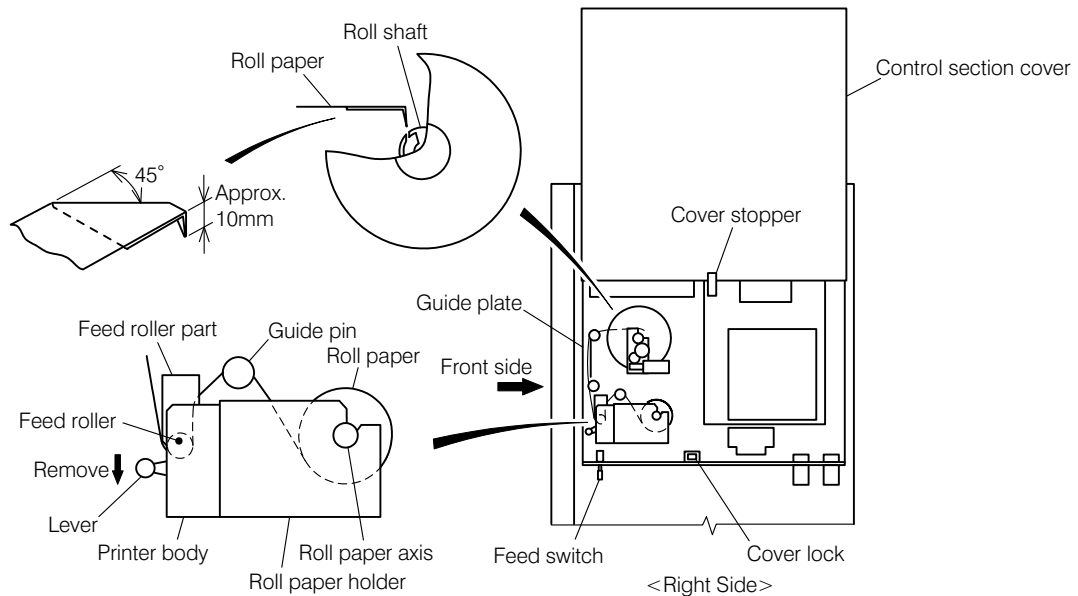
- Check the filling level of the oil by the float.

⑮ **Return to “000: Home window”.** Press **HOME** or **Back** in “500: Service Menu window”, which opens after pressing **Back** in “541: Port window”.

(3) Loading of roll paper

For a product equipped with a printer (option), load printer roll paper delivered with the product (hereafter “roll paper”) at the time of test run adjustment. Replenish when the roll paper runs short.

- ① **Stop the operation.** If operating (measurement, calibration, or cleaning), stop it. The system opens “000: Home window”. ▷ Section 4.4 (1) “Reservation of operation stop” or section 4.3 (8) “Emergency stop of the operation”.
- ② **Raise the control section cover.** Slide the cover lock knob under the control section, pull the cover upward slowly, and when the cover stopper pops up, place the control section cover in the cover stopper groove.



Loading of the Roll Paper

- ③ **Set the roll paper on the roll paper holder.** Insert the roll paper into the roll shaft and set it on the roll paper holder as shown in the picture.
- ④ **Put the paper end through feed roller.** Push down the lever and temporarily remove the feed roller part upward and return the feed roller part to the printer body while pushing the feed roll paper against the feed roller.
 - Set the roll paper in such a manner that the outer side of the rolled paper comes to the front side of the product.
- ⑤ **Take out the roll shaft.** Take out the roll shaft.
 - Take out any remaining recorded roll paper on the roll shaft.
- ⑥ **Fold the edge of the roll paper.** As shown in the picture, fold the edge of the new roll paper at a 45-degree angle, and then fold the tip of it again about 10mm.
- ⑦ **Tuck the paper into the roll shaft.** Bring the paper through the upper guide and tuck the edge into the groove of the roll shaft. Rotate the shaft two or three times to wind it safely.
- ⑧ **Check the winding status.** Press the feed switch and check that the roll paper is fed properly.
- ⑨ **Replace the control section cover.** Shift the control section cover once, rotate the cover stopper to push it inside, and put down the cover.
 - Cover lock is activated.

⑩ **Start measurement.** Different procedures are needed for the test run adjustment and for later operation.

- For test run adjustment: ▷ Back to the procedures of section 3.1 (1) “Procedures for test run adjustment”.
- To resume measurement: ▷ Sections 4.3 (1) “Start of automatic measurement”, 4.3 (2) “Start of manual measurement,” 4.3 (4) “Start of manual cleaning,” 4.3 (3) “Start of manual calibration”.

(4) Check of operating conditions

(a) Operating conditions and factory-set values

- (i) Operating (measurement, calibration, and cleaning) conditions are as per the table “Operation condition items and factory-set values”. Usually, products are set according to the order specification before shipment. For verification, see section 3.1 (4) (b) “Procedures to check the operating conditions”.
- (ii) The product is either a single-stream type or double-stream type, and the setting depends on the type. On the screen for single-stream products, no setting items for Stream 2 are displayed.
- (iii) Some items are not available in external starting (via contact input) mode.

Operating Condition Items and Factory-set Values

/	Factory set value	Items not displayed for single-stream type	Items which are disabled in External Start mode	Reference item.
[Measurement Conditions]				
B00 Operation Stop Reservation	Operation		○	4.4 (1) Reservation of operation stop
B01 Measurement Start Mode	Default		○	4.4 (2) Changing the measurement-starting mode
B02 Measurement Cycle	6 min		○	4.4 (3) Changing the measurement cycle
B03 Date Adjustment	Current date			4.4 (4) Date adjustment
B04 Time Adjustment	Current time			4.4 (5) Time adjustment
B05 Key Operation Sound	On			4.4 (6) Disabling the key operation sound
B06 Error Display	Off			4.4 (7) Automatic error display
B07 Logo Display	With			4.4 (8) Hiding the logo mark at the time of power-on
B08 Backlight	Always ON			4.4 (9) Changing the backlight time
B09 Contrast	0			4.4 (10) Changing the contrast
B10 Printer function (option)	On			4.4 (11) Disabling the printer function
B11 Communication function	Off			4.4 (12) Enabling the communication function

(To be continued)

(Continued from previous page)

	Factory set value	Items not displayed for single-stream type	Items which are disabled in External Start mode	Reference item.
B12 External starting	Off			4.4 (13) Enabling the external starting • Turn it off in case of internal starting, while turn it on in case of external starting.
B13 Measurement-Starting Stream	Stream 1	<input type="radio"/>	<input type="radio"/>	4.4 (14) Changing the measurement-starting stream
B14 Stream 1 Measurement Times	Once	<input type="radio"/>	<input type="radio"/>	4.4 (15) Changing the measurement times of stream 1
B15 Stream 2 Measurement Times	Once	<input type="radio"/>	<input type="radio"/>	4.4 (16) Changing the measurement times of stream 2
B20 Manual Operation Measurement Solution	“Stream” or “Stream 1”		<input type="radio"/>	4.4 (17) Changing the manual operation measurement solution
B21 Measurement Range or B21 Measurement Range 1	As per the Spec			4.4 (18) Changing the measurement range for stream 1
B22 Measurement Range 2	As per the Spec	<input type="radio"/>		4.4 (19) Changing the measurement range for stream 2
B23 Upper Limit Alarm or B23 Upper Limit Alarm 1	1000mg/L			4.4 (20) Changing the upper alarm for stream 1
B24 Upper Limit Alarm 2	1000mg/L	<input type="radio"/>		4.4 (21) Changing the upper alarm for stream 2
B25 Calibration Solution Replenishment	100%			4.4 (22) Changing the calibration solution volume
B26 Calibration Solution Alarm Level	0%			4.4 (23) Changing the calibration solution alarm level
B27 Dilution Rate or B27 1 Dilution Rate	As per the Spec			4.4 (24) Changing the dilution rate for stream 1
B28 2 Dilution Rate	As per the Spec	<input type="radio"/>		4.4 (25) Changing the dilution rate for stream 2
B29 2 Dilution Error Coefficient	Shipment adjustment value	<input type="radio"/>		4.4 (26) Changing the dilution error factor for stream 2
B30 Water receiving tank failure print output	On			4.4 (27) Change the water receiving tank failure print output
(Calibration Conditions)				
C00 Next Calibration Start Date	One day later		<input type="radio"/>	4.5 (1) Changing the next calibration start date
C01 Next Calibration Start Time	1 o'clock		<input type="radio"/>	4.5 (2) Changing the next calibration start time
C02 Zero Calibration Times	3 times			4.5 (3) Changing the zero calibration times
C03 Span Calibration Times	3 times			4.5 (4) Changing the span calibration times
C04 Zero Calibration Deletion Times	Once			4.5 (5) Changing the zero calibration deletion times

(To be continued)

(Continued from previous page)

	Factory set value	Items not displayed for single-stream type	Items which are disabled in External Start mode	Reference item.
C05 Span Calibration Deletion Times	Once			4.5 (6) Changing the span calibration deletion times
C20 Calibration cycle	14 days		○	4.5 (7) Changing the calibration cycle
C21 Calibration Solution Concentration	As per the Spec			4.5 (8) Changing the calibration solution concentration
C22 Zero Deviation	Shipment adjustment value			4.5 (9) Changing the zero deviation
C23 Span Factor	Shipment adjustment value			4.5 (10) Changing the span factor
C24 Zero Upper Limit	2.00			4.5 (11) Changing the alarm values for calibration error
C25 Zero Lower Limit	-0.50			
C26 Span Upper Limit	0.50			
C27 Span Lower Limit	0.05			
[Cleaning Conditions]				
E00 Next Cleaning Start Time	1 o'clock		○	4.6 (1) Changing the next cleaning start time
E01 Next Cleaning Start Time	0 min		○	4.6 (1) Changing the next cleaning start time
E02 Automatic Cleaning Cycle	24 hours		○	4.6 (2) Changing the cleaning cycle
E03 Standby Time for External Processing	0 min			4.6 (3) Changing the standby time for external processing
E04 P24 Normal Operation	Off			4.6 (4) Changing the diaphragm pump (P24) into normal operation

○: Applicable item

(b) Procedures to check the operating conditions



(i) Use the following procedure to check that the product setting is as per the Table “Operating condition items and factory-set values”

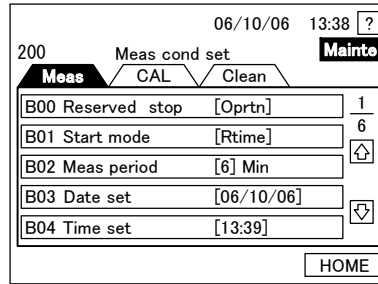
(ii) If a change is necessary, follow the instruction of the referenced section.

① **Enter the Setting Mode.** Press (or touch) **Setting** in “000: Home window”, “111: Automatic Measurement window”, “121: Manual Measurement window”, or “123: Manual Calibration window”.

- It opens the “200: Measurement Conditions Setting window”.



② **Check the measurement conditions.** Check that **Meas** is highlighted in “200: Measurement Conditions Setting window”, and check each set value (within []) displayed in “B00: Operation Stop Reservation” and later.

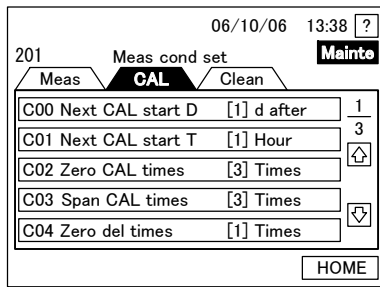
- Toggle the page by pressing  or .



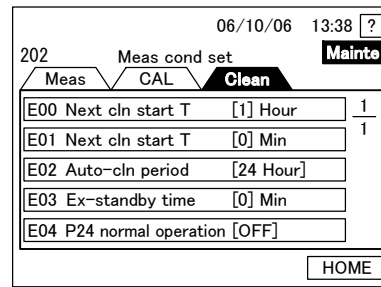
200: Measurement Conditions Setting Window

③ **Check the calibration conditions.** Press **CAL** in “200: Measurement Conditions Setting window” to check the set values of “C00: Next Calibration Start Date” and later in 201: Calibration Conditions Setting, which opens then.

- Toggle the page by pressing  or .



201: Calibration Conditions Setting Window



202: Cleaning Conditions Setting Window

④ **Check the cleaning conditions.** Press **Clean** in “201: Calibration Conditions Setting window” to check the set values of “E00: Next Calibration Start Date” and later in “202: Cleaning Conditions Setting window”, which opens then.

⑤ **Return to the original screen.** Press **HOME** or **Back** in “202: Cleaning Conditions Setting window”.

3.2 External Input/Output Signals and Loop Check

(1) Classification of external input/output signals

- (a) As shown in the table below, external input/output signals can be classified into transmission outputs, contact outputs, and contact inputs. All contact inputs except for “External Unit Busy signals” are intended for external starting.
- (b) Normally, signals are assigned to the terminal numbers as shown in the table. They may be changed according to the order specification.
- (c) For description of each signal, see section 3.2 (2) “Transmission output and loop check” and later.

Classification of External Input/Output Signals

Type	Terminal No.	Signal Name	Abbreviation	Conditions, etc.
Transmission output	70 (+)-71 (-)	Stream 1 Measurement Value output signal	TN1 Concentration	▷ 3.2(2) “Transmission output and loop check”
	72 (+)-73 (-)	Stream 2 Measurement Value output signal	TN2 Concentration	
	74 (+)-75 (-)	(no signal assigned)	No Selection	
	76 (+)-77 (-)	(no signal assigned)	No Selection	
Contact output	30-31	Power OFF signal	—	Signal assignment: Signal assignment of each terminal may be changed according to the order spec. However, 30-31 is fixed. ▷ 3.2 (3) “Contact output and loop check”
	30-32	Maintenance in Progress signal	Maintenance in Progress	
	30-33	Calibration in Progress signal	Calibration in Progress	
	30-34	Minor Alarm signal	Minor Alarm	
	40-41	Major Alarm signal	Major Alarm	
	40-42	Stream 1 Concentration Error signal	Concentration Error 1	
	40-43	Stream 2 Concentration Error signal	Concentration Error 2	
	40-44	Cleaning in Progress signal	Cleaning in Progress	
	40-45	(no signal assigned)	No Selection	
	—	Stream 1 measurement in progress signal	—	
—	Stream 2 measurement in progress signal	—		
Contact input	50-51	Measurement Stop signal (pulse)	Measurement Stop	Signal assignment: Signal assignment of each terminal may be changed according to the order spec. ▷ 3.2 (4) “Contact input and loop check”
	50-52	Measurement Start signal (pulse)	Measurement Start	
	50-53	Calibration Start signal (pulse)	Calibration Start	
	50-54	Stream Selection signal (option)	Stream Selection	
	50-55	Cleaning Start signal (pulse)	Cleaning Start	
	—	External Unit Busy signal	External BUSY	
	—	(no signal assigned)	No Selection	

(2) Transmission output and loop check

- (a) There are four systems of transmission output terminals. As shown in the table below, two or three signals (including “no selection”) are assigned to each. Since there may be some changes due to the order specifications, check it in the “533: Transmission Adjustment window” in Service Mode.
- (b) Follow the procedure to check the signals assigned to each channel, output test current (4 to 20 mADC), and check the transmission output value at the control room side.
- (c) Naturally, no loop check for Stream 2 Measurement Output signal is necessary for a single-stream unit.

Operation of Transmission Output Signals

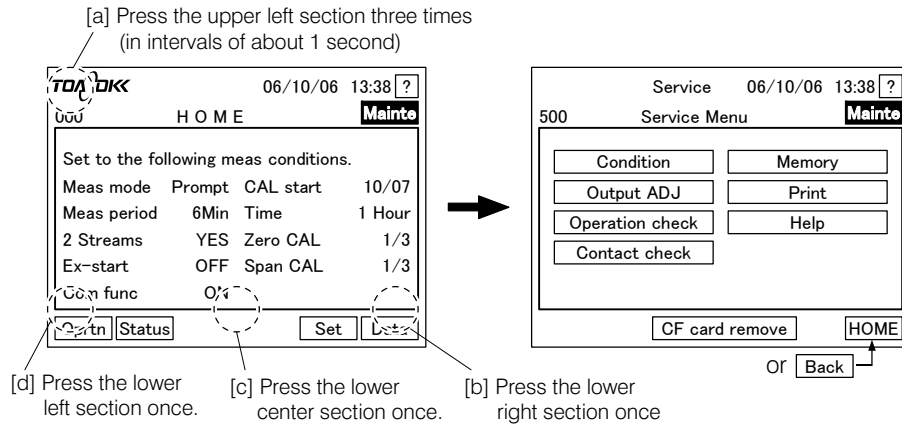
Terminal No.	Signal Name (Abbreviation)	Description of Operation
70 (+)-71 (-)	Stream 1 Measurement Value output signal [TN1 Concentration]	<ul style="list-style-type: none"> • Outputs the measured total nitrogen value (of Stream 1 in case of a double-stream unit). • Data are updated based on calculation result of every measurement (minimum 5min). • The latest Stream 1 measured value is maintained during calibration and cleaning. • For a double-stream unit, the latest Stream 1 measured value is maintained during measurement in Stream 2.
72 (+)-73 (-)	Stream 2 Measurement Value output signal [TN2 Concentration] (For double-stream units)	<ul style="list-style-type: none"> • Outputs the measured total nitrogen of Stream 2 for double-stream units. • Data are updated based on calculation result of every measurement (minimum 5min) • The latest Stream 2 measured value is maintained during calibration and cleaning • For a double-stream unit, the latest Stream 2 measured value is maintained during measurement in Stream 1.
74 (+)-75 (-)	(no signal assigned) [No Selection]	• Spare terminal
76 (+)-77 (-)	(no signal assigned) [No Selection]	• Spare terminal

① Go to “000: Home window”. Stop operation in progress (measurement, calibration, or cleaning), if any.

- In case of Internal Starting: Stop by means of Operation Stop Reservation or Emergency Stop.
 - ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”
- For External Starting: Stop input of measurement start signals from the control room, and wait until “000: Home window” opens on completion of the current measurement.

② Go to Service Mode. Press the upper left section of “000: Home window” three times (in intervals of about 1 second), then the lower right, lower center, and lower left sections once each in that order.

- “500: Service Menu window” opens.



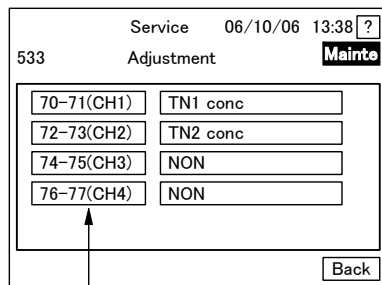
000: Home Window

500: Service Menu Window

③ Open the “533: Transmission Adjustment window”. Press **Output ADJ** in the “500: Service Menu window”.

【IMPORTANT】 • All windows in the Service Mode are for technical service. Do not perform any operations except as explained here. If a setting is changed, correct measurement can no longer be performed.

④ Check the signals. Check the signals assigned to each transmission output terminal in the “533: Transmission Adjustment window”.



- Terminals 70 - 71: Stream 1 measured value output signals
- Terminals 73 - 74: Stream 2 measured value output signals
- Terminals 74 - 75: No assigned signal (spare)
- Terminals 76 - 77: No assigned signal (spare)

— If pressed, the Transmission Check window opens.

533: Transmission Adjustment Window

⑤ Open the “Transmission Check window”. Press inside the frame of the terminal number to check (left part of the main display) “533: Transmission Adjustment window”.

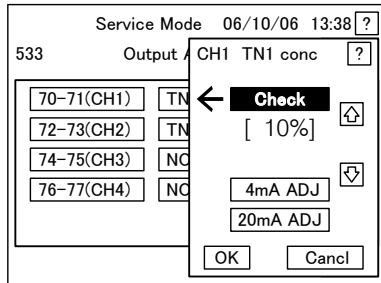
【IMPORTANT】 • Do not touch the signals on the right. If touched inadvertently, press **Cancel** on the display to redo the operation from ④.

⑥ Set the percentage. Press **Check** in the “Transmission Check window” to highlight it, and use **↓** and **↑** to change the display under **Check** to the desired percentage (%) to output.

- Current (4 to 20mADC) corresponding to the displayed percentage is output from the relevant terminal.

Percent and Test Current for Transmission Check

Transmission Check %	0	10	20	30	40	50	60	70	80	90	100
Output Current 4 to 20mADC	4.0	5.6	7.2	8.8	10.4	12.0	13.6	15.2	16.8	18.4	20.0



[Typical screenshot]
4 to 20mADC current (10% test current) is output from Terminal 70-71 (Channel 1)

Transmission Check Window

[%]: Current output rate, assuming the range of 4 to 20mADC as 100%

⬆️: Current output rate goes up in increments of 10%

⬇️: Current output rate goes down in decrements of 10%

【IMPORTANT】 • Do not touch **4mA ADJ** or **20mA ADJ**. If touched inadvertently, press **Cancel** on the display to redo the operation from ④. If adjustment of 4mA and 20mA is necessary for the product, contact a technical service company.

⑦ **Check in the control room.** Check in the control room that proper output current is received.

- For any deviation, adjust the 4mA and 20mADC values in the control room, if possible.

⑧ **Finish checking.** Upon completion of the check in the control room, press **OK** in the Transmission Check window.

- The “533: Transmission Adjustment window” will open.

⑨ **Check also other channels.** Repeat the procedures from ⑤ to ⑧ and check other transmission outputs.

⑩ **Go back to 500: Service Menu.** Press **Back** in the “533: Transmission Adjustment window”.

- To perform a loop check following this, proceed with operations in section 3.2 (3) “Contact output and loop check” here.

⑪ **Go back to the 000.** Home window: Press **HOME** in “500: Service Menu window”.

(3) Contact output and loop check

(a) There are nine systems of contact output terminals. As shown in the table below, nine signals (including “no selection”) are assigned. Since there may be changes due to order specifications, check in the “550: Contact Output Check window” in Service Mode.

(b) Use the procedures to check assignment of each contact output, and output test signals (On/Off) for necessary contact outputs to check the contact output status in the control room.

Description of Contact Output Signals

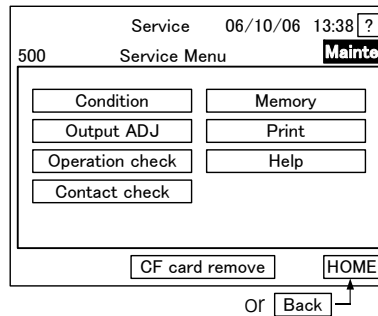
Terminal No.	Signal Name (Abbreviation)	Description of Operation
30-31	Power Cut signal [-]	<ul style="list-style-type: none"> • Outputs “Break Contact” when the power is cut off. • Informs outside that this product is not in operation. • This signal is fixed to Terminal 30-31.
30-32	Maintenance in Progress signal [Maintenance in Progress]	<ul style="list-style-type: none"> • Outputs “Break Contact” when Mainte is on as the operation status display. Indicates mainly that automatic measurement is not in progress. ▷ 1.2 Windows and Key Functions
30-33	Calibration in Progress signal [Calibration in Progress]	<ul style="list-style-type: none"> • Outputs “Break Contact” when CAL is on as operation status display. Indicates mainly that automatic calibration by internal timer or external control is in progress. ▷ 1.2 Windows and Key Functions
30-34	Minor Alarm signal [Minor Alarm]	<ul style="list-style-type: none"> • Outputs “Break Contact” when a minor alarm status occurs, including cut-of of zero water. ▷ Section 6.1 Alarm by Self-diagnosis • In most cases, measurement is continued.
40-41	Major Alarm signal [Major Alarm]	<ul style="list-style-type: none"> • Outputs “Break Contact” when a major alarm status occurs, including sampling pump error 1. ▷ Section 6.1 Alarm by Self-diagnosis • In most cases, measurement is discontinued.
40-42	Stream 1 Concentration Error signal [Concentration Error 1]	<ul style="list-style-type: none"> • Outputs “Break Contact” when total nitrogen value measured for a single-stream unit or for Stream 1 of a double-stream unit exceeds the value of “B23 Upper Alarm 1.” • Automatic measurement is continued.
40-43	Stream 2 Concentration Error signal [Concentration Error 2] (For double-stream units)	<ul style="list-style-type: none"> • Outputs “Break Contact” when total nitrogen value measured for Stream 2 of a double-stream unit exceeds the value of “B24 Upper Alarm 2.” • Automatic measurement is continued.
40-44	Cleaning in Progress signal [Cleaning in Progress]	<ul style="list-style-type: none"> • Outputs “Break Contact” when Under [Cleaning in Progress] is on as operation status display. Indicates mainly that automatic cleaning by internal timer or external control is in progress. ▷ 1.2 Windows and Key Functions
40-45	No signal assigned [No selection]	<ul style="list-style-type: none"> • Spare terminal
—	Stream 1 measurement in progress signal	<ul style="list-style-type: none"> • Outputs “Break Contact” when stream 1 is measured.
—	Stream 2 measurement in progress signal	<ul style="list-style-type: none"> • Outputs “Break Contact” when stream 2 is measured.

(c) Naturally, no loop check is necessary for contact output indicated as “No selection” or for Stream 2 Measurement Output signal of a single-stream unit.

① Go to “000: Home window”. ▷ ① of section 3.2 (2) “Transmission output and loop check”

② Go to Service Mode. ② of section 3.2 (2) “Transmission output and loop check”

③ Go to the “550: Contact Output Check window”. Press **Contact check** in the “500: Service Menu window”.

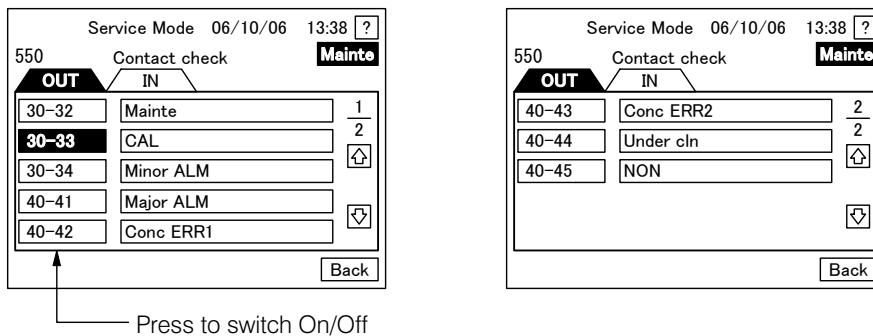


500: Service Menu Window

【IMPORTANT】 • All windows in the Service Mode are for technical service. Do not perform any operations except as explained here. If a setting is changed, correct measurement can no longer be performed.

④ Check signal items. Press or in “550: Contact Output Check window” to toggle the page, and check the signal assigned to each contact output.

- For description of signals, see “External Input/Output Signals”.
- If is in normal display (black letters), highlight it (white letters) by pressing it.



550: Contact Output Check Window

⑤ Check the contact signal in the control room. When the relevant terminal number within the frame is in normal display (black letters), check that the control room receives OFF (open) signals. Next, press the same terminal number within the frame to highlight it (white letters), and check that the control room receives “on” (break) signals.

- Normal display (black letters) The contact output is OFF (open).
- Highlight display (white letters) The contact output is ON (break).

【IMPORTANT】 • Do not touch the signals on the right. If touched inadvertently, press on the display to go back to the previous screen.

⑥ Check other contact outputs. Repeat the procedures for 4 to check for other contact outputs and that reception by the control room is successful.

⑦ Go back to the “500: Service Menu window”. Press in the “550: Contact Output Check window”.

⑧ Go back to the “000: Home window”. Press in the “500: Service Menu window”.

⑨ Check Power Cut signal. Turn off the power switch in the same manner as in a short-circuit test, and check that the signal of the contact output terminal 30-31 is ON (break) in the control

room. ▷ Section 6 “Perform a short-circuit test” of section 3.1 (1) “Procedures for test run adjustment”.

(4) Contact input and loop check

(a) Control the product without using the internal timer, by inputting contact signals from the control room.

(b) There are five systems of contact terminals. As shown in the table below, five signals out of seven (including “no selection”) are assigned. Since there may be changes due to order specifications, check it in the “551: Contact Input Check window” in Service Mode.

Operation Description of Contact Input Signals

Terminal No.	Signal Name (Abbreviation)	Description of Operation
50-51	Measurement Stop signal [Measurement Stop]	<ul style="list-style-type: none"> • Performs emergency stop of automatic measurement, automatic calibration, or automatic cleaning by a Break contact pulse input. Same as “Emergency stop” in the 180: Measurement Stop Start window. • In standby status, the unit stops immediately. During measurement, calibration, or cleaning, it stops after recovery process. • Once Measurement Stop is pressed, no contact input signal is received until Start is pressed in “110: Automatic Measurement Start window”.
50-52	Measurement Start signal [Measurement Start]	<ul style="list-style-type: none"> • One automatic measurement with external starting is started or reserved by a Break contact pulse input. • Measurement is made under the conditions set in “200: Measurement Conditions Setting window”. • After the measurement, the unit goes into standby for external starting.
50-53	Calibration Start signal [Calibration Start]	<ul style="list-style-type: none"> • One automatic calibration (external starting) is started or reserved by a Break contact pulse input, which is the same as pressing Start in the “122: Manual Calibration Start window”. • Calibration is done in conditions set in “201: Calibration Conditions Setting window”. Therefore, “C02 Zero Calibration Times” and “C03 Span Calibration Times” apply. • Upon calibration completion, the unit goes into standby for external starting.
50-54	Stream Selection signal [Stream Selection] (option)	<ul style="list-style-type: none"> • Switches the stream for automatic measurement. Stream 1 is measured in case of an Open Contact input, while Stream 2 is measured in case of a Break Contact input. Uses Measurement Start signal together.
50-55	Cleaning Start signal [Cleaning Start]	<ul style="list-style-type: none"> • One automatic cleaning (external starting) is started or reserved by a Break Contact pulse input, which is the same as pressing Start after selecting “Cleaning 1” in the “130: Manual Cleaning Start window”. • “E02 Standby Time for External Processing” in the “202 Cleaning Conditions Setting window” applies. • After cleaning, the unit goes into standby for external starting.

(To be continued)

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Terminal No.	Signal Name (Abbreviation)	Description of Operation
—	External Unit Busy signal [External BUSY]	<ul style="list-style-type: none"> • Measurement Start signal is cancelled by Break Contact pulse input, after completion of automatic measurement in progress. It is intended for timing detection for synchronization with an external unit, such as a pre-treatment unit. • This contact input is effective also when “B12 External Starting” is off (disabled), and can be used for internal starting.
—	No signal assigned [No selection]	<ul style="list-style-type: none"> • When no relevant contact input system is used.

(c) Follow the procedure to check the assigned contact input, and check the reception status in the control room for necessary contact input by means of the test signals (on/off).

- When operating with internal starting, loop check for this contact input is not necessary. Only External Unit Busy signal can be used also for internal starting.

(d) Naturally, no loop check is necessary for terminals indicated “No selection,” contact input with no assignment, such as External Unit Busy signal, or for Stream 2 Measurement Output signal of a single-stream unit.

(e) Priority in case of input of more than one contact signal, such as measurement start, calibration start, and cleaning start, is as per “Priority in case of more than one contact input signal.”

Priority in Case of More Than One Contact Input Signal

Condition		External Starting			Flow of operation
		Automatic Measurement Start	Automatic Calibration Start	Automatic Cleaning Start	
In Standby	Single	Starts immediately	Starts immediately	Starts immediately	Each operation starts immediately.
During Automatic Measurement	Single	One reservation	One reservation	One reservation	Executed after measurement completion
	Triple	Invalid	One reservation	One priority reservation	First cleaning and then calibration after measurement completion
	Double 1	One reservation	One reservation	One priority reservation	First cleaning and then calibration after measurement completion
	Double 2	One reservation	One reservation	One priority reservation	First cleaning and then calibration after measurement completion
	Double 3	One reservation	One priority reservation	One priority reservation	First calibration and then measurement after measurement completion
During Automatic Calibration	Single	One reservation	Invalid	One reservation	Measurement or cleaning after calibration completion
	Triple	One reservation	Invalid	One priority reservation	First cleaning and then calibration after calibration completion
	Double 1	One reservation	Invalid	One reservation	Cleaning after calibration completion

(To be continued)

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Condition	External Starting			Flow of operation	
	Automatic Measurement Start	Automatic Calibration Start	Automatic Cleaning Start		
	Double 2	One reservation	/	One priority reservation	First cleaning and then calibration after calibration completion
	Double 3	One reservation	Invalid	/	Measurement after calibration completion
During Automatic Cleaning	Single	One reservation	One reservation	Invalid	Measurement or calibration after cleaning completion
	Triple	One reservation	One priority reservation	Invalid	First calibration and then measurement after cleaning completion
	Double 1	/	One reservation	Invalid	Calibration after cleaning completion
	Double 2	One reservation	/	Invalid	Measurement after cleaning completion
	Double 3	One reservation	One priority reservation	/	First calibration and then measurement after cleaning completion

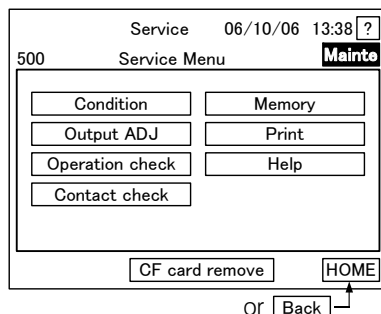
- Single: means that only one operation such as Measurement Start should be started.
- Triple: means that measurement, calibration, and cleaning are scheduled to start at the same time.
- Double: means that two operations (such as measurement and calibration) are scheduled to start at the same time.
- After execution of measurement, calibration, or cleaning, the system goes into standby status.

① Go to the “000: Home window”. ▷ ① of section 3.2 (2) “Transmission output and loop check”.

② Go to Service Mode. ▷ ② of section 3.2 (2) “Transmission output and loop check”.

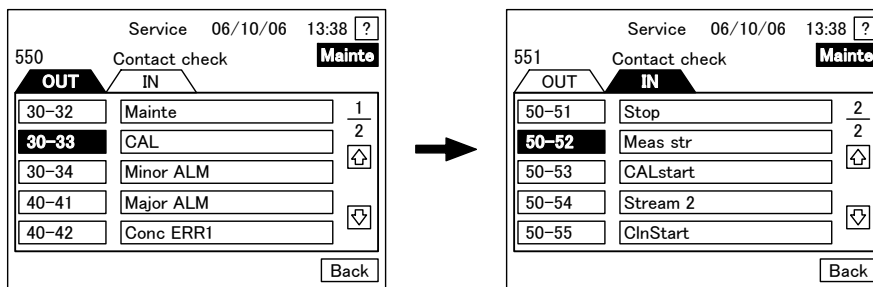
[IMPORTANT] • All windows in the Service Mode are for technical service. Do not perform any operations except as explained here. If a setting is changed, correct measurement can no longer be performed.

③ Go to the 550: Contact Output Check window. Press Contact check in the “500: Service Menu window”.



500: Service Menu Window

④ Go to the “551: Contact Input Check window”. Press IN in the “550: Contact Output Check window” to highlight it.



550: Contact Output Check Window

551: Contact Input Check Window

⑤ **Check signals.** Check signals assigned to each terminal number in “551: Contact Input Check window”.

- For description of signals, see section 3.3 (1) “Selection of startup method”.

⑥ **Check the contact signals from the control room.** Input the pulse signal of the target input signal, or switch the input signal on/off from the control side to check in “551: Contact Input Check window” that the display of the relevant terminal number frame display status is as follows:

- Normal display (black letters): Contact input is off (open)
- Highlight display (white letters): Contact input is on (break). For a pulse input, it is highlighted only for a short time (about 1 second).

【IMPORTANT】 • Do not touch the signals on the right of the main display. If touched inadvertently, press **Cancel** on the display to go back to the previous screen.

⑦ **Check other output inputs.** Repeat the procedures in “⑥” to check for other contact inputs and that reception at the control room is successful.

⑧ **Go back to the 000: Home window.** Press **Back** in the “550: Contact Output Check window”, and then press **HOME** in the “500: Service Menu window”.

3.3 Selection of Other Operation Methods

(1) Selection of startup method

(a) This product can be started using either of the following methods:

- Internal startup: The product starts measurement, calibration, and cleaning based on the built-in timer (clock function) and preset operating conditions for continuous operation.
- External startup: Contact signals for measurement start are sent from the control room to the product to start continuous operation. The internal timer is disabled.

(b) If you disable (turn off) “B12 External Starting,” one of the measurement conditions, the system goes into Internal Starting mode, while it goes into External Start mode when it is enabled (on).
 ▷ Section 4.4 (13) “Enabling the external starting”

(c) For external starting, press **Start** in “110: Automatic Measurement Start (for single-stream) window” or the “112: Automatic Measurement Start window (for double-stream)” while “B12 External Starting” is enabled (on). The system goes into external start status, getting ready to receive contact input signals.

(d) To cancel external starting status, disable (off) “B12 External Starting”.

【IMPORTANT】 • You cannot cancel the external start status by inputting a measurement stop signal in External Start mode. Disabling (turning off) of “B12 External Starting” is necessary.

(e) Contact inputs for external starting include the following signals: ▷ Section 3.2 (4) “Contact input and loop check”
 Measurement start, calibration start, stream selection, external unit busy, Cleaning start, measurement stop

(2) Selection of the measurement method

(a) Measurement methods fall into several types as shown in the table below. Though the manner of measurement start is different, content of one measurement is the same for all types. ▷ Section 7.2 (3) “Time chart.”

(b) Manual measurement can be used for test run adjustment and maintenance works.

Measurement Types

Type	Condition of use	Operation or Method	Reference
Internally-started Automatic Measurement	Internally-started Automatic measurement	[Start by the built-in timer] The built-in timer automatically starts based on the following measurement conditions: [B01 Measurement Start Mode] [B02 Measurement Cycle] [B12 Measurement-Starting Stream] [B14 Stream 1 Measurement Times] [B15 Stream 2 Measurement Times] • Continued according to the Measurement Cycle	• 4.4 (2) Changing the measurement-starting mode • 4.4 (3) Changing the measurement cycle • 4.4 (14) Changing the measurement-starting stream • 4.4 (15) Changing the measurement times of stream 1 • 4.4 (16) Changing the measurement times of stream 2

(To be continued)

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Type	Condition of use	Operation or Method	Reference
Externally-Started Automatic Measurement	External starting	[Start by contact input] At the time to start measurement, measurement start signal is input from the control room. <ul style="list-style-type: none">• Upon completion of one measurement, the system goes into standby waiting for the next signal.	• 3.2 (4) Contact input and loop check
Manual Measurement	Internal starting, and measurement is stopped.	[Start by key operation] Press Start in the “120: Manual Measurement Start window”. <ul style="list-style-type: none">• Measurement is continued with the minimum measurement cycle (about 5 min)• For a double-stream unit, select a stream.	• 4.3 (2) Start of manual measurement

(3) Selection of the calibration method

(a) Different calibration methods

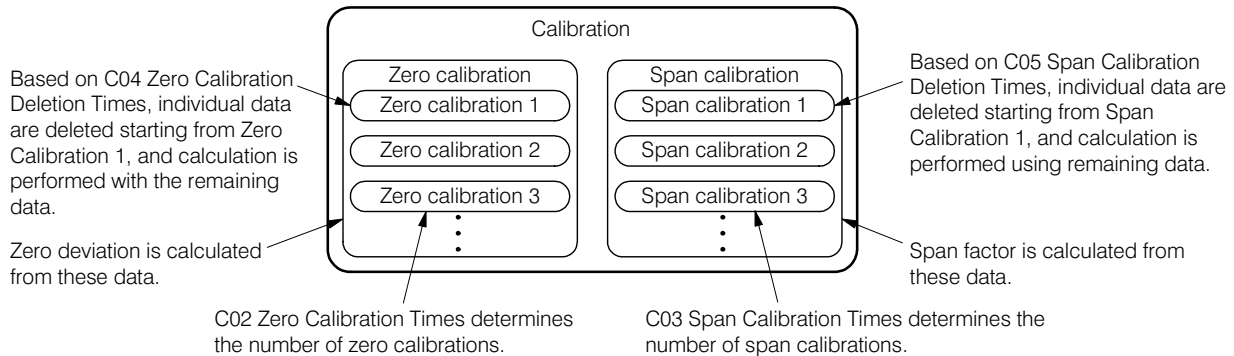
- There are different calibration methods as shown in the table below. Though they are started in a different way, the content of calibration is the same. ▷ Section 3.3 (3)(b) “Overview of calibration”
- Manual calibration can be used for test run adjustment and maintenance works.

Different Calibration Methods

Type	Condition of use	Operation or Method	Reference
Internally-started Automatic Calibration	Internally-started Automatic measurement	[Start by the built-in timer] The built-in timer automatically starts based on the following calibration conditions: [C00 Next calibration date] [C01 Next calibration time] [C20 Calibration cycle] <ul style="list-style-type: none">• Continued according to the calibration cycle	• 4.5 (1) Changing the next calibration start date • 4.5 (2) Changing the next calibration start time • 4.5 (7) Changing the calibration cycle
Externally-started Automatic Calibration	External starting	[Start by contact input] At the time to start calibration, measurement start signal is input from the control room. <ul style="list-style-type: none">• Upon completion of one calibration, the system goes into standby waiting for the next signal.	• 3.2 (4) Contact input and loop check
Manual calibration	Internal starting, and measurement is stopped.	[Start by key operation] Press Start in “122: Manual Calibration Start window”. <ul style="list-style-type: none">• Upon completion of one calibration, the system goes back to “000: Home window”.	• 4.3 (3) Start of manual calibration

(b) Overview of calibration

- This product needs periodic calibration to maintain performance. Calibration involves adjusting the readout of the product for precise display the calibration solution concentration by adjusting the zero-indication in the measurement of the zero calibration solution and adjusting the gradient of the indication during the measurement of the span calibration solution.



Orientation on Calibration Terms

- Explanation of calibration terms are as shown in the figure. Operations where several zero calibrations are performed to calculate the zero deviation is called zero calibration, while performing several span calibration operations to calculate the span factor is called span calibration. Zero- and span calibrations are called “Calibration.”
- The order of calibrations performed by a sequence program is as follows;
 - ① **Execute zero calibration operation 1.** Perform measurement (about 5 min) using the zero calibration solution instead of sample water to obtain a zero deviation value.
 - ② **Repeat zero calibration operation.** Perform so many zero calibration operations as “C02 Zero Calibration Times” (factory-set default: 3 times) to get the zero deviation for each.
 - ③ **Delete individual zero deviation.** Delete so many individual zero deviations as C04 Zero Calibration Deletion Times, starting from the Zero Calibration 1.
 - ④ **Calculate zero deviation.** Get the average of the remaining zero deviations and calculate the final zero deviation, in comparing the average to C24 Zero Upper Limit Alarm and C24 Zero Lower Limit Alarm.
 - Procedures from ① to ④ are called zero calibration.
 - ⑤ **Execute individual span calibration operations.** Perform span calibration operations (about 5 min) using the span calibration solution instead of sample water to obtain the individual span factor.
 - ⑥ **Repeat span calibration operation.** Perform so many span calibration operations as C03 Span Calibration Times (factory-set default: 3 times) to get the span factor for each.
 - ⑦ **Delete individual span factors.** Delete so many span factors as C05 Span Calibration Deletion Times, starting from the Span Calibration 1.
 - ⑧ **Calculate the span factor.** Get the average of the remaining span factors and calculate the final span factor, in comparing the average to C26 Span Upper Limit Alarm and C27 Span Lower Limit Alarm.
 - Procedures from ⑤ to ⑧ are called span calibration.
 - ⑨ **Rewrite the zero deviation and span factor** Rewrite “C22: Zero Deviation” and “C23 Span Factor” in Setting Mode.

(4) Selection of the cleaning method

- (a) There are different cleaning methods as shown in the table below. In internally started automatic cleaning and externally started automatic cleaning, operations are the same as in “Cleaning 1” of manual cleaning apart from the starting method. ▷ Section 7.2 (3) “Time chart”
- (b) Manual cleaning can be used for test run adjustment and maintenance. “Cleaning 2” and “Cleaning 3” of manual cleaning can be used, when the effect of Cleaning 1 is not sufficient.

Different Cleaning Methods

Type	Condition of use	Operation or Method	Reference
Internally-started Automatic Cleaning	Internally-started Automatic measurement	<p>[Start by the built-in timer] The built-in timer automatically starts based on the following cleaning conditions: [E00 Next Cleaning Start Time (hour)] [E01 Next Cleaning Start Time (min)] [E02 Automatic Cleaning Cycle] [E03 Standby Time for External Processing]</p> <ul style="list-style-type: none"> • Continued according to the Automatic Cleaning cycle • Same operation as Cleaning 1 (about 10 min) of manual cleaning • “E04 P24 Normal operation” does not start by built-in timer. 	<ul style="list-style-type: none"> • 4.6 (1) Changing the next cleaning start time • 4.6 (2) Changing the cleaning cycle • 4.6 (3) Changing the standby time for external processing
Externally-started Automatic Cleaning	External starting	<p>[Start by contact input] At the time to start cleaning, cleaning start signal is input from the control room.</p> <ul style="list-style-type: none"> • Upon completion of one cleaning, the system goes into standby waiting for the next signal. • Same operation as Cleaning 1 (about 10 min) of manual cleaning 	<ul style="list-style-type: none"> • 3.2 (4) Contact input and loop check
Manual Cleaning	Internal starting, and measurement is stopped.	<p>[Start by key operation] Press Start in the “130: Manual Measurement Start window”.</p> <ul style="list-style-type: none"> • Select from: Cleaning 1 (about 10 min), Cleaning 2 (about 10 min), Cleaning 3 (about 20 min) • Before Cleaning 2 or 3, preparation of Cleaning Solution 2 is necessary 	<ul style="list-style-type: none"> • 4.3 (4) Start of manual cleaning

(5) Selection of the operation stop method

(a) The following methods stop (cancel) operation (automatic measurement, manual measurement, manual calibration, and manual cleaning). Proceed with the procedures according to the description in the reference section. For external starting, simply stop using a measurement stop signal.

Different Methods to Stop Operation

Type	Condition of use	Operation or Method	Reference
Operation Stop Reservation	Internal starting / to stop after completion of the program in progress	[Stop by Operation Stop Reservation] Set “B00: Operation Stop Reservation” to [Stop].	• 4.4 (1) Reservation of operation stop
Emergency Stop	Internal starting / when there is time for recovery process after emergency stop	[Stop by Emergency Stop] Select Stop after R and press [OK] in the “180: Measurement Stop Start window”.	• 4.3 (8) Emergency stop of the operation
Forced Termination	Internal starting / when forced stop is necessary without time for recovery process	[Stop by Forced Termination] Select Stop now and press [OK] in “180: Measurement Stop Start window”.	• 4.3 (9) Forced termination of the operation
Measurement Stop Signal	In case of external starting	[Stop by a Measurement Stop signal] Input a pulse contact from the control room, etc.	• 3.2 (4) Contact input and loop check

(b) If not an emergency, stop by means of the operation stop reservation.

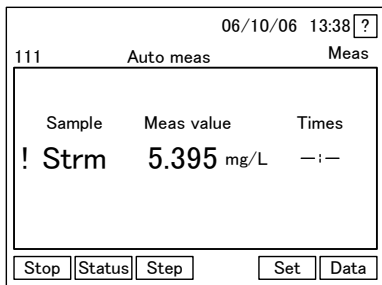
Operation Stop Methods and Measurement Menu for Internal Control

	Auto measurement	Manual measurement	Manual calibration	Manual cleaning
B00 Operation Stop Reservation	○	○	○	○
180 Measurement Stop Start (Emergency stop, forced termination)	○	○	○	○

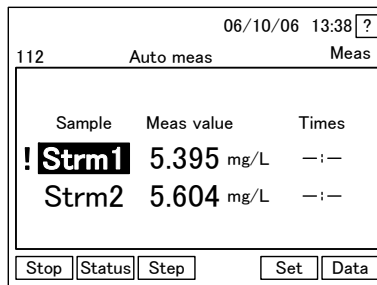
○ : applicable — : not applicable

Since manual cleaning (about 9 min) stops after completion, it is not included in the targets for operation stop reservation. Though you can reserve an operation stop for manual calibration, calibration may be then stopped without executing the preset number of measurements with the calibration solution, and thus the calibration is invalid, depending on the timing. You must be aware of that fact to use this function.

(c) When operation stop is reserved, the “!” mark is displayed in “111: Automatic Measurement in Progress window” to show that the stop is reserved. Upon completion of the operation in progress, such as automatic measurement, the system goes into standby.



111: Automatic Measurement Window for a single-stream unit



112: Automatic Measurement Window for a double-stream unit

Screenshot After Operation Stop Reservation

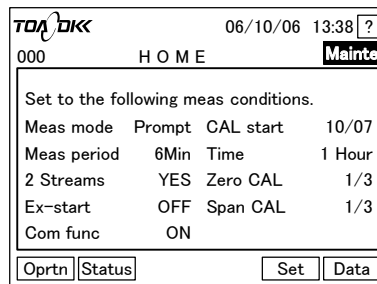
- (d) In case of an emergency stop, the sequence program for automatic measurement is stopped in mid-course, and the system goes into standby after the recovery process.
- (e) For a forced termination, all functions stop without any recovery process. After this operation, turning off/on (reset) of the power switch is necessary each time, in order to bring the product back into the initial status.
- (f) For procedures to resume measurement after operation stop, see section 4.3 (1) “Start of automatic measurement”

3.4 Stop and Restart of Operation

(1) Short-time operation stop and restart

If the scheduled standstill period is within one week, stop the system using the following procedure:

- ① **Reserve operation stop.** ▷ Section 4.4 (1) “Reservation of operation stop”
 - If an emergency stop is required for any reason, see section 4.3 (8) “Emergency stop of the operation”
- ② **Check for operation stop.** Go back to “000: Home window” to check that the operation status display in the upper right of this screen is “Maintenance in Progress”.



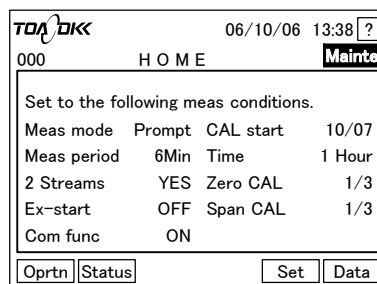
000: Home Window During Maintenance

- ③ **Turn off the power switch.** Turn the knob off (toward the front side of the product)
- ④ **Resume measurement.** When resuming automatic measurement, see section 4.3 (1) “Start of automatic measurement”.

(2) Long-time operation stop and restart

If the scheduled standstill period is longer than one week, stop the system using the following procedure. Solutions for the product have to be moved to some other place, because, otherwise, they may separate out or change in quality during the standstill period.

- ① **Reserve operation stop.** ▷ Section 4.4 (1) “Reservation of operation stop”
 - If an emergency stop is required for any reason, see section 4.3 (8) “Emergency stop of the operation”
- ② **Check for operation stop.** Go back to “000: Home window” to check that the operation status display in the upper right of this screen is “Maintenance in Progress”.



000: Home Window During Maintenance

- ③ **Move chemicals to some other place.** Put the chemicals in the following tanks to other containers.

- Calibration solution tank: Empty remaining span calibration solution into another container to dispose of it in accordance with the applicable law.
- Cleaning solution 1: Move remaining cleaning solution-1 (10% oxalic dehydrate solution) to another container to fill the tank again when resuming operation.
- Cleaning solution 2: Empty remaining cleaning solution-2 (50ppm hypochlorous acid solution) into another container to dispose of it in accordance with the applicable law.
- Supplemental hypochlorous acid tank: Empty remaining cleaning solution-2 (3500ppm hypochlorous acid solution) into another container to dispose of it in accordance with the applicable law.

WARNING

Hazardous Substances

- Cleaning Solution 1 (10% oxalic dehydrate solution) is hazardous. Order a material safety data sheet (MSDS) from the supplier to ensure safe handling in accordance with the instructions.
 - Hypochlorous acid solution is hazardous. Handle it carefully in accordance with the description on the material container.
-

- ④ **Fill the tank with pure water.** Rinse the inside of the empty tanks thoroughly, fill with pure water, attach the cap with the tube as before, and place them in their original position.
- ⑤ **Connect a plastic tank filled with pure water as sample water.** Detach the tube connected to the water-receiving tank from the tank, and put the tube end into a plastic tank filled with pure water.
 - For a double-stream unit, put two tubes in the same plastic tank.
- ⑥ **Clean the sample water system and supplemental hypochlorous acid system with pure water.** Repeat manual measurement (about 5 min/measurement) as many times as shown below. For a double-stream unit, perform this procedure for each stream. ▷ Section 4.3 (2) “Start of manual measurement”
 - If hypochlorous acid is added: 3 to 4 times
 - If no hypochlorous acid is added: About 10 times (Clean also the supplemental hypochlorous acid system)
- ⑦ **Stop manual measurement.** ▷ Section 4.4 (1) “Reservation of operation stop”
- ⑧ **Clean the cleaning system with pure water.** Prepare and fill Cleaning Solution 2 to perform manual Cleaning 3 (about 14 min/cleaning) twice. ▷ Section 4.3 (4) “Start of manual cleaning”
- ⑨ **Stop operation.** Turn off the power switch and the main power switch.
- ⑩ **Stop water supply.** Close the supply main valve for sample, tap, and pure water. Close also the tap-water inlet valve (BV1) and pure-water inlet valve (BV2) of the product.
- ⑪ **Empty the zero-water tank.** Open the valve BV3 under the zero-water tank once, and close it when the zero-water tank has become empty.
- ⑫ **Wash the water-receiving tank manually.** Use a brush or the like to wash the water-receiving tank.
 - When draining water used for cleaning, open valves BV4 and BV5 once.

⑬ **Empty each tank.** Drain pure water in the following tanks, and attach the cap with the tube firmly to avoid intrusion of dust:
Calibration solution tank, cleaning solution 1 tank, cleaning solution 2 tank, supplemental hypochlorous acid tank

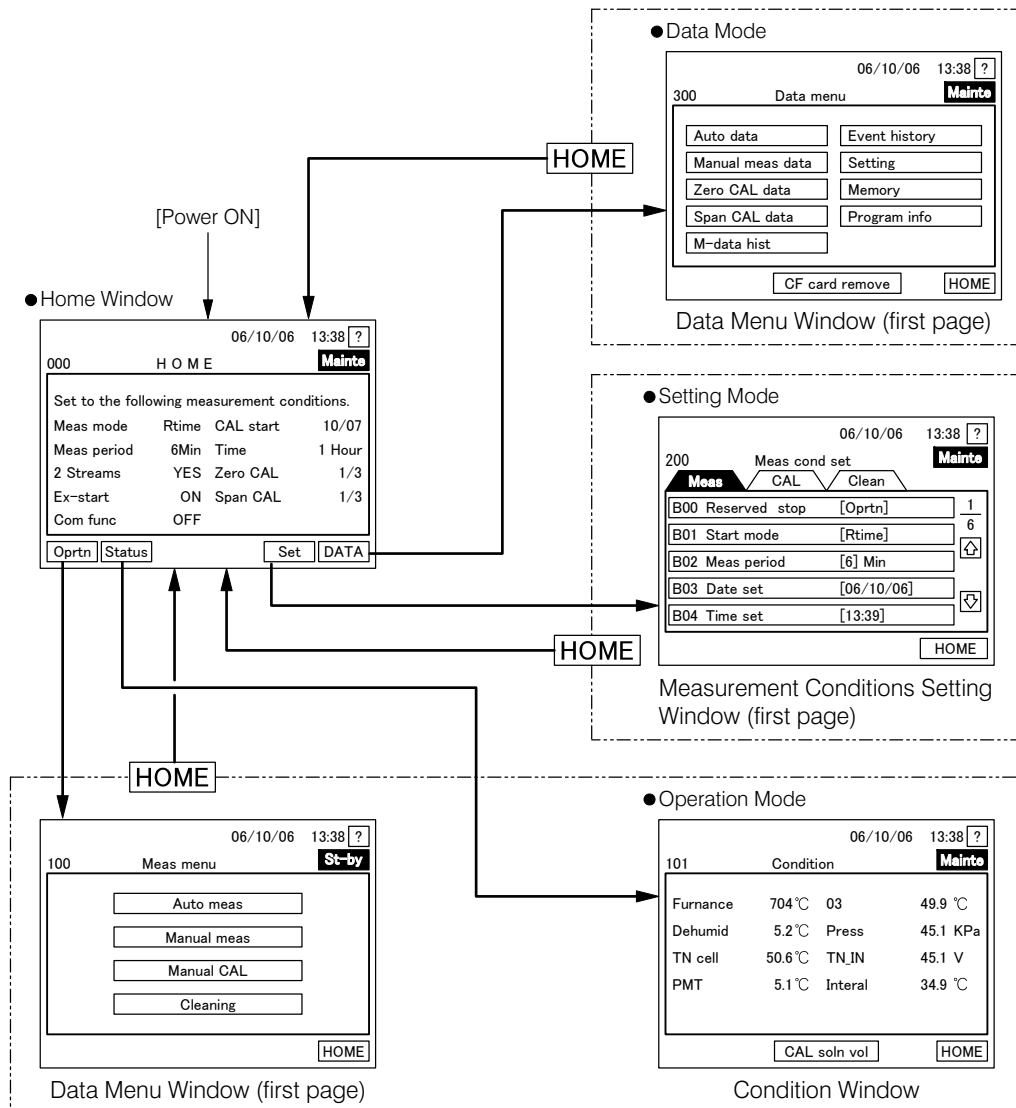
Now the system is ready for long-term storage. When resuming operation, proceed with the procedures in section 3.1 “Test Run Adjustment.”

4. Individual Operation

4.1 Mode and Navigation Map

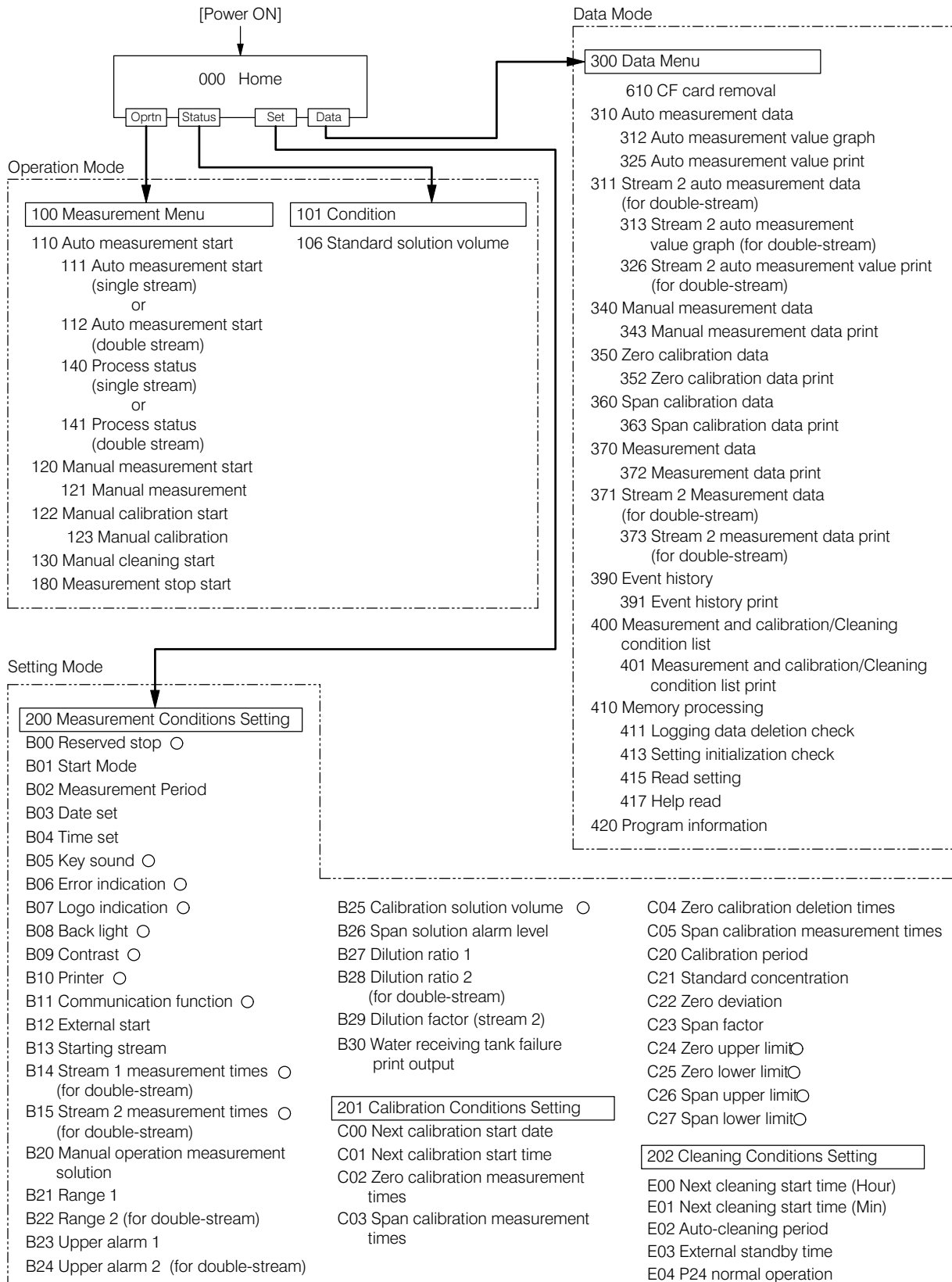
(a) Turn on the power to the product and wait for several seconds until the “000: Home window” is displayed. Except for this home window, operation windows are classified into three modes (groups). Windows for each group can be checked on the “Navigation Map” below.

- The Operation Mode has the following windows: Windows for starting automatic measurement with internal starting, manual measurement, manual calibration, and manual operation, window for setting the unit ready to receive signals for external starting, window for checking internal analysis status, window to view process status, and the window for stopping measurement.
- The Setting Mode has windows for changing the measurement settings for the calibration and cleaning conditions.
- The Data mode has windows for viewing measurement data, calibration history, event history, and list of measurement and calibration conditions.



Mode Navigation Chart

- (b) Pressing a key (**Opn**, etc) in the “000: Home window” opens the first window of the relevant mode. Press **HOME** in each mode window to return to the 000: Home window. However, you cannot go back to “000: Home window” during operation (measurement and calibration/cleaning).
- (c) Single-stream units are not equipped with windows for double-stream units. If you try to change some settings during measurement, a message will notify you that the change cannot be made during measurement.
- (d) For instructions on operations in each window, see section 4.2 “Operation in the Home Window” and later.



- Return to the **HOME** window: Press **HOME**. If there is no **HOME**, press **Back** (repeatedly) to return to **HOME**.
- ○: Setting mode windows for changes during Measurement in Progress (automatic measurement).
- (for double-stream): Window only for double-stream units that is not displayed for a single-stream unit.
- The number preceding each window name denotes the window number.

Navigation Chart

4.2 Operation in Home Window

(1) Checking main set values in the home window

(a) Check main set values in “000: Home window”. Other set values can be checked in the “400: Measurement and calibration/Cleaning Condition List window” in Data Mode.

06/10/06 13:38 ?			
000	HOME		Mainte
Set to the following meas conditions.			
Meas mode	Rtime	CAL start	10/07
Meas period	6Min	Time	1 Hour
2 Streams	YES	Zero CAL	1/3
Ex-start	OFF	Span CAL	1/3
Com func	ON		
Oprtn	Status	Set	Data

000: Home Window

(b) For descriptions of settings for each displayed item, see the following related sections. The meaning of “double-stream” is as shown below.

- Meas mode …… ▷ Section 4.4 (2) “Changing the measurement-starting mode”
- Meas period …… ▷ Section 4.4 (3) “Changing the measurement cycle”
- 2-Streams …… “No selection” means that the relevant unit is of single-stream specification.
“Yes” means that the unit is for double-stream measurement.
- Ex start …… ▷ Section 4.4 (13) “Enabling the external starting”
- Com func …… ▷ Section 4.4 (12) “Enabling the communication function”
- CAL start …… ▷ Section 4.5 (1) “Changing the next calibration start date”
- Time …… ▷ Section 4.5 (2) “Changing the next calibration start time”
- Zero CAL …… ▷ Sections 4.5 (3) “Changing the zero calibration times” and 4.5 (5) “Changing the zero calibration deletion times”
- Span CAL …… ▷ Sections 4.5 (4) “Changing the span calibration times” and 4.5 (6) “Changing the span calibration deletion times”

(2) Entering each mode from the home window

Press the following keys in the “000: Home window” to open the first window of the relevant mode. Press **Status**, however, to open the “101: Condition window”, i.e. one of the operation mode windows. (See Figure 4.1 “Mode Navigation Chart”) Also in other windows with the following keys, their functions are the same.

- **Oprtn** …… Opens the first window of the Operation Mode, “100: Measurement Menu window”.
- **Status** …… Opens the first window of the Setting Mode, “200: Measurement Conditions window”.
- **Data** …… Opens the first window of the Data Mode, “300: Data Menu window”.
- **Status** …… Opens “101: Condition window” of Operation Mode. ▷ Sections 4.3 (5) “Check of the internal analysis status” and 4.3 (6) “Check of the calibration solution volume”

(3) Stopping the output of maintenance-in-progress signal

- (a) When the product goes into Maintenance mode, Maintenance-in-Progress signal is output, and the transmission output value is on hold. Cancel this output and holding status. This function can be used for signal output checks.
- (b) When output of the Maintenance-in-Progress signal is stopped, the display changes from **Mainte** as follows. Another long press will bring up the display, and output returns to the previous status.
 - During Manual Measurement: **Mainte** in “121: Manual Measurement window” switches to “Under measurement”
 - During Manual Calibration: **Mainte** in “123: Manual Calibration window” switches to “Calibration”
 - During other maintenance status: **Mainte** in “100: Home window” or “131: Under Cleaning” switches to **St-by**.

Procedure to Stop Output of Maintenance-in-Progress Signal

Procedure and Operation	Typical screenshot
<p>① Stop the output of maintenance-in-progress signal Press Mainte for example in “000: Home window” for a longer time.</p> <ul style="list-style-type: none"> • The indication changes to “Under measurement,” “Under calibration,” or St-by. <p>② Return to Mainte Press St-by or any other applicable key for a longer time.</p>	<p style="text-align: center;">Typical screenshot of 000: Home window</p>

(4) Checking error information

- (a) When “B06: Error Indication” in Setting Mode is set to OFF (factory default), check the date, time, and description of an error, by displaying “010: Error Information window” with the **ERR** key. If “B06: Error Indication” in Setting Mode is set to ON, the “010: Error Information window” is displayed automatically.
- (b) While **ERR** is displayed, automatic measurement or other operation cannot be started. For the cause and measure of errors, see section 6.1 (2) “Alarm function and countermeasures”
- (c) Press **Clear** in the “010: Error Information window” to delete all error indications and cancel alarm output signals.

Procedure to Check Error Information

Procedure and Operation	Typical screenshot
<p>① Check that ERR lights Check for the example in “000: Home window” that ERR lights on the 2nd line.</p>	

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>② Go to “010 Error Information window” Press ERR in the “000: Home window”.</p>	
<p>③ Check the error information See the alarm description in the “010: Error Information window”.</p> <ul style="list-style-type: none"> • Display the alarm help window by pressing the relevant alarm number (A22 in the example) in the “010: Error Information window”. • Press Clear in this window to delete the error information and cancel the alarm output signal. 	
<p>④ Go back to the previous window Press Back in “010: Error Information window”.</p>	<p style="text-align: center;">Typical screenshot of 000: Home Window</p> <p style="text-align: center;">010: Error Information Window</p>

(5) Locking the window operation

- (a) Lock (fix) the screen. When locked, the buttons on the screen are disabled, and windows or changes in set values cannot be toggled. This function can be used to protect the current status.
- (b) This operation is possible, also when “B07 Logo indication” is off, and the logo mark is hidden.

Procedure to Lock the Screen Operation

Procedure and Operation	Typical screenshot
<p>① Check for locking status Press ? in the upper right of the current window to check whether the Help window is displayed. When displayed, press Back.</p> <ul style="list-style-type: none"> • If the window is not displayed, the system is already locked. Further operation is not necessary. To release the lock, go to “③”. <p>② Lock the screen Press our logo mark in the upper left section of the window for a longer time (3 seconds or longer).</p> <ul style="list-style-type: none"> • The system goes into the locked status, and all buttons except the logo mark are disabled. <p>③ Release the lock To release the lock, press the logo mark for a longer time.</p> <ul style="list-style-type: none"> • Check whether the lock is released by pressing ?. If the help window appears, the lock is canceled. 	<p>Press the logo mark for a longer time.</p> <p>Press the help key as a test.</p> <p style="text-align: center;">Typical screenshot of 000: Home Window</p>

4.3 Manipulation in Operation Mode

(1) Start of automatic measurement

(a) In case of internal starting (start-up by the built-in timer), automatic measurement can be started with a key operation. Measurement, including automatic calibration, is continued in a sequence until a stop procedure is initiated. If there is any error, operation cannot be started. ▷ Section 3.3 (1) “Selection of startup method”

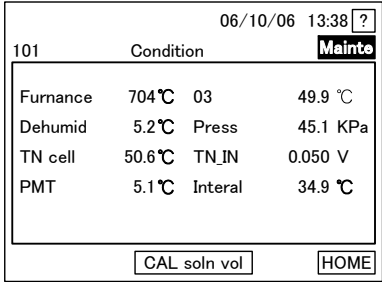
-
- 【IMPORTANT】**
- Do not start measurement or calibration before the inner temperature is stabilized.
 - Keep the door closed before and during measurement and calibration. If the door is open, the inner temperature becomes unstable, which may result in an incorrect measurement.
-

(b) For external starting (start-up by contact signal input), prepare the system to receive contact signals, including measurement start signals. ▷ Section 3.2 (4) “Contact input and loop check”

(c) The timing for internal start of automatic measurement depends on the selection in “B01: Start Mode” (“Default” or “Immediately”) (▷ Section 4.4 (2) “Changing the measurement-starting mode”). Check this and other main set values for automatic measurement in the “000: Home window”. Make the necessary changes, if any, before starting automatic measurement.
▷ Sections 4.4 “Manipulation of Measurement Conditions in Setting Mode,” 4.5 “Manipulation of Calibration Conditions in Setting Mode,” and 4.6 “Manipulation of Cleaning Conditions in Setting Mode”

(d) When stopping internally started automatic measurement, see section 4.4 (1) “Reservation of operation stop.” If the operation must be stopped in the middle of a measurement for any reason, see sections 4.3 (8) “Emergency stop of the operation” or 4.3 (9) “Forced termination of the operation.” To stop an externally started automatic measurement, input a Measurement Stop signal.

Procedure to Start Automatic Measurement

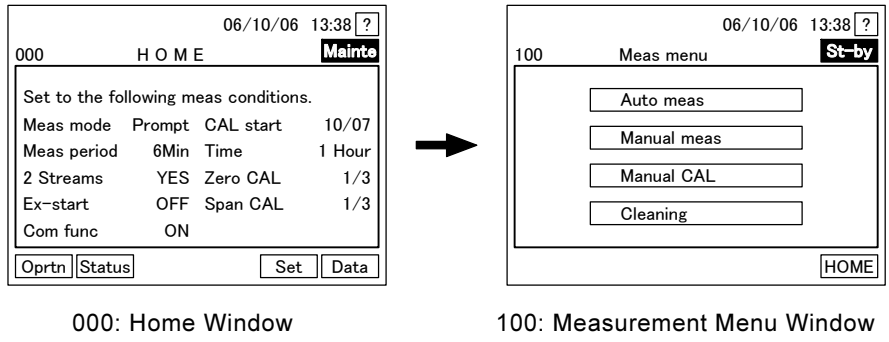
Procedure and Operation	Typical screenshot
<p>① Stop operation Stop any operation in progress (e.g. manual measurement, manual calibration, or manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Check for stabilization of the inner temperature Press Status for example in “000: Home window” to check in the “101: Condition window” that the internal temperature is stabilized within the range of Room Temp. to Room Temp. +10°C. After checking, press HOME.</p> <ul style="list-style-type: none"> • If the inner temperature is unstable, close the door and wait until it stabilizes. 	 <p>The screenshot shows a window titled '101 Condition' with a 'Maintenance' indicator. It displays four rows of data: Furnance (704°C, 03, 49.9°C), Dehumid (5.2°C, Press, 45.1 KPa), TN cell (50.6°C, TN_IN, 0.050 V), and PMT (5.1°C, Internal, 34.9°C). At the bottom, there are buttons for 'CAL soln vol' and 'HOME'. The top right corner shows the date '06/10/06' and time '13:38'.</p>
101: Condition Window	

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
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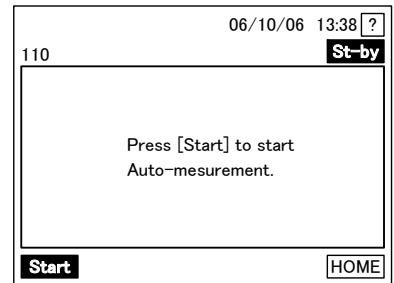
- ③ Go to the “100: Measurement menu window” Press **Oprtn** in the “000: Home window”.



- ④ Go to the “110: Auto measurement start window” Press **Auto meas** in “100: Measurement menu window”.

- ⑤ Start automatic measurement Press **Start** in “110: Auto measurement start window”.

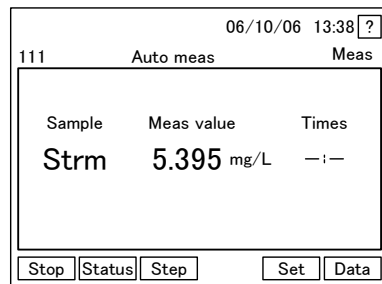
- If “B01 Start mode” is set to “default” in the internal start mode and automatic measurement does not start immediately, wait until the next automatic measurement start time of the internal timer. If the setting is “immediately,” measurement starts when **Start** is pressed.
- For internal starting, “111: Auto Measurement for single-stream window” or “112: Auto measurement for double-stream window” opens, and the indication of **Mainte** or **St-by** changes to “Under measurement”.
- For external starting, the system is now ready to receive signals, including a measurement start signal. Input a measurement start signal.



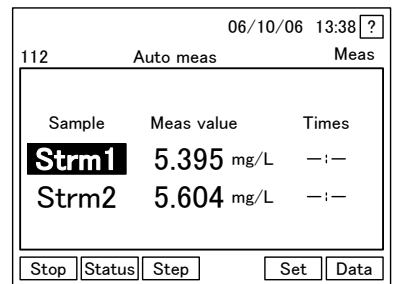
110: Auto Measurement Start Window

- ⑥ Check the automatic measurement values Check that the measured value on the screen is appropriate.

- Sample: Measured sample. For a double-stream type, the currently measured sample is highlighted (white letters).
- Measurement value: Latest measured value
- Time: Remaining time before completion of the current measurement.



111: Auto Measurement for Single-stream Window



112: Auto Measurement for Double-stream Window

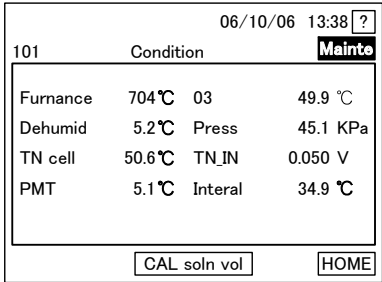
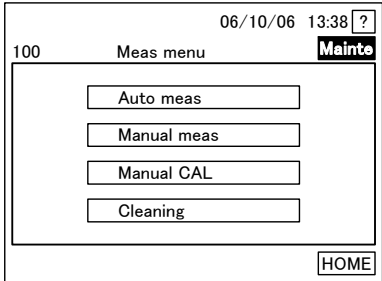
(2) Start of manual measurement

(a) For internal starting, manual operation can be started with a key operation. Before starting, select sample water.

- 【IMPORTANT】**
- Do not start measurement or calibration before the inner temperature is stabilized.
 - Keep the door closed before and during measurement and calibration. If the door is open, the inner temperature becomes unstable, which may result in an incorrect measurement.

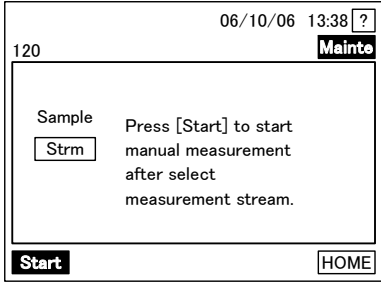
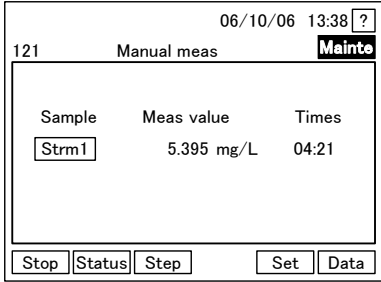
(b) After the start of manual measurement, the display changes to “Maintenance,” and measurement continues with the minimum cycle.

Procedure to Start Manual Measurement

Procedure and Operation	Typical screenshot
<p>① Stop measurement Stop measurement (automatic/manual measurement, manual calibration, and manual cleaning) ▷ Sections 4.3 (8) “Emergency stop of the operation” and 4.4 (1) “Reservation of operation stop”</p> <p>② Check for stabilization of the inner temperature Press Status for example in “000: Home window” to check in the “101: Condition window” whether the internal temperature is stabilized within the range of “Room temp. to Room Temp. + 10°C.” After checking, press HOME.</p> <ul style="list-style-type: none"> • If the inner temperature is unstable, close the door and wait until it stabilizes. 	 <p style="text-align: center;">101: Condition Window</p> <p>▷ See the screenshot in “③” of section 4.3 (1) “Start of automatic measurement”</p>
<p>③ Go to the “100: Measurement menu window” Press Oprtn in “000: Home window”.</p> <p>④ Go to the “120: Manual measurement start window” Press Manual meas in the “100: Measurement menu window”.</p>	 <p style="text-align: center;">100: Measurement Menu Window</p>

(To be continued)

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Procedure and Operation	Typical screenshot
<p>⑤ Select a sample Press the frame below “Sample” repeatedly in the “120: Manual measurement start window” to display the sample. Change it in “B20 Manual operation measurement Solution”.</p> <p>Each press switches the set value in the following order. Single-stream: Stream → Section zero → Section span → (repeat) Double-stream: Stream 1 → Section stream 2 → Section zero → Section span → (repeat)</p> <p>⑥ Start manual measurement Press Start in the “120: Manual measurement start window”.</p> <ul style="list-style-type: none"> • “121: Auto Measurement window” opens. 	 <p style="text-align: center;">120: Manual Measurement Start Window</p>
<p>⑦ Check the manual measurement value Check that the measured value on the screen is appropriate. Sample: Measured sample. Measurement value: Latest measured value Time: Remaining time before completion of the current measurement.</p> <ul style="list-style-type: none"> • Unless any error occurs, the measurement is continued until a stop operation. 	 <p style="text-align: center;">121: Manual Measurement Window</p>
<p>⑧ Stop manual measurement ▷ Section 4.4 (1) “Reservation of operation stop”</p> <ul style="list-style-type: none"> • If operation should be stopped in middle of measurement for some reason, perform emergency stop or forced termination. <ul style="list-style-type: none"> ▷ Sections 4.3 (8) “Emergency stop of the operation” and 4.3 (9) “Forced termination of the operation” 	

(3) Start of manual calibration

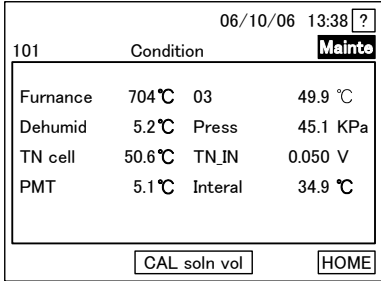
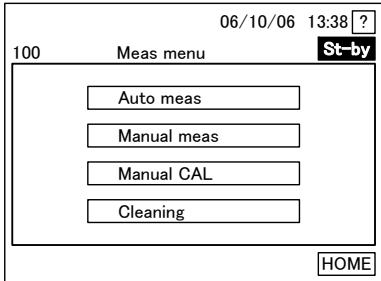
(a) For internal starting, manual calibration can be started with a key operation.

- 【IMPORTANT】**
- Do not start measurement or calibration before the inner temperature is stabilized.
 - Keep the door closed before and during measurement and calibration. If the door is open, the inner temperature becomes unstable, which may result in an incorrect measurement.

(b) Once manual calibration is started, the measurements with calibration solutions are performed as set in “C02 Zero Calibration Times” and “C03 Span Calibration Times” to renew the zero deviation and span factor, before going to the “000: Home window”.

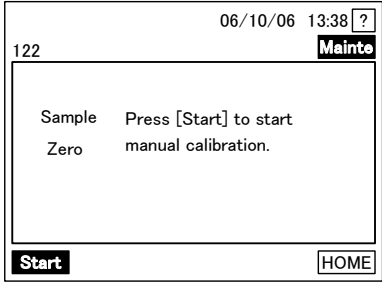
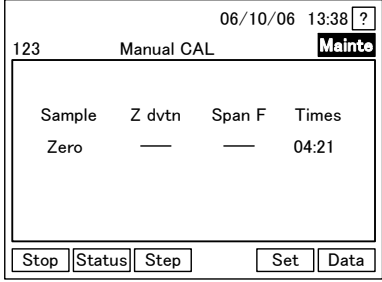
- (c) Though you can reserve operation stop using **Stop** in the “123: Manual Calibration window”, calibration may be stopped without executing the preset number of measurements with the calibration solution, and thus the calibration becomes invalid, depending on the timing. You have to be aware of it to use this function.

Procedure to Start Manual Calibration

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, and manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Check for stabilization of the inner temperature Press Status in “000: Home window” or some other window to check in “101: Condition window” whether the internal temperature is stabilized within the range of “Room temp. to Room temp. + 10°C.” After checking, press HOME.</p> <ul style="list-style-type: none"> • If the inner temperature is unstable, close the door and wait until it stabilizes. <p>③ Go to the “100: Measurement Menu window” Press Oprtn in the “000: Home window”.</p> <p>④ Go to the “122: Manual Calibration Start window” Press Manual CAL in “100: Measurement menu window”.</p>	 <p style="text-align: center;">101: Condition Window</p> <p>▷ See the screenshot in “③” of section 4.3 (1) “Start of automatic measurement”</p>  <p style="text-align: center;">100: Measurement Menu Window</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑤ Go to the “123: Manual Calibration window” Press Start in the “122: Manual calibration start window”.</p> <ul style="list-style-type: none"> • “123: Manual calibration window” opens: Sample: Calibration solution used for measurement Zero deviation: Deviation according to the latest zero calibration Span factor: Span factor according to the latest span calibration Time: Remaining time before completion of the zero- or span calibration in progress • Upon completion of the number of measurements set in “C02 Zero Calibration Times” and “C03 Span Calibration Times”, the zero deviation and span factor are updated, and the system goes to the “000: Home window”. • If calibration must be finished in mid-course, perform the operation stop by reservation, emergency stop, or forced termination. ➤ Sections 4.4 (1) “Reservation of operation stop”, 4.3 (8) “Emergency stop of the operation,” and 4.3 (9) “Forced termination of the operation”. 	 <p style="text-align: center;">122: Manual Calibration Start Window</p>  <p style="text-align: center;">123: Manual Calibration Window</p>

(4) Start of manual cleaning

(a) For internal starting, clean the route of sample water, including dilution tank, sample pot, dripping section, with a key operation. This is intended for removal of stains that cannot be removed in automatic cleaning or external cleaning only.

【IMPORTANT】 • To perform Cleaning 2 or 3, prepare Cleaning Liquid 2 to fill the Cleaning Liquid 2 tank with it beforehand. Do not use Cleaning Liquid 2, which is three days old or older. Chlorine concentration in the solution decreases gradually as the time passes to deteriorate the cleaning effect.

(b) Choose manual cleaning from the following three types:

⚠ WARNING

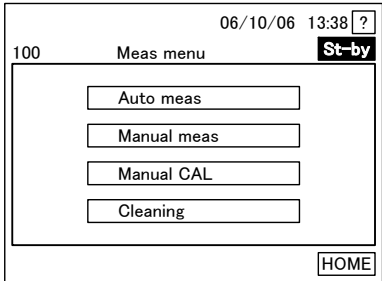
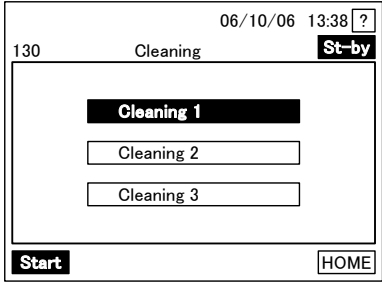
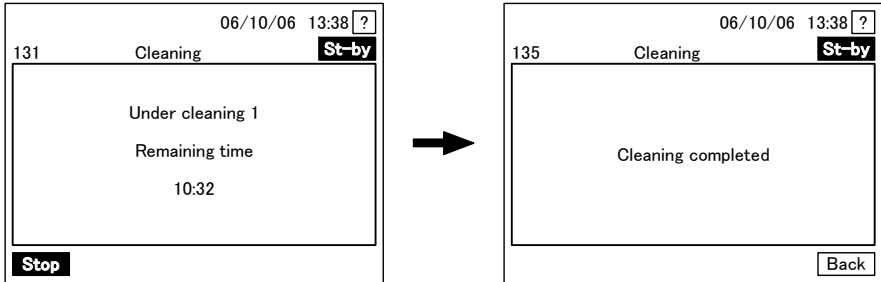
Hazardous Substances

- Cleaning Liquid 1 (10% oxalic dehydrate solution) and Cleaning Liquid 2 (50ppm hypochlorous acid solution) are hazardous substances. Wear protective equipment during handling, and, if it gets into your eyes or comes in contact with your skin, wash with water immediately and consult a physician.

- Cleaning 1 Clean with 1% oxalic dehydrate solution by diluting Cleaning Liquid 1 (10% oxalic dehydrate solution). Cleaning time is about 10 minutes. The same cleaning liquid and process are used for automatic measurement.

- Cleaning 2 Clean with 5ppm hypochlorous acid solution by diluting Cleaning Liquid 2 (50 ppm hypochlorous acid solution). Cleaning time is about 10 minutes.
- Cleaning 3 Combined cleaning of Cleaning 1 and 2. Cleaning time is about 20 minutes.

Procedure of Manual Cleaning

Procedure and Operation	Typical screenshot
<p>① Stop measurement Stop measurement (automatic/manual measurement, manual calibration, and manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “100: Measurement menu window” Press [Opn] in the “000: Home window”.</p> <p>③ Go to the “130: Manual cleaning start window” Press [Cleaning] in “100: Measurement menu window”.</p>	<p>▷ See the screenshot in “③” of section 4.3 (1) “Start of automatic measurement”</p>  <p style="text-align: center;">100: Measurement Menu Window</p>
<p>④ Select a cleaning method Press one of the cleaning method key in the “130: Manual cleaning start window” to highlight it.</p> <p>Cleaning 1: Cleaning using Cleaning Liquid 1 Cleaning 2: Cleaning using Cleaning Liquid 2 Cleaning 3: Cleaning using Cleaning Liquid 1 + 2</p> <p>⑤ Start manual cleaning Press [Start] in “130: Manual cleaning start window”.</p> <ul style="list-style-type: none"> • The “131: Cleaning 1 (or another) window” opens. After cleaning, the “135: Cleaning Completed window” opens. Sequence: Sequence program for the current cleaning (e.g. cleaning 1) • When stopping cleaning in mid-course, see sections 4.3 (8) “Emergency stop of the operation” or 4.3 (9) “Forced termination of the operation”. 	 <p style="text-align: center;">130: Manual Cleaning Start Window</p>
 <p style="text-align: center;">131: Under Cleaning 1 Window 135: Cleaning Completed Window</p>	
<p>⑥ Go back to the “000 Home window”. Press [Back] in the “135: Cleaning completed window”, and then [HOME] in the 130: Manual cleaning start window.</p>	<p>▷ See the screenshot of “④”.</p>

(5) Check of the internal analysis status

(a) Check the status in the analysis section, including temperature of the combustion furnace, by opening the “101: Condition window”.

(b) The following windows have a **Status** key, which is used to switch to “101: Condition window”.

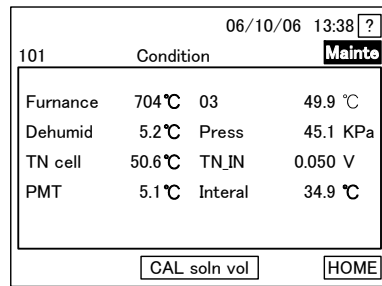
- 000: Home
- 111: Auto Measurement for single-stream or 112: Auto Measurement for double-stream
- 121: Manual Measurement
- 123: Manual Calibration

(c) Items displayed to show internal analysis status and the corresponding normal values are shown in the table below:

Internal Analysis Status and Normal Values

Indication	Item Name	Normal value	Description
Combustion furnace	Combustion furnace temp.	700±5°C	Combustion furnace temperature obtained in the control section
Dehumidifier	Dehumidifier temp.	5±1°C	Temperature of the dehumidifier
TN cell	Cell temperature	50±1°C	Temperature of the cell
PMT	Sensor temp.	5±1°C	Temperature of the sensor light-receiving section (photo multiplier)
O3	Ozonizer temp.	50±1°C	Temperature of the ozonizer
Cell pressure	Cell pressure	45±5kPa	Sensor presser
TN_IN	Sensor output	0.00 to 2.20V	Output of the total nitrogen sensor
Inside	Inside temperature	Room temp. to Room temp. + 10°C	Temperature inside the chassis of the unit

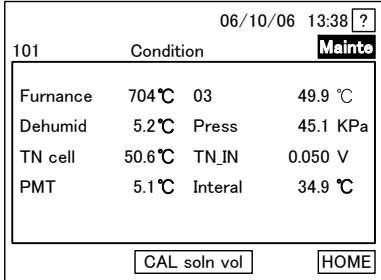
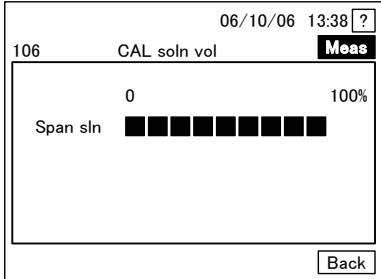
Procedure to Check the Internal Analysis Status

Procedure and Operation	Typical screenshot
<p>① Go to the “101: Condition window” Press Status for example in the “000: Home window”.</p> <p>② Check the display Check the values.</p> <p>③ Go back to the original window Press HOME or Back in the lower right of the window.</p>	<p>▷ See the screenshot in “③” of section 4.3 (1) “Start of automatic measurement”</p>  <p style="text-align: center;">101: Condition Window</p>

(6) Check of the calibration solution volume

- (a) Check the volume of span calibration solution in the tank, by displaying the 106: Standard Solution Volume window.
- (b) The span calibration solution volume is shown in percentage, showing the rate of the remaining solution compared to the TN calibration solution tank capacity (2L), in increments of 10%.
- (c) After replenishment of the solution, or if the displayed volume is different from the actual one, adjust the indication in the B25 Calibration solution volume window based on the actual quantity.
 ▷ Section 4.4 (22) “Changing the calibration solution volume”

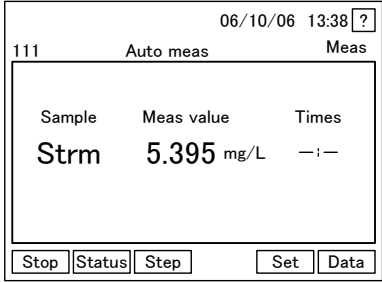
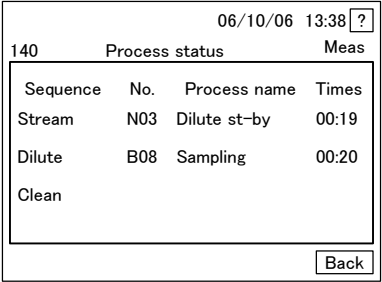
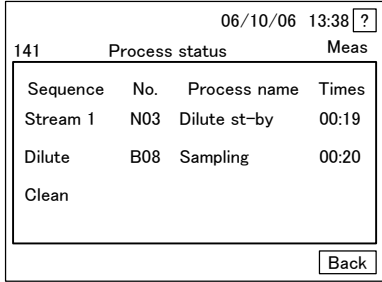
Procedure to Check the Calibration Solution Volume

Procedure and Operation	Typical screenshot
<p>① Go to the “101: Condition window” Press Status for example in the “000: Home window”.</p> <p>② Go to the “106 Standard solution volume window” Press CAL soln vol in the “101: Condition window”.</p>	<p>▷ See the screenshot in “③” of section 4.3 (1) “Start of automatic measurement”</p>  <p style="text-align: center;">101: Condition Window</p>
<p>③ Check the remaining ratio of the calibration solution Check the remaining ratio of the solution in 106: Standard Solution Volume.</p> <ul style="list-style-type: none"> • One “■” in the bar graph denotes 10%. • The example shows the quantity of 90%; i.e. 90% of the solution tank capacity (2L), namely 1.8L, is remaining. <p>④ Go back to the “000: Home window” Press Back in the “106: Standard Solution Volume window”, and then HOME in the “101: Condition window”.</p>	 <p style="text-align: center;">106: Standard Solution Volume Window</p>

(7) Check of the current process

- (a) The process window can be displayed with a key operation.
- (b) **Process** key to open Process window is in the following windows.
 - 111: Auto Measurement for single-stream or 112: Auto Measurement for double-stream
 - 121: Manual Measurement
 - 123: Manual Calibration

Procedure to Check the Current Process

Procedure and Operation	Typical screenshot
<p>① Go to the “141: Process status (double-stream) window” Press [Process] in “112: Auto Measurement for double-stream window”.</p>	 <p>111: Auto Measurement for Single-stream Window</p>
<p>② Check the process status Check the process status in “140: Process status (single-stream) window” or “141: Process status (double-stream) window”.</p> <p>Sequence: current sequence program No.: Process number Process name: Name of the process Time: remaining time for this process (min:sec)</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>140: Process Status (single-stream) Window</p> </div> <div style="text-align: center;">  <p>141: Process Status (double-stream) Window</p> </div> </div>
<p>③ Go back to the previous window Press [Back] in the “141: Process status (double-stream) window”.</p>	<p>➤ See the Screenshot of “②”</p>

(8) Emergency stop of the operation

(a) In internal start mode, operation (automatic/manual measurement, manual calibration, and manual cleaning) can be brought to an emergency stop with a key operation. To forcibly terminate the operation, instead of an emergency stop, see section 4.3 (9) “Forced termination of the operation.” For an external start, input a measurement stop signal.

【IMPORTANT】 • This function is for internal starting only. For an external start, the 180: Measurement Stop Start window is not displayed.

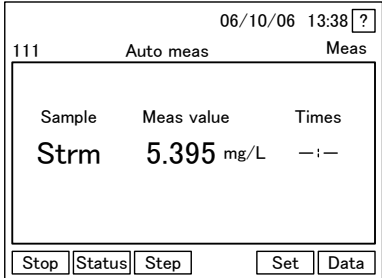
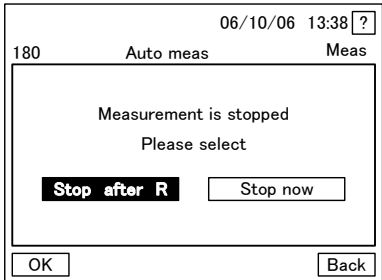
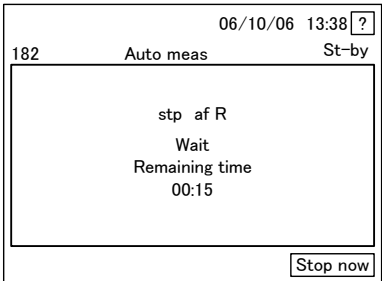
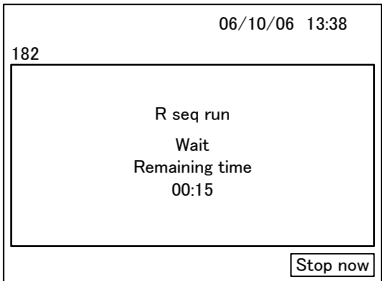
(b) If it is not an emergency, use operation stop reservation to stop operation. ➤ Section 4.4 (1) “Reservation of operation stop”.

(c) In an emergency stop, the sequence program for automatic measurement is stopped in mid-course, and the system goes into standby after the restoration process.

(d) Emergency stop can be started from the following windows with the **[Stop]** key.

- 111: Auto Measurement for single-stream or 112: Auto Measurement for double-stream
- 121: Manual Measurement
- 123: Manual Calibration
- 131: Under Cleaning 1 to 133: Under Cleaning 3

Procedure for Operation Stop

Procedure and Operation	Typical screenshot
<p>① Go to the “180: Measurement stop window” Press Stop in the “111: Auto measurement for single-stream window”.</p>	 <p style="text-align: center;">111: Auto Measurement for Single-stream Window</p>
<p>② Execute an emergency stop Press Stop after R in “180: Measurement stop window” to highlight it, and press OK.</p>	 <p style="text-align: center;">180: Measurement Stop Window</p>
<p>③ Check that the restoration sequence is completed Check that the window switches as follows: “182: Stop after restore window” ▷ Section Restoration Process in Progress ▷ “000: Home window”.</p> <ul style="list-style-type: none"> • To change to forced termination here, press Stop now in the lower right. 	<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">  <p style="text-align: center;">182: Stop after Restore Window</p> </div> <div style="margin: 0 20px;">→</div> <div style="text-align: center;">  <p style="text-align: center;">Restoration Process in Progress Window</p> </div> </div>

(9) Forced termination of the operation

(a) In internal start mode, operation (automatic/manual measurement, manual calibration, and manual cleaning) can be brought to forced termination with a key operation. To perform an emergency stop instead of forced termination, see the previous section. ▷ Section 4.3 (8) “Emergency stop of the operation”

【IMPORTANT】 • This function is for internal starting only. For external starting, “180: Measurement Stop Start window” is not displayed.

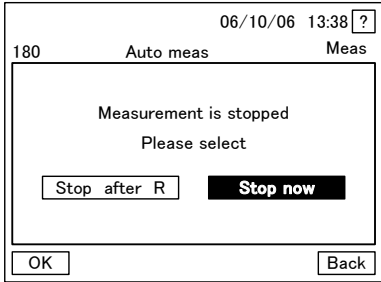
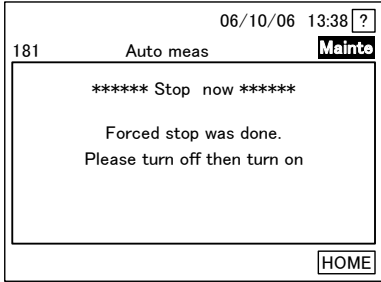
(b) When forced termination is executed, all functions are stopped without performing any restoration process. After this operation, be sure to turn the power switch off and on (reset) in order to bring the product back to the initial status.

【IMPORTANT】 • After execution of forced termination, TN syringe pump, nozzle, or some other parts may be out of their original position. As soon as the necessary work is completed, be sure to bring the product back to the initial status, without leaving it as it is.

(c) Forced termination can be started from the following windows with the **Stop** key.

- 111: Auto Measurement for single-stream or 112: Auto Measurement for double-stream
- 121: Manual Measurement
- 123: Manual Calibration
- 131: Under Cleaning 1 to 133: Under Cleaning 3

Procedure for Forced Termination of the Operation

Procedure and Operation	Typical screenshot
<p>① Go to “180: Measurement stop start window” Press Stop for example in “111: Auto measurement for single-stream window”.</p> <p>② Execute forced stop Press Stop now in “180: Measurement stop start window” to highlight it, and press OK.</p> <ul style="list-style-type: none"> • If no forced termination should be executed, press Back, which opens the “180: Measurement stop start window”. 	<p>▷ See the screenshot in “②” of section 4.3 (1) “Start of automatic measurement”</p>  <p style="text-align: center;">180: Measurement Stop Start Window</p>
<p>③ Confirm forced termination Read the description in the “181 Stop now window”.</p> <p>④ Go back to “000: Home window” Press HOME in the “181: Stop now window”.</p> <p>⑤ Bring it back to the initial status Turn off and then on the power switch.</p>	 <p style="text-align: center;">181: Stop Now Window</p>

4.4 Manipulation of Measurement Conditions in Setting Mode

(1) Reservation of operation stop

(a) In internal start mode, reserve a stop of operation (automatic/manual measurement and manual calibration). When a stop is reserved, the system stops after completing the sequence operation in progress, and then go to “000: Home window”. To stop operation in external starting mode, input a measurement stop signal.

【IMPORTANT】 • This item is for internal starting only. This function is disabled for external starting.

(b) Since manual cleaning (about 9min) stops after completion, it is not included in the targets of operation stop reservation.

Operation Stop Reservation and Measurement Menu

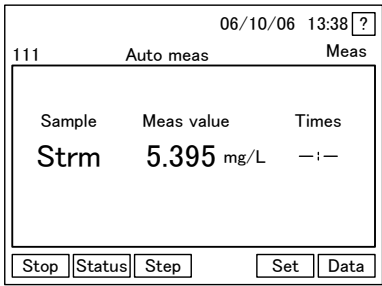
	Automatic Measurement	Manual Measurement	Manual Calibration	Manual Cleaning
B00 Reserved stop	○	○	○	—

○: Applicable —: Not Applicable

(c) The “!” mark in the right part of the “111: Auto Measurement for single-stream window” during measurement means that operation stop is already reserved.

(d) Manual calibration can be stopped by operation stop reservation. However, calibration may be then stopped without executing the preset number of measurements with calibration solution, and thus the calibration becomes invalid, depending on the timing. You have to be aware of it to use this function.



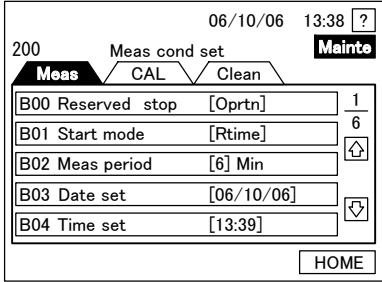
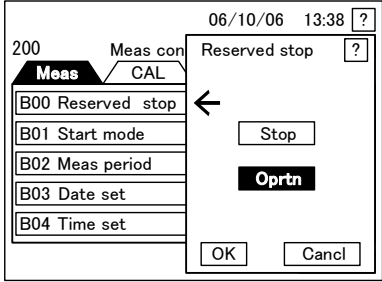
Procedure to Reserve Operation Stop

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press [Set] in one of the following windows:</p> <ul style="list-style-type: none"> • 111: Auto measurement for single-stream • 112: Auto measurement for double-stream • 121: Manual measurement • 123: Manual calibration 	 <p>The screenshot shows a window titled '111 Auto meas Meas'. It displays a table with columns 'Sample', 'Meas value', and 'Times'. The 'Sample' column contains 'Strm', the 'Meas value' column contains '5.395 mg/L', and the 'Times' column contains '—:—'. A status indicator '!' is visible in the top right corner. At the bottom, there are buttons for 'Stop', 'Status', 'Step', 'Set', and 'Data'.</p>

111: Auto Measurement for Single-stream Window

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>② Go to the “B00: Reserved stop window” Press Meas in the “200: Measurement conditions Setting window” to highlight it. Then, press  or  to go to the page with “B00 Reserved stop window”.</p> <p>③ Check the setting Check the setting shown to the right of “B00 Reserved Stop window”.</p> <p>Stop: Operation stop is reserved Operation: Operation stop is not reserved (factory-set default)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. 	 <p style="text-align: center;">200: Measurement Conditions Setting Window (1/6)</p>
<p>④ Open the “B00: Reserved Stop window” Press inside “B00: Reserved Stop window” frame in “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press Stop or any other necessary key on “B00: Reserved stop window” to highlight it, and press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After manipulation, “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press Back or HOME in the lower right of “200: Measurement conditions setting window”.</p>	 <p style="text-align: center;">B00: Reserved Stop Window</p>

(2) Changing the measurement-starting mode

(a) In internal start mode, change the timing to start automatic measurement.

【IMPORTANT】 • This item is for internal starting only. This function is disabled for external starting.

(b) There are two options, “Default” and “Immediately,” each of which means as follows;

- Default Automatic measurement is started upon arrival of the time according to the measurement cycle of the on-the-hour basis. After that, automatic measurement is repeated with the interval of the measurement cycle. When **Start** is pressed in the “110: Automatic Measurement Start window”, automatic measurement is started at the start time shown in the table below. This start time depends on the set measurement cycle.

Automatic Measurement Start Time by Default Setting for Different Measurement Cycles

Measurement Cycle	Automatic Measurement start time by default setting (minute)
6	00, 06, 12, 18, 24, 30, 36, 42, 48, 54
10	00, 10, 20, 30, 40, 50
12	00, 12, 24, 36, 48
15	00, 15, 30, 45
20	00, 20, 40
30	00, 30
60	00
120	Nearest 00 (on the hour), 00 two hours later

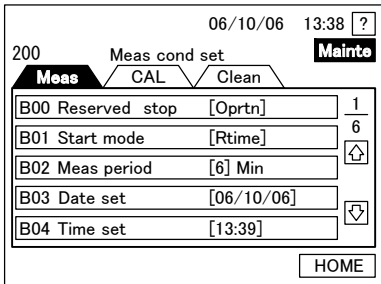
[NOTE] • For the measurement range without diluting (for both streams when 2-streams), the measurement cycle can be set to 5 minutes of minimum cycle by changing the software. Contact DKK-TOA.

(Example) When you press **Start** at AM 09:12:45, with the measurement cycle set to 6 minutes: Automatic measurement is started at AM 09:18, and the next start is AM 09:24.

- Immediately ... Automatic measurement is started immediately after pressing of **Start** in the “110: Automatic Measurement Start window”. Later, automatic measurement is performed repeatedly with the interval of measurement cycle based on the starting time.

(c) The time is calculated based on the timer incorporated in the control section.

Procedure to Change the Measurement Start Mode

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to “200: Measurement conditions setting window” Press Set in “000: Home window”.</p> <p>③ Display “B01: Start mode” Press Meas in “200: Measurement Conditions Setting window” to highlight it. Then, press ↑ or ↓ to go to the page with “B01 Start mode”.</p> <p>④ Check the setting Check the setting shown in the right of “B01 Start Mode”. Default: Started when the next measurement cycle of on-the-hour basis arrives after key operation (factory-set value) Immediately: Started immediately when the key operation is done. • If no change is needed, go to “⑦”.</p> <p>⑤ Open the “B01: Start mode window” Press inside the frame of “B01 Start Mode” in “200 Measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p>200: Measurement Conditions Setting Window (1/6)</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Press Rtime (or any other appropriate key) in “B01 Start mode” to highlighted it, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to 000 Home window: Press HOME in the 200: Measurement conditions setting window.</p>	<p style="text-align: center;">B01: Start Mode Window</p>

(3) Changing the measurement cycle

(a) In internal start mode, the cycle for automatic measurement start can be changed.

[IMPORTANT] • This item is for internal starting only. This function is disabled for external starting.

(b) Change the measurement cycle by selecting the interval from the following (in minutes). They are either a common denominator or common multiplier of 60 minutes. If “B01 Start Mode” is set to “Default,” it is set with the on-the-hour time being the reference time.

- Measurement Cycle 6, 10, 12, 15, 20, 30, 60, and 120 min

[NOTE] • For the measurement range without diluting (for both streams when 2-streams), the measurement cycle can be set to 5 minutes of minimum cycle by changing the software. Contact DKK-TOA.

(c) When the setting for “B01 Start Mode” is changed from “Immediately” to “Default,” the measurement cycle switches to the on-the-hour basis. The starting time thereafter is, therefore, different from the one in “Immediately” mode.

(d) Manual measurement is performed independently from this setting, with the shortest measurement cycle.

(e) If the start time for automatic measurement, automatic calibration, and automatic cleaning according to the internal timer fall on the same time, the operation is performed according to the priority shown in the table below:

Priority of Automatic Starting Time in Internal Start Mode

Condition		Internal Starting			Flow of operation
		Measurement Start	Calibration Start	Cleaning Start	
During Standby	Single	Starts immediately	Starts immediately	Starts immediately	Each operation starts immediately.
	Triple	Invalid	One reservation	Starts immediately	First cleaning and then calibration
	Double 1		One reservation	Starts immediately	First cleaning and then calibration

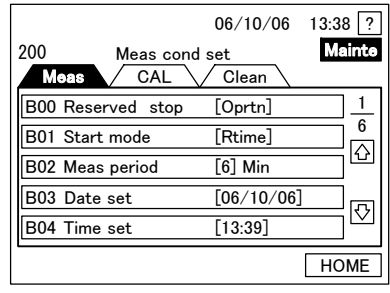
(To be continued)

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Condition		Internal Starting			Flow of operation
		Measurement Start	Calibration Start	Cleaning Start	
During Standby	Double 2	Invalid		Starts immediately	Cleaning starts immediately
	Double 3	Invalid	Starts immediately		Calibration starts immediately
During Automatic Measurement	Single		One reservation	One reservation	Starts after completion of measurement
	Double		One reservation	One priority reservation	First cleaning and then calibration after measurement completion
During Automatic Calibration	Single	Invalid		One reservation	Cleaning after calibration completion
	Double	Invalid		One reservation	Cleaning after calibration completion
During Automatic Cleaning	Single	Invalid	One reservation		Calibration after cleaning completion
	Double	Invalid	One reservation		Calibration after cleaning completion

- Single: Means that only one operation such as Measurement Start is started.
- Triple: Means that measurement, calibration, and cleaning are scheduled to start at the same time.
- Double: Means that two operations (such as measurement and calibration) are scheduled to start at the same time.

Procedure to Change the Measurement Cycle

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop measurement (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement Conditions setting window” Press [Set] in the “000: Home window”.</p> <p>③ Display “B02 Measurement period” Press [Meas] in “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B02 Measurement period”.</p> <p>④ Check the setting Check the setting shown in the right of B02 Measurement period: 5 Min (in Example): The number indicates the measurement cycle. Setting range: 5, 6, 10, 12, 15, 20, 30, 60, and 120 minutes (factory-set value: 5)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “B02: Measurement period window” Press inside the frame of the B02 Measurement period in the “200: Measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p>200: Measurement Conditions Setting Window (1/6)</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Use the ten-key pad in the “B02: Measurement period window” to set a measurement cycle value you want on the second line, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000: Home window” Press HOME in the “200: Measurement conditions setting window”.</p>	

B02: Measurement Period Window

(4) Date adjustment

(a) The date of the clock incorporated in the control section can be changed. The year is expressed using the lower two digits of the dominical year.

【IMPORTANT】 • Set the correct date. If a past date is set, the logging data (measurement data, calibration data, timely report/daily report data) from that day to the present date are deleted. In this case, data on the CF card are not deleted.

(b) For how to change the time, see section 4.4 (5) “Time adjustment”.

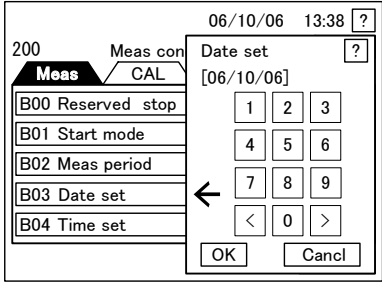
Procedure to Adjust the Date

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window” Press Set in the “000: Home window”.</p> <p>③ Display “B03 Date Set” Press Meas in the 200: Measurement conditions setting window to highlight it. Then, press ↑ or ↓ to go to the page with “B03 Date set”.</p> <p>④ Check the setting Check the setting shown in the right of B03 Date set: 06/10/06 (in Example): shows today’s dominical year, month and date. Setting range: 00/01/01 to 99/12/31</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. 	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>

200: Measurement Conditions Setting Window (1/6)

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Use the ten-key pad in the “B03 Date set window” to set the correct date on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the 000 Home window: Press [HOME] in the “200: Measurement conditions setting window”.</p>	 <p style="text-align: center;">B03: Date Set Window</p>

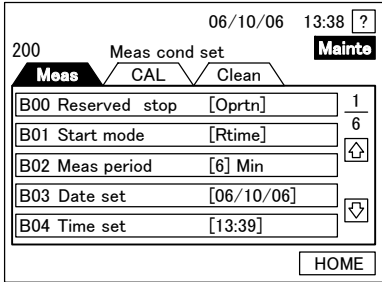
(5) Time adjustment

(a) The time of the clock incorporated in the control section can be changed.

【IMPORTANT】 • Set the correct time. If a past time is set, the logging data (measurement data, calibration data, timely report/daily report data) from that time to the present time are deleted. Data that will be deleted are copied to the CF card.

(b) For how to change the date, see section 4.4 (4) “Date adjustment.”

Procedure to Adjust the Time

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop measurement (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window” Press [Set] in the “000: Home window”.</p> <p>③ Display B04 time set Press [Meas] in the “200: Measurement Conditions Setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B04 Time set”.</p> <p>④ Check the setting Check the setting shown in the right of “B04 Time set”. 13:39 (in Example): shows the current time on 24-hour basis. Setting range: 00:00 to 23:59</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. 	<p>▷ See the screenshot in “②” of 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (1/6)</p>
<p>⑤ Open the “B04 Time set window” Press inside the frame of the “B04 Time set” in the “200: Measurement conditions setting window”.</p>	

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Use the ten-key pad in the B04 Time Set window to set the correct time on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the 200: Measurement conditions setting window opens. <p>⑦ Go back to the 000 Home window: Press [HOME] in the 200: Measurement conditions setting window.</p>	<p style="text-align: center;">B04: Time Set Window</p>

(6) Disabling the key operation sound

- (a) The electronic sound generated at the time of key operation can be turned on/off. With it turned off, no electronic sound is generated.
- (b) This operation can be done in automatic /manual measurement, or automatic calibration mode.

Procedure to Change the Key Operation Sound

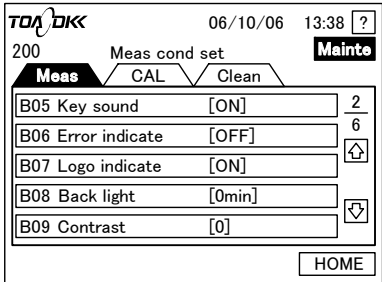
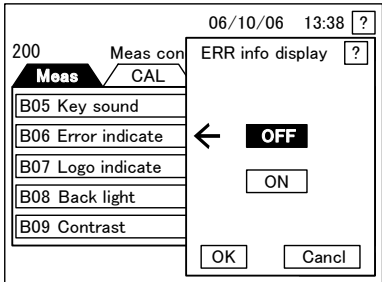
Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press [Set] for example in the “000: Home window”.</p> <p>② Display “B05 Key sound” Press [Meas] in the “200: Measurement Conditions Setting window” to highlight it. Then, press [Up] or [Down] to go to the page with “B05 Key sound”.</p> <p>③ Check the setting Check the setting shown in the right of “B05 Key Sound”.</p> <p>OFF: No electronic sound ON: Electronic sound generated on key operation (factory-set value)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. 	<p>➤ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p> <p style="text-align: center;">200: Measurement Conditions Setting Window (2/6)</p>
<p>④ Open the “B05 Key sound window” Press inside the frame of the “B05 Key Sound” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press [OFF] (or any other applicable key) to highlight it, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press [Back] or [HOME] in the lower right in the “200: Measurement conditions setting window”.</p>	<p style="text-align: center;">B05: Key Sound Window</p>

(7) Automatic error display

- (a) Change the on/off status of the automatic display of “010: Error Information window” in case of an error. However, also when it is turned off, display the “010: Error Information window” by pressing **ERR** in the second line of the screen.
- (b) This operation can be performed in automatic/manual measurement or automatic calibration mode.

[NOTE] • While an error indication is on, no automatic/manual measurement, manual calibration, or manual cleaning can be started.

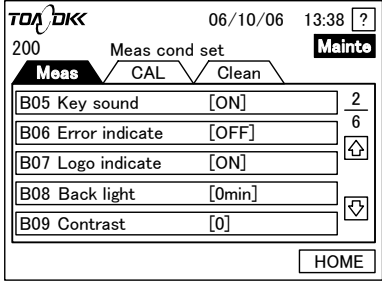
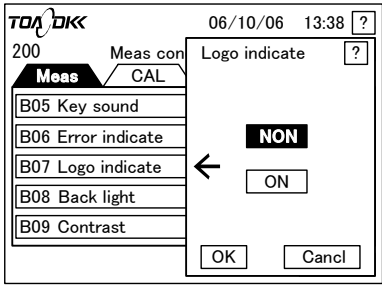
Procedure to Turn on Automatic Display of Error Information

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press Set for example in the “000: Home window”.</p> <p>② Display “B06: Error indication” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press ↑ or ↓ to go to the page with “B06 Error indication”.</p> <p>③ Check the setting Check the setting shown in the right of “B06 Error Indication”. OFF: “010: Error Information window” is not automatically displayed (factory-set default) ON: Error Information window is automatically displayed • If no change is needed, go to “⑥”.</p> <p>④ Open “B06: Error Indication window” Press inside the frame of the “B06: Error Indication” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press OFF (or any other applicable key) in the “B06: Error indication window” to highlight it, and then press OK. • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens.</p> <p>⑥ Go back to the original window Press Back or HOME in the lower right in the “200: Measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (2/6)</p>  <p style="text-align: center;">B06: Error Indication Window</p>

(8) Hiding the logo mark at the time of power-on

- (a) Turn on/off the display of our logo mark at the time of power-on (4 or 5 seconds in the screen center).
- (b) This operation can be performed in automatic/manual measurement or automatic calibration mode.

Procedure to Hide the Logo Mark at the Time of Power-on

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press [Set] for example in the “000: Home window”.</p> <p>② Display “B07: Logo Indication” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press [Up] or [Down] to go to the page with “B07 Logo Indication”.</p> <p>③ Check the setting Check the setting shown in the right of “B07 Logo Indication”.</p> <p>ON: Logo mark is displayed (factory-set default) NON: Logo mark is not displayed</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. <p>④ Open the “B07: Logo Indication window” Press inside the frame of the “B07: Logo Indication” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press [NON] (or any other applicable key) in the “B07: Logo Indication window” to highlight it, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press [Back] or [HOME] in the lower right in the “200: Measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (2/6)</p>  <p style="text-align: center;">B07: Logo Indication Window</p>

(9) Changing the backlight time

- (a) The lighting time of the screen backlight can be changed. When this time has passed, the backlight goes off to automatically lock the screen.
- (b) The backlight lights again, when you press somewhere on the unlighted screen. To resume screen operation, press the logo mark for a longer time.

【IMPORTANT】 • Once the backlight goes off to lock the screen, the lock is not released also after relighting of the backlight until the logo mark is pressed for a longer time.



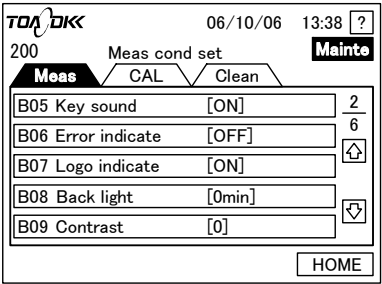
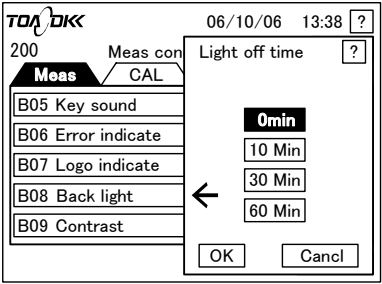
- (c) This operation can be performed in automatic/manual measurement or automatic calibration mode.

Procedure to Change the Backlight Time

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press [Set] for example in the “000: Home window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>

(To be continued)



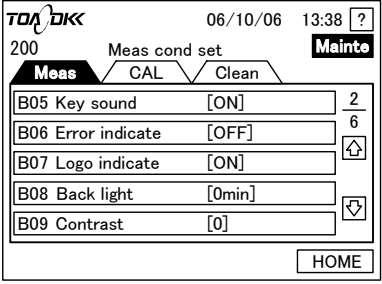
(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>② Display “B08: Back light” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press  or  to go to the page with “B08: Back light”.</p> <p>③ Check the setting Check the setting shown in the right of “B08: Back light”.</p> <p>Normal On: Backlight is always on (factory-set default) 10 Minutes: Goes off in 10 minutes after the last screen operation. 30 Minutes: Goes off in 30 minutes after the last operation. 60 Minutes: Goes off in 60 minutes after the last operation.</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. <p>④ Open the “B08: Back light window” Press inside the frame of “B08: Back light” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press 10 Min (or any other applicable key) in the “B08: Back light window” to highlight it, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press Back or HOME in the lower right in the “200: Measurement conditions setting window”.</p>	 <p>200: Measurement Conditions Setting Window (2/6)</p>  <p>B08: Back light Window</p>

(10) Changing the contrast

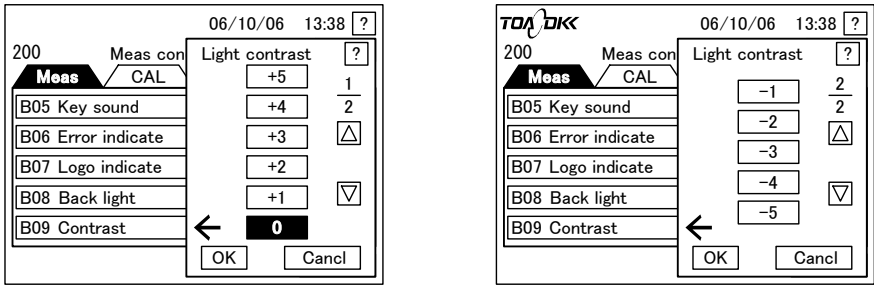
- (a) Change the screen contrast (rate of brightness versus darkness).
- (b) This operation can be performed in automatic/manual measurement or automatic calibration mode.

Procedure to Change the Contrast

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press Set for example in the “000: Home window”.</p> <p>② Display “B09: Contrast” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press  or  to go to the page with “B09: Contrast”.</p> <p>③ Check the setting Check the setting shown in the right of B09 Contrast:</p> <p>+5 (brightest), +4, +3, +2, +1, 0 (factory-set default), -1, -2, -3, -4, -5 (darkest)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. 	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p>200: Measurement Conditions Setting Window (2/6)</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>④ Open “B09: Contrast window” Press inside the frame of “B09: Contrast” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press [+3] (or any other applicable key) in the “B09: Contrast window” to highlight it, and then press [OK].</p> <ul style="list-style-type: none"> • To toggle between pages: use [△] or [▽] • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. 	 <p style="text-align: center;">B09: Contrast Window (1/2) B09: Contrast Window (2/2)</p>
<p>⑥ Go back to the original window Press [Back] or [HOME] in the lower right in the “200: Measurement conditions setting window”.</p>	<p>▷ See the screenshot of “②”.</p>

(11) Disabling the printer function



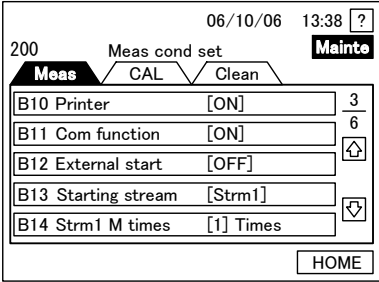
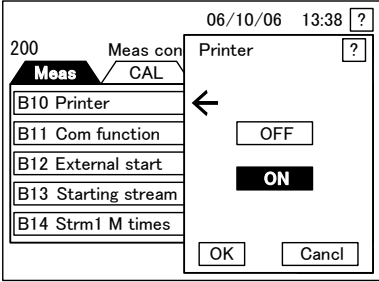
- (a) turn on/off the printer function. If set to off (disable), the printer function is disabled, so that no printout is made. The printer is an optional item.
- (b) All the data are recorded on the CF card. Thus, printing by means of a printer is not necessary, if data are read out from the CF card.
- (c) This operation can be performed in automatic/manual measurement or automatic calibration mode.

Procedure to Disable the Printer Function

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press [Set] for example in the “000: Home window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>② Display “B10: Printer” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press  or  to go to the page with B10 Printer.</p> <p>③ Check the setting Check the setting shown in the right of “B10: Printer”.</p> <p>OFF: Printer function is disabled. ON: Printer function is enabled.</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. 	 <p style="text-align: center;">200: Measurement Conditions Setting Window (3/6)</p>
<p>④ Open the “B10: Printer window” Press inside the frame of “B10: Printer” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press OFF (or any other applicable key) in the “B10: Printer window” to highlight it, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press Back or HOME in the lower right in the “200: Measurement conditions setting window”.</p>	 <p style="text-align: center;">B10: Printer Window</p>

(12) Enabling the communication function

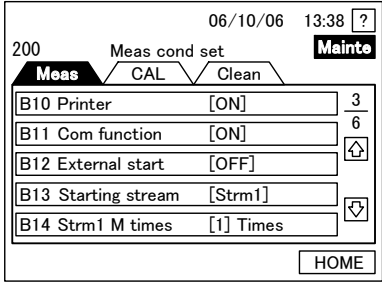
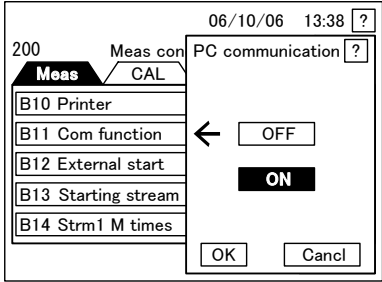
- (a) Turn on/off communication from PC. If this is set to on (enabled), writing of set values (parameters) and programs (sequences) in the product can be done from your PC.
- (b) This writing using the communication function can be performed only in the “000: Home window”. Data can be read out regardless of the on/off status of the communication function or whether any measurement is in progress.
- (c) This operation can be performed in automatic/manual measurement or automatic calibration mode.

Procedure to Enable the Communication Function

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press Set for example in the “000: Home window”.</p>	<p>➤ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>② Display “B11: Communication Function” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press \uparrow or \downarrow to go to the page with “B11: Communication function”.</p> <p>③ Check the setting Check the setting shown in the right of “B11: Communication function”.</p> <p>OFF: Writing from the PC is disabled (factory-set default). ON: Writing from the PC is enabled.</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. 	 <p style="text-align: center;">200: Measurement Conditions Setting Window (3/6)</p>
<p>④ Open the “B11: Communication function window” Press inside the frame of “B11: Communication function” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press OFF (or any other applicable key) in the “B11: Communication Function window” to highlight it, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press Back or HOME in the lower right in the “200: Measurement conditions setting window”.</p>	 <p style="text-align: center;">B11 Communication Function Window</p>

(13) Enabling the external starting

(a) Select from externally-started operation and internally-started operation, by turning on/off “B12 External Start”. \triangleright Section 3.3 (1) “Selection of startup method”

External Starting ON Operation can be performed by external starting. When **Start** is pressed in Automatic Measurement mode, i.e. in “110: Auto Measurement start window”, the control section becomes ready to receive input signals, including Automatic Measurement Start signal, from outside (except for External Unit Busy signal). Internal starting is disabled. Therefore, internally-started automatic cleaning and internally-started automatic calibration are not performed. Periodically enter the Cleaning Start Signal or Calibration Start Signal.

External Starting OFF Operation can be performed by internal starting. The control section activates Automatic Measurement Start or other operations based on the built-in timer. External starting is disabled.

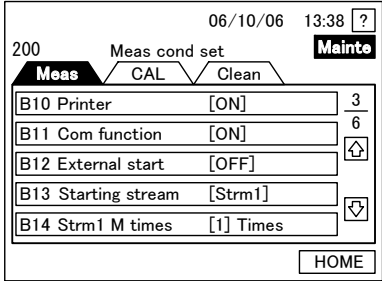
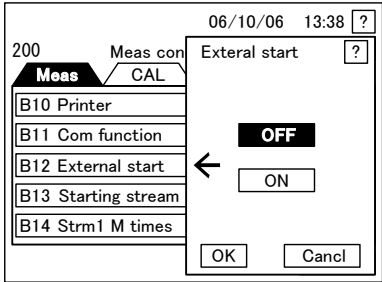
(b) Contact signals, which can be input from outside in Automatic Measurement mode of external start, are as follows. However, “External unit busy” signal can be input regardless of on/off status of external starting.

- Measurement Stop signal
- Measurement Start signal

- Calibration Start signal
- Stream Selection signal
- External Unit Busy signal
- Cleaning Start signal

(c) For the description of the contact input signals as well as the priority in case of overlapping signals, see section 3.3 (1) “Selection of startup method.”

Procedure to Enable External Starting

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement Conditions Setting window” Press [Set] for example in the “000: Home window”.</p> <p>③ Display “B12: External start” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press [Up] or [Down] to go to the page with “B12: external start”.</p> <p>④ Check the setting Check the setting shown in the right of “B12: External Start”. OFF: External starting is disabled (factory-set default). ON: External starting is enabled.</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. 	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (3/6)</p>
<p>⑤ Open the “B12: External start window” Press inside the frame of “B12: External Start in the “200: Measurement conditions setting window”.</p> <p>⑥ Change the setting Press [OFF] (or any other applicable key) in the “B12: External Start window” to highlight it, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “00: Home window”. Press [HOME] in the “200: Measurement conditions setting window”.</p> <ul style="list-style-type: none"> • If external starting is turned ON (enabled), make the system ready for start of automatic measurement (receiving external input signal) after this operation. ▷ Section 4.3 (1) “Start of automatic measurement” 	 <p style="text-align: center;">B12: External Start Window</p>

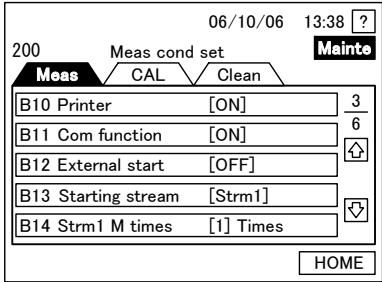
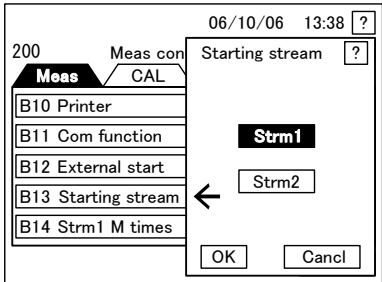
(14) Changing the measurement-starting stream (for double-stream units)

- (a) This operation is not necessary for a single-stream unit. change the stream to start measurement for a double-stream unit. If you set it to “Stream 1,” measurement is started with Stream 1, and then proceeds to Stream 2 measurement.

- 【IMPORTANT】**
- B13: Starting Stream is not displayed for a single-stream unit.
 - This function is for internal control only. In external control mode, it is disabled.

- (b) Measurement of Stream 2 is started upon completion of the preset number of measurements for Stream 1. The timing of measurement start depends on the measurement-starting stream, number of measurements for Stream 1 and Stream 2, etc.

Procedure to Change the Measurement-starting Stream

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window” Press [Set] for example in the “000: Home window”.</p> <p>③ Display “B13: Starting stream”. Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B13: Starting stream”.</p> <p>④ Check the setting Check the setting shown in the right of “B13: Starting stream”. Stream 1: Starts measurement with stream 1 (factory-set default). Stream 2: Starts measurement with stream 2</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. 	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (3/6)</p>
<p>⑤ Open the “B13: Starting stream window”. Press inside the frame of “B13: Starting stream” in the “200: Measurement conditions setting window”.</p> <p>⑥ Change the setting Press [Strm1] (or any other applicable key) in the “B13: Starting stream window” to highlight it, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “200: Measurement conditions setting window”.</p>	 <p style="text-align: center;">B13: Starting Stream Window</p>

(15) Changing the measurement times of stream 1 (for a double-stream unit)

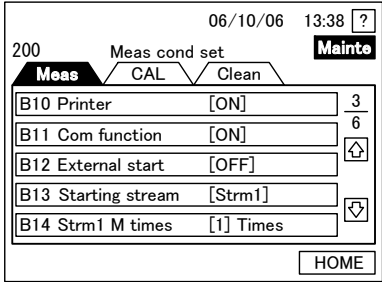
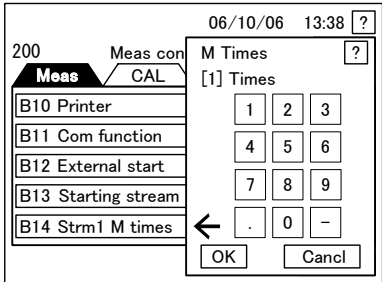
(a) This operation is not necessary for a single-stream unit. Change the number of measurements for Stream 1 for a double-stream unit. For example, if you set “3” as the number of measurements for Stream 1, the system starts measurement of Stream 2 after measuring Stream 1 three times.

- 【IMPORTANT】**
- “B14: Stream 1 Measurement Times” is not displayed for a single-stream unit.
 - This function is for internal control only. In external control mode, it is disabled.

(b) If you set this to “0”, Stream 1 is not measured. In this case, “B15: Stream 2 measurement times” cannot be set to “0”.

(c) This operation can be performed also in automatic/manual measurement or automatic calibration mode.

Procedure to Change Stream 1 Measurement Times

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window”. Press [Set] for example in “000: Home window”.</p> <p>② Display “B14: Stream 1 measurement times”. Press Meas in the “200: Measurement conditions Setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B14: Stream 1 Measurement Times”.</p> <p>③ Check the setting Check the setting shown in the right of “B14: Stream 1 measurement times”. Once (in example): The number shows the number of measurements for Stream 1. Setting range: 00 to 99 (factory-set default: 1)</p> <ul style="list-style-type: none"> • If set to “0,” no measurement is performed. • If no change is needed, go to “⑥”. <p>④ Open the “B14: Stream 1 measurement times window”. Press inside the frame of “B14: Stream 1 measurement times” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Use the ten-key pad in the “B14: Stream 1 measurement times window” to set the necessary number of measurements for stream 1 on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press [Back] or [HOME] in the lower right in the “200: Measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p>200: Measurement Conditions Setting Window (3/6)</p>  <p>B14: Stream 1 Measurement Times Window</p>

(16) Changing the measurement times of stream 2 (for a double-stream unit)

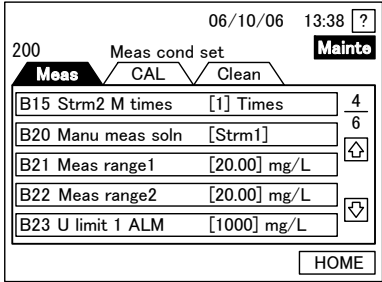
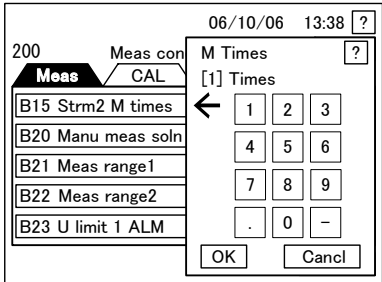
(a) This operation is not necessary for a single-stream unit. Change the number of measurements for Stream 2 for a double-stream unit. For example, if you set “3” as the number of measurements for Stream 2, the system starts measurement of Stream 1 after measuring Stream 2 three times.

- 【IMPORTANT】**
- “B15: Stream 2 Measurement Times” is not displayed for a single-stream unit.
 - This function is for internal control only. In external control mode, it is disabled.

(b) If you set this to “0”, Stream 2 is not measured. In this case, “B14: Stream 1 Measurement Times” cannot be set to “0”.

(c) This operation can be performed also in automatic/manual measurement or automatic calibration mode.

Procedure to Change Stream 2 Measurement Times

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window”. Press [Set] for example in “000: Home window”.</p> <p>② Display “B15: Stream 2 measurement times”. Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B15: Stream 2 measurement times”.</p> <p>③ Check the setting Check the setting shown in the right of “B15: Stream 2 measurement times”. Once (in example): The number shows the number of measurements for Stream 2. Setting range: 00 to 99 (factory-set default: 1)</p> <ul style="list-style-type: none"> • If set to “0,” no measurement is performed. • If no change is needed, go to “⑥”. <p>④ Open the “B15: Stream 2 measurement times window”. Press inside the frame of “B15: Stream 2 measurement times” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Use the ten-key pad in the “B15: Stream 2 Measurement times window” to set the necessary number of measurements for stream 2 on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the original window Press [Back] or [HOME] in the lower right in the “200: Measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p>200: Measurement Conditions Setting Window (4/6)</p>  <p>B15: Stream 2 Measurement Times Window</p>

(17) Changing the manual operation measurement solution

In internal start mode, change the measurement solution (sample water) for manual measurement.

[IMPORTANT] • This function is for internal control only. In external control mode, it is disabled.

Procedure to Change the Manual Operation Measurement Solution

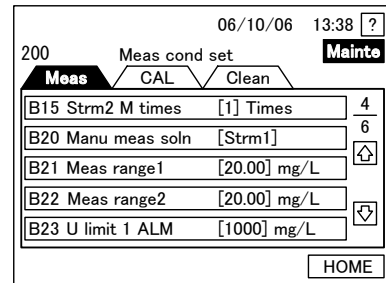
Procedure and Operation	Typical screenshot
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- ① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning)
 ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”

- ② Go to the “200: Measurement conditions setting window”.
 Press **[Set]** in the “000: Home window”.

▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”

- ③ Display “B20: manual operation measurement solution”
 Press **[Meas]** in the “200: measurement conditions setting window” to highlight it. Then, press **[↑]** or **[↓]** to go to the page with “B20: manual operation measurement solution”.



200: Measurement Conditions Setting Window (4/6)

- ④ Check the setting Check the setting shown in the right of “B20: Manual operation measurement solution”.

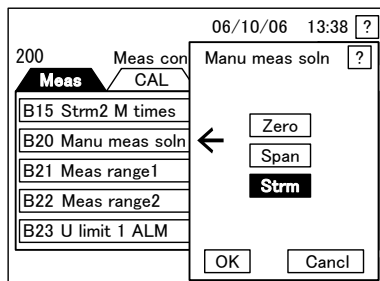
Zero: Measures zero calibration solution
 Span: Measures span calibration solution
 Stream: Measures sample for the stream (for single-stream)
 Stream 1: Measures sample for Stream 1 (for double-stream)
 Stream 2: Measures sample for Stream 2 (for double-stream)

- If no change is needed, go to “⑦”.

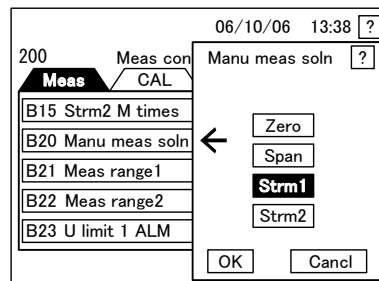
- ⑤ Open the “B20: manual operation measurement solution window”. Press inside the frame of “B20: manual operation measurement solution” in the “200: Measurement conditions setting window”.

- ⑥ Change the setting Press **[Strm1]** (or any other applicable key) in the “B20: manual operation measurement solution window” to highlight it, and then press **[OK]**.

- If no change is needed, press **[Cancel]**.
- After operation, the “200: Measurement conditions setting window” opens.



B20: Manual Operation Measurement Solution Window (for single-stream)



B20: Manual Operation Measurement Solution Window (for double-stream)

- ⑦ Go back to the “000: Home window”. Press **[HOME]** in the “200: Measurement conditions setting window”, if no other setting change is necessary

▷ See the Screenshot of “③”.

(18) Changing the measurement range for stream 1

(a) Do not change the measurement range, unless necessary.

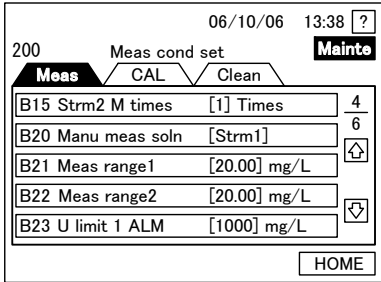
【IMPORTANT】 • If change in the measurement range is necessary, ask for technical service. Related setting values must be also changed.

- If the measurement range is changed, setting of the following items becomes necessary. Unless this work is done properly, you cannot obtain correct measurement values.
- B23: Upper Alarm 1
- B24: Upper Alarm 2
- B27: Dilution Rate 1
- B28: Dilution Rate 2 (not necessary for a single-stream unit)
- B29: Dilution factor (stream 2) (not necessary for a single-stream unit)
- C21: Standard Concentration
- Preparation and filling of span calibration solution conforming to the changed measurement range.
- Calibration using changed span calibration solution

(b) The measurement range set here is the range of transmission output and concentration range of the graph.

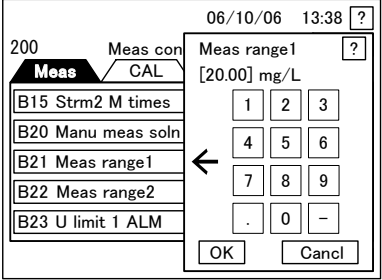
(c) The description in the table below applies only to operation for changing the measurement range for a single-stream unit or for Stream 1 of a double-stream unit.

Procedure to Change the Stream 1 Measurement Range

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display B21 range 1 Press Meas in the “200: Measurement Conditions Setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B21 Range 1 (or “B21 Range” for a single-stream unit)”.</p> <p>④ Check the setting Check the setting shown in the right of “B21: range 1”. 20.00mg/L Example: The figure indicates the maximum readout value for stream 1. The example shows the range of 0 to 20.00 mg/L. Setting range: 2.000 to 1000mg/L (factory-set value: depends on the order specification) • If no change is needed, go to “⑦”.</p> <p>⑤ Open the “B21: Range 1 window” Press inside the frame of B21 range 1 in the “200: measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (4/6)</p>

(To be continued)

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Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Use the ten-key pad in “B21 range 1 window” to set the measurement range for stream 1 on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000 Home window”. Press [HOME] in the “200: Measurement conditions setting window”, if no other setting change is necessary</p>	 <p style="text-align: center;">B21: Range 1 Window (for double-stream)</p>

(19) Changing the measurement range for stream 2 (for double-stream)

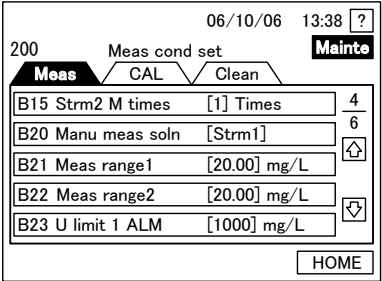
(a) Do not change the measurement range, unless necessary.

- 【IMPORTANT】**
- B22: Range 2 is not displayed for a single-stream unit.
 - If change in the measurement range is necessary, ask for technical service. Related setting values must be also changed.

(b) This operation is not necessary for a single-stream unit. The description in the table below applies only to operation for changing the measurement range for Stream 2 of a double-stream unit.

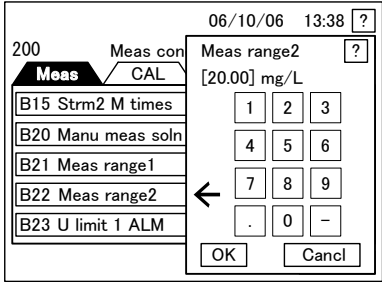
(c) The measurement range set here is the range of transmission output and concentration range of the graph.

Procedure to Change the Stream 2 Measurement Range

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Sections 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to “200: Measurement conditions setting”. Press [Set] in “000: Home window”.</p> <p>③ Display “B22: range 2” Press [Meas] in “200: Measurement conditions setting” to highlight it. Then, press [↑] or [↓] to go to the page with “B22: Range 2”.</p> <p>④ Check the setting Check the setting shown in the right of “B22: Range 2”.</p> <p>20.00mg/L Example: The figure indicates the maximum readout value for Stream 2. The example shows the range of 0 to 20.00 mg/L.</p> <p>Setting range: 2.000 to 1000mg/L (factory-set value: depends on the order specification)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. 	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p> <div style="text-align: center;">  <p style="text-align: center;">200: Measurement Conditions Setting Window (4/6)</p> </div>

(To be continued)

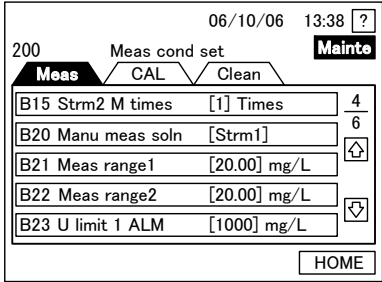
(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑤ Open the B22 Range 2 window: Press inside the frame of B22: Range 2 in 200 measurement conditions setting.</p> <p>⑥ Change the setting Use the ten-key pad in “B22: Range 2” to set the measurement range for Stream 2 on the second line, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, 200: Measurement Conditions Setting opens. <p>⑦ Go back to the “000: Home window” Press HOME in the “200: Measurement conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">B22: Range 2 Window (for double-stream)</p>

(20) Changing the upper alarm for stream 1

- (a) Change the upper alarm value for Stream 1 of a double-stream unit, or for a single-stream unit. If the measurement range has been changed, this operation is necessary.
- (b) The unit of upper alarm is concentration in mg/L. If this is set to “0” mg/L, no upper alarm is activated for Stream 1.

Procedure to Change the Stream 1 Upper Alarm

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window” Press Set in the “000: Home window”.</p> <p>③ Display “B23: upper alarm 1” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press ↑ or ↓ to go to the page with B23 upper alarm 1.</p> <p>④ Check the setting Check the setting shown in the right of “B23 Upper Alarm 1”. 1000mg/L Example: The figure indicates the upper alarm value for Stream 1. Setting range: 0 to 1000mg/L (factory-set value: 1000)</p> <ul style="list-style-type: none"> • If set to “0” mg/L, no activation. • If no change is needed, go to “⑦”. <p>⑤ Open the “B23: upper alarm 1 window” Press inside the frame of B23 upper alarm 1 in the “200: Measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (4/6)</p>

(To be continued)

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Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Use the ten-key pad in the “B23: upper alarm 1 window” to set an upper alarm value you want for stream 1 on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000: Home window” Press [HOME] in the “200: Measurement conditions setting window”, if no other setting change is necessary</p>	
	<p>B23: Upper Alarm 1 Window</p>

(21) Changing the upper alarm for stream 2 (for double-stream)

(a) This operation is not necessary for a single-stream unit. Change the upper alarm value for Stream 2. If the measurement range has been changed, this operation is necessary.

【IMPORTANT】 • B24 Upper Alarm 2 is not displayed for a single-stream unit.

(b) The unit of upper alarm is concentration in mg/L. If this is set to “0” mg/L, no upper alarm is activated for Stream 2.

Procedure to Change the Stream 2 Upper Alarm Value

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “B24: upper alarm 2” Press [Meas] in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B24 upper alarm 2”.</p> <p>④ Check the setting Check the setting shown in the right of “B24 upper alarm 2”. 1000mg/L Example: The figure indicates the upper alarm value for Stream 2. Setting range: 0 to 1000mg/L (factory-set value: 1000)</p> <ul style="list-style-type: none"> • If set to “0” mg/L, no activation. • If no change is needed, go to “⑦”. <p>⑤ Open the “B24: upper alarm 2 window” Press inside the frame of “B24 upper alarm 2” in the “200: measurement conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p> <div style="text-align: center;"> </div> <p style="text-align: center;">200: Measurement Conditions Setting Window (5/6)</p>

(To be continued)

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Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Use the ten-key pad in the “B24: upper alarm 2 window” to set an upper alarm value you want for stream 2 on the second line, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000: Home window” Press HOME in the “200: Measurement conditions setting window”, if no other setting change is necessary</p>	<p style="text-align: center;">B24: Upper Alarm 2 Window</p>

(22) Changing the calibration solution volume

- (a) Change the displayed remaining rate of the span calibration solution. Make sure to change it to the correct rate whenever
- Calibration solution is replenished, or
 - The quantity displayed on the screen differs from the actual one.

【IMPORTANT】 • Set the remaining rate according to the actual quantity remaining in the calibration solution tank. Otherwise, there may be cases where no “A20: Span Solution failure” warning is issued though there is no more calibration solutions or vice versa.

- (b) The calibration solution volume is shown in percentage, indicating the rate of the remaining solution compared to the calibration solution tank capacity (2L).
- (c) The value of B25 Calibration solution volume changes to a value that can be assumed as the current solution remaining ratio, in subtracting consumed liquid in sequence, also taking the dilution rate and span calibration times into account. In the 106: Standard Solution Volume window, see the same remaining rate in a bar graph.
- (d) This operation can be performed also in automatic/manual measurement or automatic calibration mode.

Procedure to Change the Calibration Solution Volume

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press Set for example in the “000: Home window”.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>② Display “B25: Calibration solution volume” Press Meas in the “200: Measurement conditions setting window” to highlight it. Then, press \uparrow or \downarrow to go to the page with “B25: Calibration solution volume”.</p> <p>③ Check the setting Check the setting shown in the right of “B25: Calibration solution volume”.</p> <p>86% Example: The figure shows remaining calibration solution in percentage. Setting range: 0 to 120% (factory-set value: 100)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. 	<p>200: Measurement Conditions Setting Window (5/6)</p>
<p>④ Open the “B25: Calibration solution volume window” Press inside the frame of “B25: Calibration solution volume” in the “200: Measurement Conditions Setting window”.</p> <p>⑤ Change the setting Use the ten-key pad in the “B25: Calibration solution volume window” to set the correct remaining solution ratio on the second line, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement Conditions Setting window” opens. <p>⑥ Go back to the original window Press Back or HOME in the lower right in the “200: Measurement conditions setting window”.</p>	<p>B25: Calibration Solution Volume Window</p>

(23) Changing the calibration solution alarm level

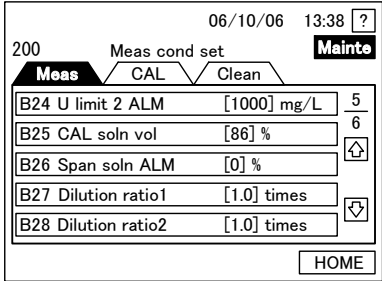
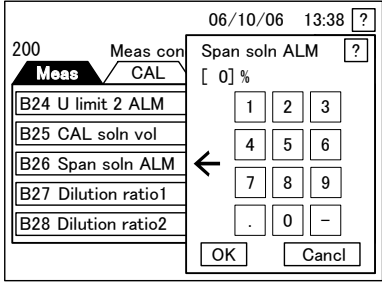
- (a) Change the alarm level concerning the calibration solution volume. This level will be the reference value for alarm generation concerning “A20: Span Solution Failure.”
- (b) The rate of calibration solution consumption per span calibration is as follows. Set the alarm level higher than the corresponding value (increment: 5%).
 - 1 fold dilution: about 5%
 - 5 fold dilution: about 1.5%
 - 10 fold dilution: about 1.0%
- (c) If it is set to “0”%, this alarm is never activated.
- (d) Change this alarm level after any change in the dilution rate or number of span calibrations.

Procedure to Change the Span Solution Alarm Level

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning)</p> <p>▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p>	

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>② Go to the “200: Measurement conditions setting window” Press [Set] in “000: Home window”.</p> <p>③ Display “B26: Span solution alarm level” Press [Meas] in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B26: Span solution alarm Level”.</p> <p>④ Check the setting Check the setting shown in the right of “B26: Span Solution Alarm Level”.</p> <p>0% Example: The figure indicates the alarm level for calibration solution volume. Setting range: 0 to 100% (factory-set value: 0%); Increment: 5%</p> <ul style="list-style-type: none"> • If set to “0”%, no activation. • If no change is needed, go to “⑦”. <p>⑤ Open the B26 span solution alarm level window Press inside the frame of B26 span solution alarm level in the 200 Measurement conditions Setting window.</p> <p>⑥ Change the setting Use the ten-key pad in the “B26: span solution alarm level window” to set an alarm value you want on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000: Home window” Press [HOME] in the “200: Measurement Conditions Setting window”, if no other setting change is necessary</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p>200: Measurement Conditions Setting Window (5/6)</p>  <p>B26: Span Solution Alarm Level Window</p>

(24) Changing the dilution rate for stream 1

(a) Do not change the dilution rate, unless necessary.

【IMPORTANT】 • The dilution rate affects the range of measurement. Ask for technical service.

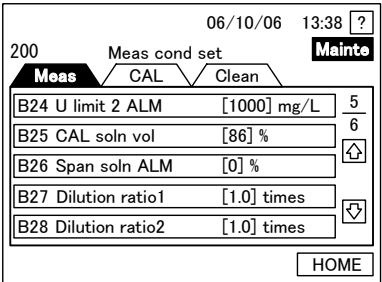
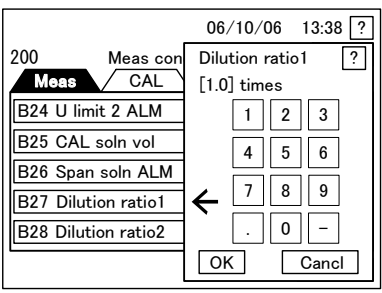
(b) In this product, the solution is not diluted for the measurement range within 0 to 20mL, while it is diluted so that the concentration of sample or span calibration solution becomes 20mg/L or less for measurement, if the concentration is higher. The dilution factors corresponding to maximum readout of the measurement range are shown in the table below:

Dilution Factor for Different Measurement Ranges

	Maximum readout of the measurement range (mg/L)							
	20	30	40	50	100	200	500	1000
Diluting factor	1 fold	1.5 fold	2 fold	2.5 fold	5 fold	10 fold	25 fold	50 fold

(c) The next table is applicable only when changing the dilution factor for a single-stream unit, or for Stream 1 of a double-stream unit.

Procedure to Change the Dilution Rate for Stream 1

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window” Press [Set] in the “000: Home window”.</p> <p>③ Display “B27: Dilution Ratio 1” Press Meas in the “200: Measurement Conditions Setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B27: dilution Ratio 1 (or “B27 Dilution Ratio” for a single-stream unit)”.</p> <p>④ Check the setting Check the setting shown in the right of “B27: dilution Ratio 1”. 1.0 fold Example: The figure indicates the dilution factor for Stream 1. Setting range: 1 to 50 fold (factory-set value depends on the order specification)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “B27: Dilution ratio 1 window” Press inside the frame of “B27: Dilution ratio 1” in the “200: Measurement conditions setting window”.</p> <p>⑥ Change the setting Use the ten-key pad in the “B27: dilution Ratio 1 window” to set a dilution factor you want for Stream 1 on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000: Home window” Press [HOME] in the “200: Measurement conditions setting window”, if no other setting change is necessary.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p>200: Measurement Conditions Setting Window (5/6)</p>  <p>B27: Dilution Ratio 1 Window</p>

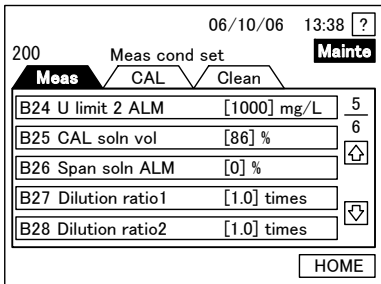
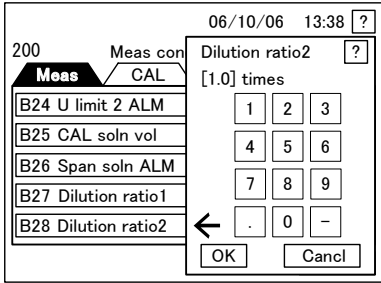
(25) Changing the dilution rate for stream 2 (for double-stream)

(a) This operation is not necessary for a single-stream unit. Do not change the dilution rate, unless necessary.

- [IMPORTANT]**
- B28 Dilution Ratio 2 is not displayed for a single-stream unit.
 - The dilution rate affects the range of measurement. Ask for technical service.

- (b) The dilution ratio for different measurement ranges is same as in section 4.4 (24) “Changing the dilution rate for stream 1” “(b)”.
- (c) The next table is applicable only when changing the dilution factor for Stream 2 of a double-stream unit.

Procedure to Change the Dilution Ratio for Stream 2

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “B28: Dilution ratio 2” Press [Meas] in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “B28 1 Dilution rate”.</p> <p>④ Check the setting Check the setting shown in the right of “B28: Dilution ratio 2”: 1.0 fold Example: The figure indicates the dilution factor for Stream 1. Setting range: 1 to 50 fold (factory-set value depends on the order specification)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “B28: Dilution Ratio 2 window” Press inside the frame of “B28: Dilution ratio 2” in the “200: Measurement conditions setting window”.</p> <p>⑥ Change the setting Use the ten-key pad in “B28: dilution ratio 2 window” to set a dilution factor you want for Stream 2 on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “200: Measurement conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “200: measurement conditions setting window”, if no other setting change is necessary.</p>	<p>▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (5/6)</p>  <p style="text-align: center;">B28: Dilution Ratio 2 Window</p>

(26) Changing the dilution error factor for stream 2 (for double-stream)

- (a) This operation is not necessary for a single-stream unit. Change the dilution error factor for Stream 2 of a double-stream unit. This error coefficient offsets any dilution error for Stream 2 that has no calibration function.

【IMPORTANT】

- “B29 Dilution factor (stream 2)” is not displayed for a single-stream unit.
- This operation is necessary after any change in the measurement range.

- (b) Measure same sample (measurement solution) in Stream 1 with the dilution rate for Stream 1 and then in Stream 2 with the dilution rate for Stream 2, and use the measured values to calculate the dilution error factor with the following equation:

Dilution error factor for Stream 2 = Measured value in Stream 1 / Measured value in Stream 2

(Example) Measured value in Stream 1: 10mg/L
 Measured value in Stream 2: 9mg/L
 $10/9 = 1.111$ (Dilution error factor for Stream 2)

Procedure to Change the Dilution Error Factor for Stream 2

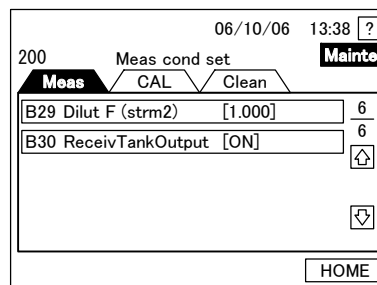
Procedure and Operation	Typical screenshot
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- ① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning)
 ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”

- ② Go to the “200: Measurement conditions setting window”.
 Press **[Set]** in the “000: Home window”.

▷ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”

- ③ Display “B29: Dilution factor (stream 2)” Press **Meas** in the “200: Measurement conditions setting window” to highlight it. Then, press **[↑]** or **[↓]** to go to the page with “B29: Dilution factor (stream 2)”



200: Measurement Conditions Setting Window (6/6)

- ④ Check the setting Check the setting shown in the right of “B29 Dilution factor (stream 2)”.

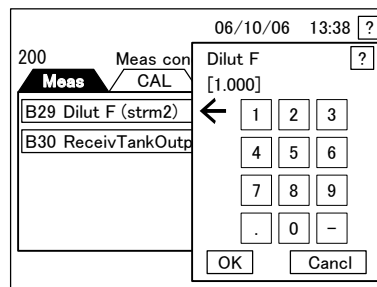
1.000 fold Example: The figure indicates the dilution error factor for Stream 2.
 Setting range: 0.500 to 2.000

- If no change is needed, go to “⑦”.

- ⑤ Open the “B29 Dilution factor (stream 2) window” Press inside the frame of “B29 dilution factor (stream 2)” in the “200: Measurement conditions setting window”.

- ⑥ Change the setting Use the ten-key pad in the “B29: Dilution factor (stream 2) window” to set a dilution error factor you want for Stream 2 on the second line, and then press **[OK]**.

- If no change is needed, press **[Cancel]**.
- After operation, the “200: Measurement conditions setting window” opens.



B29: Dilution Factor (Stream 2) Window

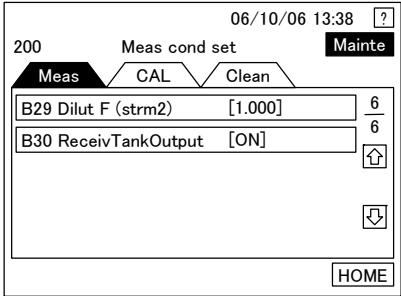
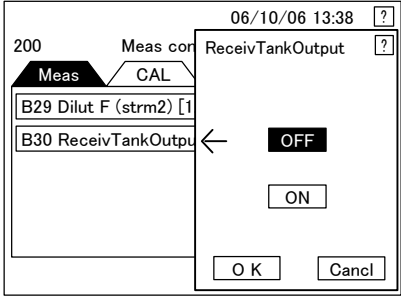
- ⑦ Go back to the “000: Home window” Press **[HOME]** in the “200: Measurement Conditions Setting window”, if no other setting change is necessary.

(27) Changing the water receiving tank failure print output

- (a) Minor alarm signal output and printer print for water receiving tank 1 failure or water receiving tank 2 failure (option) can be turned on/off.
- (b) When “water receiving tank failure print output” is off (invalid), even if the water receiving tank becomes failure state, minor alarm signal is not output and the printer also does not print. When it is on (valid), as is the case with other minor alarm items, minor alarm signal is output (changed to closed) and the printer print “water receiving tank 1 failure” or “water receiving tank 2 failure”.

- (c) Even if this setting is off (invalid), error indication (**ERR**) lighting and error information window display can be performed.
- (d) This operation can be performed also in automatic/manual measurement or automatic calibration mode.

Procedure to Change the Water Receiving Tank Failure Print Output

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window” Press Set in the “000: Home window”.</p> <p>② Display “B30: Water receiving tank failure print output” Press Meas in the 200: Measurement conditions setting window to highlight it. Then, press Up or Down to go to the page with “B30: Water receiving tank failure print output window”.</p> <p>③ Check the setting Check the setting shown in the right of B30: Water receiving tank failure print output: OFF: Water receiving tank failure print output is invalid. ON: Water receiving tank failure print output is valid. (Factory setting)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. <p>④ Open the “B30: Water receiving tank failure print output window” Press inside the frame of the “B30: Water receiving tank failure print output” in the “200: Measurement conditions setting window”.</p> <p>⑤ Change the setting Press OFF (or any other applicable key) in the “B30: Water receiving tank failure print output window” to highlight it, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “200: Measurement conditions setting window” opens. <p>⑥ Go back to the “000: Home window” Press HOME in the “200: Measurement Conditions Setting window”, if no other setting change is necessary.</p>	<p>➤ See the screenshot in “②” of section 4.4 (1) “Reservation of operation stop”</p>  <p style="text-align: center;">200: Measurement Conditions Setting Window (6/6)</p>  <p style="text-align: center;">B30: Water Receiving Tank Failure Print Output Window</p>

4.5 Manipulation of Calibration Conditions in Setting Mode

(1) Changing the next calibration start date

- (a) In internal start mode, change the next calibration start date. This date shows after how many days after measurement start the calibration is made, and applies only for the first calibration after start of automatic measurement. The second and later calibrations are performed based on the calibration cycle, which starts with the first calibration.

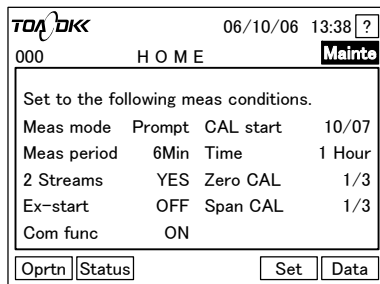
【IMPORTANT】 • This function is for internal control only. In external control mode, it is disabled.

- (b) Setting of “1 day” or longer is recommended. If it is set to “0 day,” automatic calibration is started promptly, when the system recovers from any power failure after calibration start time. Thus, if power failure happens repeatedly, several calibrations may be performed in a day.
- (c) If “C20: Calibration Period” is set to “0,” automatic calibration is disabled. Therefore, no “next calibration,” date of which is set here, is performed either.
- (d) Calibration is performed with Stream 1. For Stream 2 of a double-stream unit, offset by means of “B29: Dilution factor (stream 2)” is performed instead of calibration.

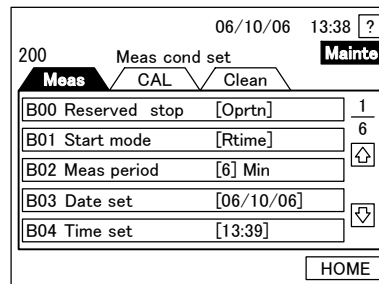
Procedure to Change the Next Calibration Start Date

Procedure and Operation	Typical screenshot
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- ① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning)
 ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”
- ② Go to the “200: Measurement conditions setting window”.
 Press **[Set]** in “000: Home window”.



000: Home Window

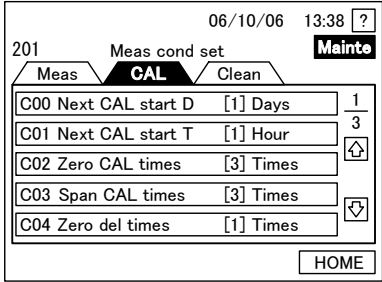
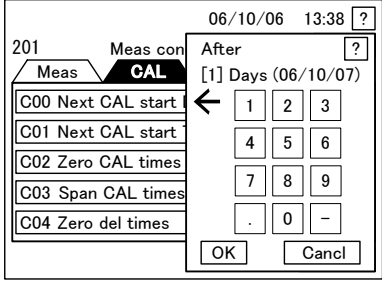


200: Measurement Conditions Setting Window (1/6)

- ③ Display “C00: Next calibration start date” Press **CAL** in the “200: Measurement conditions setting window” to highlight it. Then, press **↑** or **↓** to go to the page with “C00: Next calibration start date”.
 - “201: Calibration conditions setting window” opens.

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>④ Check the setting Check the setting shown in the right of “C00: Next calibration start date”.</p> <p>1 day Example: The figure indicates the next calibration start date.</p> <p>Setting range: 0 to 31 days (Factory-set value: 1)</p> <ul style="list-style-type: none"> • “1 day” means that calibration is performed on the next day. • If no change is needed, go to “⑦”. <p>⑤ Open the “C00: Next calibration start date window” Press inside the frame of “C00: Next calibration start date” in “201: Calibration conditions setting window”.</p>	 <p style="text-align: center;">201: Calibration Conditions Setting Window (1/3)</p>
<p>⑥ Change the setting Use the ten-key pad in the “C00: Next calibration start date window” to set a next calibration start date you want on the second line, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, “201: Calibration conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press HOME in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C00: Next Calibration Start Date Window</p>

(2) Changing the next calibration start time

(a) In internal start mode, change the next calibration start time. This time refers to the time to start automatic calibration during automatic measurement, and applies for operation started by “Next Calibration Start Date” and operation started based on calibration cycle.

【IMPORTANT】 • This function is for internal control only. In external control mode, it is disabled.

(b) In automatic calibration, measurement of calibration solution for “C02 Zero Calibration Times” and C03 Span Calibration Times are performed successively regardless of the measurement cycle, and no sample in the stream is measured in the mean time.

(c) If the next calibration start date is set to “0” and the system is turned on or recovered from a power failure after the next calibration start time, automatic calibration is performed when the power is turned on.

(d) If the internal-timer-based start time for automatic measurement, automatic calibration, and automatic cleaning fall on the same time, operation is performed according to the priority.

▷ “f” in section 4.4 (3) “Changing the measurement cycle”

Procedure to Change the Calibration Start Time

Procedure and Operation	Typical screenshot
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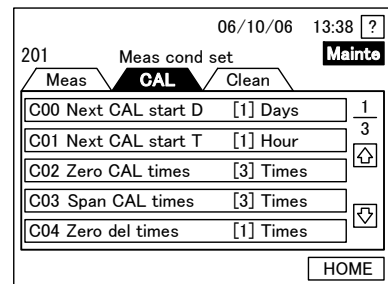
- ① **Stop operation** Stop operation (automatic/manual measurement, manual calibration, or manual cleaning)
 - ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”
- ② **Go to the “200: Measurement conditions setting window”**. Press **[Set]** in the “000: Home window”.
- ③ **Display “C01: Next calibration start time”** Press **CAL** in the “200: Measurement conditions setting window” to highlight it. Then, press **[↑]** or **[↓]** to go to the page with “C01: Next calibration start time”.
 - “201: Calibration conditions setting window” opens.
- ④ **Check the setting** Check the setting shown in the right of “C01: Next Calibration Start Time”.

1 o'clock Example: The figure indicates the next calibration start date (24-hour base). The example shows 1:00 AM.
Setting range: 0 to 23 o'clock (Factory-set value: 1)

 - If no change is needed, go to “⑦”.
- ⑤ **Open the “C01: Next calibration start time window”** Press inside the frame of “C01: Next calibration start time” in the “201: Calibration conditions setting window”.

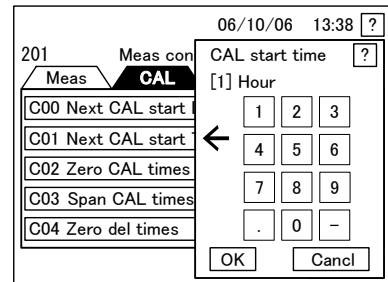
▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”

▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”



201: Calibration Conditions Setting Window (1/3)

- ⑥ **Change the setting** Use the ten-key pad in the “C01: Next calibration start time window” to set a next calibration start time you want on the second line, and then press **[OK]**.
 - If no change is needed, press **[Cancel]**.
 - After operation, the “201: Calibration conditions setting window” opens.
- ⑦ **Go back to the “000: Home window”**. Press **[HOME]** in the “201: Calibration conditions setting window”, if no other setting change is necessary.

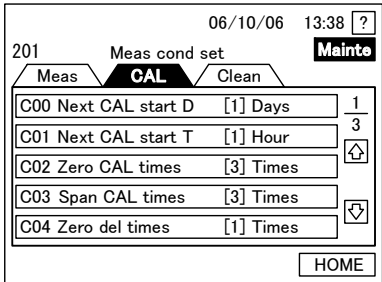
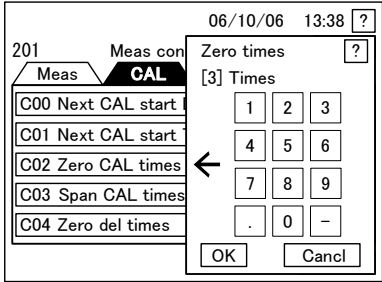


C01: Next Calibration Start Time Window

(3) Changing the zero calibration times

- (a) Change the number of zero calibration measurements; i.e. how many times to measure zero calibration solution in one automatic/manual calibration.
- (b) Zero Calibration Times must be set to a bigger value than “C04 Zero Deletion Times.” If you set zero calibration times to “0,” no zero calibration is performed.
- (c) In automatic calibration, the system measures zero calibration solution as many times as set here first, and then performs span calibration as many times as set in “C03 Span Calibration Times.”

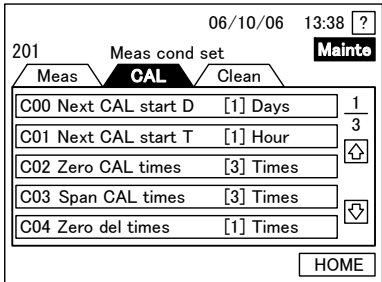
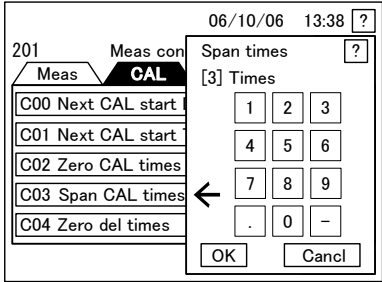
Procedure to Change Zero Calibration Times

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “C02: Zero calibration times” Press CAL in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “C02: Zero calibration times”.</p> <ul style="list-style-type: none"> • “201: Calibration conditions setting window” opens. <p>④ Check the setting Check the setting shown in the right of “C02: Zero Calibration Times”.</p> <p>3 times Example: The figure indicates the number of zero calibration measurements. Setting range: 0 to 9 times (Factory-set value: 3)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “C02: Zero Calibration times window” Press inside the frame of “C02: Zero calibration times” in “201: Calibration conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">201: Calibration Conditions Setting Window (1/3)</p>
<p>⑥ Change the setting Use the ten-key pad in the “C02: Zero Calibration Times window” to set the number of calibration measurements you want on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C02: Zero Calibration Times Window</p>

(4) Changing the span calibration times

- (a) Change the number of span calibration measurements; i.e. how many times to measure span calibration solution in one automatic/manual calibration.
- (b) Span Calibration Times must be set to a bigger value than “C05: Span Deletion Times”. If you set span calibration times to “0”, no span calibration is performed.
- (c) In automatic calibration, the system measures zero calibration solution as many times set in “C02: Zero Calibration Times,” and then performs span calibration as many times as set here.

Procedure to Change Span Calibration Times

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “C03: Span calibration times” Press CAL in the “200: Measurement conditions setting window” to highlight it. Then, press [Left] or [Right] to go to the page with “C03: Span Calibration Times”.</p> <ul style="list-style-type: none"> • “201: Calibration conditions setting window” opens. <p>④ Check the setting Check the setting shown in the right of “C03: Span calibration times”.</p> <p>3 times Example: The figure indicates the number of span calibration measurements. Setting range: 0 to 9 times (Factory-set value: 3)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open “C03: Span calibration times window” Press inside the frame of C03 Span calibration times in “201: Calibration conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">201: Calibration Conditions Setting Window (1/3)</p>
<p>⑥ Change the setting Use the ten-key pad in “C03: Span calibration times window” to set the number of calibration measurements you want on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C03: Span Calibration Times Window</p>

(5) Changing the zero calibration deletion times

- (a) Change the zero calibration deletion times, i.e. the number of times to delete data from the data measured according to “C02 Zero Calibration Times.” It applies both of automatic and manual calibration.
- (b) Zero solution measurement data are deleted in order, starting from the initial data. The purpose of this deletion is to obtain more reliable calibration data from the remaining data.
- (c) The zero calibration deletion times must be set to a number smaller than “C02 Zero Calibration Times,” including “0”.

Procedure to Change Zero Calibration Deletion Times

Procedure and Operation	Typical screenshot
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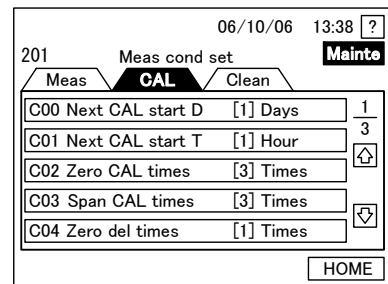
- ① **Stop operation** Stop operation (automatic/manual measurement, manual calibration, or manual cleaning)
 - ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”
- ② **Go to the “200: Measurement conditions setting window”**. Press **[Set]** in the “000: Home window”.
- ③ **Display “C04: Zero calibration deletion times”** Press **CAL** in the “200: Measurement conditions setting window” to highlight it. Then, press **[↑]** or **[↓]** to go to the page with “C04: Zero calibration deletion times”.
 - “201: Calibration conditions setting window” opens.
- ④ **Check the setting** Check the setting shown in the right of “C04: Zero calibration deletion times”.

Once Example: The figure indicates the number of zero calibration deletions.
Setting range: 0 to 8 times (Factory-set value: 1)

 - If no change is needed, go to “⑦”.
- ⑤ **“C04: Zero Calibration Deletion Times window”** Press inside the frame of “C04: Zero calibration deletion times” in the “201: Calibration conditions setting window”.

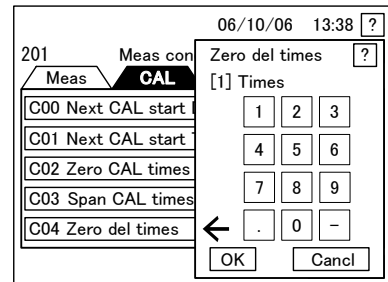
▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”

▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”



201: Calibration Conditions Setting Window (1/3)

- ⑥ **Change the setting** Use the ten-key pad in the “C04: Zero Calibration deletion times window” to set the number of deletions you want on the second line, and then press **[OK]**.
 - If no change is needed, press **[Cancel]**.
 - After operation, the “201: Calibration conditions setting window” opens.
- ⑦ **Go back to the “000: Home window”**. Press **[HOME]** in the “201: Calibration conditions setting window”, if no other setting change is necessary.

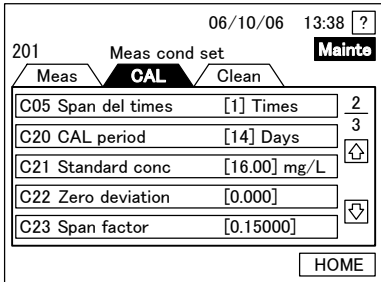
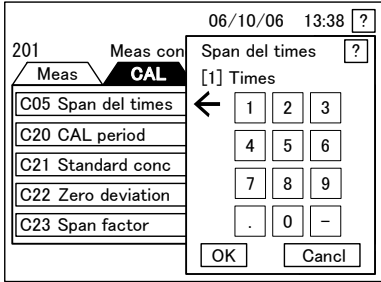


C04: Zero Calibration Deletion Times Window

(6) Changing the span calibration deletion times

- (a) Change the span calibration deletion times, i.e. the number of times to delete data from the data measured according to “C03: Span Calibration Times.” It applies both of automatic and manual calibration.
- (b) Span solution measurement data are deleted in order, starting from the initial data. The purpose of this deletion is to obtain more reliable calibration data from the remaining data.
- (c) The span calibration deletion times must be set to a number smaller than “C03: Span Calibration Times”, including “0”.

Procedure to Change Span Calibration Deletion Times

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “C05: Span calibration deletion times” Press CAL in “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “C05: Span calibration deletion Times”. • “201: Calibration conditions setting window” opens.</p> <p>④ Check the setting Check the setting shown in the right of “C05: Span Calibration Deletion Times”. Once Example: The figure indicates the number of span calibration deletions. Setting range: 0 to 8 times (Factory-set value: 1) • If no change is needed, go to “⑦”.</p> <p>⑤ Open the “C05: Span calibration deletion times window” Press inside the frame of “C05: Span calibration deletion times” in the “201: Calibration conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">201: Calibration Conditions Setting Window (2/3)</p>
<p>⑥ Change the setting Use the ten-key pad in the “C05: Span Calibration deletion times window” to set the number of deletions you want on the second line, and then press [OK]. • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens.</p> <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C05: Span Calibration Deletion Times Window</p>

(7) Changing the calibration cycle

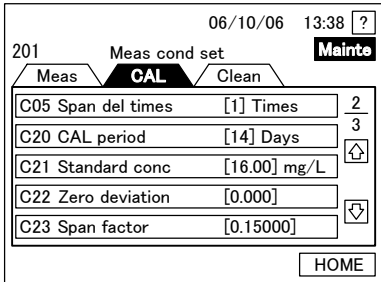
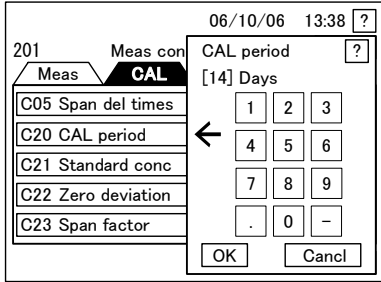
(a) In internal start mode, change the calibration cycle, which refers to the number of days before the automatic calibration date.

【IMPORTANT】 • This item is for internal starting only. This function is disabled for external starting.

(b) If the calibration cycle is set to “0,” automatic calibration by the internal timer is disabled. Perform manual calibration.

(c) The calibration cycle affects consumption speed of the calibration solution. If it is changed, change also the replenishment cycle for the calibration solution.

Procedure to Change Calibration Cycle

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “C20: Calibration period” Press CAL in “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “C20: Calibration period”. • “201: Calibration conditions setting window” opens.</p> <p>④ Check the setting Check the setting shown in the right of “C20: Calibration Period”. 14 days Example: The figure indicates the calibration cycle. Setting range: 0 to 31 days (Factory-set value: 14) • If set to “0,” automatic calibration is disabled. • If no change is needed, go to “⑦”.</p> <p>⑤ Open the “C20: Calibration period window” Press inside the frame of “C20: Calibration period” in the “201: Calibration conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">201: Calibration Conditions Setting Window (2/3)</p>
<p>⑥ Change the setting Use the ten-key pad in the “C20: Calibration Period window” to set the calibration cycle you want on the second line, and then press [OK]. • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens.</p> <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C20: Calibration Period Window</p>

(8) Changing the calibration solution concentration

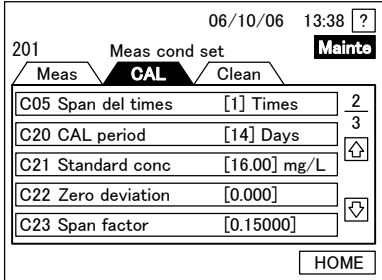
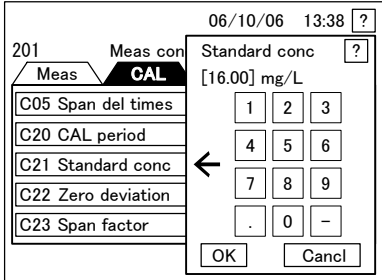
(a) Do not change the calibration solution concentration, unless necessary, except for any minor change within the measurement range.

[IMPORTANT] • The calibration solution concentration affects the range of measurement. Ask for technical service.

(b) Set the actual calibration solution concentration. When using calibration solution with different concentration from the conventional one, change is necessary.

(c) The calibration solution concentration should be about 80% of the maximum readout value for “B21 Range 1.” For Stream 2, offset by means of B29 Dilution factor (stream 2) is performed instead of calibration.

Procedure to Change Calibration Solution Concentration

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window” Press [Set] in the “000: Home window”.</p> <p>③ Display “C21: Standard concentration” Press CAL in the “200: Measurement Conditions Setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “C21: Standard concentration”.</p> <ul style="list-style-type: none"> • “201: Calibration conditions setting window” opens. <p>④ Check the setting Check the setting shown in the right of “C21: Standard Concentration”.</p> <p>16.00mg/L Example: The figure indicates the calibration solution concentration. Setting range: 0.000 to 1000mg/L</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “C21: Standard concentration window”. Press inside the frame of “C21: Standard concentration” in the “201: Calibration conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">201: Calibration Conditions Setting Window (2/3)</p>
<p>⑥ Change the setting Use the ten-key pad in the “C21: Standard Concentration window” to set the concentration you want on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C21: Standard Concentration Window</p>

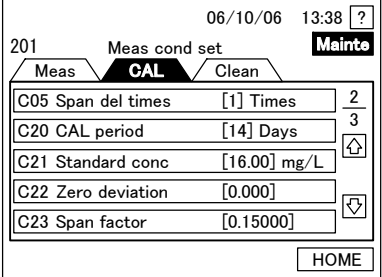
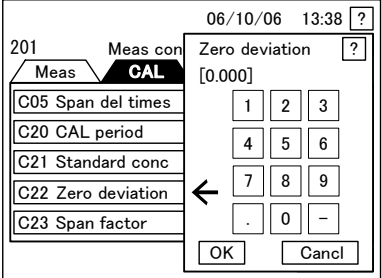
(9) Changing the zero deviation

(a) Change the zero deviation. Zero deviation is used for calculation of concentration as shown in the equation below:

$$\text{Concentration} = (\text{law data of the area} - \text{zero deviation}) \times \text{span factor} \times \text{dilution rate}$$

(b) Though it is updated automatically based on the zero calibration results of automatic /manual calibration, replace it with zero deviation you obtained with another method, by performing the following operation. However, it is re-written again automatically in the next zero calibration.

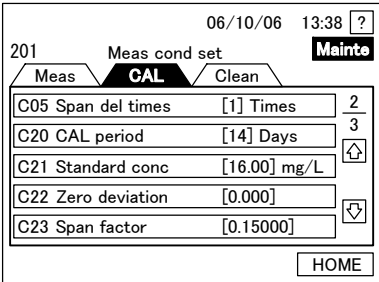
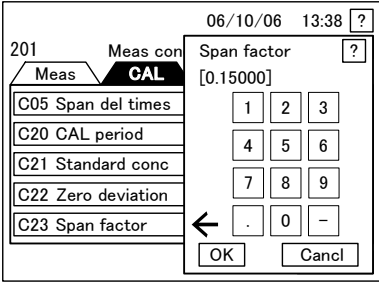
Procedure to Change Zero Deviation

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “C22: Zero deviation” Press CAL in “200: Measurement Conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “C22: Zero Deviation”. • “201 Calibration Conditions Setting window” opens.</p> <p>④ Check the setting Check the setting shown in the right of “C22: Zero deviation”. 0.000 Example: The figure indicates the zero deviation. Setting range: -1.000 to 5.000 • If no change is needed, go to “⑦”.</p> <p>⑤ Open the “C22: Zero deviation window” Press inside the frame of “C22: Zero deviation” in the “201: Calibration conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">201: Calibration Conditions Setting Window (2/3)</p>
<p>⑥ Change the setting Use the ten-key pad in the “C22: Zero deviation window” to set the zero deviation you want on the second line, and then press [OK]. • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens.</p> <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C22: Zero Deviation Window</p>

(10) Changing the span factor

- (a) Change the span factor.
- (b) Though it is updated automatically based on the span calibration results of automatic/manual calibration, replace it with the span factor you obtained with another method, by performing the following operation. However, it is re-written again automatically in the next span calibration.

Procedure to Change the Span Factor

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement Conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “C23: Span factor” Press CAL in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “C23: Span factor”. • “201: Calibration Conditions Setting window” opens.</p> <p>④ Check the setting Check the setting shown in the right of “C23 Span Factor”. 0.150 Example: The figure indicates the span factor. Setting range: 0.00000 to 5.00000 • If no change is needed, go to “⑦”.</p> <p>⑤ Open the “C23: Span factor window” Press inside the frame of “C23: Span factor” in the “201: Calibration conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">201: Calibration Conditions Setting Window (2/3)</p>
<p>⑥ Change the setting Use the ten-key pad in the “C23: Span Factor window” to set the span factor you want on the second line, and then press [OK]. • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens.</p> <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	 <p style="text-align: center;">C23: Span Factor Window</p>

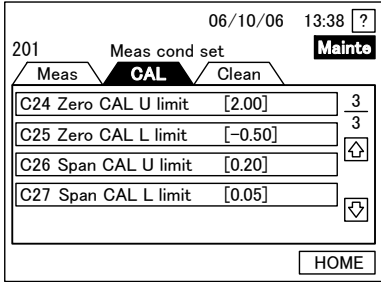
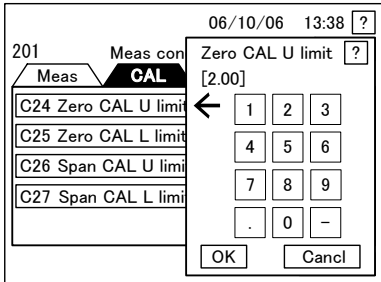
(11) Changing the alarm values for calibration error

(a) Change each alarm value in the following calibration errors:

- C24 Zero Upper Limit: Set a highest permissible zero deviation as the alarm value. If the zero deviation exceeds it during calibration, it results in a minor alarm of “A33 Zero Calibration Error”.
- C25 Zero Lower Limit: Set a lowest permissible zero deviation as the alarm value. If the zero deviation becomes lower than it during calibration, it results in a minor alarm of “A33 Zero Calibration Error”.
- C26 Span Upper Limit: Set a highest permissible span factor as the alarm value. If the span factor exceeds it during calibration, it results in a minor alarm of “A34 Span Calibration Error”.
- C27 Span Lower Limit: Set a lowest permissible span factor as the alarm value. If the span factor becomes lower than it during calibration, it results in a minor alarm of “A34 Span Calibration Error”.

(b) This operation can be done in automatic/manual measurement or automatic calibration mode.

Procedure to Change Calibration Error Alarm Values

Procedure and Operation	Typical screenshot
<p>① Go to the “200: Measurement conditions setting window”. Press [Set] or example in the “000: Home window”.</p> <p>② Display the item to be changed Press CAL in the “200: Measurement conditions setting window” to highlight it. Then, press [↑] or [↓] to go to the page with “C24: Zero upper limit” or any other item to change.</p> <ul style="list-style-type: none"> • “201: Calibration conditions setting window” opens. <p>③ Check the setting Check the setting shown in the right of “C24: Zero upper limit” or any other item to change:</p> <p>[C24 Zero Upper Limit] 0.50 Example: Alarm value for the zero upper limit Setting range: -1.00 to 5.00 (Factory-set value: 2.00)</p> <p>[C25 Zero Lower Limit] -0.50 Example: Alarm value for the zero lower limit Setting range: -1.00 to 1.00 (Factory-set value: -0.50)</p> <p>[C26 Span Upper Limit] 0.50 Example: Alarm value for the span upper limit Setting range: 0.00 to 5.00 (Factory-set value: 0.50)</p> <p>[C27 Span Lower Limit] 0.10 Example: Alarm value for the span lower limit Setting range: 0.00 to 5.00 (Factory-set value: 0.05)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑥”. <p>④ Open “C24 Zero upper limit (or any other applicable) window” Press inside the frame of “C24: Zero upper limit (or any other applicable) window” in the “201: Calibration Conditions Setting window”.</p> <p>⑤ Change the setting Use the ten-key pad in “C24: Zero upper limit (or any other applicable) window” to set an alarm value you want on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “201: Calibration conditions setting window” opens. If any other alarm values should be changed, perform operations in “③ to ⑤”. <p>⑥ Go back to the “000: Home window”. Press [HOME] in the “201: Calibration conditions setting window”, if no other setting change is necessary.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p>201: Calibration Conditions Setting Window (3/3)</p>  <p>C24: Zero Upper Limit Window</p>

4.6 Manipulation of Cleaning Conditions in Setting Mode

(1) Changing the next cleaning start time

(a) In internal start mode, change the next cleaning start time for automatic cleaning. The first automatic cleaning after start of automatic measurement starts at the time set here. Automatic cleaning takes place only during automatic measurement.

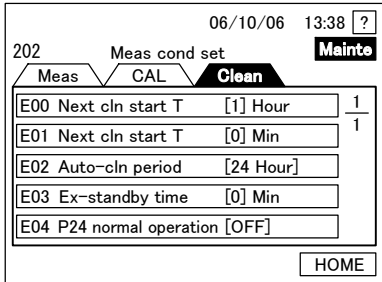
【IMPORTANT】 • This function is for internal starting only. In external starting mode, it is disabled. Periodically enter Cleaning Start Signal to perform the automatic cleaning.

(b) Next Cleaning Start Time can be set only on-the-hour basis (00 minute), in 1-hour increments. Automatic cleaning is repeated based on the automatic-cleaning period, starting from the next cleaning start time. Therefore, if the automatic-cleaning cycle is set to 0.5 to 23 hours, automatic cleaning for the later cleanings is performed based on this automatic-cleaning period, regardless of the time shown in “E00 Next cleaning start time”.

(c) If start of automatic measurement or recovery from a power failure takes place after the next cleaning start time, automatic cleaning is not performed until the next cleaning start time of the next day.

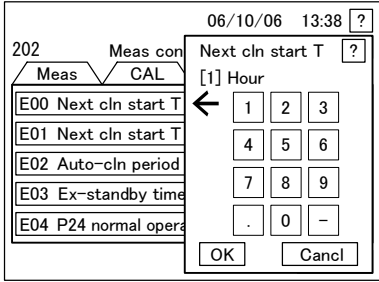
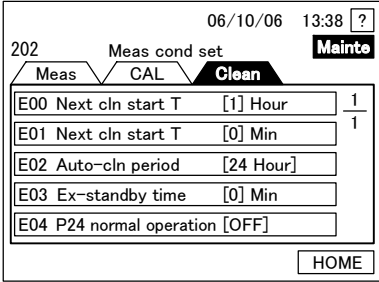
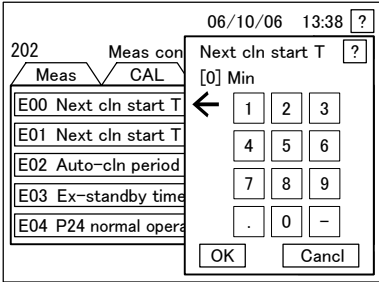
(d) Automatic cleaning is a function to clean the dilution tank using 1% oxalic dehydrate solution by diluting Cleaning Liquid 1 or the sample pot, dripping section, and other parts using pure water. The cleaning time is about 10 minutes. Cleaning 1 of manual cleaning uses the same cleaning liquid and the same process.

Procedure to Change the Next Cleaning Start Time

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “E00: Next cleaning start time” Press [Clean] in the “200: Measurement conditions setting window” to highlight it.</p> <ul style="list-style-type: none"> • “202: Cleaning conditions setting window” opens. <p>④ Check the setting Check the setting shown in the right of “E00: Next cleaning start time”.</p> <p>1 o'clock Example: The figure indicates the next cleaning start date (24-hour base). Setting range: 0 to 23 o'clock (Factory-set value: 1), in 1-hour increments.</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “E00: Next cleaning start time (hour) window” Press inside the frame of “E00: Next cleaning start time (hour)” in the “202: Cleaning conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">202: Cleaning Conditions Setting Window</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑥ Change the setting Use the ten-key pad in the “E00: Next cleaning start time (hour) window” to set the next cleaning start time (hour) you want on the second line, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “201: Calibration conditions setting window” opens. 	 <p style="text-align: center;">E00: Next cleaning start time (hour) window</p>
<p>⑦ Check the setting Check the setting shown in the right of “E01: Next cleaning start time (min)”.</p> <p>0 minute Example: The figure indicates the next cleaning start time (min). Setting range: 0 to 59 min (Factory-set value: 0)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑩”. 	 <p style="text-align: center;">202: Cleaning Conditions Setting Window</p>
<p>⑧ Open the “E01: Next cleaning start time (min) window” Press inside the frame of “E01: Next cleaning start time (min)” in the “202: Cleaning conditions setting window”.</p>	 <p style="text-align: center;">E01: Next cleaning start time (min) window</p>
<p>⑨ Change the setting Use the ten-key pad in the “E01: Next cleaning start time (min) window” to set the next cleaning start time (min) you want on the second line, and then press OK.</p> <ul style="list-style-type: none"> • If no change is needed, press Cancel. • After operation, the “202: Cleaning conditions setting window” opens. 	<p>⑩ Go back to the “000: Home window”. Press HOME in the “202: Cleaning conditions setting window”, if no other change is necessary.</p>

(2) Changing the cleaning cycle

(a) In internal start mode, change the cleaning cycle for automatic cleaning, the time period before the next automatic cleaning. Set a cleaning cycle appropriate for the nature of the sample and measurement period.

【IMPORTANT】 • This function is for internal starting only. In external starting mode, it is disabled. Periodically enter Cleaning Start Signal to perform the automatic cleaning.

(b) If the automatic cleaning cycle is set to “0,” no automatic cleaning is performed.

(c) If the internal-timer-based start time for automatic measurement, automatic calibration, and automatic cleaning fall on the same time, operation is performed according to the priority.

▷ “f” in section 4.4 (3) “Changing the measurement cycle”

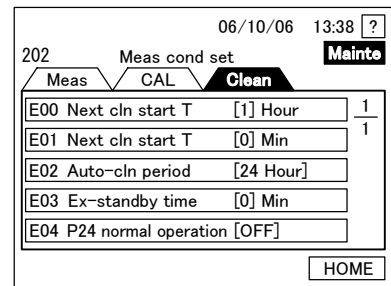
Procedure to Change the Automatic Cleaning Cycle

Procedure and Operation	Typical screenshot
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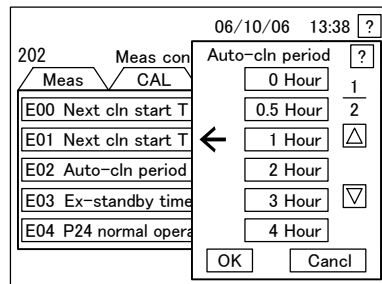
- ① Stop operation Stop operation (automatic/manual measurement, manual calibration, manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”
- ② Go to the “200: Measurement conditions setting window”. Press **[Set]** in the “000: Home window”.
- ③ Display “E01: Auto-cleaning period” Press **Clean** in the “200: Measurement conditions setting window” to highlight it.
 - “202: Cleaning conditions setting window” opens.
- ④ Check the setting Check the setting shown in the right of “E01 Auto-cleaning Period”:
 0 hour Example: The figure indicates the cleaning cycle.
 Setting range: 0, 0.5, 1, 2, 3, 4, 5, 6, 8, 12, 24 hours (factory-set value: 24)
 - If set to “0,” automatic cleaning is disabled.
 - If no change is needed, go to “⑦”.
- ⑤ Open “E01: Auto-cleaning period window” Press inside the frame of the “E01: Auto-cleaning period” in “201 Calibration conditions setting window”.
- ⑥ Change the setting Press **[1 Hour]** or any other applicable key in “E01: Auto-cleaning period window” to highlight it, and then press **[OK]**.
 - Moving between pages: **[Up]** or **[Down]**
 - If no change is needed, press **[Cancel]**.
 - After operation, the “201: Calibration conditions setting window” opens.

▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”

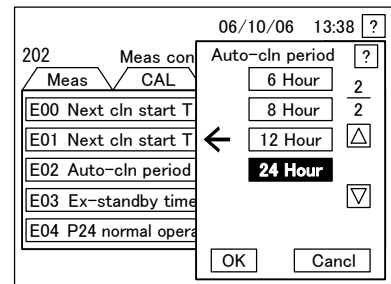
▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”



202: Cleaning Conditions Setting Window



E01: Auto-cleaning Period Window (1/2)



E01: Auto-cleaning Period Window (2/2)

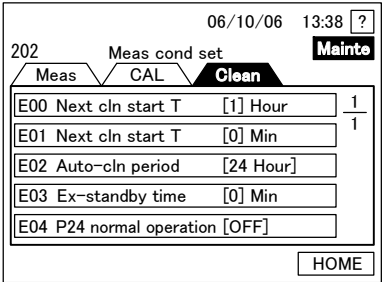
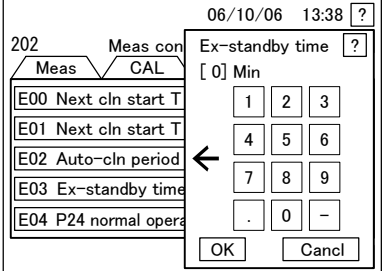
- ⑦ Go back to the “000: Home window”. Press **[HOME]** in the “202: Cleaning conditions setting window”, if no other change is necessary.

▷ See the screenshot of section “④”.

(3) Changing the standby time for external processing

- (a) Change the standby time for external processing, which is intended for suspension of automatic measurement resumption while the external unit is busy.
- (b) Use this function when an external preprocessing unit is used in synchronization with the cleaning period during automatic measurement and the operation time of the external unit is longer than automatic cleaning time.
- (c) The standby time for external processing is the period from start of the automatic cleaning to resumption of automatic measurement. Make sure that automatic cleaning and operation of the preprocessing unit are completed within this period.
- (d) If you do not use this function, set the Standby time for external Processing to “0” to disable this function.

Procedure to Change the Standby Time for External Processing

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “E03: External standby time”..... Press [Clean] the “200: Measurement conditions setting window” to highlight it.</p> <ul style="list-style-type: none"> • “202 Cleaning Conditions setting window” opens. <p>④ Check the setting Check the setting shown in the right of “E03: External standby time”:</p> <p>0 minute Example: The figure indicates the standby time for external processing. Setting range: 0 to 99 minutes (Factory-set value: 0)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “E03: External standby time window” Press inside the frame of “E03: External standby time” in the “202: Cleaning conditions setting window”.</p>	<p>▷ See the screenshot in “②” of section 4.5 (1) “Changing the next calibration start date”</p> <p>▷ See the screenshot in “③” of section 4.5 (1) “Changing the next calibration start date”</p>  <p style="text-align: center;">202: Cleaning Conditions Setting Window</p>
<p>⑥ Change the setting Use the ten-key pad in the “E03: External standby time window” to set standby time you want on the second line, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “202: Cleaning conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “202: Cleaning conditions setting window”, if no other change is necessary.</p>	 <p style="text-align: center;">E03: External Standby Time Window</p>

(4) Changing the diaphragm pump (P24) into normal operation

The diaphragm pump (P24) operation method can be changed. When condensation occurs inside the dripping section due to high ambient humidity, set to ON (normal operation).

Procedure to Change the Diaphragm Pump (P24) into Normal Operation

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to the “200: Measurement conditions setting window”. Press [Set] in the “000: Home window”.</p> <p>③ Display “E04: P24 Normal operation” Press [Clean] the “200: Measurement conditions setting window” to highlight it.</p> <ul style="list-style-type: none"> • “202 Cleaning Conditions setting window” opens. <p>④ Check the setting Check the setting shown in the right of “E04: P24 Normal operation”:</p> <p>ON: P24 is set to normal operation. OFF: P24 operates according to the sequence table. (Factory-set value)</p> <ul style="list-style-type: none"> • If no change is needed, go to “⑦”. <p>⑤ Open the “E04: P24 normal operation window” Press inside the frame of “E04: P24 normal operation” in the “202: Cleaning conditions setting window”.</p>	<p style="text-align: center;">202: Cleaning Conditions Setting Window</p>
<p>⑥ Change the setting Press [OFF] (or any other applicable key) in the “E04: P24 normal operation” to highlight it, and then press [OK].</p> <ul style="list-style-type: none"> • If no change is needed, press [Cancel]. • After operation, the “202: Cleaning conditions setting window” opens. <p>⑦ Go back to the “000: Home window”. Press [HOME] in the “202: Cleaning conditions setting window”, if no other change is necessary.</p>	<p style="text-align: center;">E04: P24 Normal Operation Window</p>

4.7 Data Mode Operation

(1) Check of automatic measurement data

(a) View a list and line graph of the past automatic measurement data stored in the internal memory.

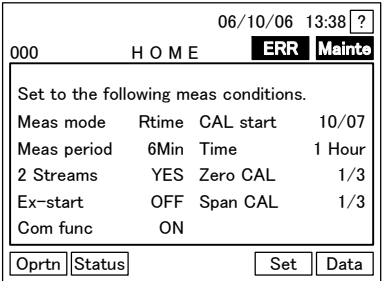
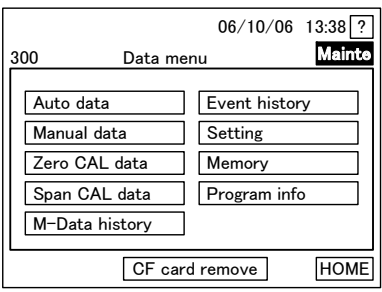
(b) The following windows have **Data** key to switch to the data mode:

- 000: Home
- 111: Auto Measurement for single-stream or 112: Auto Measurement for double-stream
- 121: Manual Measurement
- 123: Manual Calibration

(c) Up to 4032 data (for 14 days in case of 5 minutes' cycle) of the most recent automatic measurement are stored. For a double-stream unit, this is the number of the total data for Stream 1 + 2. When new data are added to 4032 already-stored data, the oldest data are deleted.

(d) For printing of automatic measurement data, see section 4.7 (2) Printing of automatic measurement data.

Procedure to View Automatic Measurement Data

Procedure and Operation	Typical screenshot
<p>① Go to the "300: Data Menu window". Press Data for example in the "000: Home window".</p>	 <p>The screenshot shows the '000 HOME' window with a date and time of 06/10/06 13:38. It displays measurement conditions: Meas mode, Rtime, CAL start, Meas period, 2 Streams, Ex-start, and Com func. At the bottom, there are buttons for 'Oprtn', 'Status', 'Set', and 'Data'.</p>
<p>② Open "P30: Date Range window". Press Auto data in the "300: Data Menu window".</p>	 <p>The screenshot shows the '300 Data menu' window with a date and time of 06/10/06 13:38. It contains several menu items: 'Auto data', 'Manual data', 'Zero CAL data', 'Span CAL data', 'M-Data history', 'Event history', 'Setting', 'Memory', and 'Program info'. At the bottom, there are buttons for 'CF card remove' and 'HOME'.</p>

Typical Screenshot of the 000: Home Window

300: Data Menu Window

(To be continued)

(Continued from previous page)

Procedure and Operation

Typical screenshot

- ③ Change the date range Set the date range for data you want to view on the second line of P30: Date Range window,” and then press **OK**.

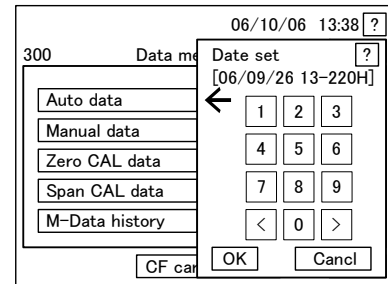
Date range initial value: Date and time of the oldest logged data (dominical year, month, day, time) and the effective display hour (maximum: 255 hours), based on the measurement starting time of respective data.

To change the numbers: ten-key

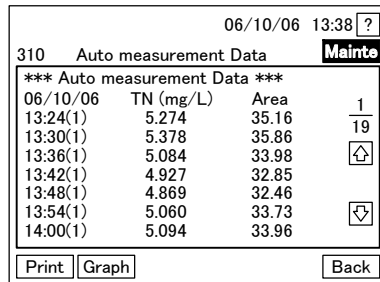
To move between the areas: **<** or **>**. You may also press the respective area on the second line.

- Go back to the “300: Data Menu window”, by pressing **Cancel** instead of **OK**.
- After operation, the “310: Auto Measurement Data” or “311: Stream 2 Auto Measurement Data window” opens.
- For a single-stream unit, proceed to “⑤”.

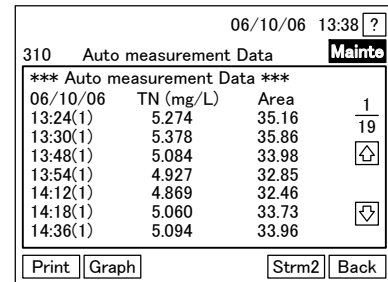
- ④ Select the stream For a double-stream unit, press **Strm2** or **Strm1** to go to the applicable window



P30: Date Range Window



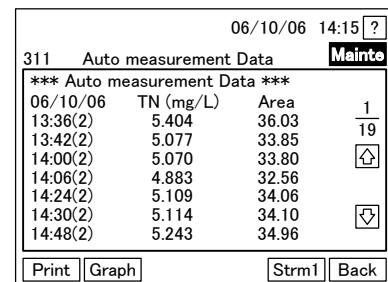
310: Auto Measurement Data Window (for a single-stream unit)



310: Auto Measurement Data Window (of Stream 1)

- ⑤ View the data Press **<** or **>** to toggle between pages of each measurement data window and view the necessary data.

- The displayed time is the time of measurement start for respective data.
- The number in parenthesis in the right of the time denotes the type of the sample.
No mark: Single-stream unit
(1) ... Stream 1 (double-stream unit)
(2) ... Stream 2 (double-stream unit)
- TN(mg/L): measured total nitrogen and the unit
- Area: data area
- If no graph should be displayed, go to “⑦”.



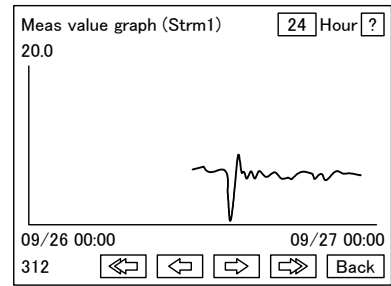
311: Stream 2 Auto Measurement Data Window

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
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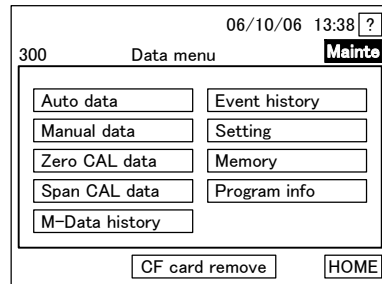
- ⑥ **Display a graph** To display a graph, press **[Graph]** in the respective measurement data window. When finished, press **[Back]**.
- **[←] [→]** ... To move the abscissa axis horizontally.
 - **[←] [→]** ... To move the abscissa axis horizontally in quad speed.
 - **[24]** ... To switch the abscissa axis length among 6, 12, and 24 hours.



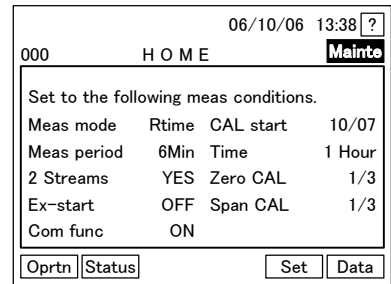
312: Automatic Measurement Value Graph Window (for Stream 1)

- ⑦ **Go back to the “300: Data Menu window”**. Press **[Back]** on “310 Auto Measurement Data” or “311: Stream 2 Auto Measurement Data window”.
- ⑧ **Go back to the “000: Home window”**. Press **[HOME]** or **[Back]** in “300: Data Menu window”.

▷ See the screenshot in “④” or “⑤”



300: Data Menu Window



000: Home Window

(2) Printing of automatic measurement data

- (a) Print a list of the past automatic measurement data in the memory.
- (b) The following windows have **[Data]** key to switch to the data mode:
- 000: Home
 - 111: Auto Measurement for single-stream or 112: Auto Measurement for double-stream
 - 121: Manual Measurement
 - 123: Manual Calibration
- (c) When printing, set “B10: Printer” to “ON.”
- (d) To see automatic measurement data without printing it, see section 4.7 (1) “Check of automatic measurement data”

Procedure to Print Automatic Measurement Data

Procedure and Operation	Typical screenshot
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① Go to the “310: Auto Measurement Data (or other applicable) window”. Perform following operations in referring to ① to ④ of section 4.7 (1) Check of automatic measurement data.”

- Open the “300: Data Menu window”
- Open “P30: Date Range P window”
- Change the date range
- Select the stream

② Go to “325: Auto Measurement Value Printing window”. For a single-stream unit, press **[Print]** in the “310: Auto Measurement Data window”. For a double-stream unit, press **[Strm2]** or **[Strm1]** to go to the applicable window.

- Data with “(1)” following the time are Stream 1 data, while data with “(2)” are Stream 2 data.

06/10/06 13:38 ?			
310 Auto measurement data Mainte			
*** Auto measurement data ***			
06/10/06	TN (mg/L)	Area	1
13:24	5.274	35.16	19
13:30	5.378	35.86	
13:36	5.084	33.98	↑
13:42	4.927	32.85	
13:48	4.869	32.46	
13:54	5.060	33.73	↓
14:00	5.094	33.96	
Print		Graph	
Back			

310: Auto Measurement Data Window (single-stream unit)

06/10/06 13:38 ?			
310 Auto measurement data Mainte			
*** Auto measurement data ***			
06/10/06	TN (mg/L)	Area	1
13:24(1)	5.274	35.16	19
13:30(1)	5.378	35.86	
13:48(1)	5.084	33.98	↑
13:54(1)	4.927	32.85	
14:12(1)	4.869	32.46	
14:18(1)	5.060	33.73	↓
14:36(1)	5.094	33.96	
Print		Graph	
Strm2		Back	

310: Auto Measurement Data Window (of Stream 1)

06/10/06 14:15 ?			
311 Auto measurement data Mainte			
*** Auto measurement data ***			
06/10/06	TN (mg/L)	Area	1
13:36(2)	5.404	36.03	19
13:42(2)	5.077	33.85	
14:00(2)	5.070	33.80	↑
14:06(2)	4.883	32.56	
14:24(2)	5.109	34.06	
14:30(2)	5.114	34.10	↓
14:48(2)	5.243	34.96	
Print		Graph	
Strm1		Back	

311: Stream 2 Auto Measurement Data Window

③ Reset the date range, if necessary Press **[Re-set]** in “325: Stream 1 Auto Measurement Value Print (or any other applicable) window” to change the date range, if necessary.

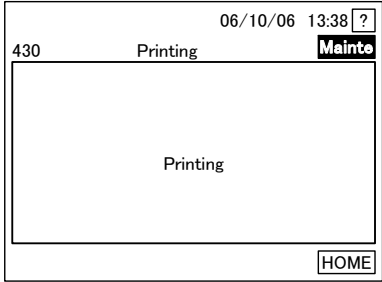
④ Print out Press **[OK]** in “325: Auto Measurement Value Print window” (for Stream 1 as an example).

06/10/06 13:38 ?	
325 Auto measurement data Mainte	
Print following data Please press [OK] Measurement value [auto-measurement] 06/09/06 13-241 Hour	
OK	Re-set
Back	

325: Auto Measurement Value Print Window (Example: Stream 1)

(To be continued)

(Continued from previous page)

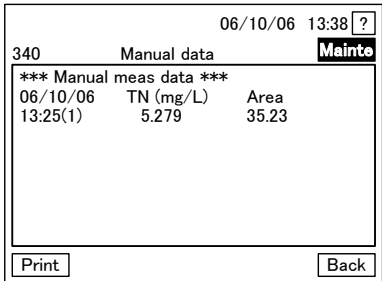
Procedure and Operation	Typical screenshot
<p>⑤ Check completion of printing Check that section “430: Printing window” disappears to bring you back to “310: Auto Measurement Data window”.</p>	
<p>⑥ Go back to “300: Data Menu”. Press Back in “310: Auto Measurement Data” or any other applicable window.</p>	<p>▷ See the screenshot in “⑦” of section 4.7 (1) “Check of automatic measurement data”</p>
<p>⑦ Go back to the “000: Home window”. Press HOME or Back in the “300: Data Menu window”.</p>	<p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

430: Printing Window

(3) Check or Printing of manual measurement data

- (a) View or print out a list of the past manual measurement data in the memory.
- (b) Up to 50 most-recent manual measurement data are stored.
- (c) When printing, set “B10: Printer” to “ON”. ▷ Section 4.4 (11) “Disabling the printer function”

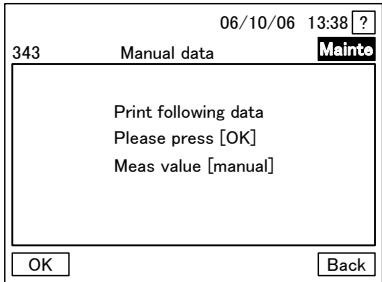
Procedure to View or Print out Manual Measurement Data

Procedure and Operation	Typical screenshot
<p>① Go to the “300: Data menu window”. Press Data for example in the “000: Home window”.</p>	<p>▷ See the screenshot in “①” of section 4.7 (1) “Check of automatic measurement data”</p>
<p>② Open “340: Manual measurement data window”. Press Manual data in “300: Data menu window”.</p>	<p>▷ See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p>
<p>③ Check the data Check the necessary data in the “340: Manual Measurement Data window”.</p> <ul style="list-style-type: none"> • The displayed time indicates the time of measurement start, respectively. • The number in parenthesis in the right of the time denotes the sample type. No mark: Single-stream unit (1): Stream 1 (double-stream unit) (2): Stream 2 (double-stream unit) (Z): zero water (S): span calibration solution • TN(mg/L): measured total nitrogen and the unit • Area: data area • If no printing is needed, go to “⑦”. 	

340: Manual Measurement Data Window

(To be continued)

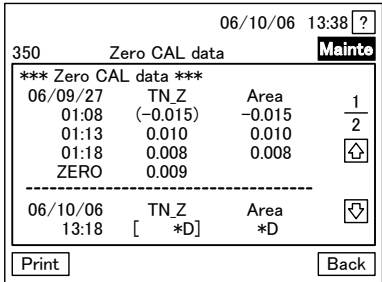
(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>④ Go to “343: Manual Measurement data printing window”. Press [Print] in the “340: Manual measurement data window”.</p> <p>⑤ Print out Press [OK] in “343: Manual measurement data Printing window”.</p> <ul style="list-style-type: none"> Section “430 Printing window” opens. 	 <p style="text-align: center;">343: Manual Measurement Data Print Window</p>
<p>⑥ Check completion of printing Check that section “430: Printing window” disappears to bring you back to “340: Manual measurement data window”.</p> <p>⑦ Go back to the “300: Data menu window”: Press [Back] in the “340: Manual measurement data window”.</p> <p>⑧ Go back to the “000: Home window”. Press [HOME] or [Back] in the “300: Data Menu window”.</p>	<p>▷ See the screenshot in “⑤” of section 4.7 (2) “Printing of automatic measurement data”</p> <p>▷ See the screenshot in “③”.</p> <p>▷ See the screenshot in “⑧” of section 4.7 (1) Check of automatic measurement data”</p>

(4) Check or printing of zero calibration data

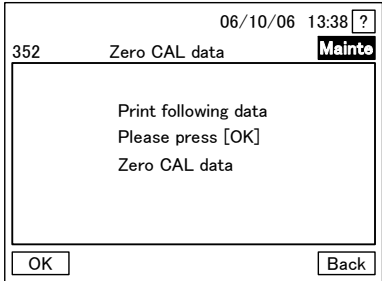
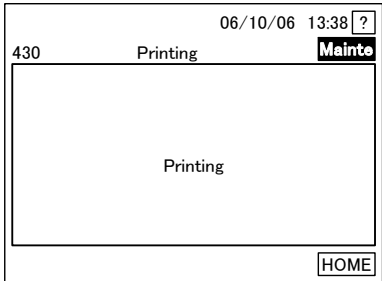
- (a) View or print out a list of the past zero calibration data in the memory.
- (b) Up to 10 most-recent zero calibration data are stored.
- (c) When printing, set “B10: Printer” to “ON”. ▷ Section 4.4 (11) “Disabling the printer function”

Procedure to View or Print out Zero Calibration Data

Procedure and Operation	Typical screenshot
<p>① Go to the “300: Data menu window”. Press [Data] for example in the “000: Home window”.</p> <p>② Open “350: Zero Calibration Data window”. Press [Zero CAL data] in the “300: Data Menu window”.</p> <p>③ Check the data Toggle between pages by pressing [↑] or [↓] in the “350: Zero calibration data window” to check the necessary data.</p> <p>TN_Z: Zero deviation. The value in the parenthesis is zero deviation to be deleted when calculating. Area: Data area Zero: Average zero deviation</p> <ul style="list-style-type: none"> The displayed time is start time of respective zero calibration. If no printing is needed, go to “⑦”. 	<p>▷ See the screenshot in “①” of section 4.7 (1) Check of automatic measurement data”</p> <p>▷ See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p>  <p style="text-align: center;">350: Zero Calibration Data Window</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>④ Go to “352: Zero Calibration data print window”. Press Print in the “350: Zero calibration data window”.</p> <p>⑤ Print out Press OK in the “352: Zero Calibration Data Print window”.</p> <ul style="list-style-type: none"> • Section “430: Printing window” opens. 	 <p style="text-align: center;">352: Zero Calibration Data Print Window</p>
<p>⑥ Check completion of printing Check that section “430: Printing window” disappears to bring you back to the “350: Zero Calibration Data window”.</p>	 <p style="text-align: center;">430: Printing Window</p>
<p>⑦ Go back to the “300: Data menu window”. Press Back in the “350: Zero calibration data window”.</p> <p>⑧ Go back to the “000 Home window”. Press HOME or Back in the “300: Data menu window”.</p>	<p>▷ See the screenshot in “③”.</p> <p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

(5) Check or printing of span calibration data

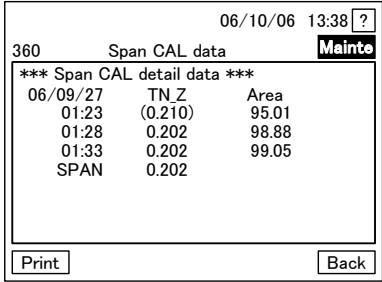
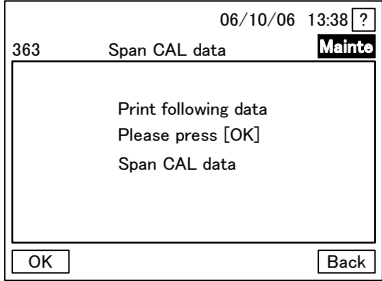
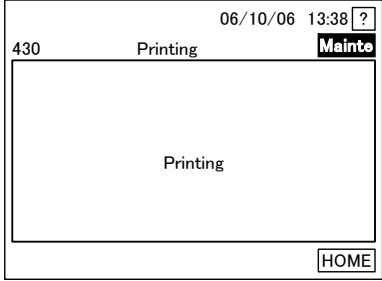
- (a) View or print out a list of the past span calibration data in the memory.
- (b) Up to 10 most-recent span calibration data are stored.
- (c) When printing, set “B10: Printer” to “ON”. ▷ Section 4.4 (11) “Disabling the printer function”

Procedure to View or Print out Span Calibration Data

Procedure and Operation	Typical screenshot
<p>① Go to the “300: Data menu window”. Press Data for example in the “000: Home window”.</p> <p>② Open the “360: Span calibration data window”. Press Span CAL data in the “300: Data menu window”.</p>	<p>▷ See the screenshot in “①” of section 4.7 (1) “Check of automatic measurement data”</p> <p>▷ See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p>

(To be continued)

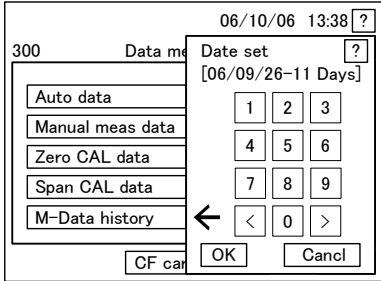
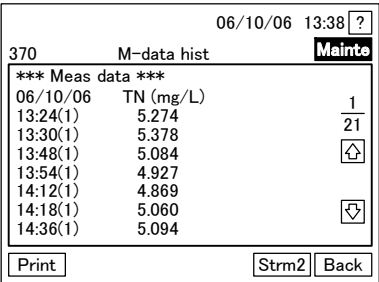
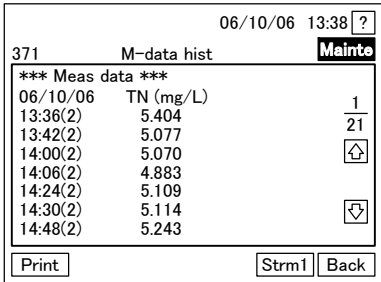
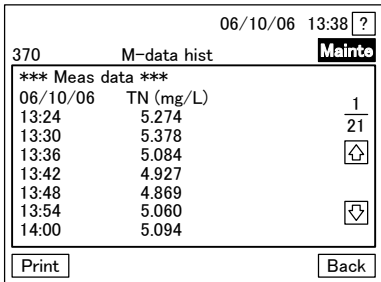
(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>③ Check the data Check the necessary data in “360: Span calibration data window”.</p> <p>TN_S: Span factor. The value in the parenthesis is a span factor to be deleted when calculating.</p> <p>Area: Data area</p> <p>SPAN: Average span factor</p> <ul style="list-style-type: none"> • The displayed time is start time of respective span calibration. • If no printing is needed, go to “⑦”. 	 <p style="text-align: center;">360: Span Calibration Data Window</p>
<p>④ Go to “363: Span calibration data print window”. Press Print in the “360: Span calibration data window”.</p> <p>⑤ Print out Press OK in the “363: Span calibration data print window”.</p> <ul style="list-style-type: none"> • Section “430: Printing” window” opens. 	 <p style="text-align: center;">363: Span Calibration Data Print Window</p>
<p>⑥ Check completion of printing Check that section “430: Printing window” disappears to bring you back to the “360: Span calibration data window”.</p>	 <p style="text-align: center;">430: Printing Window</p>
<p>⑦ Go back to the “300: Data menu window”. Press Back in the “360: Span calibration data window”.</p> <p>⑧ Go back to the “000: Home window”. Press HOME or Back in the “300: Data menu window”.</p>	<p>▷ See the screenshot in “③”.</p> <p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

(6) Check or printing of daily report history

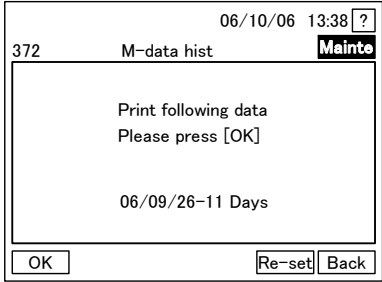
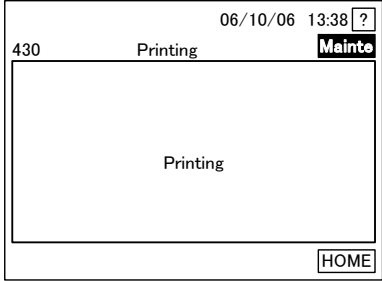
- (a) View or print out the daily report history stored in the internal memory.
- (b) Most recent daily report data are stored for up to 14-days (5-minute cycle).
- (c) When printing, set “B10: Printer” to “ON”. ▷ Section 4.4 (11) “Disabling the printer function”

Procedure to View or Print out Daily Report History

Procedure and Operation	Typical screenshot
<p>① Go to the “300: Data menu window”. Press [Data] for example in the “000: Home window”.</p> <p>② Open “P30: Date range window”. Press [M-Data hist] in the “300: Data Menu window”.</p> <p>③ Change the date range Set the date range for data you want to view on the second line of the “P30: Date range window”, and then press [OK].</p> <p>To change the numbers: Use ten keys. Make sure to set a 2-digit number. To move between areas: Use [<] or [>]. Or, press the respective area on the second line.</p> <ul style="list-style-type: none"> Go back to the “300: Data menu window”, by pressing [Cancel] instead of [OK]. After operation, “370: Measurement data” or “371: Stream 2 Measurement Data window” opens. For a single-stream unit, proceed to “⑤”. <p>④ Select the stream For a double-stream unit, press [Strm2] or [Strm1] to go to the applicable window.</p>	<p>“See the screenshot in “①” of section 4.7 (1) “Check of automatic measurement data”</p> <p>“See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p>  <p style="text-align: center;">P30: Date Range P Window</p>
 <p style="text-align: center;">370: Measurement Data Window (of Stream 1)</p>	 <p style="text-align: center;">371: Stream 2 Measurement Data Window</p>
<p>⑤ Check the data Press [↑] or [↓] to toggle between pages in “370: Measurement data (single-stream)” or other window” to check the necessary data.</p> <ul style="list-style-type: none"> The displayed time is the time of measurement start for respective data. The number in parenthesis in the right of the time denotes the type of the sample. No mark: Single-stream unit (1): Stream 1 (double-stream unit) (2): Stream 2 (double-stream unit) TN(mg/L): measured total nitrogen and the unit If no printing is needed, go to “⑥”. <p>⑥ Go to “372: Measurement data” or other window Press [Print] in the data window you want to print.</p>	 <p style="text-align: center;">370: Measurement Data Window (single-stream)</p>

(To be continued)

(Continued from previous page)

Procedure and Operation	Typical screenshot
<p>⑦ Print out Press [OK] in the “372: Daily report print” or “373: Stream 2 Daily report print window”.</p> <ul style="list-style-type: none"> • Section “430: Printing” window” opens. 	 <p style="text-align: center;">372: Total Nitrogen 1 o'clock Report: Daily Report Print Window</p>
<p>⑧ Check completion of printing Check that section “430: Printing window” disappears to bring you back to “370: Measurement Data List” or “371: Stream 2 Measurement Data List window”.</p>	 <p style="text-align: center;">430: Printing Window</p>
<p>⑨ Go back to the “300: Data menu window”. Press [Back] in the “370: Measurement data list” or “371: Stream 2 Measurement data list window”.</p>	<p>▷ See the screenshot in “④” or “⑤”</p>
<p>⑩ Go back to the “000: Home window”. Press [HOME] or [Back] in the “300: Data menu window”.</p>	<p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

(7) Check or printing of event history

(a) View or print out stored event history. Up to 100 most-recent event history data are stored.

(b) Event history refers to the history of alarm occurrence, changes in operating conditions, start and stop of operation, etc.

- A** ...Alarm occurrence ▷ Section 6.1 “Alarm by Self-diagnosis”
- B**...Measurement conditions ▷ Section 4.4 “Manipulation of Measurement Conditions in Setting Mode”
- C**...Calibration conditions ▷ Section 4.5 “Manipulation of Calibration Conditions in Setting Mode”
- D** ... (for technical service)
- E**...Cleaning settings ▷ Section 4.6 “Manipulation of Cleaning Conditions in Setting Mode”
- I**.....Other events ▷ Section “Other Events” table

(**: two-digit number)

(c) Other events are shown in the table below:

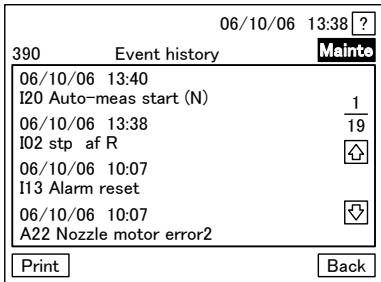
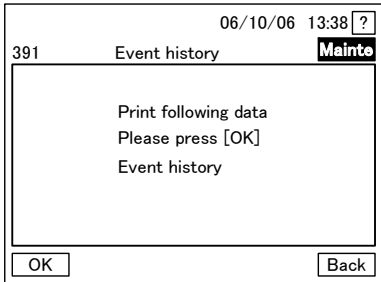
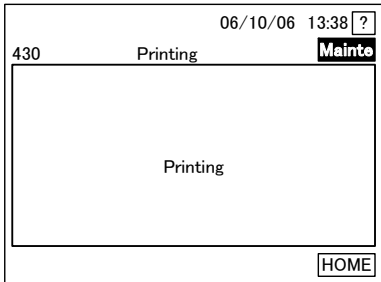
Other Events

Event No.	Item	Description	Printing
I01	Power on	The power SW is turned on when the power is supplied to the product, or power to the product is supplied when the power SW is on.	—
I02	Stop after restore	Operation including auto-measurement has been stopped emergently.	○
I03	Stop now	Operation including auto-measurement has been stopped forcibly.	○
I04	Reserved stop completed	Operation sequence has been completed after operation stop reservation	○
I05	Calibration completed	Calibration has been completed.	○
I10	External start of stream 1	Measurement start signal has been input for Stream 1.	—
I11	External start of stream 2	Measurement start signal has been input for Stream 2.	—
I12	External start of calibration	Calibration start signal has been input.	—
I13	(*) Cancel	Automatic recovery occurred. Or alarm has been canceled on the Error Window. Respective alarm number or “ALL” (all canceled) is displayed in the “*” part.	—
I14	External start of cleaning	Cleaning start signal has been input.	—
I16	Special sequence start (*)	The number in * denotes start of the following operation: 0: Operation check of the sampling pump in service mode 1: Operation check of the sampling nozzle in service mode 2: Manual Cleaning 1 in 130: Manual Cleaning Start window 3: Manual Cleaning 2 in 130: Manual Cleaning Start window 4: Manual Cleaning 3 in 130: Manual Cleaning Start window	—
I20	Auto-measurement start	Automatic measurement has been started	—
I21	Manual measurement start (stream1)	Manual measurement for stream 1 has been started	—
I22	Manual measurement start (stream2)	Manual measurement for stream 2 has been started	—
I23	Manual measurement start (zero)	Manual measurement of zero calibration solution has been started	—
I24	Manual measurement start (span)	Manual measurement of span calibration solution has been started	—
I25	Auto-calibration start (zero)	Auto zero calibration solution has been started	—
I26	Auto-calibration start (span)	Auto span calibration solution has been started	—
I27	Manual calibration start (zero)	Manual zero calibration solution has been started	—
I28	Manual calibration start (span)	Manual span calibration solution has been started	—
I29	Measurement stop	Stop of total-nitrogen measurement due to alarm generation or power-off	○

○: Applicable —: Not applicable

(d)When printing with the printer, set “B10: Printer” to ON. ▷ Section 4.4 (11) “Disabling the printer function”

Procedure to View or Print out Event History

Procedure and Operation	Typical screenshot
<p>① Go to the “300: Data menu window”. Press Data for example in the “000: Home window”.</p> <p>② Open the Event History window Press Event history in the “300: Data Menu window”.</p> <p>③ Check the data Toggle between pages by pressing Up or Down in “390: Event history list window” to check the necessary data.</p> <ul style="list-style-type: none"> • The displayed time is time of occurrence or operation start time. • List is shown in order, with the latest event being at the top. The first line shows date and time of occurrence, while the second line shows the event item, etc. • For operation condition changes, the value after the change is shown. • If no printing is needed, go to “⑦”. <p>④ Go to “391: Event history print window”.Press Print in for example “390: Event history list window”.</p> <p>⑤ Print out Press OK in “391: Event history print window”.</p> <ul style="list-style-type: none"> • “430: Printing window” opens. <p>⑥ Check completion of printing Check that “430: Printing window” disappears to bring you back to “390: Event history list window”.</p> <p>⑦ Go back to “300: Data menu window”. Press Back in “390: Event history list window”.</p> <p>⑧ Go back to the “000: Home window”. Press HOME or Back in the “300: Data menu window”.</p>	<p>▷ See the screenshot in “①” of section 4.7 (1) “Check of automatic measurement data”</p> <p>▷ See the screenshot in “②2 of section 4.7 (1) “Check of automatic measurement data”</p>  <p style="text-align: center;">390: Event History List Window</p>  <p style="text-align: center;">391: Event History Print Window</p>  <p style="text-align: center;">430: Printing Window</p> <p>▷ See the screenshot in “③”.</p> <p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

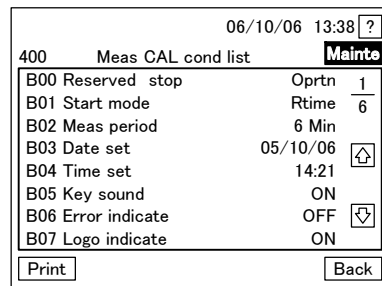
(8) Check or printing of the measurement and calibration condition list

- (a) View or print out the list of measurement and calibration conditions in the memory.
- (b) These set values can be changed in Setting Mode.
- (c) When printing, set “B10: Printer” to “ON”. ➤ Section 4.4 (11) “Disabling the printer function”

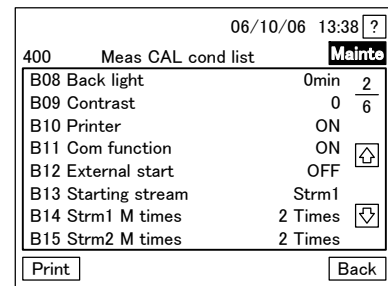
Procedure to View or Print out Measurement and Calibration Conditions

Procedure and Operation	Typical screenshot
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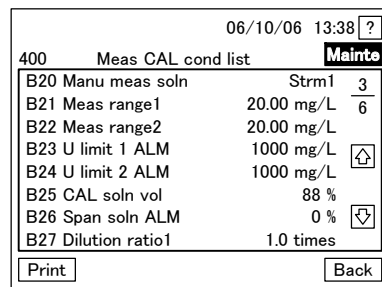
- | | |
|---|---|
| <p>① Go to the “300: Data menu window”. Press [Data] for example in “000: Home window”.</p> | <p>➤ See the screenshot in “①” of section 4.7 (1) Check of automatic measurement data”</p> |
| <p>② Open the “400: Measurement and calibration/Cleaning Condition list window”. Press [Set] in the “300: Data menu window”.</p> | <p>➤ See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p> |
| <p>③ Check the data Toggle between pages by pressing [Up] or [Down] in “400: Measurement/ Calibration/Cleaning condition list window” to check the necessary data.</p> <ul style="list-style-type: none"> • For conditions of each item, see 4.4 “Manipulation of measurement conditions in Setting Mode”. • If no printing is needed, go to “⑨”. | |



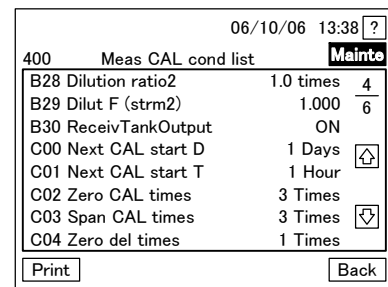
Measurement and Calibration/Cleaning Condition List Window (1/6)



Measurement and Calibration/Cleaning Condition List Window (2/6)



Measurement and Calibration/Cleaning Condition List Window (3/6)



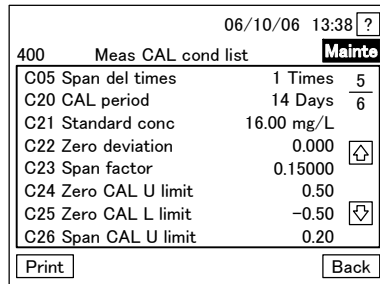
Measurement and Calibration/Cleaning Condition List Window (4/6)

(To be continued)

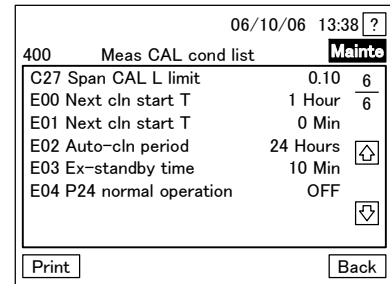
(Continued from previous page)

Procedure and Operation

Typical screenshot

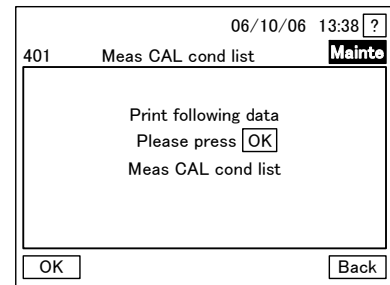


Measurement and Calibration/Cleaning Condition List Window (5/6)



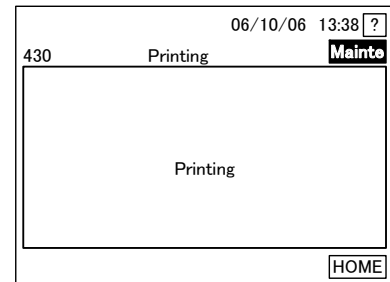
Measurement and Calibration/Cleaning Condition List Window (6/6)

- ④ Go to “401: Measurement and calibration/Cleaning Condition list print window”. Press **[Print]** in “400: Measurement and calibration/Cleaning condition list window”.
- ⑤ Print out Press **[OK]** in “401: Measurement and calibration/Cleaning condition list print window”.
 - Section “430: Printing window” opens.



401: Measurement and Calibration/Cleaning Condition List Print Window

- ⑥ Check completion of printing Check that section “430: Printing window” disappears to bring you back to the “400: Measurement and calibration/Cleaning condition list window”.



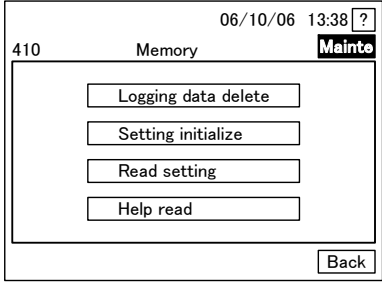
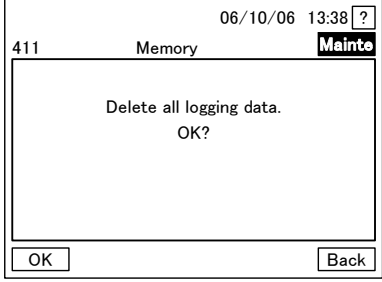
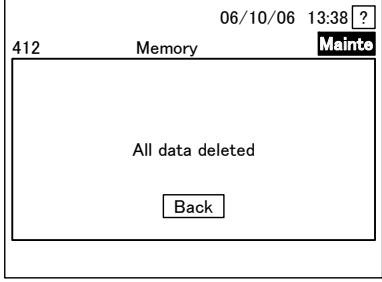
430: Printing Window

- ⑦ Go back to the “300: Data menu window”. Press **[Back]** in “400: Measurement/ Calibration/Cleaning condition list window”. ▷ See the screenshot in ③
- ⑧ Go back to the “000: Home window”. Press **[HOME]** or **[Back]** in the “300 Data menu window”. ▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”

(9) Deletion of logging data

Delete all the data stored in the memory of the control section.

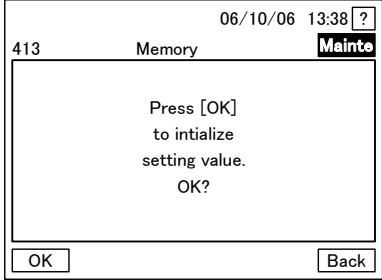
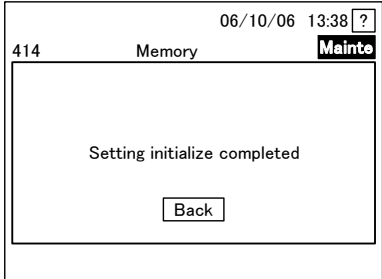
Procedure to Delete Logging Data

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to “300: Data Menu window”. Press Data in “000: Home window”.</p> <p>③ Open “410: Memory Processing window”. Press Memory in the “300: Data Menu window”.</p> <p>④ Open “411: Logging Data Deletion Check window”. Press Logging data delete in “410: Memory Processing window”.</p>	<p>▷ See the screenshot in “①” of section 4.7 (1) “Check of automatic measurement data”</p> <p>▷ See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p>  <p style="text-align: center;">410: Memory Processing Window</p>
<p>⑤ Execute Press OK in “411: Logging Data Deletion Check window”.</p> <ul style="list-style-type: none"> • “412: Logging Data Deletion Completed window” opens. 	 <p style="text-align: center;">411: Logging Data Deletion Check Window</p>
<p>⑥ Check for completion of deletion Press Back in “412: Logging Data Deletion Completed window”.</p> <ul style="list-style-type: none"> • “410: Memory Processing window” opens. 	 <p style="text-align: center;">412: Logging Data Deletion Completed Window</p>
<p>⑦ Go to the “300: Data Menu window”. Press Back in “410: Memory Processing window”.</p> <p>⑧ Go back to “000: Home window”. Press HOME in “300: Data Menu window”.</p>	<p>▷ See the screenshot in “③”.</p> <p>▷ See the screenshot “⑧” in 4.4 (1) “Reservation of operation stop”</p>

(10) Initialization of set values

Initialize all the set values stored in the memory of the control section.

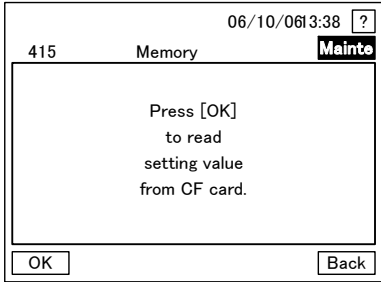
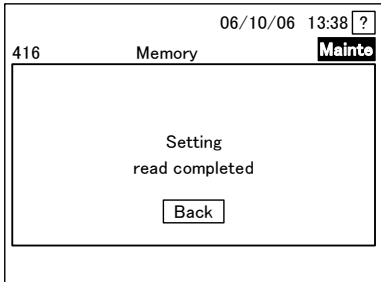
Procedure to Initialize Set Values

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to “300: Data menu window”. Press Data in “000: Home window”.</p> <p>③ Open “410: Memory processing window”. Press Memory in “300: Data menu window”.</p> <p>④ Open “413: Set value initialization check window”. Press Setting initialize in “410: memory processing window”.</p> <p>⑤ Execute Press OK in “413: Set value initialization check window”. • “414: Setting initialization completed window” opens.</p>	<p>▷ See the screenshot in “①” of section 4.7 (1) “Check of automatic measurement data”</p> <p>▷ See the screenshot in “②” of section 4.7 (1) Check of automatic measurement data”</p> <p>▷ See the screenshot in “③” of section 4.7 (1)(a) “Change the date range”</p>
<p>⑥ Check for completion of deletion Press Back in “414: Setting Initialization Completed window”. • “410: Memory Processing window” opens.</p>	 <p>413: Set Value Initialization Check Window</p>
<p>⑦ Go to “300: Data menu window”. Press Back in “410: Memory processing window”.</p> <p>⑧ Go back to the “000: Home window”. Press HOME in the “300: Data menu window”.</p>	 <p>414: Setting Initialization Completed Window</p> <p>▷ See the Screenshot in “③” of section 4.7 (1)(a) “Change the date range”</p> <p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

(11) Reading set values

Read set values stored on the CF card to replace set values in the memory of the control section with them collectively.

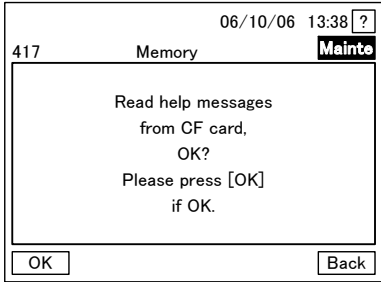
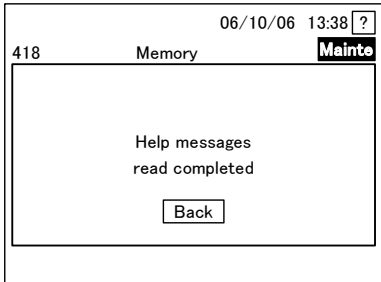
Procedure to Read Set Values

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to “300: Data menu window”. Press Data in “000: Home window”.</p> <p>③ Open “410: Memory processing window”. Press Memory in “300: Data menu window”.</p> <p>④ Open “415: Read setting window”. Press Read setting in “410: Memory processing window”.</p> <p>⑤ Execute Press OK in section “415: Read setting window”. • “416: Reading of set values completed window” opens.</p>	<p>▷ See the screenshot in “①” of section 4.7 (1) Check of automatic measurement data”</p> <p>▷ See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p> <p>▷ See the screenshot in “③” of section 4.7 (1)(a) “Change the date range”</p>
<p>⑥ Check for completion of writing Press Back in “416: Reading of set values completed window”. • “410: Memory processing window” opens.</p>	 <p style="text-align: center;">415: Read Setting Window</p>
<p>⑦ Go to “300: Data menu window”. Press Back in “410: Memory processing window”.</p> <p>⑧ Go back to “000: Home window”. Press HOME in “300: Data menu window”.</p>	 <p style="text-align: center;">416: Reading of Set Values Completed Window</p> <p>▷ See the Screenshot in “③” of section 4.7 (1)(a) “Change the date range”</p> <p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

(12) Reading of help information

Read help information stored on the CF card to replace help information in the memory of the control section with them collectively.

Procedure to Read Help Information

Procedure and Operation	Typical screenshot
<p>① Stop operation Stop operation (automatic/manual measurement, manual calibration, or manual cleaning) ▷ Section 4.4 (1) “Reservation of operation stop” and 4.3 (8) “Emergency stop of the operation”</p> <p>② Go to “300: Data Menu”. Press [Data] in “000: Home window”.</p> <p>③ Open “410: Memory processing window”. Press [Memory] in “300: Data menu window”.</p> <p>④ Open “415: Read setting window”. Press [Help read] in “410: Memory processing window”.</p> <p>⑤ Execute Press [OK] in “417: Help read window”. • “418: Help read completed window” opens.</p>	<p>▷ See the screenshot in “①” of section 4.7 (1) “Check of automatic measurement data”.</p> <p>▷ See the screenshot in “②” of section 4.7 (1) “Check of automatic measurement data”</p> <p>▷ See the screenshot in “③” of section 4.7 (1)(a) “Change the date range”</p>
<p>⑥ Check for completion of writing Press [Back] in “418: Help read completed window”. • “410: Memory Processing window” opens.</p>	 <p style="text-align: center;">417: Help Read Window</p>
<p>⑦ Go to “300: Data menu window”. Press [Back] in “410: Memory processing window”.</p> <p>⑧ Go back to “000: Home window”. Press [HOME] in “300: Data menu window”.</p>	 <p style="text-align: center;">418: Help Read Completed Window</p> <p>▷ See the screenshot in “③” in 4.7 (1)(a) “Change the date range”</p> <p>▷ See the screenshot in “⑧” of section 4.7 (1) “Check of automatic measurement data”</p>

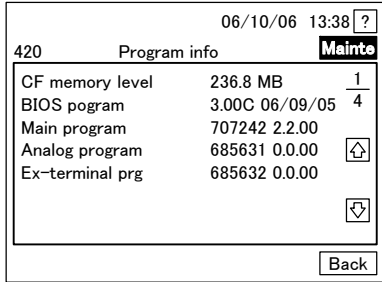
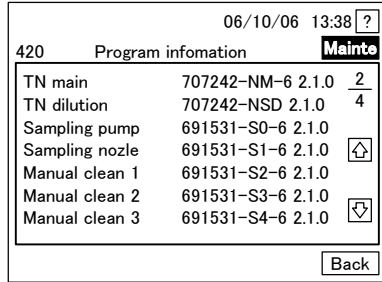
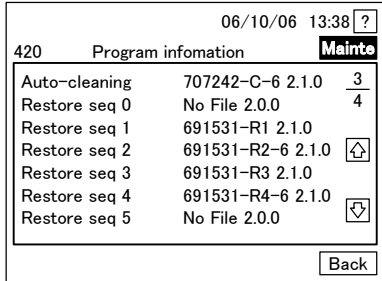
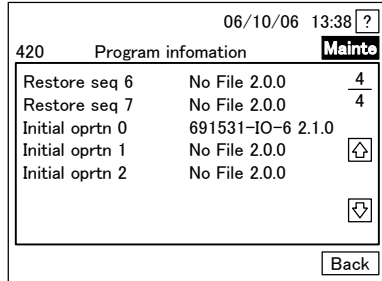
(13) Check of the program information

- (a) Check the number and version of the main program and sequence programs stored in the control section.
- (b) Program information is intended mainly for technical service.

Items and Description of the Program Information Window

Item	Description
CF card memory level	Remaining memory of the CF card
BIOS program	Program version number of BIOS (which controls peripheral devices)
Main program	Number and version number of the main program
Analog program	Number and version number of the analog board
External terminal program	Number and version number of the external terminal board
TN main	Main sequence program for total nitrogen measurement
TN dilution	Sequence program for total nitrogen measurement exclusively for dilution process
Sampling pump	Number and version number of the program for operation test of the sampling pump
Sampling nozzle	Number and version number of the program for operation test of the sampling nozzle
Manual cleaning 1	Number and version number of the program which controls Manual Cleaning 1
Manual cleaning 2	Number and version number of the program which controls Manual Cleaning 2
Manual cleaning 3	Number and version number of the program which controls Manual Cleaning 3
Auto-cleaning	Number and version number of the program which controls Auto-Cleaning
Restore sequence 0	Number and version number of the program for restore sequence 0. Normally, sequence without any processing.
Restore sequence 1	Number and version number of the program for restore sequence for TN dilution sequence.
Restore sequence 2	Number and version number of the program for restore sequence for TN main program
Restore sequence 3	Number and version number of the program for restore sequence for Alarm Nos. 21 (nozzle motor error 1) and 22 (nozzle motor error 2)
Restore sequence 4	Number and version number of the program for restore sequence for Alarm Nos. 23 (sampling pump error 1) and 24 (sampling pump error 2)
Restore sequence 5	Reserved item for restore sequence (not used)
Restore sequence 6	Reserved item for restore sequence (not used)
Restore sequence 7	Reserved item for restore sequence (not used)
Initial sequence 0	Initial sequence when power is turned on
Initial sequence 1	Reserved item for initialization (not used)
Initial sequence 2	Reserved item for initialization (not used)

Procedure to View Program Information

Procedure and Operation	Typical screenshot
<p>① Go to “300: Data Menu window”. Press Data for example in “000: Home window”.</p>	<p>➤ See the screenshot in “①” of 4.7 (1) “Check of automatic measurement data”</p>
<p>② Open “420: Program Information window”. Press Program info in “300: Data Menu window”.</p>	<p>➤ See the screenshot in “②” of 4.7 (1) “Check of automatic measurement data”</p>
<p>③ Check data Press ▲ or ▼ to toggle between pages in “400: Program Information window” and view the necessary data.</p>	
 <p>420: Program Information Window (1/4)</p>	 <p>420: Program Information Window (2/4)</p>
 <p>420: Program Information Window (3/4)</p>	 <p>420: Program Information Window (4/4)</p>
<p>④ Go to “300: Data Menu window”. Press Back in “420: Program Information window”.</p>	
<p>⑤ Go back to “000: Home window”. Press HOME or Back in “300: Data Menu window”</p>	<p>➤ See the screenshot in “⑧” of 4.7 (1) “Check of automatic measurement data”</p>

(14) Removing the CF card

(a) The product uses the “610: CF Card Removal window” to remove the CF card.

[IMPORTANT] • Make sure to remove the CF card only in the “610: CF Card Removal window”.

(b) At the “CF Card Removal window”, the window cannot be switched to another window as long as the CF card is not removed.

- The CF card can be reinserted at any window at any time.

Procedure to Remove the CF Card

Procedure and Operation	Typical screenshot
<p>① Go to “300: Data Menu window”. Press Data for example in “000: Home window”.</p> <p>② Open “610: CF Card Removal window”. Press CF card remove in “300: Data Menu window”.</p> <ul style="list-style-type: none"> • CF card remove is not displayed when CF card is removed. 	<p>➤ See the screenshot in “①” of 4.7 (1) “Check of automatic measurement data”</p>
<div> </div> <p style="text-align: center;">300: Data Menu Window</p>	<div> </div> <p style="text-align: center;">300: Data Menu Window When No CF Card is In</p>
<p>③ Remove the CF card Check that “610 CF Card Removal window” is displayed before removing the CF card.</p> <ul style="list-style-type: none"> • When you pull out the CF card, “300: Data Menu window” without CF card remove opens. <p>④ Go back to “000: Home window”. Press HOME or Back in “300: Data Menu window”.</p>	<div> </div> <p style="text-align: center;">610: CF Card Removal Window</p>

5. Maintenance

5.1 Maintenance List

(a) In order to allow the product to function properly and maintain the specified performance, the functions must be understood and maintenance must be performed periodically.

【IMPORTANT】 • Perform maintenance periodically. Otherwise, equipment failure may result.

(b) The intervals described in the Standard Maintenance List are based on standard installation conditions (in compliance with section 8.1 “Installation Example and Conditions”). The intervals may differ with the conditions of installation. Thus, the intervals may need to be corrected depending on the operating conditions after several months.



Hazardous Substances

- As for chemicals and solutions conditioned by the chemicals, obtain the Material Safety Data Sheet (MSDS) from the purchasing source and follow the instructions for safe handling.

(c) When maintenance is required as a result of an inspection, perform the maintenance even if it is prior to the date of periodic maintenance (e.g., one-month intervals) when periodic cleaning is scheduled. Then, the date of the maintenance should be the initial date in determining the following periodic maintenance date.

(d) Refer technical service, such as repairs, to a sales agent or our company. Personnel who have received technical training from DKK-TOA or persons with equivalent technical experience and skills must provide technical services.

Standard Maintenance List

Item	Name	Description	Intervals							Procedures
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually	As needed	
[Sampling part]										
1	Water receiving tank and float switch	(1) Flow rate of the sampling water, contamination, check for float switch operation	<input type="radio"/>	<input type="radio"/>						▽ 5.4 “Check and Cleaning of the Water Receiving Tank and Float Switch”
		(2) Periodic cleaning			<input type="radio"/>					

○: Corresponding

(To be continued)

(Continued from previous page)

Item	Name	Description	Intervals						Procedures	
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually		As needed
2	Water receiving tank filter	(1) Check for the stain on the filter and the damage of the PFA tube	<input type="radio"/>	<input type="radio"/>						▽ 5.5 “Maintenance of the Filter Assembly for the Water Receiving Tank”
		(2) Periodic cleaning of the filter			<input type="radio"/>					
		(3) Periodic replacement of the filter						<input type="radio"/>		
		(4) Replacement of the PFA tube							<input type="radio"/>	
3	Sampling water pipe and drainpipe	(1) Check for leakage and stain of the sampling water pipe	<input type="radio"/>	<input type="radio"/>						▽ 5.6 “Check and Cleaning of the Sample Water Pipe and the Drain Pipe”
		(2) Cleaning of the sampling water pipe							<input type="radio"/>	
		(3) Check for the drainpipe clogging	<input type="radio"/>	<input type="radio"/>						
		(4) Periodic replacement of the drainpipe						<input type="radio"/>		
		(5) Check for the pump	<input type="radio"/>	<input type="radio"/>						
		(6) Check for the dirt on the water sampling opening	<input type="radio"/>	<input type="radio"/>						
		(7) Check for the water sampling site	<input type="radio"/>	<input type="radio"/>						
[Dilution part]										
4	PeriStar pump P1	(1) Check for the solution leakage, damage on the PFA tube, pump performance	<input type="radio"/>	<input type="radio"/>						▽ 5.7 “Check the PeriStar Pump and Replacement of the Tubes”
		(2) Periodic replacement of the pump tube • Replacement intervals vary depending on the measurement intervals.				<input type="radio"/>				
		(3) Replacement of the PFA tube							<input type="radio"/>	
5	Diaphragm pump P2	(1) Check for the leakage, damage on the tube, and pump defect	<input type="radio"/>	<input type="radio"/>						▽ 5.8 “Checking, Cleaning, and Parts Replacement of the Diaphragm Pump”
		(2) Reconnection of the tube							<input type="radio"/>	
		(3) Replacement of the tube							<input type="radio"/>	

(To be continued)

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Item	Name	Description	Intervals						Procedures	
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually		As needed
6	Dilution tank and piping	(1) Check for the solution leakage, damage on the PFA tube, contamination in the dilution tank, and damage on the drain tube	<input type="radio"/>	<input type="radio"/>						▷ 5.9 “Checking, Cleaning, and Replacement of the Dilution Tank”
		(2) Reconnection of the tube						<input type="radio"/>		
		(3) Replacement of the PFA tube						<input type="radio"/>		
		(4) Periodic cleaning in the dilution tank				<input type="radio"/>				
		(5) Periodic replacement of the drain tube						<input type="radio"/>		
7	Solenoid valve SV1•2•4•5•7•8	(1) Check for the liquid leakage	<input type="radio"/>	<input type="radio"/>					▷ 5.10 “Check and Replacement of the Solenoid Valve”	
		(2) Reconnection of the tube						<input type="radio"/>		
		(3) Replacement of the solenoid valve						<input type="radio"/>		
8	Solenoid valve SV3•6•9	(1) Check for the liquid leakage	<input type="radio"/>	<input type="radio"/>					▷ 5.10 “Check and Replacement of the Solenoid Valve” SV6 is for 2-Streams	
		(2) Reconnection of the tube						<input type="radio"/>		
		(3) Replacement of the solenoid valve						<input type="radio"/>		
9	Zero water tank	(1) Check for the flow rate, leakage, damage on the PFA tube, and contamination in the zero water tank	<input type="radio"/>	<input type="radio"/>					▷ 5.11 “Checking and Cleaning of the Zero Water Tank”	
		(2) Reconnection of the tube						<input type="radio"/>		
		(3) Replacement of the PFA tube						<input type="radio"/>		
		(4) Periodic cleaning in the zero water tank				<input type="radio"/>				
[Tank part]										
10	Cleaning solution tank 1•2	(1) Check for the flow rate, position of the tube end, damage on the tube, contamination in the tank	<input type="radio"/>	<input type="radio"/>					▷ 5.12 “Maintenance of the Cleaning Fluid Tank”	
		(2) Replenishment of the cleaning solution 1 • Cleaning solution 2 is conditioned as needed.						<input type="radio"/>		
		(3) Replacement of the tube						<input type="radio"/>		
		(4) Cleaning in the tank						<input type="radio"/>		

(To be continued)

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Item	Name	Description	Intervals						Procedures	
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually		As needed
11	Calibration solution tank	(1) Check for flow rate, position of the tube end, damage on the tube, contamination in the tank	<input type="radio"/>	<input type="radio"/>						▷ 5.13 “Maintenance of the Calibration Solution Tank”
		(2) Replenishment of the span calibration solution							<input type="radio"/>	
		(3) Replacement of the tube							<input type="radio"/>	
		(4) Cleaning in the tank							<input type="radio"/>	
[Sample infusion part]										
12	Solenoid valve SV21	(1) Check for the liquid leakage	<input type="radio"/>	<input type="radio"/>						▷ 5.10 “Check and Replacement of the Solenoid Valve”
		(2) Reconnection of the tube							<input type="radio"/>	
		(3) Replacement of the solenoid valve							<input type="radio"/>	
13	PeriStar pump P21	(1) Check for the solution leakage, damage on the PFA tube, pump performance	<input type="radio"/>	<input type="radio"/>						▷ 5.7 “Check the PeriStar Pump and Replacement of the Tubes”
		(2) Periodic replacement of the pump tube • Replacement intervals vary depending on the measurement intervals.				<input type="radio"/>				
		(3) Replacement of the PFA tube							<input type="radio"/>	
14	Sample pot	(1) Check for the contamination	<input type="radio"/>	<input type="radio"/>						▷ 5.14 “Checking and Cleaning the Sample Pot”
		(2) Periodic cleaning of the sample pot				<input type="radio"/>				
[Air refining part]										
15	Diaphragm pump P23	(1) Check for the leakage, damage on the tube, and pump defect	<input type="radio"/>	<input type="radio"/>						▷ 5.8 “Checking, Cleaning, and Parts Replacement of the Diaphragm Pump”
		(2) Reconnection of the tube							<input type="radio"/>	
		(3) Replacement of the tube							<input type="radio"/>	
		(4) Periodic cleaning of the valves				<input type="radio"/>				
		(5) Periodic replacement of the valves and diaphragm					<input type="radio"/>			

(To be continued)

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Item	Name	Description	Intervals						Procedures	
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually		As needed
16	Diaphragm pump P24	(1) Check for the leakage, damage on the tube, and pump defect	<input type="radio"/>	<input type="radio"/>						▷ 5.8 “Checking, Cleaning, and Parts Replacement of the Diaphragm Pump”
		(2) Reconnection of the tube							<input type="radio"/>	
		(3) Replacement of the tube							<input type="radio"/>	
		(4) Periodic cleaning of the valves				<input type="radio"/>				
		(5) Periodic replacement of the valves and diaphragm • Replacement intervals vary depending on the measurement intervals and P24 operation status.					<input type="radio"/>			
17	Filter AF21	(1) Check for the dust and clogging	<input type="radio"/>		<input type="radio"/>					▷ 5.15 “Checking, Cleaning, and Replacement of the Filter AF21”
		(2) Periodic cleaning				<input type="radio"/>				
		(3) Periodic replacement						<input type="radio"/>		
18	Air-refining agent and filter	(1) Check for discoloration of the air-refining agent CF21 (Purafil)	<input type="radio"/>	<input type="radio"/>						▷ 5.16 “Check and Replacement of the Air-refining Agent and Replacement of the Filter”
		(2) Periodic replacement of the air-refining agent • Replacement intervals vary depending on the measurement intervals, environment, and P24 operation status.				<input type="radio"/>	(4month)			
19	Filter AF22·23	(1) Check for the dust and clogging	<input type="radio"/>		<input type="radio"/>					▷ 5.17 “Checking, Cleaning, and Replacement of the Filter AF22/AF23”
		(2) Periodic replacement						<input type="radio"/>		
		(3) Cleaning of the case							<input type="radio"/>	
20	Filter AF24	(1) Check for the dust and clogging	<input type="radio"/>		<input type="radio"/>					▷ 5.18 “Checking, and Replacement of the Filter AF24”
		(2) Periodic replacement						<input type="radio"/>		
21	PFA tube of the air refining part	(1) Check for the tube connection and damage on the tube	<input type="radio"/>		<input type="radio"/>					▷ 5.19 “Check, and Replacement of the air refining part tube”
		(2) Reconnection of the tube							<input type="radio"/>	
		(3) Replacement of the tube							<input type="radio"/>	

(To be continued)

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Item	Name	Description	Intervals						Procedures
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually	
[Material measurement and dropping part]									
22	Solenoid valve SV22·23·24	(1) Check for liquid leakage	<input type="radio"/>	<input type="radio"/>					▷ 5.10 “Check and Replacement of the Solenoid Valve”
		(2) Reconnection of the tube						<input type="radio"/>	
		(3) Replacement of the solenoid valve						<input type="radio"/>	
23	Solenoid valve SV25	(1) Check for liquid leakage	<input type="radio"/>	<input type="radio"/>					▷ 5.10 “Check and Replacement of the Solenoid Valve”
		(2) Reconnection of the tube						<input type="radio"/>	
		(3) Replacement of the solenoid valve						<input type="radio"/>	
24	Syringe pump P22	(1) Check for the performance and water drip interfusion	<input type="radio"/>		<input type="radio"/>				▷ 5.20 “Checking, Cleaning, and Replacement of the Syringe Pump”
		(2) Cleaning of the syringe						<input type="radio"/>	
		(3) Periodic replacement of the syringe					<input type="radio"/>		
25	Oil tank	(1) Check for the water drip interfusion and oil quantity	<input type="radio"/>		<input type="radio"/>				▷ 5.21 “Check, Replenishment, and Replacement of the Oil Tank”
		(2) Periodic replenishment of the oil				<input type="radio"/>			
		(3) Oil change						<input type="radio"/>	
26	Nozzle	(1) Check for dripping and damage on the nozzle and tube	<input type="radio"/>		<input type="radio"/>				▷ 5.22 (1) “Check for the Nozzle”
		(2) Cleaning of the nozzle						<input type="radio"/>	▷ 5.22(2) “Cleaning of the nozzle tube”
		(3) Periodic replacement of the nozzle assembly				<input type="radio"/>			▷ 5.22(3) “Replacement of the nozzle 100 assembly”
27	O-ring of the dripping part cover	(1) Check for the damage				<input type="radio"/>			▷ 5.23 “Replacement of the O-ring for the Dripping Part Cover”
		(2) Periodic replacement					<input type="radio"/>		

(To be continued)

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Item	Name	Description	Intervals							Procedures	
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually	As needed		
[Combustion tube and liquid seal]											
28	Combustion tube	(1) Replacement of the combustion tube <ul style="list-style-type: none"> Replacement intervals vary depending on the measurement intervals and sample water quality. Replacement interval of the sea water measurement is every 2-week. (no dilution, measurement interval: 5 min) 			○ (2 months)					”	▷ 5.24 “Check and Replacement of the Combustion Tube and the O-ring
		(2) Check for the damage on the O-ring			○ (2 months)						
		(3) Periodic replacement of the O-ring					○				
29	Liquid seal tube	(1) Check for the stain of the tube	○	○							▷ 5.25 “Check and Replacement of the Liquid Seal Tube”
		(2) Replacement of the tube							○		
[Detection part]											
30	Cell	(1) Cleaning in the cell							○		▷ 5.26 “Cleaning of the Cell and Replacement of the O-ring”
		(2) Replacement of the O-ring							○		
[Others]											
31	Printer	(1) Check for the remaining quantity of the roll paper			○						▷ 3.1(3) “Loading of roll paper”
		(2) Replacement of the roll paper] <ul style="list-style-type: none"> For measurement interval of 5 min : approximately 0.7m /day, 1 roll is for 50 days Replacement intervals vary depending on the operating conditions. 			○ (1.5 months)						
32	Surge absorber	(1) Replacement after lightning strike								○	▷ 5.27 “Replacement of the Surge Absorber”
		(2) Periodic replacement							○		
33	Calibration result	Check zero deviation and span factor <ul style="list-style-type: none"> By 4.7(4) “Check or Printing of zero calibration data” and 4.7(5) “Check or printing of span calibration data” 	○	○							• In case of error, refer to 6.1(2) “Alarm function and countermeasures”

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Item	Name	Description	Intervals						Procedures	
			At start-up	Weekly	Monthly	Every 3	Every 6 month	Annually		As needed
[Hypochlorous acid adding part] (option)										
34	Tank for additional hypochlorous acid	(1) Check for the liquid amount, position of the tube end, contamination in the tank and damage on the tube	<input type="radio"/>	<input type="radio"/>						▷ 5.28 “Maintenance of the Tank for Hypochlorous Acid for Supplementation”
		(2) Periodic replenishment of the solution			<input type="radio"/>					
		(3) Replacement of the tube							<input type="radio"/>	
		(4) Cleaning in the tank							<input type="radio"/>	
35	PeriStar pump P3	(1) Check for the solution leakage, damage on the PFA tube, pump performance	<input type="radio"/>	<input type="radio"/>						5.7 “Check the PeriStar Pump and Replacement of the Tubes”
		(2) Periodic replacement of the pump tube • Replacement intervals vary depending on the measurement intervals.				<input type="radio"/>				
		(3) Replacement of the PFA tube							<input type="radio"/>	
36	Solenoid valve SV10	(1) Check for liquid leakage	<input type="radio"/>	<input type="radio"/>						5.10 “Check and Replacement of the Solenoid Valve”
		(2) Reconnection of the tube							<input type="radio"/>	
		(3) Replacement of the solenoid valve							<input type="radio"/>	




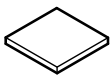
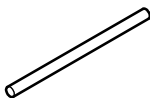


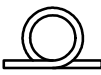
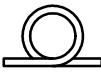


5.2 Standard Accessories and One year Spare Parts

(1) Standard accessories

(a) The table below shows the standard accessories. These items vary depending on the specifications and may be subject to change without prior notice.

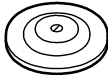
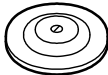





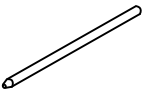


(b) Among the items in the table below, the instruction manual may be sent separately from the product if it is specified upon order.

Standard Accessories







Item	Code No.	Part name	Outline	Quantity	Note
1	—	Inspection report		1	
2	—	Instruction manual		1	
3	131H4051	Printer roll paper		1	Option STH-771 Loading is needed upon start-up
4	69153100	CF card		1	64MB Completed writing of the TNC-250 software. Incorporated in the product.
5	6952130K	Combustion tube assembly		2	One of the two is needed to be incorporated upon start-up. Replacement interval: 2 months (It varies depending on the measurement intervals and sample water.) Replacement interval for sea water measurement: 2 weeks (no dilution, measurement interval: 5 min).
6	6954130K	Silicon oil assembly		1	Dimethyl silicon oil (No.141D042) Contains 200mL. Approximately 50mL should be replenished upon start-up.
7	6954140K	Syringe assembly		1	Syringe with inlet
8	116E668	Pharmed tube		0.6m	$\phi 2.38 \times \phi 5.56$ for P1 Replacement interval: 3 months (It varies depending on the measurement intervals.)
9	116E664	Pharmed tube		0.6m	$\phi 3.18 \times \phi 6.35$ for P21 Replacement interval: 3 months (It varies depending on the measurement intervals.)
10	125A113	Lead valve		1	for P24 for APN-085LVX-1 Replacement interval: 6 months (It varies depending on the measurement intervals.)
11	125A179	Valve		1	for P23 for APN-110KVX-1-21 Replacement interval: 6 months

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Item	Code No.	Part name	Outline	Quantity	Note
12	125A114	Diaphragm		1	for P24 for APN-085LVX-1 Replacement interval: 6 months (It varies depending on the measurement intervals.)
13	125A178	Diaphragm kit		1	for P23 for APN-110KVX-1-21 Replacement interval: 6 months
14	6196720K	Carulite		1	Contains 300g Replacement interval: 4 months (It varies depending on the measurement intervals and environment)
15	6251900K	Purafil		1	Contains 300g Replacement interval: 4 months (It varies depending on the measurement intervals, environment, and P24 operation status.)
16	6251910K	Puracarbo		1	Contains 300g Replacement interval: 4 months (It varies depending on the measurement intervals, environment, and P24 operation status.)
17	6895810K	Gigacoal A		1	Contains 300g Replacement interval: 4 months (It varies depending on the measurement intervals, environment, and P24 operation status.)
18	136A001	PTFE filter		8	PF-1, $\phi 55$ for air-refining agent: 2 pieces \times 4 places, Replacement interval: 4 months Filter: 2 places Replacement interval: 1 year
19	7089440K	Nozzle 100 assembly		1	For dripping part Replacement interval: 3 months
20	118J080	Banding band		32 (44)	PLT1M For P1: 2 pieces, for P21: 6 pieces. Replacement interval: 3 months} Quantity in the () is when hypochlorous acid (option) is added. For P3; 3 pieces. Replacement interval: 3 months
21	6993110K	O-ring assembly		1	See table "O-ring assembly details"

O-ring Assembly Details




Item	Code No.	Part name	Outline	Quantity	Note
1	125B500	O-ring		2	AS-568-112 For combustion tube part Replacement interval: 6 months
2	115A591	O-ring		4	Red P16 Upper and lower parts of the combustion tube (2 places) Replacement interval: 6 months
3	115A592	O-ring		2	Red P20 For combustion tube part Replacement interval: 6 months
4	115A508	O-ring		1	G115 Dripping part cover Replacement interval: 1 year
5	115A322	O-ring		1	S32 For detector cell Replacement interval: 1 year
6	115A444	O-ring		1	S34 For detector cell Replacement interval: 1 year

(2) One year spare parts

(a) The table below shows the standard one year spare parts. These items vary depending on the specifications and may be subject to change without prior notice.



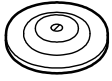




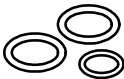


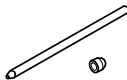

(b) As for the parts below whose replacement procedures are not described in this book, ask the technical service company for replacements.

One Year Spare Parts

Item	Code No.	Part name	Outline	Annual requirement		Note
				For use	For spare	
1	116E668	Pharmed tube (pump tube)		1m		$\phi 2.38 \times \phi 5.56 \times$ length 1000, For P1, length for 1 time: 145mm, Replacement interval: 3 months (It varies depending on the measurement intervals.)
2	116E664	Pharmed tube (pump tube)		1m		$\phi 3.18 \times \phi 6.35 \times$ length 1000, for P21, length for 1 time: 145mm, Replacement interval: 3 months (It varies depending on the measurement intervals.)
3	116E663	Pharmed tube (pump tube)		1m		$\phi 1.6 \times \phi 4.8 \times$ length 1000, for P3 when hypochlorous acid (option) is added, length for 1 time: 145mm, Replacement interval: 3 months (It varies depending on the measurement intervals.)



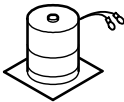
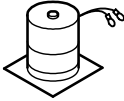
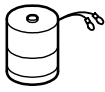
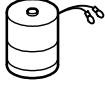
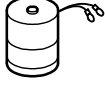
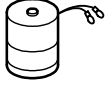
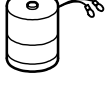
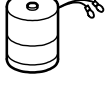
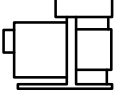

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Item	Code No.	Part name	Outline	Annual requirement		Note
				For use	For spare	
4	125A113	Lead valve		2		For diaphragm pump in P24 (APN-085LVX-1), Replacement interval: 6 months (It varies depending on the measurement intervals, P24 operation status.)
5	125A179	Valve		2		For diaphragm pump in P23 (APN-110KVX-1-21) Replacement interval: 6 months
6	125A114	Diaphragm		2		For diaphragm pump in P24 (APN-085LVX-1), Replacement interval: 6 months (It varies depending on the measurement intervals, P24 operation status.)
7	125A178	Diaphragm kit		2		For diaphragm pump in P23 (APN-110KVX-1-21) Replacement interval: 6 months
8	7089350K	Carulite		1		Contains 1kg Replacement interval: 4 months (It varies depending on the measurement intervals and environment.)
9	6993140K	Air-refining agent assembly		1		▷ See table “Details of Air-refining Agent Assembly”
10	6952130K	Combustion tube assembly		6		Replacement interval: 2 months (It varies depending on the measurement intervals and sample water). Replacement interval: 2 weeks for sea water measurement (no dilution, measurement intervals: 5 min)
11	6993110K	O-ring assembly		1		▷ See table “O-ring Assembly Details” in 5.2(1) “Standard accessories”
12	116E022	Hyprene tube		2m		φ7 × φ11, for drain, Replacement interval: 1 year
13	116E031	Uni tube		4m		φ9 × φ13, for liquid seal (2 places), Replacement interval: 1 year
14	7266510K	Nozzle 100 assembly		4		For dripping part Replacement interval: 3 months
15	67622100	Filter		1		Mesh 100 Replacement interval: 1 year

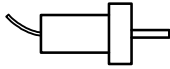
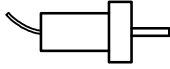
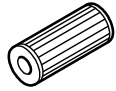
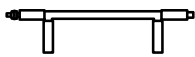
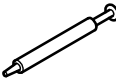

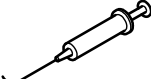

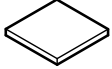




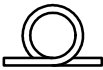

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Item	Code No.	Part name	Outline	Annual requirement		Note
				For use	For spare	
16	136A001	Filter		24		PF-1, φ55, Teflon For air refining cylinder (4 pieces, 2 sheets for each) Replacement interval: 4 months
17	131H4051	Roll paper for printer		7		STH-771 For printer (option) For 50 days with the measurement interval: 5 min (approximately 0.7m/day), Replacement interval: 1.5 months (It varies depending on the status of use)
18	6953880K	Three-way solenoid valve			1	Terminal treatment of AV1302-515-MF-TD (126A 475) For SV1 and SV2
19	6953890K	Two-way solenoid valve			1	Terminal treatment of AV1202-53-MF-TD (126A 476) For SV5, SV7 and SV8
20	6953900K	Two-way solenoid valve			1	Terminal treatment of SAVR-3232-118-TD (126A 473) For SV4
21	6954040K	Three-way solenoid valve			1	Terminal treatment of SAVR-3332-118-TD (126A 472) For SV3,SV6 and SV9
22	6953910K	Three-way solenoid valve			1	Terminal treatment of AVR-2312-318 (126A468) For SV21
23	6954050K	Two-way solenoid valve			1	Terminal treatment of AVR-2212-318 (126A467) For SV22,SV23 and SV24
24	6954060K	Two-way solenoid valve			1	Terminal treatment of AV-2212-53PP (126A466), corrosion-proof For SV25
25	6954070K	Two-way solenoid valve			1	Terminal treatment of AVR-2212-318 (126A467) For SV10 when hypochlorous acid (option) is added
26	125A177	Air pump (diaphragm pump)			1	ANP-110KVX-1-21 For diaphragm pump in P23
27	125A115	Air pump (diaphragm pump)			1	APN-085LVX-1 For diaphragm pump in P24


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
Item	Code No.	Part name	Outline	Annual requirement		Note
				For use	For spare	
28	107A259	Synchronous motor			1	SR485J54-00 For dripping motor M21
29	107A260	Synchronous motor			1	SR48G5Z3M For syringe pump in P22
30	136A021	Glass element S		1		For filter AF21
31	6388830K	Ozone generating pipe assembly			1	For ozonizer
32	136D699	Syringe for Rheodyne		1		750SNR For syringe pump in P22
33	6954130K	Dimethyl silicon oil assembly			1	Contains 200mL For syringe pump in P22
34	6954140K	Syringe assembly			1	Syringe and inlet For replenishment of oil tank
35	41711700	L-shaped pipe			1	φ8 For drain
36	134G620	CF card			1	64MB
37	126H093	PP mini check valve			1	MFP-3-V Attached when hypochlorous acid (option) is added
38	141D002	Silicon grease			1	Contains 5g
39	6952220U	ZNR unit (surge absorber)			1	
40	136A822	Filter			2	PF-1 φ47 Tetron For filter AF22 and AF23 Replacement interval; 1 year
41	116D302	PFA tube			2	φ2 × φ3
42	118J080	Banding band			44	PLT1M PLT1M 2 pieces for P1, 6 pieces for P21, 3 pieces for P3 (option), Replacement interval: 3 months

(To be continued)

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Item	Code No.	Part name	Outline	Annual requirement		Note
				For use	For spare	
43	132B960	Filter tube 9922-05-DQ			1	For AF24

Details of Air-refining Agent

Item	Code No.	Part name	Outline	Annual requirement		Note
				For use	For spare	
1	6251920K	Purafil		1		Contains 1kg Replacement interval: 4 months (It varies depending on the measurement intervals, environment, and P24 operation status.)
2	6251930K	Puracarbo		1		Contains 1kg Replacement interval: 4 months (It varies depending on the measurement intervals, environment, and P24 operation status.)
3	7089340K	Gigacoal A		1		Contains 1kg Replacement interval: 4 months (It varies depending on the measurement intervals, environment, and P24 operation status.)

5.3 Common Operation Before/After Maintenance

(1) Operation before maintenance

Conduct the operation before maintenance following the procedures below, when the procedures in section 5.4 “Check and Cleaning of Water Receiving Tank and Float Switch” and the following sections have descriptions that refer to this item.

① **Stop operation.** Stop automatic operation and other operations by the following procedures.

- Upon internal starting Enter Operation Stop Reservation. (▷ See 4.4(1) “Reservation of operation stop”) The product stops after the sequence program in progress finishes.
- Upon external starting Enter the Measurement Stop signal from the control room. The product makes an emergency stop.

② **Turn off the power switch.** After confirming the “000: Home window”, turn the power switch to “OFF”.

③ **Turn off the power supply.** For safety, turn off the power at the supply source.

Next, operate according to the procedures of each item.

【IMPORTANT】 • Before drawing out the analysis component, pull out the tubes inserted in the drain cylinder together with the inner cover, and put the ends of the tube in a container such as a beaker. When returning the analysis component to the original location, make sure to return the ends of the tubes in the drain cylinder.

(2) Operation after maintenance

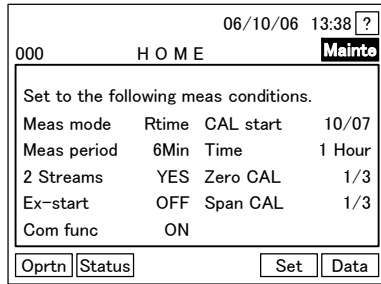
Conduct the operation after maintenance under the procedures below, when the procedures in 5.4 “Check and Cleaning of Water Receiving Tank and Float Switch” and the following sections have the descriptions that refer to this item.

① **Set to operation status.** Supply power to the product and turn the power switch of the product to ON.

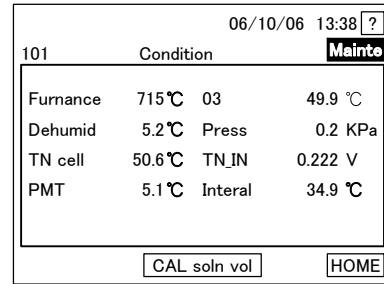
- A few seconds after turning the power switch to ON, “000: Home window” opens. If it is not 000: Home, push **[Back]**, then push **[HOME]** after **[HOME]** opens on the window.

② **Check the status of internal analysis.** Push **[Status]** in the “000: Home window” and confirm that each item displayed on the “101: Internal Analysis Status window” is within the following range.

- It takes approximately 1 hour for the temperature of the combustion furnace to rise from the room temperature to the set temperature.



000: Home Window



101 Internal Analysis Status Window

Combustion Furnace ... 700°C ± 10°C	Dehumidifier..... 5°C ± 1°C	TN Cell .. 50°C ± 1°C
PMT 5°C ± 1°C	O ₃ 50°C ± 1°C	
Cell Pressure..... 45 ± 3 kPa		
TN_IN 0.00 to 0.05 V		

At the beginning of power activation, it may receive high voltage. However, it gradually approaches the range above.

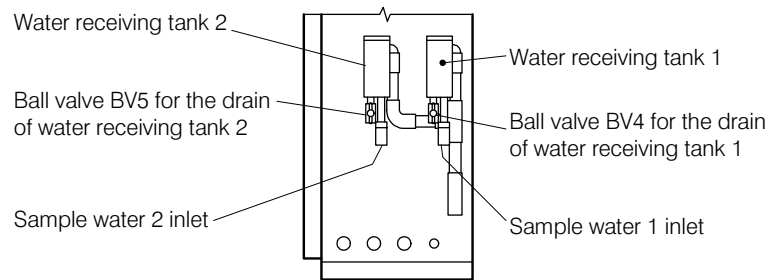
Inside Room temperature to room temperature +10°C

- 【IMPORTANT】**
- Confirm that the internal temperature is in the range of room temperature to room temperature +10°C and is stable as well. Unless it is stabilized, do not start measurement or calibration.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.

- ③ Confirm calibration start date. Push **HOME** in the “101: Internal analysis status window” and confirm that calibration start date displayed in the “000: Home window” is the desired date. If necessary, change the date. ▷ See 4.5(1) “Changing of the next calibration start date”
- ④ Check measurement start stream. As for 2 streams, check the “B13 Measurement start stream”, and if necessary, change the stream. ▷ See 4.4(14) “Changing the measurement-starting stream”.
 - If necessary, check other operation conditions. ▷ See 4.7(8) “Check or printing of the measurement and calibration condition list”.
- ⑤ Set to automatic measurement start status. Push **Oprtn** in the “000: Home window”, then the 100: Measurement Menu window opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, and then push **Start**.
 - When “B01 Measurement start mode” is “Regulation” upon internal starting Automatic measurement starts when it is the measurement start time of measurement cycle.
 - When “B01 Measurement start mode” is Immediate upon internal starting Automatic measurement starts immediately by this operation.
 - Upon external starting After the operation ⑤, automatic measurement starts when the measurement start signal is input from the control room.

5.4 Check and Cleaning of the Water Receiving Tank and Float Switch

(a) Conduct periodic check of the inside of water receiving tank and the float switch according to the 5.1 “Maintenance List.” As for 2 Streams, there are water receiving tank 1 and 2.



Water Receiving Tank (Example for Two Streams)

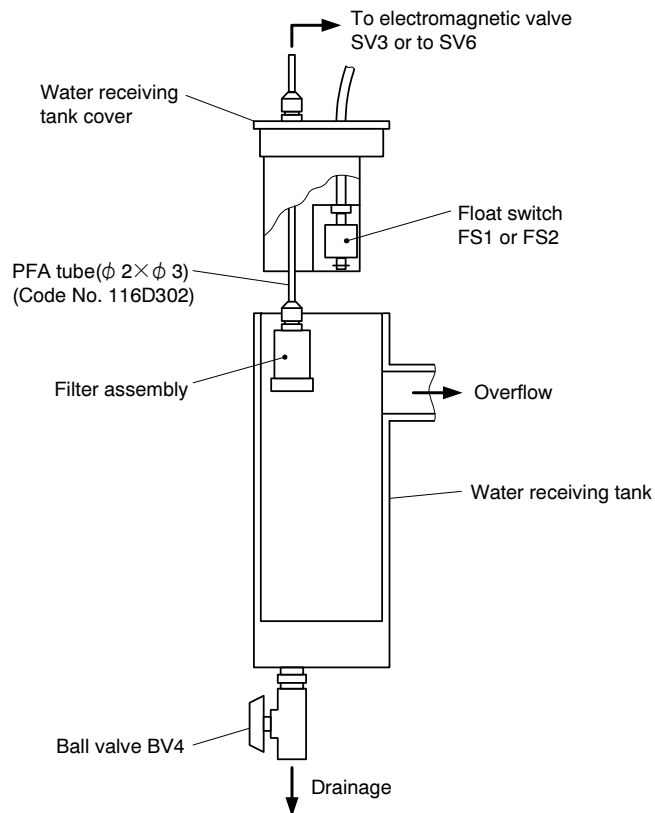
(b) If cleaning is necessary as a result of the check, clean even if it is prior to the scheduled date of periodic cleaning. Then, the date above should be the initial date in reckoning the next periodic cleaning date.

(c) As for the check of the filter assembly in the water receiving tank, refer to 5.5 “Maintenance of the Filter Assembly for the Water Receiving Tank”.

(d) The following shows the procedures for checking and cleaning in the water receiving tank.

① **Stop operation.** Stop automatic operation and other operations by the following procedures.

- Upon internal starting Enter Operation Stop Reservation.
- Upon external starting Enter the Measurement Stop signal from the control room.



Inside the Water Receiving Tank and the Float Switch

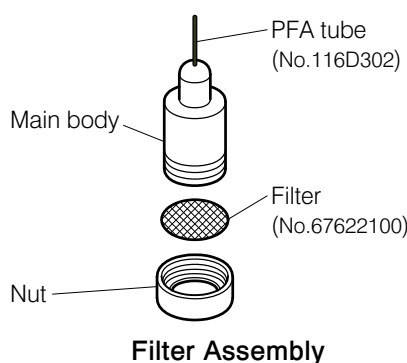
- ② **Check the flow rate of the sample water.** Lift the cover of the water receiving tank and check the sampling water overflows in the tank.
- In case of error, adjust the quantity of sampling water. ▷ See 6.1(2) “Alarm function and countermeasures” and “A07 and A08” in the table.
- ③ **Stop the sample water infusion.** Stop the sample water infusion with the procedures such as closing the sample water adjusting valve by opening the bypass valve set in the sample water way.
- ④ **Drain sample water in the water receiving tank.** Set the ball valve BV4 (BV5 for Water receiving tank 2) on the lower part of the water receiving tank to OPEN.
- ⑤ **Conduct the required operations.** Perform the necessary maintenance of the following.
- When there is no error, advance to the operation ⑦.
- [Check for the contamination and performance of the float switch]
- Check for the contamination inside the water receiving tank and on the float switch, if necessary, clean with the reference to “Cleaning in the water receiving tank”.
 - Check for the sediment at the bottom in the water receiving tank, if necessary, clean with the reference to “Cleaning in the water receiving tank”.
 - After closing the ball valve BV4 and filling tap water from the upper side of the water receiving tank, check whether the float of the float switch buoys by a few millimeters. If not, clean with reference to “Cleaning in the water receiving tank”.
- [Periodic cleaning]
- Full clean inside the water receiving tank and of the float switch with brushes and other cleaning tools, and rinse with tap water.
- ⑥ **Stop drainage from the water receiving tank.** Close the ball valve BV4 (BV5 for Water receiving tank 2).
- ⑦ **Infuse sample water.** Open the sample water adjusting valve set on the sample water way and infuse sample water by opening the bypass valve.
- ⑧ **Adjust the flow rate.** In order that sample water always overflows from the water receiving tank, adjust the sample water adjusting valve on the sample water way. After adjusting, close the cover of the water receiving tank.
- When other maintenance is conducted without interruption, the operation ⑨ is not necessary.

-
- 【IMPORTANT】**
- Unless the internal temperature is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

- ⑨ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.5 Maintenance of the Filter Assembly for the Water Receiving Tank

- (a) Conduct periodic checks of the filter assembly in the water receiving tank according to the 5.1 “Maintenance List”. As for 2 Streams, there are water receiving tank 1 and 2.
- (b) If cleaning is necessary as a result of the check, clean even if it is prior to the scheduled date of periodic cleaning. Then, the date above should be the initial date in reckoning the next periodic cleaning date. If dirt and dust are found on the filter as a result of the check, clean even if it is prior to the scheduled date of periodic cleaning. Then, the date above should be the initial date in reckoning the next periodic cleaning date according to the maintenance intervals.
- (c) The following shows the procedures for checking and cleaning the filter assembly and replacement of the PFA tubes.



Filter Assembly

- ① **Stop operation.** Stop automatic operation and other operations by the following procedures.
- Upon internal starting Enter operation stop reservation.
 - Upon external starting Enter measurement stop signal from the control room.
- ② **Take out the filter assembly.** Remove the cover of the water receiving tank upward and take out the filter assembly together with the PFA tube fixed on the cover. ▷ See the drawing ① “Inside the Water Receiving Tank and the Float Switch” of 5.4 “Check and Cleaning of the Water Receiving Tank and the Float Switch”.
- ③ **Conduct required operations.** Perform the necessary maintenance of the following.
- When the maintenance is not necessary, advance to the operation ④.
- [Check for dirt and dust on the filter]
- Check the dirt and dust on the filter When there are dirt and dust, clean.
- [Check for the PFA tube]
- Check that there are bending, clogging and notable stain of the PFA tube, if these are found, replace the PFA tube.
- [Periodic cleaning of the filter]
- Follow the procedures below for cleaning. Replace any damaged filters.
 - [a] Take out the filter Loosen and remove the nut, then take out the filter.
 - [b] Clean Clean the filter, nut and inside the main body with the brush and other cleaning tools. Then, rinse with tap water.
 - [c] Assemble Assemble back to the original state.
- [Periodic replacement of the filter]
- Replace the filter under the following procedures.

- [a] Take out the filter Loosen and remove the nut, then take out the filter.
- [b] Clean. Clean the nut and inside the main body with the brush and other cleaning tools. Then, rinse with tap water.
- [c] Prepare a new filter Prepare the attached filter.
[Replacement part] filter No.67622100,mesh 100
- [d] Assemble Assemble them back to the original state.

[Replacement of the PFA tube]

- Loosen the joint and replace the connected PFA tube (for sampling).
[Replacement part] PFA tube No.116D302, $\phi 2 \times \phi 3$

④ **Incorporate the filter assembly.** Incorporate the filter assembly back into the former state in the water receiving tank.

- When other maintenance is conducted without interruption, operation ⑤ is not necessary.

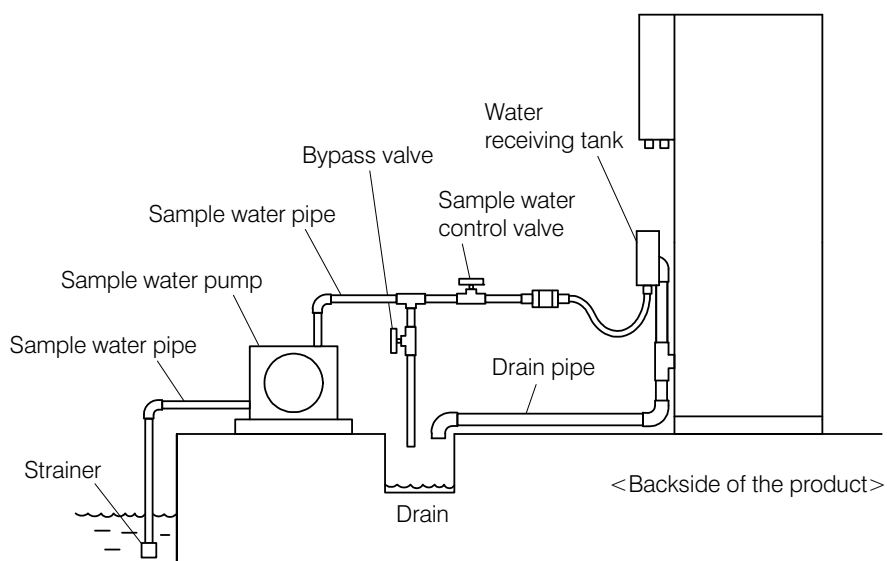
【IMPORTANT】

- Unless the internal temperature is stabilized, do not start measurements or calibrations.
- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.

⑤ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement Menu window” opens. Push **Auto meas** and the “110 Automatic Measurement Start window” opens, then push **Start** .

5.6 Check and Cleaning of the Sample Water Pipe and the Drain Pipe

(a) Conduct periodic check and cleaning of the sample water pipe from the water sampling inlet to the water receiving tank and of the drain pipe from the drain outlet to the drain according to the 5.1 “Maintenance List”. As for 2 Streams, there are water-receiving tank 1 and 2.



Sample Water Pipe and Drain Pipe

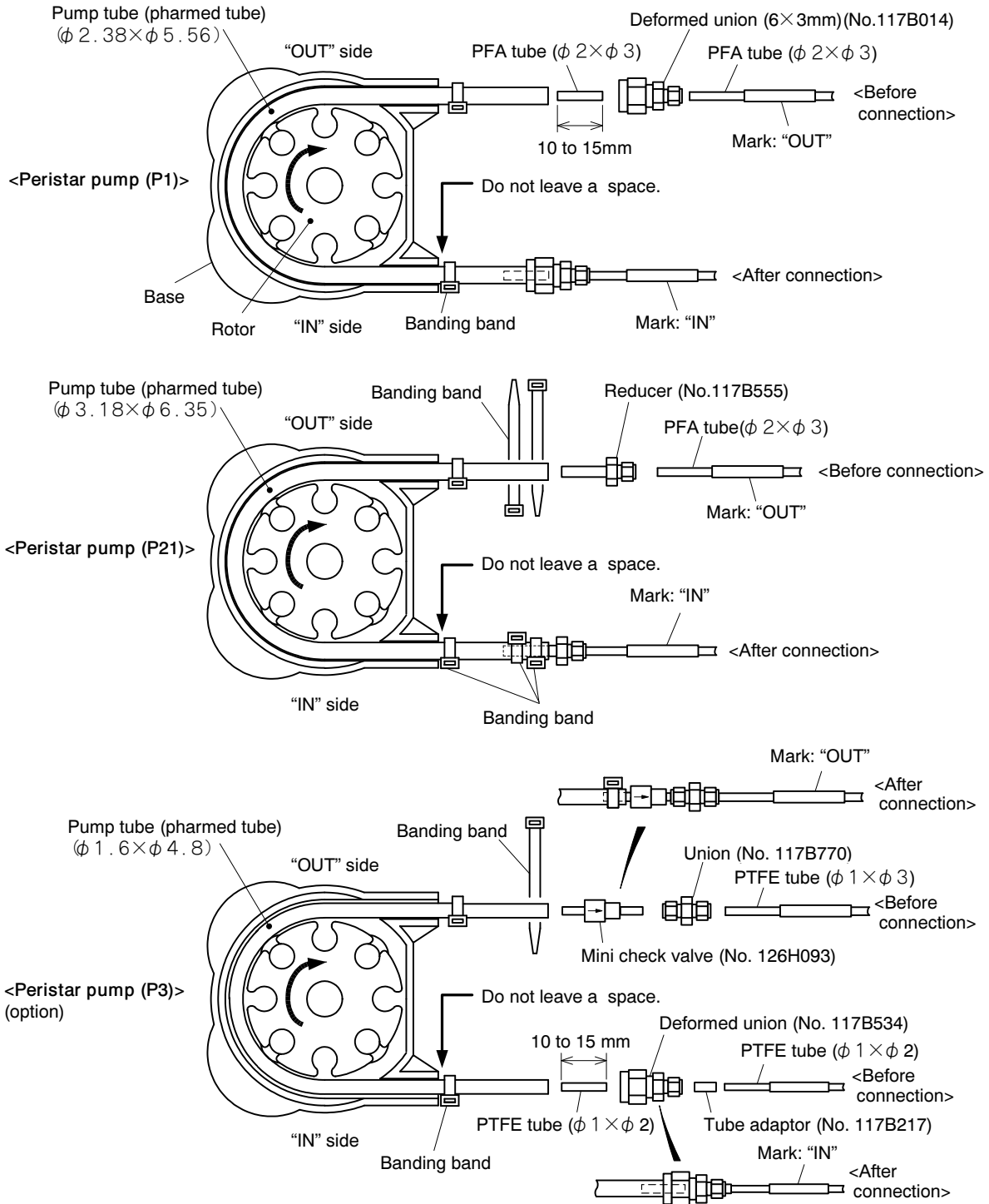
(b) This can be checked visually during operation such as automatic measurement. The following chart shows the procedures for maintenance and other measures.

The Procedures for Maintenance and the Measures

Item	Details of maintenance and procedures	Measures in case of error
1	Check for the leakage from the sample water pipe ... Check that there are leakage, disconnection and bending.	After stopping operation, fix or replace the pipe.
	Check for the stain on the sample water pipe ... Check that there is stain on the sample water pipe.	Clean the pipe.
2	Cleaning of the piping ... After stopping operation, clean by flushing and other cleaning method. ▷ See 2.1(2) “Flushing of the piping”	—
3	Check for the clogging in the drain pipe ... Check that there are leakage, disconnection, bending and clogging of the drain pipe.	After stopping operation, fix or replace the pipe. If it is replaced, the date is set as the periodic replacement date of the drain pipe.
4	Periodic replacement of the drain pipe ... Conduct periodic replacement of the drain pipe.	After stopping operation, replace the pipe (φ7 × φ11).
5	Check for the pump ... Check that there are abnormal sound and oscillation from the water sampling pump.	Contact the pump manufacturer for inspection.
6	Check for the stain on the sample water inlet ... Check that there is clogging on the strainer of the sample water inlet or on the pipe opening. (Unnecessary in case there is no strainer.)	Clean the strainer or the pipe opening.
7	Check for the sampling point ... Check whether the flow around the sampling water inlet is not changing, if the sample water acquired represents the flow, and if the sample water inlet is above the water surface.	Clean the strainer or the pipe opening. Set the flow to acquire the sample water representing the flow. Or shift the sample water inlet.

5.7 Check the PeriStar Pump and Replacement of the Tubes

- (a) Periodically check the PeriStar pump (P1, P21, P3) and replace the tube according to 5.1 "Maintenance List".
- (b) The size of the pump tube varies according to the pump.
- (c) The following shows the procedures for checking the PeriStar pump and replacement of the pump tube.



How to Connect the Pump Tube and the Connection Tube

① Conduct the necessary checks. Conduct the necessary checks from the following.

[Check for leakage]

- Check the leakage from the pump tube or from the connected tube. If there is leakage, reconnect the tubes according to the operation ② and the following operations.

[Check for damage on the connection tube]

- Check disconnection, bending, clogging, and notable stain on the connected tube. When these are found, replace the tube according to operation ② and the following operations.

[Check for pump operation]

- Check abnormal sound and oscillation from the PeriStar pump. If there is an error, request technical service. In this case, operation ② and the following operations are not necessary.

② Stop operation and turn off power. ▷ See 5.3(1) “Operation before maintenance”

③ Conduct the necessary operations. Conduct necessary operations from the following.

[Periodic replacement of the pump tube]

- Remove the connection tube Remove the tubes on the IN and OUT sides connected to the PeriStar tube to be replaced by loosening the union or by cutting the banding band with the nippers.
- Remove the cover Draw the cover (resin) of the PeriStar pump to the front and remove it from the base.
- Remove the pump tube With the rotor drawing slightly, take out the used pump tube.
- Prepare a new pump tube Choose the pump tube (Pharmed tube) prepared as one year spare parts with the same diameter as the used pump tube, and cut the new tube 145 mm-long.

Size of the Tubes for the PeriStar Pump and the Pump Tube

Pump	Tube size	Note
PeriStar pump P1	$\phi 2.38 \times \phi 5.56 \times \text{length } 145\text{mm}$ Part No.116E668	For dilution, Connector number 27
PeriStar pump P21	$\phi 3.18 \times \phi 6.35 \times \text{length } 145\text{mm}$ Part No.116E664	For sample infusion, Connector number 6
PeriStar pump P3 (Option)	$\phi 1.6 \times \phi 4.8 \times \text{length } 145\text{mm}$ Part No.116E663	For adding hypochlorous acid, Connector number 29

- Apply silicon grease Apply silicon grease to the periphery of the pump tube contacted to the rotor.

- Lay the pump tube Lay the new pump tube (or the pump tube to be reorganized) between the base and the rotor. The length of the tubes should be the same for the IN and OUT sides.

- The tubes are easily laid with the rotor lifted a little.

- Attach the cover Slightly push the cover along the base until it makes a clicking noise.

- Band the tubes on the pump side Band the pump tube protruding from the Peristar pump at the point closest to the PeriStar pump side with a banding band.

- Note that the tube on the IN side should be banded to contact the PeriStar pump. This is for preventing the pump tube from drawing in.

[Replacement part] Banding band No.118J080, PLT1M

[Replacement of the connection tube]

- [a] Prepare a connection tube Prepare the tube with the same specification as the connection tube to be replaced, and cut the new tube to the same length.
- [b] Remove the connection tube Remove the connection tube to be replaced by loosening the union or by cutting the banding band with the nippers. Remove the other end of the tube.
- [c] Connect the opposite side of the PeriStar pump Connect one end of the new connection.

④ **Connect the connection tube.** Refer to the drawing “How to connect the pump tube and the connection tube” and connect the connection tubes to the both ends of the new pump tube.

- Connect the connection tube with the mark ”IN” to the IN side of the PeriStar pump, the tube with the mark “OUT” to the OUT side.
- When the position of the PeriStar pump is as in the drawing “How to connect the pump tube and the connection tube,” the downside is the IN side and the upper side is the OUT side.

【IMPORTANT】 • If the connection tube connected to the IN side is connected to the OUT side, solution cannot be sent, and normal operation will be disrupted.

- When other maintenance is conducted without interruption, operation ⑤ is not necessary.

⑤ **Set to automatic measurement start status.** ▷ See 5.3(2) “Operation after maintenance”

⑥ **Check the performance of the peristar pump.** After resuming automatic measurement, check whether the PeriStar pump with the replaced pump tube works normally.

5.8 Checking, Cleaning, and Parts Replacement of the Diaphragm Pump

(a) Periodically check the diaphragm pump (P2/P23/P24) according to 5.1 “Maintenance List”. Also, conduct periodic cleaning or replacement of the valve and diaphragm of the diaphragm pump (P23, P24).

[NOTE] • Diaphragm pump in P2 does not require periodic cleaning or replacement of the valve and diaphragm because the operation time is short.

(b) The diaphragm pumps in the following chart are used for this product.

Diaphragm Pump

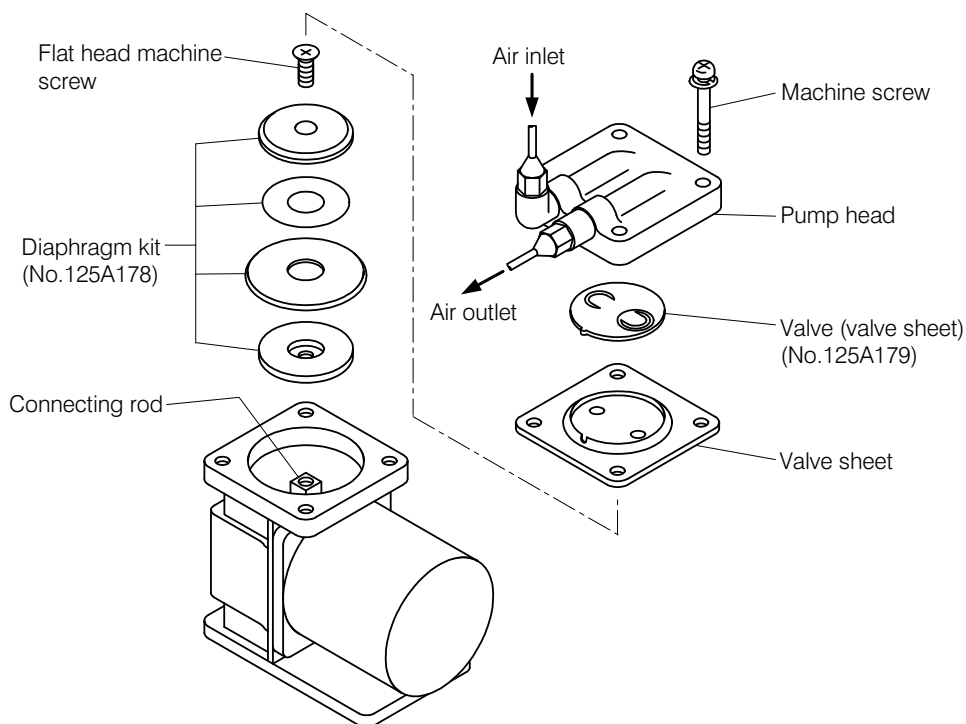
Name	Code number	Pump manufacturer type	Connector number	Note
Diaphragm pump P2	125B223	Diaphragm pump MW901EEA-D1	CN505/CN506	Discharge of air for dilution
Diaphragm pump P23	125A177	Diaphragm pump APN-110KVX-1-21	CN507/CN508	Suctioning of gas from the cell
Diaphragm pump P24	125A115	Diaphragm pump APN-085LVX-1	CN509/CN510	Discharge of air for refining

(c) The following shows the procedures of check for the diaphragm pump, reconnection and replacement of the tube and cleaning or replacement of the valve and the diaphragm.

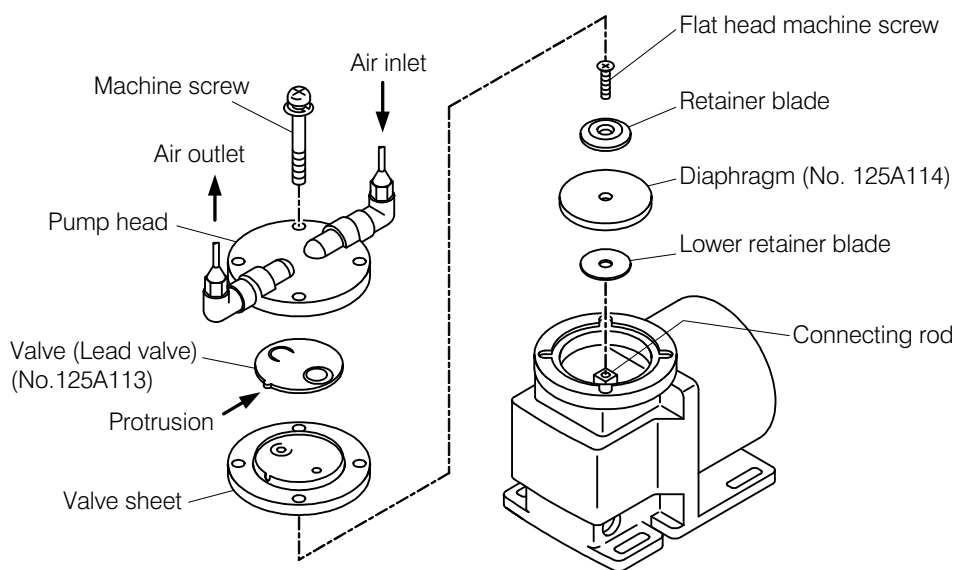
① **Conduct the necessary checks.** Conduct the necessary checks from the following. Checks can be done visually during operation such as automatic measurement.

[Check for leakage]

- Check for any leaks from the tube. If a leak is found, securely connect the tube using operation ② and the following operations.



Diaphragm Pump P23 (APN-110KVX-1-21)



Diaphragm Pump P24 (APN-085LVX-1)

[Check for damage of the tube]

- Check disconnection, bending, clogging and notable stain of the connected tube. When these are found, replace the tube according to the operation ② and the following operations.

[Check for the pump error]

- If there are abnormal sound and oscillation from the diaphragm pump, request the technical service. In this case, the operation ② and the following operations are not necessary.

② Stop operation and turn off power. ▷ See 5.3(1) “Operation before maintenance”

③ Conduct the necessary operations. Conduct necessary operations from the following.

[Reconnection of the tube]

- Reconnect the tubes when there is leakage from the connecting part.

[Replacement of the tube]

- Replace with the tube of the same specification as the tube in use.

[Periodic cleaning of the valves][Periodic replacement of the valve and diaphragm]

[a] Remove the lead wire Remove the lead wire of the pump at the relaying connector part.

[b] Put marks on the tube When there are no marks of IN and OUT sides on the tube, put marks such as taping on the tube and then remove both IN and OUT sides.

- The marking are for preventing mistakes upon reconnection.

[c] Take out the pump Remove the pump attaching board from the case and take it out together with the pump.

[d] Take out the valve and the diaphragm Remove the pump head and take out the valve and the valve sheet. Then, slacken the flat head machine screw to remove the diaphragm from the connecting rod.

[e] Clean or replacement Clean or replace the valve and the diaphragm.

- Upon cleaning Clean the valve, diaphragm, valve sheet and the inside of the pump head using the cloth with ethyl alcohol.

- Upon replacement Remove the used valve and diaphragm (as for P23, diaphragm kit) and prepare new ones. Then clean the valve sheet and inside the pump head using the cloth with ethyl alcohol.

Code Number of the Valve and Diaphragm

Name	Pump manufacturer type	Part number of the valve	Part number of the diaphragm	Note
Diaphragm pump P24	APN-085LVX-1	125A113	125A114	
Diaphragm pump P23	APN-110KVX-1-21	125A179	125A178	Diaphragm kit

- [f] Fix the diaphragm Fit the square concave of the lower retainer plate with the square of the connection rod (as for P23, this is not necessary), place the diaphragm and the retainer plate. Apply the screw lock agent (Loctite No. 222 or the equivalent agent) to the flat head machine screw and fix the screw to the connecting rod (clamping torque:1.96 N·m).
- [g] Build in the valve Place the valve with the protruding part of the periphery of the valve fit to the cutout of the valve sheet. Then, clamp by the pump head as the original setting (clamping torque:1.37 N·m).
- [h] Fix to the case Fix the pump together with the pump attaching board at the original position of the case.
- [i] Connect the tube and the lead wire Connect the tube with the mark IN to the IN side of the pump and connect the other tube to the OUT side. Connect the lead wire connector to the original point.

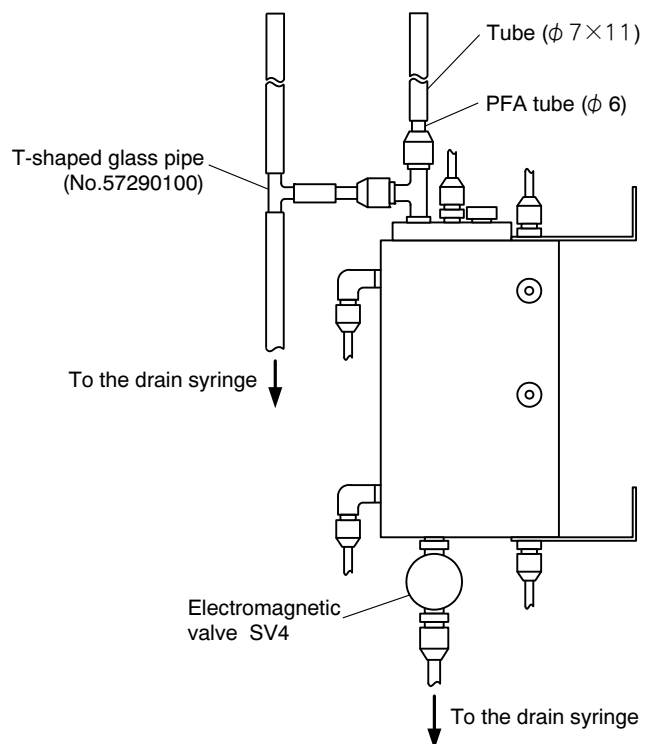
- When other maintenance is conducted without interruption, operation ④ is not necessary.

④ Set to automatic measurement start status. ▷ See 5.3(2) “Operation after maintenance”.

⑤ Check the performance of the pump. After resuming the automatic measurement, check whether the pump works properly.

5.9 Checking, Cleaning, and Replacement of the Dilution Tank

- (a) Conduct periodic check of the dilution tank according to 5.1 “Maintenance List”.
- (b) If cleaning is necessary as a result of the check for the contamination in the dilution tank, clean even if it is prior to the scheduled date of periodic cleaning. Then, the date above should be the initial date in reckoning the next periodic cleaning date. This applies to the check and replacement of the tube for drain.
- (c) The following shows the procedures for the check of the dilution tank and tube, cleaning of the tank, and replacement of the tube.



Dilution Tank

- ① **Conduct the necessary checks.** Conduct the necessary checks from the following. Checks can be done visually during operation such as automatic measurement.

[Check for solution leakage]

- Check that there is leakage from the tube connecting part. If the leakage is found, advance to the operation ③ and reconnect the tube.

[Check for damage of the PFA tube]

- Check bending, clogging and notable stain of the connected PFA tube. If these are found, advance to the operation ③ and replace the PFA tube.

[Check for the contamination in the dilution tank]

- Check for the contamination inside the dilution tank and sediment. If these are found, advance to the operation ② and clean the tank.

[Check for the damage on the drain tube]

- Check bending, clogging and notable stain of the connected drain tube. If these are found, advance to the operation ③ and replace the drain tube.

- ② **Conduct periodic cleaning in the dilution tank** For the cleaning in the dilution tank, perform manual cleaning 2 (cleaning with 5ppm of sodium hypochlorite solution) or manual cleaning 3 (cleaning with 1% oxalic acid dehydrate solution +25ppm of sodium hypochlorite solution). ▷ See 4.3(4) “Start of manual cleaning”
- ③ **Stop operation.** Stop automatic operation and other operations by the following procedures.
- Upon internal starting Enter operation stop reservation.
 - Upon external starting Enter measurement stop signal from the control room.
- ④ **Conduct the necessary operations.** Perform the necessary maintenance from the following.
- [Reconnection of the tube]
- If there is leakage from the connecting part, tighten the tube connecting part again.
- [Replacement of the PFA tube]
- Replace with the tube of the same specification as the tube in use.
- [Replacement part] PFA tube No.116D302, $\phi 2 \times \phi 3$
- [Periodic replacement of the drain tube]
- Replace the drain tube
- [Replacement part] Hyprene tube No.116E022, $\phi 7 \times \phi 11$
- When other maintenance is performed without interruption, operations ⑤ and ⑥ are not necessary.
- ⑤ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” to confirm that the internal temperature displayed in the “101: Internal Analysis Status window” is in the range of “room temperature to room temperature +10°C” and it is stable as well.
-
- 【IMPORTANT】**
- Unless it is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value can not be obtained.
-
- ⑥ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the 100: Measurement menu window opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start**.

5.10 Check and Replacement of the Solenoid Valve

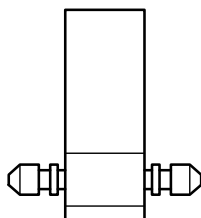
- (a) Conduct periodic check of the solution leakage from the solenoid valve according to 5.1 “Maintenance List.” If there is solution leakage, tighten the tube again and replace the solenoid valve.

Solenoid Valve and Main Specifications

Name	Code number	valve direction	manufacturer type	Belonging PC board	Connector number	Note
solenoid valve SV1	126A475	Three-way	AV1302-515-MF-TD	Dilution	6	
solenoid valve SV2	126A475	Three-way	AV1302-515-MF-TD		7	
solenoid valve SV3	126A472	Three-way	SAVR-3332-118-TD		8	
solenoid valve SV4	126A473	Two-way	SAVR-3232-118-TD		9	
solenoid valve SV5	126A476	Two-way	AV1202-53-MF-TD		10	
solenoid valve SV6	126A472	Three-way	SAVR-3332-118-TD		11	For 2 Streams
solenoid valve SV7	126A476	Two-way	AV1202-53-MF-TD		12	
solenoid valve SV8	126A476	Two-way	AV1202-53-MF-TD		13	
solenoid valve SV9	126A472	Three-way	SAVR-3332-118-TD		14	
solenoid valve SV10	126A467	Two-way	AVR-2212-318		15	For adding hypochlorous acid (option)
solenoid valve SV21	126A468	Three-way	AVR-2312-318	TN	7	
solenoid valve SV22	126A467	Two-way	AVR-2212-318		8	
solenoid valve SV23	126A467	Two-way	AVR-2212-318		9	
solenoid valve SV24	126A467	Two-way	AVR-2212-318		10	
solenoid valve SV25	126A466	Two-way	AV-2212-53PP		11	

- (b) This product has built-in solenoid valves in the chart. They are identified by the number (e.g., SV1) on the PC board to which the lead wire of the solenoid valve is connected and by the manufacturer type printed on the solenoid valve.

- (c) The following shows the procedures for the check and replacement of the solenoid valve.



Solenoid Valve

- ① **Conduct checks for the solution leakage.** Check whether there is solution leakage from the solenoid valve.

- If there is no solution leakage and incompatibility of the solenoid valve, operations② and after are not necessary.

② **Stop operation and turn off power.** ▷ See 5.3(1) “Operation before maintenance”

③ **Conduct the necessary operations.** Perform the necessary maintenance from the following.

[Reconnection of the tube]

- If there is solution leakage from the connecting part of the tube, reconnect the tube. If the solution leakage continues even after the above procedure, replace the solenoid valve.

[Replacement of the solenoid valve]

- Prepare a new solenoid valve of the same type with the solenoid valve to be replaced and conduct following replacement.

[a] Remove the lead wire Following the lead wire of the used solenoid valve, check the connector number printed on the connected PC board and remove the connector.

[b] Remove the solenoid valve Remove the used solenoid valve from the attaching part.

[c] Connect the tube Disconnect one tube connected to the used solenoid valve and connect to the same connecting opening of the new solenoid valve. Connect remaining tube(s) (one or two) as above.

【IMPORTANT】 • Tube should be connected to the same connecting opening. Connection to the different connecting opening causes the operation incompatibility.

[d] Install the solenoid valve Fix the new solenoid valve to the installation part.

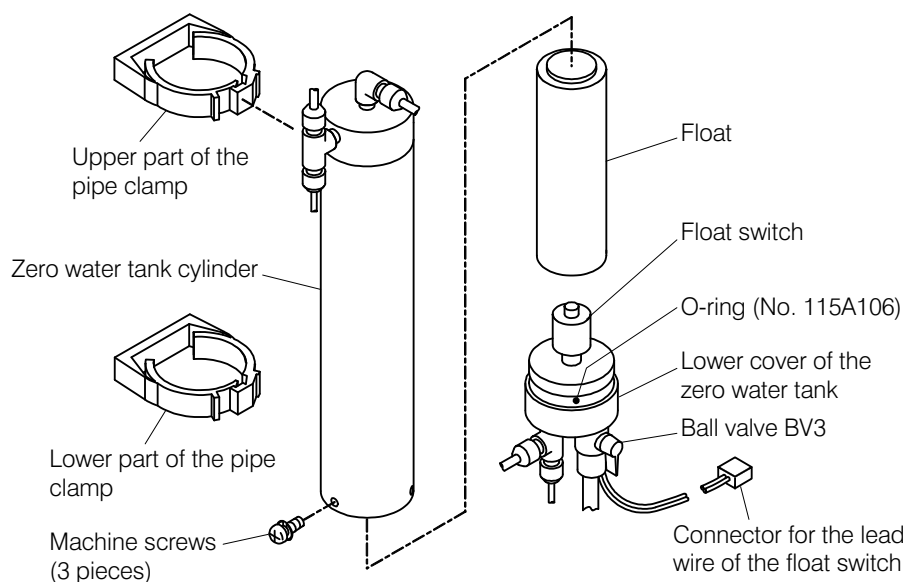
[e] Connect the lead wire Connect the lead wire of the new solenoid valve to the same connector.

- When other maintenance is conducted without interruption, the operation ④ is not necessary.

④ **Set to automatic measurement status.** ▷ See 5.3(2) “Operation after maintenance.”

5.11 Checking and Cleaning of the Zero Water Tank

- (a) Conduct periodic check of the zero water tank according to 5.1 “Maintenance List”. Contamination causes the water degradation.
- (b) If cleaning is necessary as a result of the check, clean even if it is prior to the scheduled date of periodic cleaning. Then, the date above should be the initial date in reckoning the next periodic cleaning date.
- (c) The following shows the procedures for the check in the zero water tank, retightening of the tube, replacement of the PFA tube, and cleaning in the zero water tank.



Zero Water Tank

- ① **Conduct the necessary checks.** Conduct the necessary checks from the following. Checks can be done visually during operation such as automatic measurement.
- [Check for the flow rate]
- Check is pure water is sufficiently supplied and the float in the zero water tank is buoyed. In case of error, check the deionizer and remove the causes of the error.
- [Check for the solution leakage]
- Check that there is solution leakage from the connecting part of the tube. If there is leakage, reconnect the tube by the operations ② and after.
- [Check for damage on the PFA tube]
- Check that there are bending, clogging and notable stain of the PFA tube, if these are found, replace the PFA tube by the operations ② and after.
- [Check for the contamination in the zero water tank]
- Check that there are contamination and sediment in the zero water tank. If these are found, clean the tank by the operations ② and after.
- ② **Stop operation and turn off power.** ▷ See 5.3(1) “Operation before maintenance”
- ③ **Discharge pure water.** Close the valve (BV2) of pure water inlet and open the valve (BV3) of the lower part of the zero water tank.
- ④ **Conduct the necessary operations.** Perform the necessary maintenance from the following.
- [Reconnection of the tube]
- If there is solution leakage from the connecting part of the tube, reconnect the tube.

[Replacement of the PFA tube]

- Replace with the tube of the same specification as the tube in use.
[Replacement part] PFA tube No.116D302, $\phi 2 \times \phi 3$

[Periodic cleaning in the zero water tank]

- [a] Remove the tubes After putting marks on the tube to prevent mistakes upon reconnection, remove the tubes connected to the zero water tank.
- [b] Remove the lead wire Remove the lead wire of the float switch (FS3) at the connector part.

【IMPORTANT】 • Do not put moisture on the connector part of the lead wire of the float switch.

- [c] Take out the zero water tank Remove the pipe clamp and take out the zero water tank.
- [d] Remove the lower cover of the zero water tank Take out three pieces of the machine screws of the lower part of the zero water tank, remove the lower cover of the tank.
- [e] Clean Clean inside the zero water tank, float, float switch, O-ring, and lower cover of the tank with a brush and other cleaning tools. Then, rinse thoroughly with pure water.
- [f] Check the O-ring Check that there are no defects on the O-ring such as flaws and deformations.
- If there are defects, replace the ring.

【IMPORTANT】 • Do not apply grease on the O-ring. This is for preventing impact on the water quality.

- [g] Assemble the zero water tank After putting the float in the zero water tank and attaching the O-ring on the lower cover of the tank to be set to the original position in the tank, fix with the pipe clamp.
- [h] Connect the tube and the lead wire Connect the tube as the former state and connect the connector of the lead wire of the float switch.

⑤ **Supply pure water.** Close the valve (BV3) for drain and open the valve (BV2) of the pure water inlet.

⑥ **Conduct pre-cleaning of the zero water tank.** Conduct pre-cleaning in the zero water tank by the following procedures.

- [a] Fill with pure water Wait until pure water is filled in the zero water tank cylinder.
- [b] Discharge pure water Close the valve (BV2) of the pure water inlet and open the valve (BV3).
- [c] Supply pure water Close the valve (BV3) for drain and open the valve (BV2) of the pure water inlet.
- [d] Repeat Repeat [b] and [c] 2 to 3 times.
- [e] Supply pure water After pre-cleaning, close the valve (BV3) for drain and open the valve (BV2) of the pure water inlet.

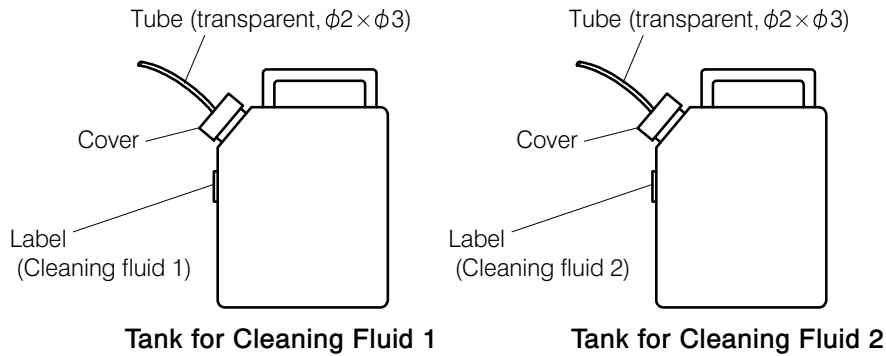
⑦ **Check the operation of the float switch.** Check whether the float in the zero water tank is buoyed and the inflow of the pure water stops. Also, check there is no leakage.

- When other maintenance is conducted without interruption, the operation ⑧ is not necessary.

⑧ **Set to automatic measurement status.** ▷ See 5.3(2) “Operation after maintenance”.

5.12 Maintenance of the Cleaning Fluid Tank

- (a) Conduct periodic check of tanks for the cleaning fluid 1 and 2 according to 5.1 “Maintenance List”.
- (b) The following shows the procedures for checking, replenishment, and filling of the cleaning fluid required as a result of the check.



- ① **Conduct the necessary checks.** Conduct the necessary checks from the following. Checks can be done visually during operation such as automatic measurement. If there are no errors for all the items, operations ② and after are not necessary.

[Check for the fluid volume of the tank for cleaning fluid 1]

- Check whether the cleaning fluid in the tank for cleaning fluid 1 is not running out. If there is only a little fluid left, conduct replenishment or filling by the operations ② and after.

[Check for the fluid volume of the tank for cleaning fluid 2]

- Adjust the tank for cleaning fluid 2 when Manual Cleaning 2 or Manual Cleaning 3 is necessary.

[Check for the position of the tube end]

- Check whether the tube end in the cleaning fluid tank is around the bottom of the tank. If the tube end is floated, adjust the tube length in the tank by arranging the cover part.

[Check for damage on the tube]

- Check that there are bending, clogging and notable stain of the tube, if these are found, replace the tube by the operations ② and after.

[Check for the contamination in the tank]

- Check that there is notable contamination inside the cleaning fluid tank. If the contamination is found, clean the tank by the operations ② and after.

- ② **Stop operation.** Stop automatic operation and other operations by the following procedures.

- Upon internal starting enter operation stop reservation.
- Upon external starting enter measurement stop signal from the control room.

- ③ **Conduct the necessary operations.** Perform the necessary maintenance from the following.

 **WARNING**

Hazardous Substances

- Oxalic acid dihydrate for conditioning the cleaning fluid 1 is a hazardous substance. Obtain Material Safety Data Sheet (MSDS) from the purchasing source and handle safely under the instructions.
 - Cleaning fluid 2, hypochlorous acid solution, contains hazardous substance. Handle safely under the explanation printed on the container of the material.
-

[Replenishment of the cleaning fluid 1]

- Condition the cleaning fluid 1 and replenish or fill the fluid. ▷ See 2.4(1) “Preparation and filling of cleaning solution 1.”

[Filling of the cleaning fluid 2]

- When manual cleaning 2 or manual cleaning 3 is immediately performed, condition the new cleaning fluid 2 and fill the fluid. ▷ See 2.4(2) “Preparation and filling of cleaning solution 2”.

-
- 【IMPORTANT】**
- Do not use the cleaning fluid 2 which is conditioned three days ago and before. The chloride concentration in the fluid gradually decreases, which leads to the smaller effect of the cleaning.
 - Upon disposal of the cleaning fluid 2, treat the fluid in accordance with the law.
-

[Replacement of the tube]

- Remove the used tube and, put the new tube after cutting to the same length with the old tube.

[Cleaning in the tank]

- [a] Transfer the remaining fluid to other cases Remove the cover and transfer the remaining cleaning fluid 1 in the tank to other cases. Dispose the cleaning fluid 2.
- [b] Clean in the tank Clean inside the tank with tap water. Also, clean the tube ends.
- [c] Rinse Rinse in the tank with pure water.
- [d] Return the cleaning fluid Return the cleaning fluid 1 put in other cases to the tank. Keep the tank for cleaning fluid 2 empty.
- [e] Put the cover Put the cover to the original position.

- ④ **Check the position of the tube end.** Adjust the tube end to locate at the bottom in the tank and securely close the tank cover.
- When other maintenance is performed without interruption, operations ⑤ and ⑥ are not necessary.

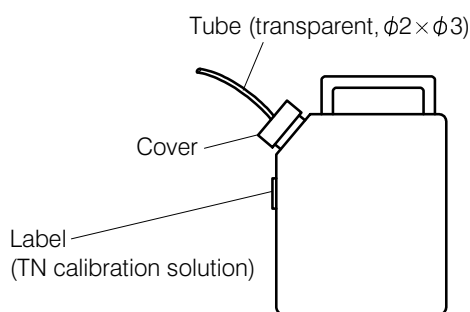
- ⑤ **Confirm the stability of the internal temperature.** Push Status on the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen.

-
- 【IMPORTANT】**
- Unless it is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

- ⑥ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the 100: Measurement menu window opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.13 Maintenance of the Calibration Solution Tank

- (a) Periodically check the calibration solution tank according to 5.1 “Maintenance List”.
- (b) The following shows the procedures for checking and filling of the span calibration solution required as a result of the check.



Calibration Solution Tank

- ① **Conduct the necessary checks.** Conduct the necessary checks from the following. Checks can be done visually during operation such as automatic measurement. If there are no defects for all the items, operations ② and after are not necessary.

[Check for the fluid volume]

- Check whether the calibration solution in the tank is not running out. If there is only a little solution left, fill the solution by the operations ② and after.

[Check for the position of the tube end]

- Check whether the tube end in the calibration solution tank is around the bottom of the tank. If the tube end is floated, adjust the tube length in the tank by arranging the cover part.

[Check for damage on the tube]

- Check that there are bending, clogging and notable flaw of the tube, if these are found, replace the tube by the operations ② and after.

[Check for the contamination in the tank]

- Check that there is notable contamination inside the calibration solution tank. If the contamination is found, clean the tank by the operations ② and after.

② Stop operation. …… Stop automatic operation and other operations by the following procedures.

- Upon internal starting …… Enter operation stop reservation.
- Upon external starting …… Enter measurement stop signal from the control room.

③ Conduct the necessary operations. …… Perform the necessary maintenance from the following.

[Filling of the span calibration solution]

- Condition the span calibration solution and fill the solution. ▷ See 2.3(3) “Preparation and filling of the span calibration solution”

【IMPORTANT】

- Be sure to dispose the remaining span calibration solution and fill the new solution.
- Upon disposal of the span calibration solution, treat the solution in accordance with the law.

[Replacement of the tube]

- Remove the used tube and, put the new tube after cutting to the same length with the old tube.

[Cleaning in the tank]

- [a] Transfer the remaining solution to the tank for disposal …… Remove the cover and transfer the remaining span calibration solution in the tank for disposal.
- [b] Clean in the tank …… Clean inside the tank with tap water. Also, clean the tube ends.
- [c] Rinse …… Rinse in the tank with pure water.
- [d] Fill the calibration solution …… ▷ See 2.3(3) “Preparation and filling of the span calibration solution”.

④ Check the position of the tube end. …… Adjust the tube end to locate at the bottom in the tank and securely close the tank cover.

- When other maintenance is performed without interruption, operations ⑤ and ⑥ are not necessary.

⑤ Confirm the stability of the internal temperature. …… Push Status on the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature+10 °C” on the screen.

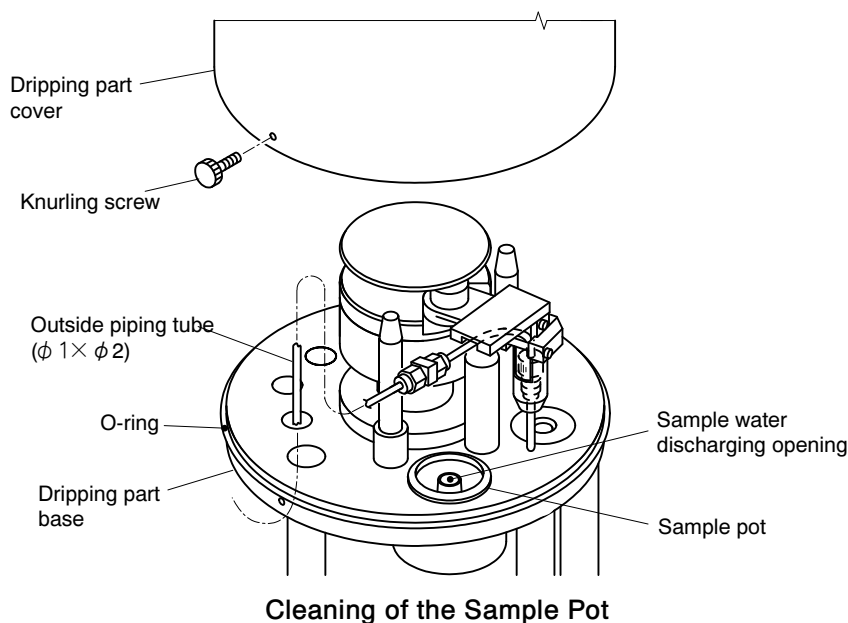
【IMPORTANT】

- Unless it is stabilized, do not start measurements or calibrations.
- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.

- ⑥ Set to automatic measurement start status. Push **Oprtn** in the “000: Home window”, then the 100: Measurement menu window opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.14 Checking and Cleaning the Sample Pot

- (a) Periodically check the sample pot according to 5.1 “Maintenance List.”
- (b) If cleaning is necessary as a result of the check, clean even if it is prior to the scheduled date of periodic cleaning. Then, the date above should be the initial date in reckoning the next periodic cleaning date.
- (c) The following shows the procedures for the contamination check and cleaning.



- ① **Check for contamination.** Check that there is contamination inside the sample pot. If there is no contamination, operations ② and after are not necessary.
- ② **Conduct periodic cleaning of the sample pot.** Perform manual cleaning 2 (cleaning by 5ppm hypochlorous acid solution) or manual cleaning 3 (cleaning by 1% oxalic acid dehydrate solution +5ppm hypochlorous acid solution) ▷ See 4.3(4) “Start of manual cleaning”.
- When the cleaning result is confirmed, advance to the operation ⑦.
 - If confirming of the cleaning result or manual cleaning is required, conduct operations ③ and after.
- ③ **Stop operation.** Stop automatic operation and other operations by the following procedures.
- Upon internal starting. Enter operation stop reservation.
 - Upon external starting. Enter measurement stop signal from the control room.
- ④ **Remove the dripping part cover.** Take out knurling screws (2 pieces) and remove the dripping part cover upward.
- Turn the dripping part cover to the left and right and the cover is easily removed.

 **WARNING**

High temperature

- The upper part of the combustion furnace under the dripping part has high temperature. Do not touch.
-

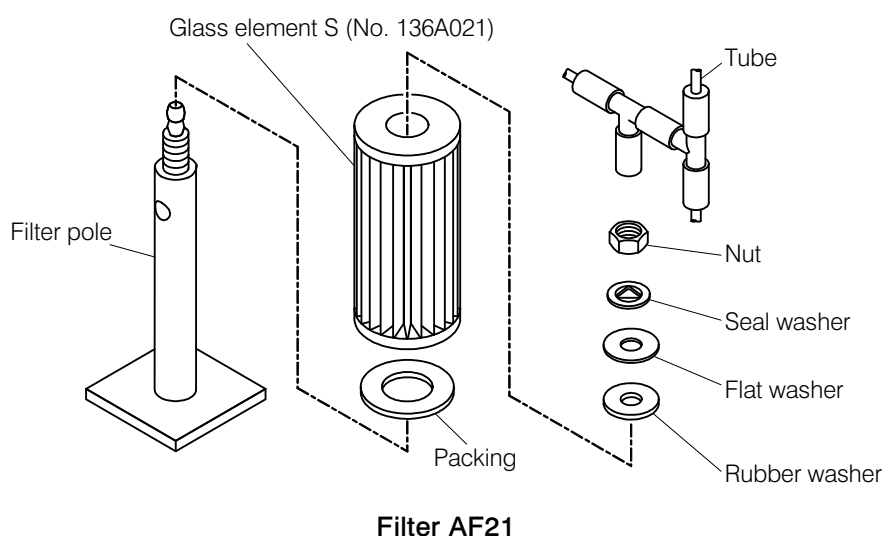
- ⑤ **Check or clean the inside of the sample pot.** Check that there is contamination inside the sample pot and especially around the sample water discharging opening (the center hole). If there is contamination, clean with a mini brush and other tools.
- If cleaning is not conducted, operation ⑦ is not necessary.
- ⑥ **Attach the dripping part cover.** Put the dripping part cover to the original position and fix it with knurling screws (2 pieces).
- ⑦ **Conduct another manual cleaning.** When cleaning is conducted in ⑤, perform Manual Cleaning 2 (cleaning by 5ppm hypochlorous acid solution) or manual cleaning 3 (cleaning by 1% oxalic acid dehydrate solution +5ppm hypochlorous acid solution). ▷ See 4.3(4) “Start of manual cleaning.”
- When other maintenance is conducted without interruption, operations ⑧ and ⑨ are not necessary.
- ⑧ **Confirm the stability of the internal temperature.** Push **Status** in the 000: Home window and the 101: Internal analysis status window opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen.

-
- 【IMPORTANT】**
- Unless it is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

- ⑨ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the 100: Measurement menu window opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.15 Checking, Cleaning, and Replacement of the Filter AF21

- (a) Periodically check the filter AF21 according to 5.1 “Maintenance List.”
- (b) If cleaning or replacement is necessary as a result of the check, clean or replacement even if it is prior to the scheduled date of periodic cleaning or replacement. Then, the date above should be the initial date in reckoning the next periodic cleaning or replacement date.
- (c) The following shows the procedures for checking, cleaning, and replacement of the filter AF21. Replacement part is glass element S.



- ① **Check for dirt, dust and clogging.** Check whether there are dirt, dust and clogging of the filter AF21. If these are not found, operations ② and after are not necessary.
- ② **Stop operation.** Stop automatic operation and other operations by the following procedures.
 - Upon internal starting Enter operation stop reservation.
 - Upon external starting Enter measurement stop signal from the control room.
- ③ **Remove the glass element S.** Remove the tube connected to the upper part and loosen a nut to take out the glass element S.
- ④ **Conduct the necessary operations.** Conduct necessary operations from the following.

[Periodic cleaning]

 - Clean the dirt and dust on the surface of the glass element S with a brush and a vacuum cleaner. If many spots of the glass element have clogging, replace it.

[Periodic replacement]

 - Remove the used glass element S and prepare the new one.

Replacement part Glass element S(No.136A021)
- ⑤ **Fit the glass element.** Fit the glass element to the filter pole as it was and connect the tube after fixing it with the nut.
 - When other maintenance is conducted without interruption, operations ⑥ and ⑦ are not necessary.

- ⑥ **Confirm the stability of the internal temperature.** Push **Status** in the 000: Home window and the 101: Internal analysis status window opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen

【IMPORTANT】

- Unless it is stabilized, do not start measurements or calibrations.
- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.

- ⑦ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the 100: Measurement menu window opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start**.

5.16 Check and Replacement of the Air-refining Agent and Replacement of the Filter

- (a) Periodically check the air-refining agent according to 5.1 “Maintenance List.”
- (b) This product uses the air-refining agent in the following table.

Air-refining Agent and Filter

Name	Code number	Part name	Note
Air-refining agent CF21	6251900K	Purafil	Potassium permanganate is impregnated to activated alumina. Contains 300g.
	6251920K		Same as above. Contains 1kg.
Air-refining agent CF22	6895810K	Gigacoal A	Contains phosphoric acid. Contains 300g.
	7089340K		Same as above. Contains 1kg.
Air-refining agent CF23	6251910K	Puracarbo	Contains metals. Contains 300g.
	6251930K		Same as above. Contains 1kg.
Air-refining agent CF24	6196720K	Carulite	Contains copper (Cu), manganese (Mn), aluminum oxide (Al ₂ O ₃). Contains 300g.
	7089350K		Same as above. Contains 1kg.
Filter	136A001	PTFE filter	PF-1, φ55

【IMPORTANT】 • The above air-refining agent after use is not categorized as the industrial waste requiring special control. Therefore, the agent can be disposed as general industrial waste.

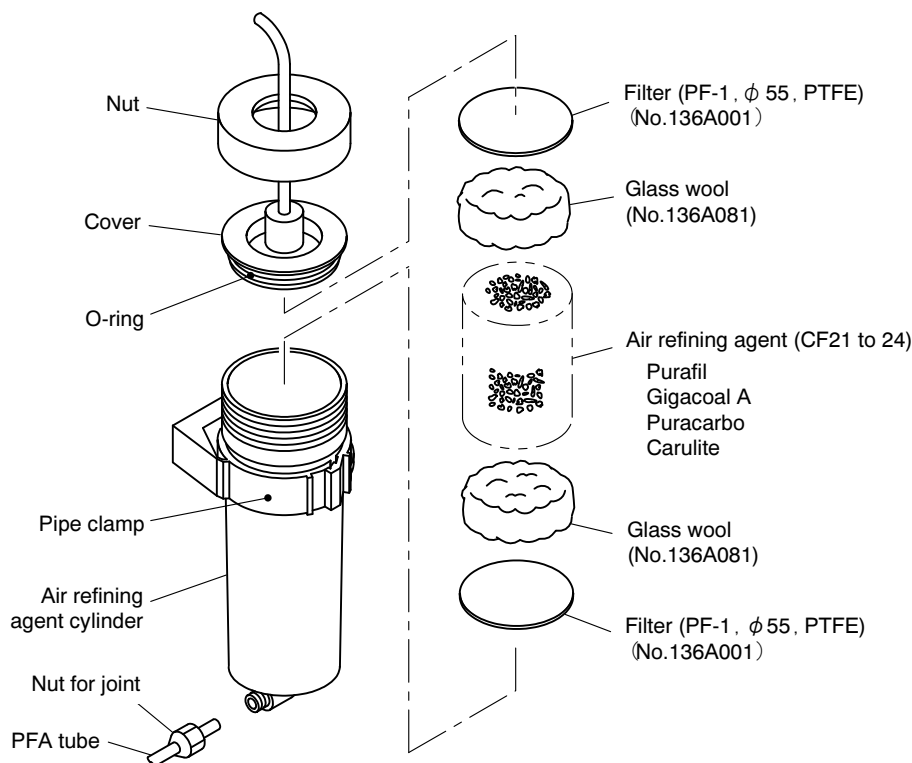
- (c) If replacement of the air-refining agent is necessary as a result of the check, replace even if it is prior to the scheduled date of periodic replacement. Then, the date above should be the initial date in reckoning the next periodic replacement date by the maintenance interval.
- (d) The following shows the procedures for checking and replacing the air-refining agent. Upon replacing the air-refining agent, filter should be replaced as well.

 **WARNING**

Hazardous Substances

- Upon handling four types of air-refining agent, aspirating protective equipments, protective gloves, and security goggles must be worn. Do not aspirate the powder. Also, keep the powder away from eyes and skin. If the powder gets in the eyes, wash thoroughly with running water. If it comes in contact with the skin, wash thoroughly with soapy water. If it spills, wipe with paper and dispose it together with the used refining agent as industrial waste.
- Inhaling of potassium permanganate contained in air-refining agent CF21 (Purafil) for a long time may cause lung disease.
- Phosphoric acid contained in the air-refining agent CF22 (Gigacoal A) causes irritation in the mucosa of the eyes and respiratory organs.
- Metals contained in the air-refining agent CF23 (Puracarbo) cause dermatitis and irritation in the mucosa of the eyes and respiratory organs.
- Do not inhale the powder of the air-refining agent CF24 (Carulite). Also, keep it away from the eyes and skin. Contained copper cause dermatitis and irritation in the eyes and nose. Highly concentrated dust of magnesium oxide may cause irritation in the mucosa.

① **Check for the discoloration of the air-refining agent CF21.** Check whether most of the air-refining agent CF21 (Purafil) turns to brownish-red. CF211 (Purafil) turns colors from red-brown to brownish-red. When most of the agent has the discoloration above, replace the agent.



Replacement of the Air-refining Agent and Filter

- This check can be done during operations, such as automatic measurement.
- Even if it is prior to the periodic replacement date, replace the agent when most part has discoloration.

② Stop operation. Stop automatic operation and other operations by the following procedures.

- Upon internal starting Enter operation stop reservation.
- Upon external starting Enter measurement stop signal from the control room.

③ Replace periodically Replace the air-refining agent by the following procedures.

- Remove the tube. Loosen the joint to remove the tube connected to the lower part of the air-refining agent cylinder.
- Remove the cover Loosen the nut and remove the cover.
- Take out the air refining cylinder Remove the click of the fixed pipe clamp to take out the air-refining agent cylinder.
- Take out the used air-refining agent and filter Take out the contents with tweezers. As for glass wool, it can be reused.
- Set the new air-refining agent and filter Set the new air-refining agent according to the following order.
 - New filter at the upper part
 - Glass wool (reused) at the upper part
 - New air-refining agent
 - Glass wool (reused) at the lower part
 - New filter at the lower part

-
- 【IMPORTANT】** • Be sure to fill the same type of air-refining agent as the agent taken out. There are four air refining cylinders, but overlapping of the agent types and change of the order decrease the air refining function.
-

[f] Fix the air refining cylinder Return to the former position and fix by pipe clamp.

[g] Connect.....Check whether O-ring is properly set and there is no foreign material mingled on the O-ring part. Then, set the cover and tighten the nut. Also, connect the tube at the lower part of the air-refining agent cylinder to the former position.

- ④ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen and it is stable.

-
- 【IMPORTANT】** • Unless it is stabilized, do not start measurements or calibrations.
- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

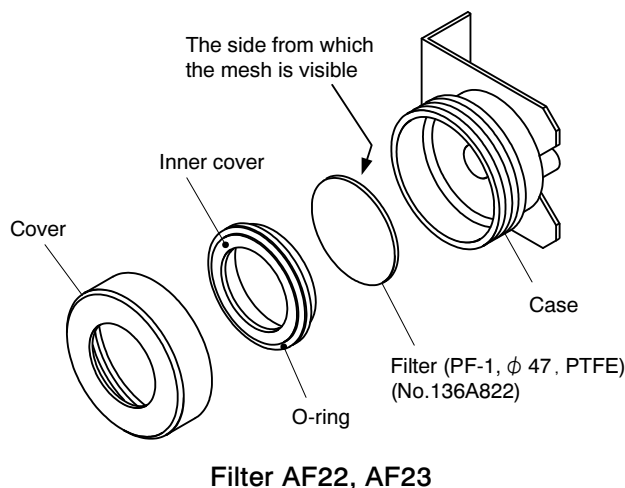
- ⑤ **Calibrate.** ▷ See 4.3(3) “Start of manual calibration”

- As zero deviation may change after the replacement of the air-refining agent, calibration is required before starting normal measurement.
- When other maintenance is conducted without interruption, operation ⑥ is not necessary.

- ⑥ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the 100: Measurement menu window opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.17 Checking, Cleaning, and Replacement of the Filter AF22/AF23

- (a) Periodically check the filter AF22/AF23 according to 5.1 “Maintenance List.”
- (b) If replacement is necessary as a result of the check, replace even if it is prior to the scheduled date of periodic replacement. Then, the date above should be the initial date in reckoning the next periodic replacement date.
- (c) The following shows the procedures for check and replacement of the filter AF22/AF23 and the cleaning of the case.



- ① **Check for dirt, dust and clogging.** Check whether there are dirt, dust and clogging of the filter AF22, AF23. If these are not found, operations ② and after are not necessary.
- ② **Stop operation.** Stop automatic operation and other operations by the following procedures.
 - Upon internal starting Enter operation stop reservation.
 - Upon external starting Enter measurement stop signal from the control room.
- ③ **Remove the filter.** Loosen a nut to take out the filter.
- ④ **Conduct the necessary operations.** Conduct necessary operations from the following.

[Periodic replacement]

 - Remove the used filter and prepare the new one.
Replacement part Filter (No.136A822), PF-1, φ47, PTFE

[Cleaning of the case]

 - Clean the dust on the case and inner cover with a cleaning paper and other tools.

【IMPORTANT】 • Do not use alcohol for cleaning. It causes a crack on the resinous case.

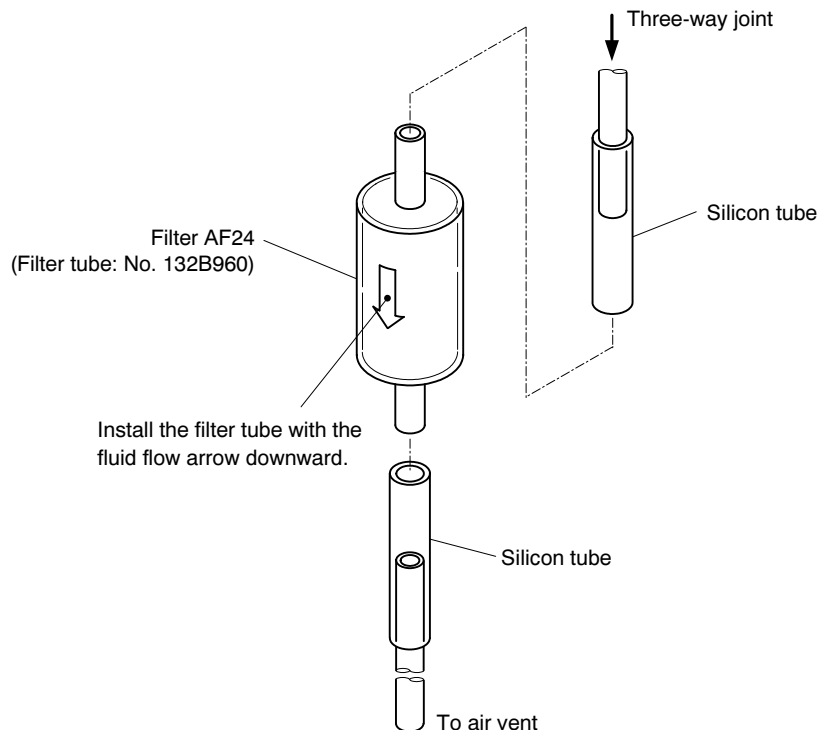
- ⑤ **Fit the filter.** Fit the filter to the original position with the filter side without mesh set to the front and fix it with a nut.
 - When other maintenance is conducted without interruption, operations ⑥ and ⑦ are not necessary.
- ⑥ **Confirm the stability of the internal temperature.** Push Status in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabilized.

-
- 【IMPORTANT】**
- Unless it is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

⑦ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.18 Checking and Replacement of the Filter AF24

- Periodically check the filter AF24 according to 5.1 “Maintenance List.”
- If replacement is necessary as a result of the check, replace even if it is prior to the scheduled date of periodic replacement. Then, the date above should be the initial date in reckoning the next periodic replacement date.
- The following shows the procedures for check and replacement of the filter AF24 and the cleaning of the case.



Filter AF24

- ① **Check for dirt, dust and clogging.** Check whether there are dirt, dust and clogging of the filter AF24. If these are not found, operations ② and after are not necessary.
- ② **Stop operation.** Stop automatic operation and other operations by the following procedures.
- Upon internal starting Enter operation stop reservation.
 - Upon external starting Enter measurement stop signal from the control room.
- ③ **Remove the filter.** Remove the filter from the top and bottom silicon tube.
- ④ **Conduct the necessary operations.** Conduct necessary operations from the following.
- [Periodic replacement]
- Remove the used filter AF24 and prepare the new one.
Replacement part Filter tube (No.132B960)
- ⑤ **Install the filter.** Install the filter tube to the top and bottom silicon tube
- At this time, install it with the fluid flow arrow downward.
 - When other maintenance is conducted without interruption, operations ⑥ and ⑦ are not necessary.
- ⑥ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabilized.

【IMPORTANT】

- Unless it is stabilized, do not start measurements or calibrations.
- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.

- ⑦ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.19 Check and Replacement of the Tube of the Air Refining Part

(a) Periodically check the PFA tube connected to the air refining cylinder and ozonizer according to 5.1 “Maintenance list”.

(b) The following shows the procedures for check and replacement of the PFA tube.

① Conduct the necessary checks. Conduct the necessary checks from the following. Checks can be done visually during operation such as automatic measurement. If there are no defects for all the items, operations ② and after are not necessary.

[Check for the tube connection]

- Check that there are leakage from the tube connecting part and disconnection of the tube. If these are found, advance to the operations ② and after to reconnect the tube.

[Check for damage of the tube]

- Check bending, clogging and notable stain of the PFA tube. If these are found, advance to the operations ② and after to replace the PFA tube.

② Stop operation and turn off power. ▷ See 5.3(1) “Operation before maintenance”.

③ Conduct the necessary operations. Conduct necessary operations from the following.

[Reconnection of the tube]

- Reconnect the PFA tube. If the condition is not improved, replace the PFA tube.

[Replacement of the tube]

- Cut the attached new PFA tube to the same length with the old one and replace it.

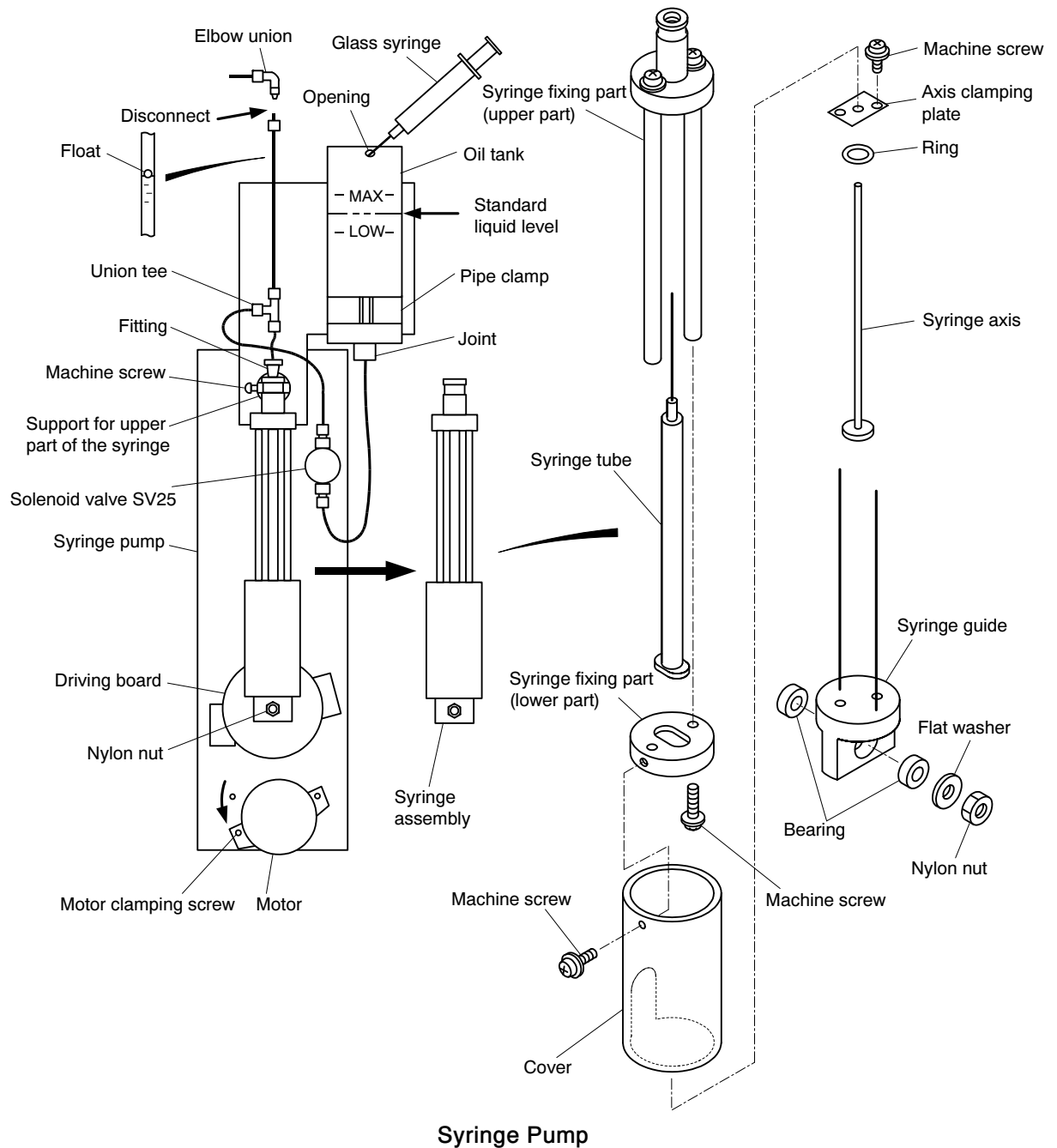
[Replacement part] PFA tube No.116D302, $\phi 2 \times \phi 3$

- When other maintenance is conducted without interruption, operation ④ is not necessary.

④ Set to automatic measurement status. ▷ See 5.3(2) “Operation after maintenance”.

5.20 Checking, Cleaning, and Replacement of the Syringe Pump

- (a) Conduct periodic check of the syringe pump according to 5.1 “Maintenance List”.
- (b) If water droplet interfuses in the silicon oil, it piles up in the edge of the syringe axis by the gravity. This causes the rust on the syringe axis. The rust causes sampling pump A23 Error 1 (Major error) or Sampling pump A24 Error 2 (Major error).
- (c) If replacement of the syringe is necessary as a result of the check, replace even if it is prior to the scheduled date of periodic replacement. Then, the date above should be the initial date in reckoning the next periodic replacement date.
- (d) The following shows the procedures for cleaning of the syringe pump and the replacement of the syringe.



- ① **Check.** Conduct visual check of the following items. If maintenance is not necessary as a result of the check, operations ② and after are not necessary.

[Check for the performance]

- Check whether the syringe pump works smoothly. If the performance is not normal, cleaning or replacement of the syringe is required. Advance to operations ② and after.

[Check for the interfusion of water droplet]

- Check whether water droplet is piled up in the edge of the syringe axis. If it is piled up, cleaning is required. Advance to operations ② and after.

- ② **Stop operation and turn off power.** ▷ See 5.3(1) “Operation before maintenance.”

- ③ **Pull out the tube from the drain cylinder.** Pull out the tubes inserted in the drain cylinder together with the inner cover of the cylinder. Then put the ends of the tube in a container such as a beaker.

【IMPORTANT】 • Before drawing out the analyzing component, pull out the tubes inserted in the drain cylinder together with the inner cover, and put the ends of the tube in a container such as a beaker. When returning the analyzing component to the original place, make sure to return the ends of the tubes in the drain cylinder.

- ④ **Draw out the analyzing component.** Draw out the analyzing component and face it to the front.

WARNING

High temperature

- Upper part of the combustion furnace has high temperature. Do not touch.
-

- ⑤ **Disconnect the gear.** Take out one of the motor clamping screw at the lower part of the syringe pump and slant the motor.

- Gear is disconnected and the driving board can be revolved manually.

- ⑥ **Remove the union tee.** Loosen the nut of the union tee to which the pin of the syringe tube is connected. Then, remove the union tee from the pin.

- Receive the silicon oil running out on the cleaning paper.

- ⑦ **Take out the nylon nut.** Revolve the driving board manually to place the cover of the syringe pump at the lowest point. Then, take out the nylon nut with the spanner.

【IMPORTANT】 • Do not lose the bearing, flat washer and lock nut.

- ⑧ **Take out the syringe assembly.** Loosen the machine screw at the support for upper part of the syringe to take out the syringe assembly.

- ⑨ **Remove the cover.** Remove the cover of the syringe assembly.

- ⑩ **Conduct the necessary operations.** Conduct necessary operations from the following.

[Cleaning of the syringe]

- [a] Remove the stain on the syringe axis. Clean the syringe axis with the cleaning paper impregnated with ethanol.

- [b] Clean the syringe tube Put ethanol in the clean beaker. Then, insert the syringe axis in the syringe tube and repeat inhaling of the ethanol and discharging until it works smoothly.
- [c] Wait until it is dried Pull out the syringe axis from the syringe tube to dry.
- [d] Conduct pre-cleaning Put silicon oil in the clean beaker. Combine the syringe axis with the syringe tube and repeat inhaling of the silicon oil and discharging 2 to 3 times.

[Periodic replacement of the syringe]

- [a] Pull out the syringe guide Pull out the syringe guide together with the syringe axis from the syringe tube.
- [b] Take out the used syringe tube Take out the two machine screws under the syringe clamp and take out the used syringe tube.
- [c] Take out the used syringe axis Take out the machine screw on the axis clamping board to take out the used syringe axis from the syringe guide.
- [d] Prepare new parts. Prepare the new syringe axis and syringe tube.
[Replacement part] Syringe for rheodyne No.136D699, 750SNR
- [e] Make temporary joint of the syringe tube Set the new syringe axis on the upper syringe clamp. Then, make temporary joint of the lower syringe clamp on the upper syringe clamp by slightly tightening the machine screw.
- [f] Make temporary joint of the syringe axis Make temporary joint of the new syringe axis to the syringe guide by the ring and the axis clamping board by slightly tightening the machine screw.
- [g] Tighten securely After inserting the syringe axis in the syringe tube to make a slight piston movement, securely tighten the two machine screws on the axis clamping board with the axis inserted. Also, securely tighten the machine screw at the lower syringe clamp.

【IMPORTANT】 • Check whether the piston movement is smoothly made after tightening.

- [h] Remove the stain on the syringe axis Clean the syringe axis with the cleaning paper impregnated with ethanol.
- [i] Clean the syringe tube Put ethanol in the clean beaker. Then, insert the syringe axis in the syringe tube and repeat inhaling of the ethanol and discharging until it works smoothly.
- [j] Wait until it is dried Pull out the syringe axis from the syringe tube to dry.
- [k] Conduct pre-cleaning Put silicon oil in the clean beaker. Combine the syringe axis with the syringe tube and repeat inhaling of the silicon oil and discharging 2 to 3 times.

⑪ **Put the cover.** Put the cover with the syringe axis inserted in the syringe tube.

⑫ **Set the syringe assembly.** Set the syringe guide part of the syringe assembly to the axis of the driving board. Then, fix by the lock nut together with the bearings (2 pieces) and flat washer.

【IMPORTANT】 • Upon tightening the nylon nut on the driving board, turn back about 360-degree after completely tightening the nut. Over-tightening disables the revolving of the driving board.

⑬ **Connect the union tee.** Place the upper part of the syringe assembly on the support of the upper syringe assembly and fix with the machine screw. Then, connect the union tee to the pin of the syringe tube.

⑭ **Engage the gear.** Set the gear installed on the back side of the motor to engage with the gear on the driving axis. Then, tighten the motor clamping screw.

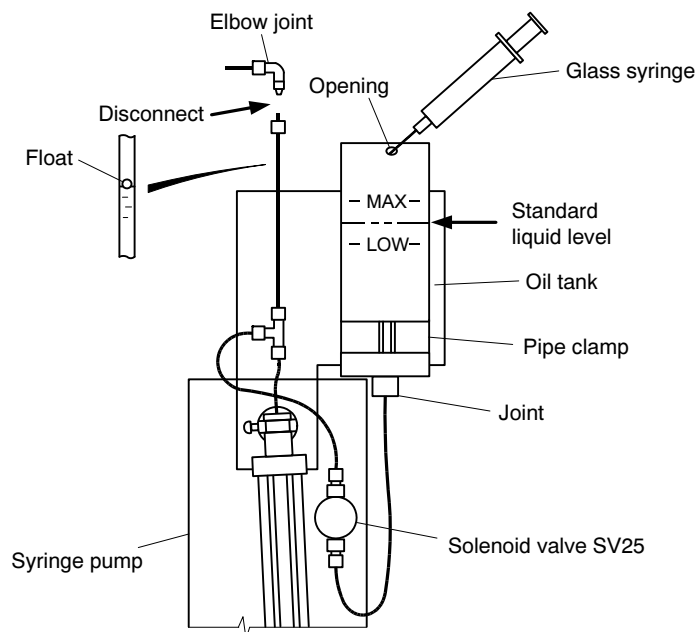
- ⑮ **Set to operation status.** Supply power to the product and turn the power switch of the product to ON.
- A few seconds after turning the power switch to ON, the “000: Home window” opens.
- ⑯ **Conduct performance check and adjustment of the oil level** Conduct operations “⑤ Set to service mode” to “⑮ Return to “000: Home window” in 3.1(2) “Filling of silicon oil.”
- When other maintenance is conducted without interruption, operations ⑰ and ⑱ are not necessary.
- ⑰ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” and the 101: Internal analysis status window opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabilized.

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- 【IMPORTANT】**
- Unless it is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

- ⑱ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.21 Check, Replenishment, and Replacement of the Oil Tank

- (a) Periodically check the oil tank for the syringe pump according to 5.1 “Maintenance List”.
- (b) If replenishment of the silicon oil is necessary as a result of the check, conduct replenishment even if it is prior to the scheduled date of periodic replenishment. Then, the date above should be the initial date in reckoning the next periodic replenishment date.
- (c) The following shows the procedures for check of the oil tank and replenishment of the silicon oil or the replacement.



Standard Oil Level of the Oil Tank

- ① **Check the interfusion of the water droplets.** Check whether water droplet interfuses in the silicon oil in the oil tank. If the interfusion is found, change the oil according to the operations ② and after.
- Check can be done visually during operation such as automatic operation.
 - If nothing is done for the interfusion of the water droplet in the silicon oil due to some troubles, syringe axis gets rust, which may cause a failure in the syringe pump.
- ② **Stop operation.** Stop automatic operation and other operations by the following procedures.
- Upon internal starting Enter operation stop reservation.
 - Upon external starting Enter measurement stop signal from the control room.
- ③ **Conduct the necessary operations.** Conduct necessary operations from the following.
- [Check for the oil level]
- Check whether the oil level in the oil tank is within the acceptable range. If it is below the range, replenish oil.
- [Periodic replenishment of oil]
- Use the syringe to fill the silicon oil from the replenishment opening of the oil tank until the level reaches within the tolerance of the standard oil level.

-
- 【IMPORTANT】** • Oil level of the oil tank should not exceed the maximum oil level. Otherwise, excessive silicon oil outflows.
-

[Oil change]

- [a] Close the replenishment opening Put the sticky tape to prevent the silicon oil from flowing out of the replenishment opening of the oil tank.
- [b] Remove the oil tank Remove the pipe clamp to take out the oil tank.
- [c] Transfer silicon oil with water droplet Hold the oil tank with the its joint side faced to the ceiling, remove the joint, and .transfer silicon oil with water droplet to another container to dispose it.
- [d] Install the oil tank Install the joint to the empty oil tank and fix the tank to the former position with the pipe clamp. Remove the sticky tape put on the replenishment opening.
- [e] Conduct performance check and adjustment of the oil level Conduct operations of ⑤ “Go to service mode” to ⑮ return to “000: Home window” in 3.1(2) “Filling of silicon oil”.
- When other maintenance is conducted without interruption, operations ④ and ⑤ are not necessary.

- ④ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabled.

-
- 【IMPORTANT】** • Unless it is stabilized, do not start measurements or calibrations.
- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

- ⑤ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start** .

5.22 Checking, Cleaning, and Replacement of the Nozzle

- (a) Periodically check the nozzle tube (nozzle 100 assembly) according to 5.1 “Maintenance List”.
Cleaning or replacement of the nozzle is necessary depending on the result of the check.
- (b) If replacement of the nozzle is necessary as a result of the check, conduct the replacement even if it is prior to the scheduled date of periodic replacement. Then, the date above should be the initial date in reckoning the next periodic replacement date.
- (c) The following shows the procedures for checking, cleaning or replacement of the nozzle.

(1) Check for the nozzle

Check the following items

- The visual check can be conducted during the operation of automatic measurement, etc.
- If cleaning or replacement is not necessary as a result of the check, cleaning or replacement operation is not necessary.

[Check for dripping]

- Check whether dripping is normal. If the dripping is not normal, first clean the end of the nozzle.
▷ See 5.22(2) “Cleaning of the nozzle tube”
- If the condition is not improved, replacement of nozzle 100 assembly is necessary.
▷ See 5.22(3) “Replacement of nozzle 100 assembly”

[Check for the nozzle tube or tube damage]

- If the nozzle tube is deformed or tube is folded, replacement of nozzle 100 assembly is necessary.
▷ See 5.22(3) “Replacement of nozzle 100 assembly”

(2) Cleaning of the nozzle tube

① **Stop operation.** Stop automatic operation and other operations by the following procedures.

- Upon internal starting Enter operation stop reservation.
- Upon external starting Enter measurement stop signal from the control room.

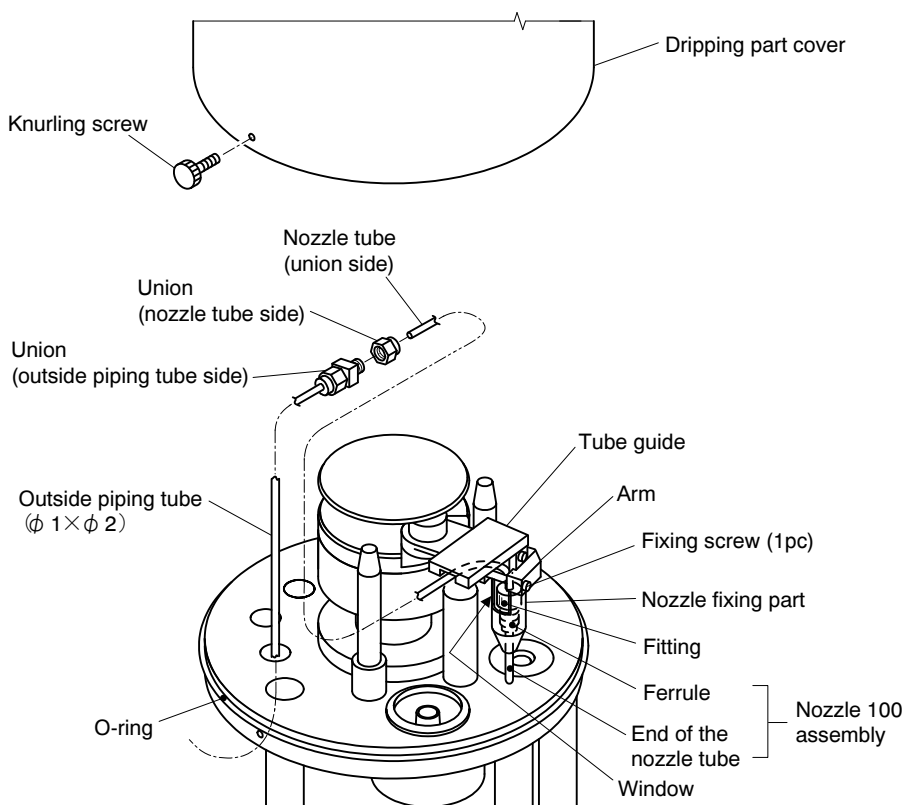


High temperature

- Upper part of the combustion furnace has high temperature. Do not touch.
-

② **Remove the dripping part cover.** Take out knurling screws (2 pcs) and remove the dripping part cover upward.

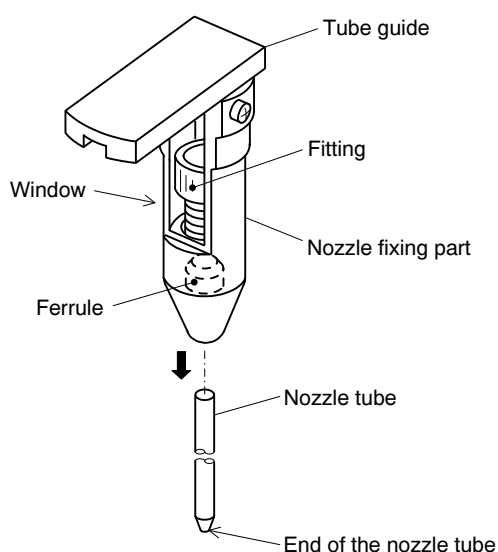
- Turn the dripping part cover to the left and right and the cover is easily removed.



Removal of Dripping Part Cover and Nozzle Tube

- ③ **Disconnect the nozzle tube from the outside piping tube.** Loosen the union (nozzle tube side) and disconnect the nozzle tube (union side).
- ④ **Remove the nozzle fixing part.** Loosen the arm fixing screw (1 pc) and remove the nozzle fixing part, together with the tube guide.
- ⑤ **Remove the nozzle tube from the nozzle fixing part.** Turn and loosen the fitting through the nozzle fixing part window with your fingers. Grasp the nozzle tube (union side) and remove the nozzle tube downward so that it is slowly pushed out to the hole at the bottom of the nozzle fixing part.

-
- 【IMPORTANT】**
- Do not touch the end of the nozzle tube. Also, carefully remove the nozzle tube downward so that the end of the tube does not get scratched.
 - Do not forcefully bend or fold the nozzle tube.
-



Removal of Nozzle Tube from Nozzle Fixing Part

⑥ Clean the nozzle tube.

① Preparation

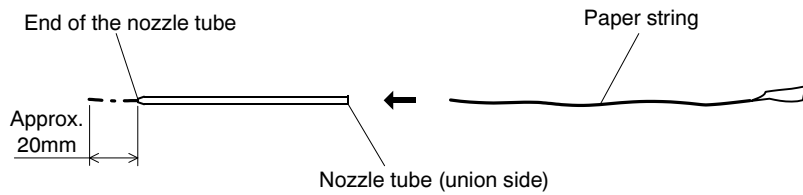
- Paper string 3 to 5 pieces (After cutting KIMWIPES in the lengthwise direction at a width of approximately 7 to 8mm, twist it with clean hands to make a piece of paper string.
- Hydrochloric acid 10wt% solution Approx. 100mL
- Pure water
- Beaker
- Washing bottle

! WARNING

Hazardous Substances

- Wear protective gear when handling the hydrochloric acid used to wash the nozzle tube. Also always check the Material Safety Data Sheet (MSDS).
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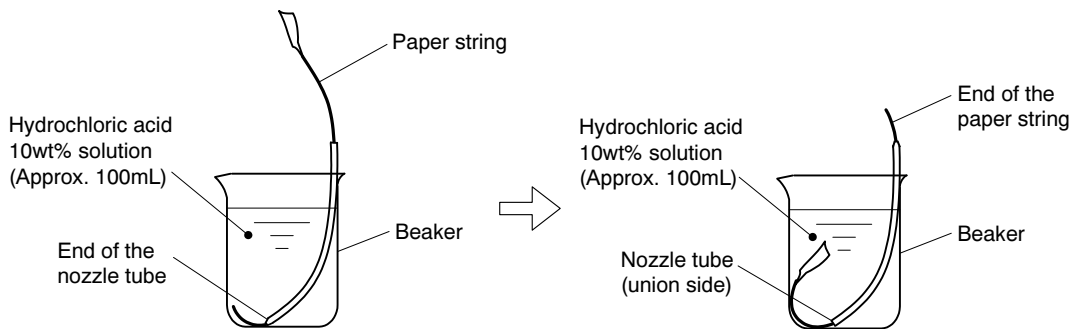
- ② Pass the paper string. Lay the nozzle tube removed at step ⑤ straight and while turning a piece of paper string, insert it into the nozzle tube (union side). When the paper string reaches the end of the tube, continue to insert it until the end of the string protrudes about 20mm from the end of the tube.



Passing the Paper String through the Nozzle Tube

③ Immerse in hydrochloric acid solution Immerse the end of the nozzle tube with paper string passed through it into a beaker filled with hydrochloric acid 10wt% solution (approximately 100mL) for about 5 minutes.

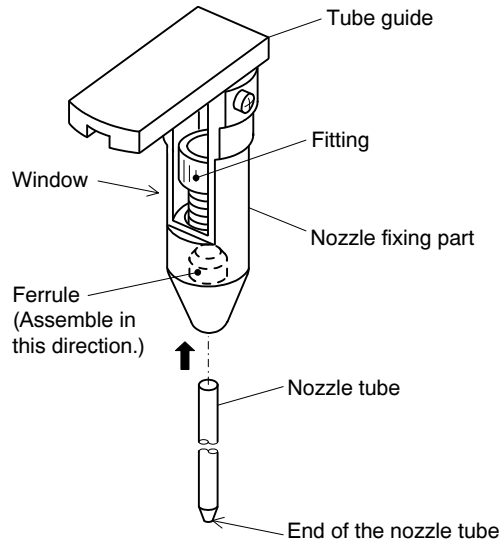
- Next, immerse the nozzle tube (union side) into the beaker for approximately 1 minute until the hydrochloric acid 10wt% solution permeates the entire length of the paper string.



Immersing in Hydrochloric Acid Solution

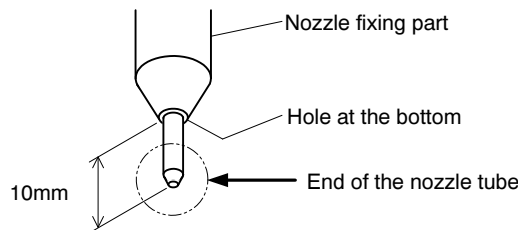
- ④ Pull out the paper string Remove the nozzle tube from the beaker and slowly pull out the paper string protruding from the end of the tube.
- ⑤ Remove the hydrochloric acid solution Lightly shake the nozzle tube to remove the hydrochloric acid solution inside it.
- ⑥ Repeat Repeat steps ③ to ⑤.
- ⑦ Clean with pure water Using a washing bottle, etc. pour pure water through the nozzle tube (union side) and clean the inside and outside of the nozzle tube with pure water.
- ⑧ Remove the pure water Remove the pure water remaining inside the nozzle tube by passing a piece of paper string through the tube (union side).
- ⑨ **Insert the nozzle tube to the nozzle fixing part.** Insert the cleaned nozzle tube (union side) upward through the hole at the bottom the nozzle fixing part, pass it through the ferrule and fitting inside the nozzle fixing part, and pull it out through the window to its original state.

-
- 【IMPORTANT】**
- At this time, do not touch the end of the nozzle tube. Also install the tube carefully so that the end does not get scratched.
 - When inserting the nozzle tube, pass it with the ferrule facing in the direction shown in the figure below.
-



Inserting the Nozzle Tube to the Nozzle Fixing Part

- ⑨ **Fix the end of the nozzle tube.** With the end of the nozzle tube protruding about 10mm from the hole at the bottom of the nozzle fixing part, fix the ferrule and nozzle tube by tightening the fitting with your fingers.



End of the Nozzle Tube and Fixing Position

- ⑨ **Reassemble the nozzle fitting part.** Reassemble the nozzle fitting part to the arm with the fixing screw.
- ⑩ **Reconnect the nozzle tube to the outside piping tube** While guiding the nozzle tube along the groove of the tube guide, reconnect it to the outside piping tube ($\phi 1 \times \phi 2$) with the union (nozzle tube side).
- ⑪ **Reinstall the dripping part cover.** Reinstall the dripping part cover and fix it with the 2 knurled screws.
- When continuing to other maintenance, steps ⑩ and ⑪ are not necessary.

- ⑫ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabled.

-
- 【IMPORTANT】**
- Unless it is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

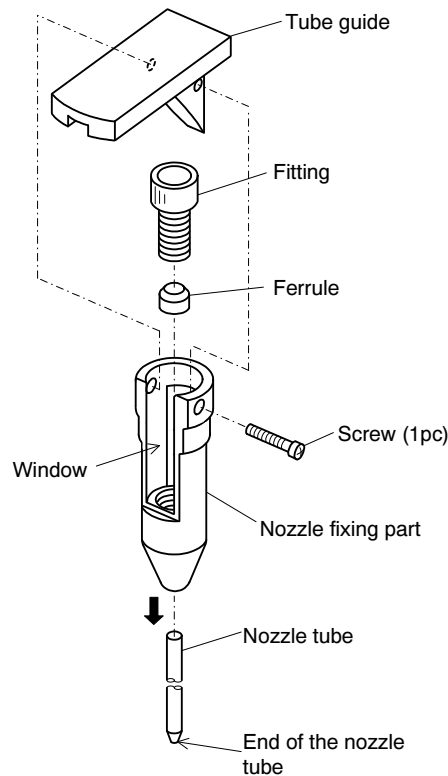
- ⑬ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start**.

(3) Replacement of nozzle 100 assembly

Procure a new nozzle 100 assembly (nozzle tube and ferrule) and replace it by the following procedure.

[Replacement part] Nozzle 100 assembly (Part code: 7266510K)

- ① **After stopping operation, remove the dripping part cover.** Refer to steps ① and ② of 5.22(2) “Cleaning of the nozzle tube” and after stopping operation, remove the dripping part cover.
- ② **Disconnect the nozzle tube from outside piping tube.** Loosen the union (nozzle tube side) and disconnect the nozzle tube (union side).
- ③ **Remove the nozzle fixing part.** Loosen the arm fixing screw and remove the nozzle fixing part, together with the tube guide.
- ④ **Remove the tube guide.** Loosen the screw (1 pc) and remove the tube guide from the nozzle fixing part.



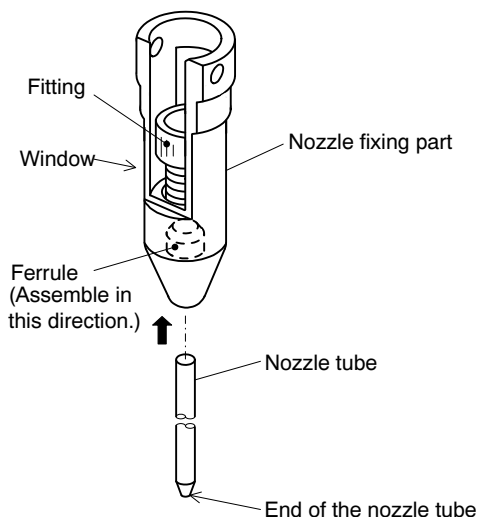
Removing the Tube Guide and Nozzle 100 Assembly

- ⑤ **Remove the old nozzle tube from the nozzle fixing part.** Turn and loosen the fitting through the fixing part window with your fingers. Grasp the nozzle tube (union side) and remove the old nozzle tube downward so that it is slowly pushed out through the hole at the bottom of the nozzle fixing part.

-
- 【IMPORTANT】**
- Do not touch the end of the nozzle tube. Also, carefully remove the nozzle tube downward so that the end of the tube does not get scratched.
 - Do not forcefully bend or fold the nozzle tube.
-

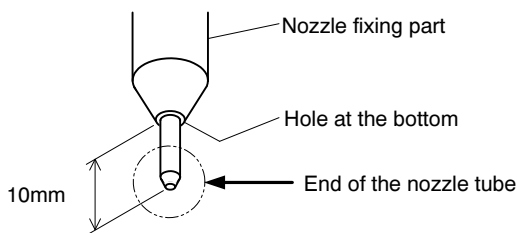
- ⑥ **Replace the ferrule.** Loosen and remove the fitting and turn the nozzle fixing part upside down and remove the old internal ferrule.
- Set the new ferrule at the inside of the nozzle fixing part in its original direction and temporarily fix it with the fitting.
- ⑦ **Replace the nozzle tube.** Insert the new nozzle tube (union side) upward through the hole at the bottom of the nozzle fixing part, pass it through the ferrule and fitting inside the nozzle fixing part and pull it out through the window to its original state.

-
- 【IMPORTANT】**
- At this time, do not touch the end of the nozzle tube. Also, carefully remove the nozzle tube downward so that the end of the tube does not get scratched.
 - When inserting the nozzle tube, insert it with the ferrule facing in the direction shown in the figure below.
-



Replacing with New Nozzle 100 Assembly (Ferrule and Nozzle Tube)

- ⑧ **Fix the end of the nozzle tube.** With the end of the nozzle tube protruding about 10mm from the hole at the bottom of the nozzle fixing part, fix the ferrule and nozzle tube by tightening the fitting with your fingers.



End of Nozzle Tube and Fixing Position

- ⑨ **Reinstall the tube guide.** Reinstall the tube guide to the nozzle fixing part with the screw (1 pc).
- ⑩ **Reassemble the nozzle fixing part.** Reassemble the nozzle fixing part to the arm with the fixing screw (1pc).
- ⑪ **Return to original state.** Refer to steps ⑩ to ⑬ of 5.22(2) “Cleaning of the nozzle tube” and reconnect the nozzle tube (union side) and install the dripping section part. After checking the stability of the internal temperature, return the product to the automatic operation start state.

5.23 Replacement of the O-ring for the Dripping Part Cover

(a) Conduct periodic check of the O-ring for the dripping part cover according to 5.1 “Maintenance list”.

- Refined air passes inside the dripping part cover. If an air seal is not maintained, it causes unstable support of the base.

(b) The following shows the procedures for check and replacement of the O-ring for the dripping part cover. Visual checks can be done during operations, such as automatic measurement.

- See the drawing “Removal of the Dripping Part Cover and the Nozzle” in 5.21 “Check, Replenishment, and Replacement of the Nozzle”.

① **Check for the damage.** Check that there are damage and deformation of the O-ring for dripping part cover. If these are found, replace the O-ring by the operations ② and after.

- If there is no defect, operations ② and after are not necessary.

② **Stop operation.** Stop automatic operation and other operations by the following procedures.

- Upon internal starting Enter operation stop reservation.
- Upon external starting Enter measurement stop signal from the control room.

③ **Remove the dripping part cover.** Take out the knurling screws (2 pieces) and remove the dripping part cover upward.

- Turn the dripping part cover to the left and right and the cover is easily removed.

WARNING

High temperature

- Upper part of the combustion furnace has high temperature. Do not touch.
-

④ **Conduct periodic replacement.** Remove the used O-ring and assemble the new O-ring.

⑤ **Attach the dripping part cover.** Attach the dripping cover to the former position and fix it with the knurling screws (2 pieces).

- When other maintenance is conducted without interruption, operations ⑥ and ⑦ are not necessary.

⑥ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabilized.

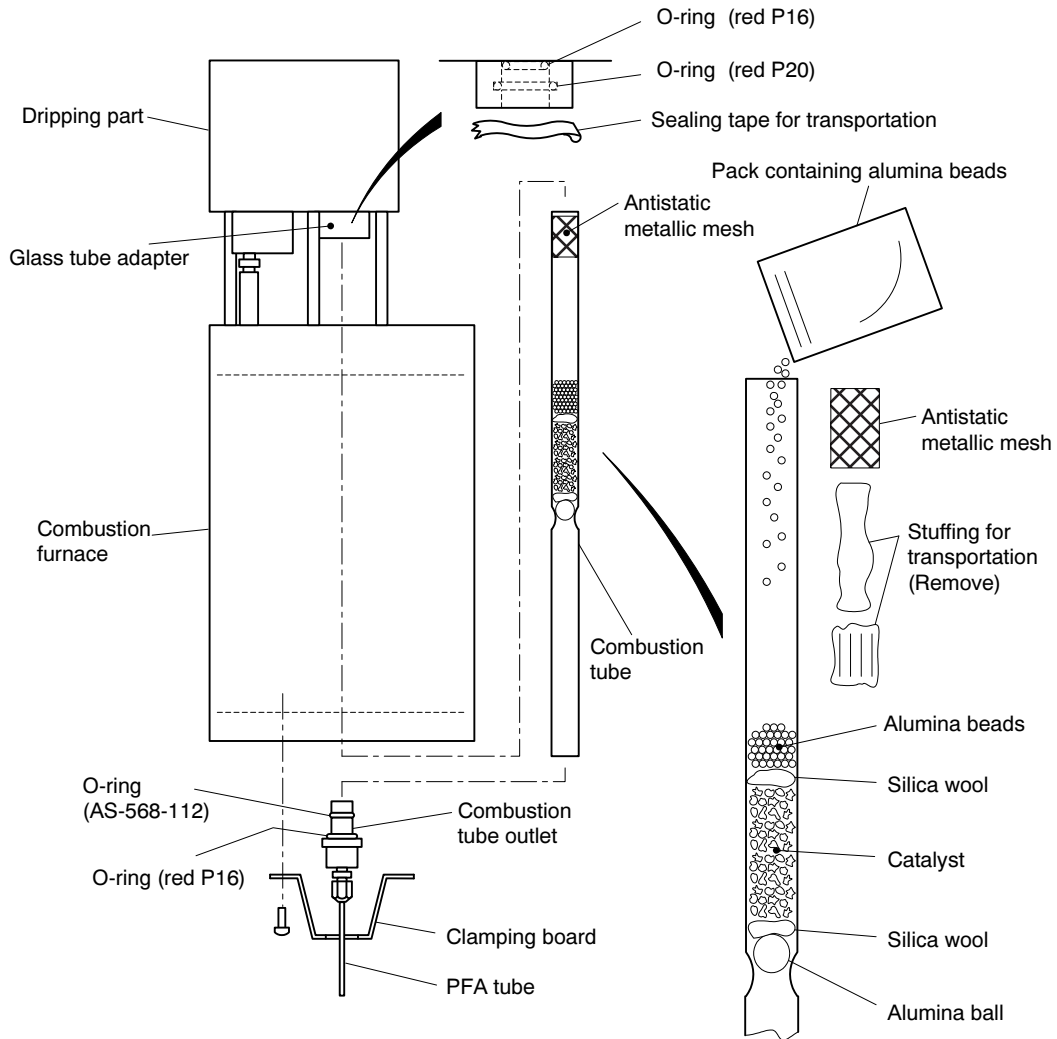
【IMPORTANT】 • Unless it is stabilized, do not start measurements or calibrations.

- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

⑦ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start**.

5.24 Check and Replacement of the Combustion Tube and the O-ring

- (a) Conduct periodic checks of the combustion tube and the O-ring according to the 5.1 “Maintenance List”.
- (b) As for the combustion tube and O-ring, conduct periodic replacement even if there is no damage. If replacement is necessary as a result of the check, replace even if it is prior to the scheduled date of periodic replacement. Then, the date above should be the initial date in reckoning the next periodic replacement date.
- (c) The following shows the procedures for the check and replacement of the combustion tube and the O-ring.



Removal of the Combustion Tube

- ① Stop operation and turn off power. ▷ See 5.3(1) “Operation before maintenance”.
- ② Wait for temperature depression in the combustion furnace. Wait until the temperature of the combustion tube in the furnace goes down around the room temperature.

 **WARNING**

High temperature

- Upper part of the combustion furnace has high temperature. Do not touch.
-

【IMPORTANT】 ● Wear gloves when handling the combustion tube to avoid adhesion of fat and a skin burn by the residual heat.

- ③ **Remove the fixing board.** Remove the fixing board on the lower part of the combustion furnace from the furnace.
 - ④ **Take out the combustion tube.** Pull out the combustion tube together with the combustion tube outlet downward.
 - Turn the combustion tube gently and the tube is easily pulled out.
 - ⑤ **Clean the O-ring groove and other parts.** Pull out the combustion tube outlet from the combustion tube. Then, take out the O-ring and clean the junction of the O-ring with cleaning paper. Clean the junction of the O-ring on the upper glass tube adapter as above.
 - ⑥ **Conduct the necessary operations.** Conduct necessary operations from the following.

[Replacement of the combustion tube]

 - [a] Prepare the combustion tube Prepare a new combustion tube from the accessories or one-year spare parts.
Combustion tube assembly (Code number: 6952130K)
 - [b] Take out the stuffing for transportation With the side of the antistatic metallic mesh faced to the ceiling, hold the combustion tube. Then, take out the antistatic metallic mesh at the inlet of the new combustion tube and stuffing for transportation (2 types) in back of the mesh with tweezers.
-

 **WARNING**

Injuries

- Breakage of the combustion tube of silica wool may cause injuries by the broken pieces. Handle with care to avoid breakage.
-

[c] Settle the catalyst and other items Fill the total amount of the alumina beads put in the combustion tube from the top of the combustion tube. Then, settle them by tapping with a handle of the driver and insert the antistatic metallic mesh.

[Check for the O-ring]

- Check two O-rings on the upper connection part of the combustion tube and two O-rings at the combustion tube outlet for damage, deformation and deterioration. If these are found, replace the O-ring.

[Periodic replacement of the O-ring]

- Remove the used O-ring and prepare the following O-rings from the accessories or one year spare parts.
O-ring (AS-568-112) (Code number: 125B500) 1 piece

O-ring (Red P16) (Code number: 115A591)2 pieces

O-ring (Red P20) (Code number: 115A592)1 piece

- ⑦ **Apply grease to the O-ring and assemble.** Apply silicon grease thinly to the O-rings (special and P20). Then, assemble them to the glass tube adapter and combustion tube outlet.

【IMPORTANT】 • Three types of the O-rings (4 pieces) must be set in the positions as in the drawing. Do not set in the different position.

- ⑧ **Install the combustion tube.** Install the combustion tube outlet to the lower part of the tube and insert from the lower part to joint to the upper glass tube adapter.

- ⑨ **Attach the fixing board.** Attach the fixing board to the former position.

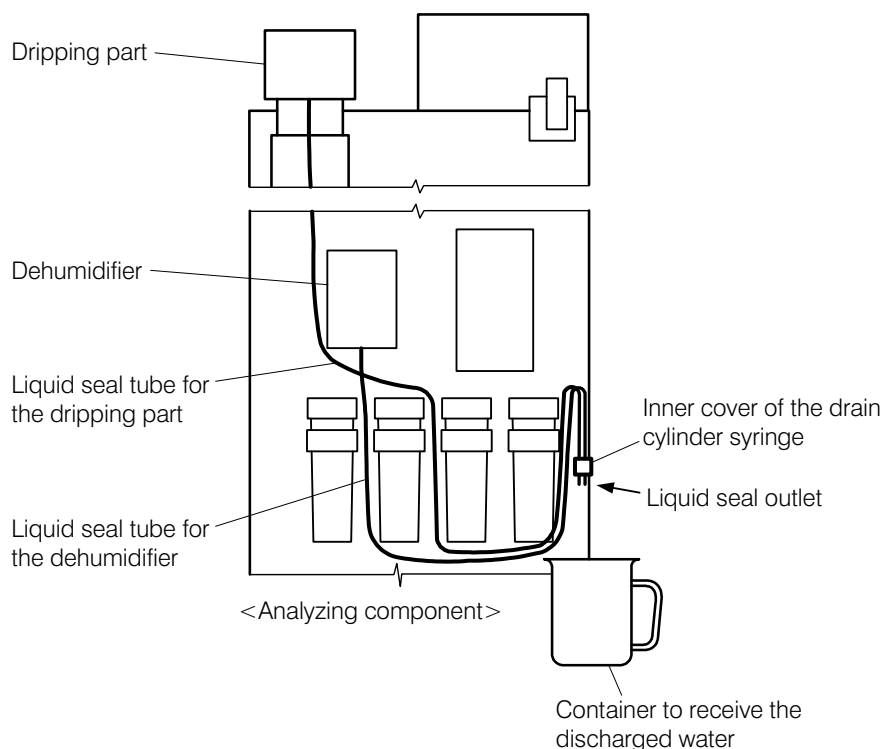
- When other maintenance is conducted without interruption, operation ⑩ is not necessary.

- ⑩ **Set to automatic measurement status.** ▷ See 5.3(2) “Operation after maintenance”.

- During operation, the temperature in the combustion furnace can be checked in the 101: Internal Analysis Status window.

5.25 Check and Replacement of the Liquid Seal Tube

- (a) Conduct periodic checks of the liquid seal tube according to 5.1 “Maintenance List”.
There are liquid seal tubes for the dripping part and the dehumidifier. Both are connected to the drain cylinder.
- (b) If replacement of the liquid seal tube is necessary as a result of the check, replace even if it is prior to the scheduled date of periodic replacement. Then, the date above should be the initial date in reckoning the next periodic replacement date.
- (c) The following shows the procedures for check and replacement of the liquid seal tube.



Cleaning and Replacement of the Liquid Seal Tube

- ① **Stop operation.** Stop automatic operation and other operations by the following procedures.
 - Upon internal starting Enter operation stop reservation.
 - Upon external starting Enter measurement stop signal from the control room.
 - ② **Pull out the tube from the drain cylinder.** Pull out the tubes inserted in the drain cylinder together with the inner cover of the cylinder. Then put the ends of the tube in a container such as a beaker.
-
- 【IMPORTANT】** • Before drawing out the analyzing component, pull out the tubes inserted in the drain cylinder together with the inner cover, and put the ends of the tube in a container such as a beaker. When returning the analyzing component to the original position, make sure to return the ends of the tubes in the drain cylinder.
-
- ③ **Draw out the analyzing component.** Draw out the analyzing component and face it to the front.

 **WARNING**

High temperature

- Upper part of the combustion furnace has high temperature. Do not touch.
-

④ Conduct the necessary operations. Conduct necessary operations from the following.

[Check for the stain on the tube]

- Check that there are notable stain and clogging inside the liquid seal tubes for dripping part and dehumidifier. If these are found, replace the tube.

[Replacement of the tube]

- [a] Remove the liquid seal tube Remove the liquid seal tube to be replaced from the dripping part or the dehumidifier. Then, transfer the remaining water in the liquid seal to a container.
- [b] Prepare a new tube Cut the tube of the same specification to the same length.
[Replacement part] Uni tube (9 × 13) (Code number: 116E031)
- [c] Connect the tube.....Connect the liquid seal tube to the former position of the dripping part or the dehumidifier and insert the other end in the inner cover of the drain cylinder.

⑤ Return the analyzing component. Return the analyzing component to the former place and insert the tubes received in the container such as a beaker in the inner cover of the drain cylinder.

- When the replacement of the tube is not conducted, advance to operation ⑦.

【IMPORTANT】 ● When the analyzing component is returned, be sure to return the ends of the tubes together with the inner cover of the drain cylinder in the drain cylinder.

⑥ Fill pure water. ▷ See 2.6 “Filling Pure Water into the Liquid-seal Tubes”

- When other maintenance is conducted without interruption, operations ⑦ and ⑧ are not necessary.

⑦ Confirm the stability of the internal temperature. Push **Status** in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabilized.

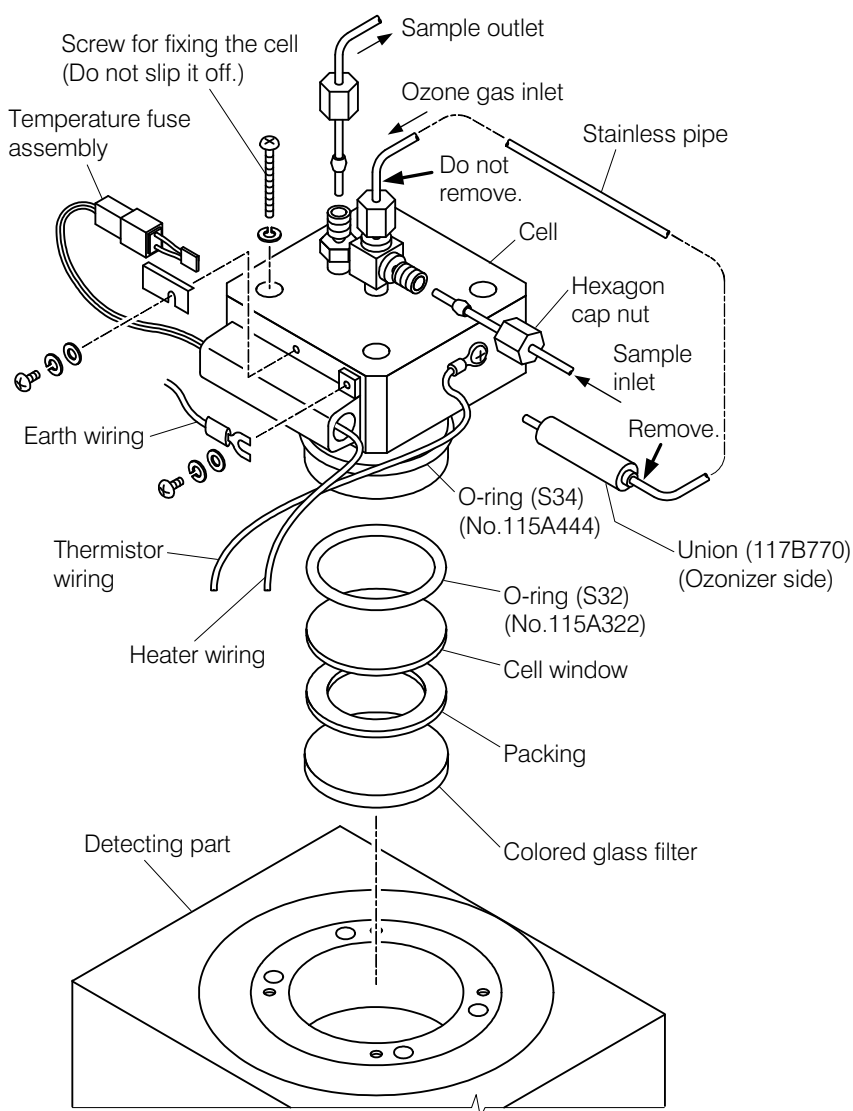
【IMPORTANT】 ● Unless it is stabilized, do not start measurements or calibrations.

- Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.

⑧ Set to Automatic Measurement Start Status. Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start**.

5.26 Cleaning of the Cell and Replacement of the O-ring

Periodically clean the cell of the detecting part according to 5.1 “Maintenance List” and replace the O-ring set in the cell.



Removal of the O-rings of the Cell and the Cell Window

- ① Stop operation and turn off power. ▷ See 5.3(1) “Operation before maintenance”.
- ② Remove the piping. Remove the three piping connected to the upper part of the cell.
Remove the stainless piping at the ozone inlet not at the cell side but at the union part of the other end.
- ③ Remove the earth wiring. Remove the earth wiring.
- ④ Take out the cell. Take out the cell fixing screws (4 pieces) and keep them. Then pull up the cell slowly.

【IMPORTANT】 • If the cell fixing screws fall down in the detecting part, it is difficult to take them out. To avoid this, keep them temporarily in a pocket.

- ⑤ Take out the cell window and other items. Take out the O-ring (S32), cell window, packing and colored glass filter from the detecting part. Then remove the O-ring (S34) on the cell side.

⑥ Conduct the necessary operations. Conduct necessary operations from the following.

[Cleaning in the cell]

- Clean carefully the cell window, colored glass filter, packing and other gas-contacting parts of the cell with cleaning paper containing alcohol.

-
- 【IMPORTANT】**
- Invisible stain can decrease the transmittance of the cell window. Wipe the window thoroughly to avoid this.
 - To avoid breakage of the cell window by falling, cleaning at the low place is recommended.
-

[Replacement of the O-ring]

- Prepare a next new O-ring. For S32, apply silicon grease evenly.

[Replacement part] O-ring S32(Part code: 115A322)

O-ring S34(Part code: 115A444)

⑦ Install the parts back into the former position. After drying the parts and inside the detection component thoroughly, install the parts in the order shown in the drawing. Then, fix the cell with the cell clamping screw.

-
- 【IMPORTANT】**
- Tighten the cell clamping screws (4 pieces) with even torque. If one part of the cell is tightened hard, it may cause gas leakage.
-

⑧ Connect the piping and the wiring. Connect the removed piping and wiring to the former state.

- When other maintenance is conducted without interruption, operations ⑧ is not necessary.

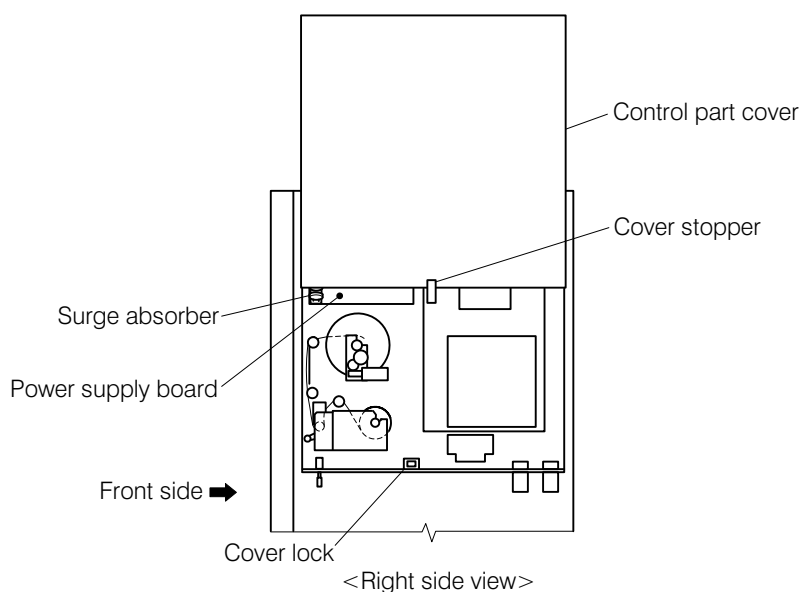
⑨ Calibrate. ▷ See 4.3(3) “Start of manual calibration.”

- Cleaning of the cell window cause changes in calibration value. Therefore, it is required that calibration should be done before starting the normal measurement.
- When other maintenance is conducted without interruption, operations ⑩ is not necessary.

⑩ Set to automatic measurement status. ▷ See 5.3(2) “Operation after maintenance.”

5.27 Replacement of the Surge Absorber

Conduct periodic replacement of the surge absorber according to 5.1 “Maintenance List”. Also, replace it when the lightning strikes nearby the equipment and it can be affected.



Replacement of the Surge Absorber

- ① **Stop operation and turn off power.** ▷ See 5.3(1) “Operation before maintenance”.
- ② **Remove the control part cover.** Slide the knob of the cover lock on the lower part of the control part and lift slowly the control part cover. Cover stopper pops out, but keep lifting the cover to remove.
 - Cover lock is locked.
 - When other maintenance is conducted without interruption, operation ⑤ is not necessary.
- ③ **Replace after a lightning strike or periodic replacement.** Pull out the used surge absorber (part name: ZNR unit) on “CN9” on the power supply board and install the new one. Replacement part part name: ZNR unit (part code: 6952220U)
- ④ **Put the control part cover to the former position.** Fit the control part cover to the control part guide and slide down the cover as it was. Then, turn the cover stopper in the center to push inward and further slide down the cover.
- ⑤ **Set to automatic measurement status.** ▷ See 5.3(2) “Operation after maintenance”.

5.28 Maintenance of the Tank for Hypochlorous Acid for Supplementation

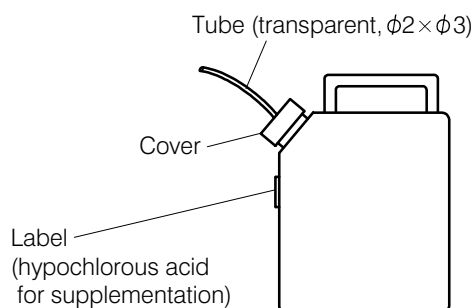
- (a) Conduct periodic checks of the tank of the hypochlorous acid for supplementation according to 5.1 "Maintenance List".

⚠ WARNING

Hazardous Substances

- Hypochlorous acid solution contains hazardous substances. Handle safely under the explanation printed on the container of the material.
-

- (b) The following shows the procedures for check and filling of the hypochlorous acid solution required as a result of the check.



Tank of the Hypochlorous Acid for Supplementation

- ① **Conduct the necessary checks.** Conduct the necessary checks from the following. Checks can be visually done during operations, such as automatic measurement. If there are no defects for all the items, operations ② and after are not necessary.

[Check for the solution volume]

- Check that there is sufficient volume of solution remaining in the tank of the hypochlorous acid for supplementation. If not, fill the solution by the operations ② and after.

[Check for the position of the tube end]

- Check whether the tube end in the tank is around the bottom of the tank. If the tube end is floated, adjust the tube length in the tank by arranging the cover part.

[Check for the contamination in the tank]

- Check that there is notable contamination inside the tank. If the contamination is found, clean the tank by the operations ② and after.

[Check for damage on the tube]

- Check that there are bending, notable flaw and clogging of the tube, if these are found, replace the tube by the operations ② and after.

- ② **Stop operation.** Stop automatic operation and other operations by the following procedures.

- Upon internal starting Enter operation stop reservation.
- Upon external starting Enter measurement stop signal from the control room.

- ③ **Conduct the necessary operations.** Perform the necessary maintenance from the following.

[Periodic filling of the solution]

- Condition and fill the hypochlorous acid solution for supplementation. The date above should be the initial date in reckoning the next periodic filling date according to the maintenance intervals.
▷ See 2.5 “Preparation and Filling of Hypochlorous Acid Solution for Supplementation”.

-
- 【IMPORTANT】**
- Be sure to dispose the remaining hypochlorous acid solution for supplementation and fill the new solution.
 - Upon disposal of the hypochlorous acid solution for supplementation, treat the solution in accordance with the law.
-

[Replacement of the tube]

- Remove the used tube and install the new tube after cutting it to the same length with the used one.

[Cleaning in the tank]

- [a] Transfer the remaining solution to the tank for disposal Remove the cover and transfer the remaining hypochlorous acid solution for supplementation to the tank for disposal.
- [b] Clean in the tank. Clean in the tank with city water. Also, clean the tube end.
- [c] Rinse Rinse in the tank with pure water.
- [d] Fill the hypochlorous acid solution for supplementation ▷ See 2.5 “Preparation and Filling of Hypochlorous Acid Solution for Supplementation”.

- ④ **Check the position of the tube end.** Adjust the tube end to put at the bottom in the tank and close the tank cover tightly.

- When continuing to other maintenance, steps ⑤ and ⑥ are not necessary.

- ⑤ **Confirm the stability of the internal temperature.** Push **Status** in the “000: Home window” and the “101: Internal analysis status window” opens. Confirm that the internal temperature is in the range of “room temperature to room temperature +10°C” on the screen as well as it is stabilized.

-
- 【IMPORTANT】**
- Unless it is stabilized, do not start measurements or calibrations.
 - Keep the door closed before starting measurements and calibrations and during all measurements and calibrations. If the door is left open, the internal temperature becomes unstable and the correct measurement value may not be obtained.
-

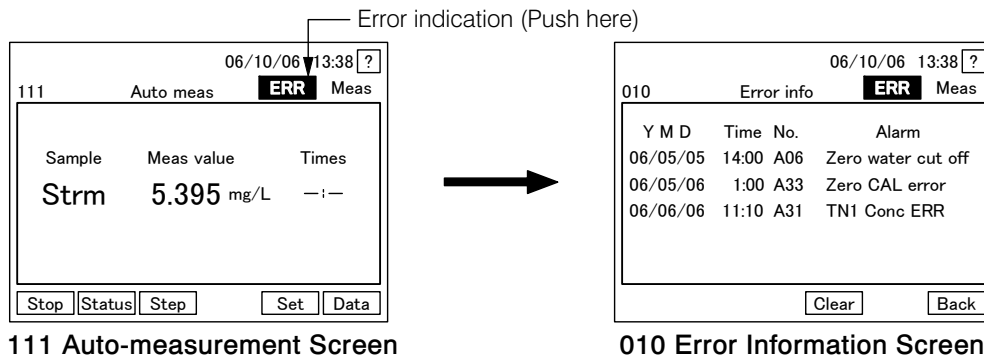
- ⑥ **Set to automatic measurement start status.** Push **Oprtn** in the “000: Home window”, then the “100: Measurement menu window” opens. Push **Auto meas** and the “110 Automatic measurement start window” opens, then push **Start**.

6. Self-diagnosis and Countermeasures

6.1 Alarm by Self-diagnosis

(1) Display and output of the alarm

- (a) This product constantly monitors the status of the main parts by self-diagnosis. If an error is detected, "Error indication" as an alarm lights, and a contact signal is output at the same time (excluding some parts). Confirm the details of the error and take measures. ▷ See 6.1 "Alarm by Self-diagnosis".
- (b) Error indication (**ERR**) lights on the 2nd line on the screen to indicate that the product is in the Error status. Push the indication part and the 010: Error Information window opens. Note that the 010: Error Information window is automatically displayed as the error indication lights, if B06: Error indication is valid (ON). ▷ See 4.4(7) "Automatic error display".
- As for the details about the alarm numbers (No.) and the handling procedures, see 6.1 "Alarm by Self-diagnosis"



- (c) Classification of the contact output and alarms related to alarms is shown in the following table. Alarms, excluding power off and concentration error, are divided into minor alarm and major alarm. ▷ See 3.2(3) "Contact output and loop check".

Contact Output and Alarms

Contact output	Corresponding alarms	
Power off signal	A00 Power off	
Minor alarm signal	A03 CF card memory failure	A08 Water receiving tank 2 failure
	A04 CF card write error	A20 Span solution failure
	A05 Battery error	A33 Zero calibration error
	A06 Zero water cut off	A34 Span calibration error
	A07 Water receiving tank 1 failure	
Major alarm signal	A00 System reset	A26 TN Cell temp error
	A21 Nozzle motor error1	A27 Ozonizer temp error
	A22 Nozzle motor error2	A28 Dehumidifier temp error
	A23 Sampling pump error 1 (syringe pump)	A29 PMT temp error
	A24 Sampling pump error 2 (syringe pump)	A30 Press Error
	A25 Combustion Furnace temperature error	

(To be continued)

(Continued from previous page)

Contact output	Corresponding alarms	
Conc error signal (stream1)	A31 TN1 Conc error	
Conc error signal (stream2)	A32 TN2 Conc error	
No contact output	A02 System error	A09 Initial sequence error

(d) If the product has the printer (option), time of occurrence, alarm number and alarm item name are printed at the same time as the error indication lights.

(2) Alarm function and countermeasures

(a) The following table shows standards, functions, causes and countermeasures by alarms.

(b) Push **Clear** on the “010: Error Information window” after removing the error causes. Then, all the error indications (**ERR**), error information on the screen and contact output related to the alarm is canceled. Note that some alarms are automatically canceled upon removal of the causes.

- Alarm status is recorded in the “390: Event history list window”. Writing in the “010: Error Information window” is not necessary.

(c) Explanation for the print function of the error information as for the product with a printer (option) is omitted in the table “Alarms and countermeasures” because it is the same as the indications of the alarms on the “010: Error Information window”.

Alarm Function and Countermeasures

Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A00 Power off [Power off]	<p>Standards</p> <ul style="list-style-type: none"> • Self-diagnosis is conducted to check whether the power supply to the product is stopped during automatic/manual operation (measurement, calibration, and cleaning). <p>Functions</p> <ul style="list-style-type: none"> • When it occurs, the Power off signal turns to “close”. Then it returns to “open” upon power recovery. Upon power recovery, “000: Home window” opens and “Error indication” is displayed. It is also displayed on the “010: Error Information window”. • Note: when it is under auto-operation (measurement, calibration and cleaning) and duration of power off is below 24 hours, operation status becomes stand-by after power recovery to start next operations such as Measurement start. Also, note that reservation for operation start before power recovery is canceled. 	<p>Causes</p> <ul style="list-style-type: none"> • Power failure. Power switch is turned off by mistake. <p>Countermeasures</p> <ul style="list-style-type: none"> • Confirm the causes and take preventive steps if necessary. • When the duration of Power off is 24 hours and over, resume measurement by pushing Start on the “110 Measurement start window”. <p>Cancel</p> <ul style="list-style-type: none"> • Push Clear on the “010: Error Information window (Cancel is valid during operation)”. Error information is deleted, and the error indication on the screen is cleared. Contact output is automatically canceled upon power recovery.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A01 System reset [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check there is nonconformity in the system performance of the control part upon power-on. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Major alarm signal turns to close. "Error indication" lights and it is also displayed on the "010: Error Information window". If it occurs during automatic/manual operation (measurement, calibration and cleaning), the operation is stopped and the "000: Home window" opens. 	<p>Causes</p> <ul style="list-style-type: none"> Backup battery drain, nonconformity of the CPU board, etc. <p>Countermeasures</p> <ul style="list-style-type: none"> Turn the power switch to Off then turn it to On. If it does not recover, contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> Push Clear on the "010: Error Information window".
A02 System error [No]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check there is nonconformity in the performance of the control part in the initializing process after power-on. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, "Error indication" lights and ". Turn off power and then turn on" is displayed in the "010: Error Information window". Contact signal is not output. If it occurs during operations, all the operations stop. 	<p>Causes</p> <ul style="list-style-type: none"> There are possible nonconformities in the memory of the control part. <p>Countermeasures</p> <ul style="list-style-type: none"> Turn the power switch to Off then turn it to On. If it does not recover, contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> Push Clear on the "010: Error Information window".
A03 CF card memory failure [Minor alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether empty space of the CF card is not over 1% of the total upon reading the CF card. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. "Error indication" lights, and it is also displayed in the "010: Error Information window". Operations are continued. 	<p>Causes</p> <ul style="list-style-type: none"> Space of the CF card is full with data. <p>Countermeasures</p> <ul style="list-style-type: none"> Make the empty space of the CF card 10% and above the total. <p>Cancel</p> <ul style="list-style-type: none"> Push Clear on "010: Error Information window (Cancel is valid during operation)". Upon next writing, if the empty space is over the standard, it is self-canceled.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A04 CF card write error [Minor alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether writing in the CF card is valid after writing on the CF card. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. "Error indication" lights, and it is also displayed in the "010: Error Information window". Record the data on the memory (SRAM) instead of the CF card, and continue operations. 	<p>Cause</p> <ul style="list-style-type: none"> CF card is not inserted. <p>Countermeasure</p> <ul style="list-style-type: none"> Insert CF card. <hr/> <p>Causes</p> <ul style="list-style-type: none"> There is no designated folder for the CF card. Name is not correct. <p>Countermeasures</p> <ul style="list-style-type: none"> Create a designated folder. Or correct the name for the folder. <hr/> <p>Cause</p> <ul style="list-style-type: none"> CF card is broken. <p>Countermeasure</p> <ul style="list-style-type: none"> Replace it with a new CF card. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the "010: Error Information window (Cancel is valid during operation)". Upon next writing, if writing is performed without problems, it is self-canceled.
A05 Battery error [Minor alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether there is lowering of electric power in the initializing process after power-on. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. "Error indication" lights, and it is also displayed in the "010: Error Information window". 	<p>Cause</p> <ul style="list-style-type: none"> Battery drain (Lithium battery). <p>Countermeasure</p> <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> Push Clear on "010: Error Information window" (Cancel is valid during operation).
A06 Zero water cut off [Minor alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether the float switch (FS3) of the zero water tank has been OFF (Open) for 5 seconds and over upon starting of automatic/manual measurement and calibration. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. "Error indication" lights, and it is also displayed in the "010: Error Information window". Under automatic measurement/calibration/cleaning, the operations are stopped and wait for the signal for the next start. Under manual measurement/calibration/cleaning, the operations are stopped and it is returned to the "000: Home window". 	<p>Cause</p> <ul style="list-style-type: none"> Pure water supply is stopped. <p>Countermeasure</p> <ul style="list-style-type: none"> Enable pure water supply. <hr/> <p>Causes</p> <ul style="list-style-type: none"> Float switch failure, electrical problem, etc. <p>Countermeasures</p> <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear on "010: Error Information window" (Cancel is valid during operation). If the float switch (FS3) returns to ON (Close) upon next starting, it is self-canceled.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
<p>A07 Water receiving tank 1 failure [Minor alarm]</p>	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether the float switch (FS1) of the water receiving tank 1 has been OFF (Open) for 5 seconds and over upon starting of stream 1 by automatic/manual measurement. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. "Error indication" lights and it is also displayed in the "010: Error Information window". Automatic measurement is paused and waits for the next start signal. Manual measurement is stopped and returns to "000: Home window". When "B30 Water receiving tank failure print output" is off, minor alarm signal is not output and the printer also does not print. 	<p>Causes</p> <ul style="list-style-type: none"> Sample water is not supplied to the water receiving tank 1. <p>Countermeasures</p> <ul style="list-style-type: none"> Supply sample water to the water receiving tank 1. <hr/> <p>Causes</p> <ul style="list-style-type: none"> Float switch (FS1) failure, electrical problem, etc. <p>Countermeasures</p> <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the "010: Error Information window". If the float switch (FS1) returns to ON (Close) upon next start of the automatic measurement, it is self-canceled.
<p>A08 Water receiving tank 2 failure [Minor alarm]</p>	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether the float switch (FS1) of the water receiving tank 2 has been OFF (Open) for 5 seconds and over upon starting of stream 2 by automatic/manual measurement. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. "Error indication" lights, and it is also displayed on the "010: Error Information window". Automatic measurement is paused and waits for the next start signal. Manual measurement is stopped and returns to "000: Home window". When "B30 Water receiving tank failure print output" is off, minor alarm signal is not output and the printer also does not print. 	<p>Causes</p> <ul style="list-style-type: none"> Sample water is not supplied to the water receiving tank 2. <p>Countermeasures</p> <ul style="list-style-type: none"> Supply sample water to the water receiving tank 2. <hr/> <p>Causes</p> <ul style="list-style-type: none"> Float switch failure, electrical problem, etc. <p>Countermeasures</p> <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the "010: Error Information window". If the float switch (FS2) returns to ON (Close) upon next start of the automatic measurement, it is self-canceled.
<p>A09 Initial sequence error [No]</p>	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether initial sequence program is not executed in the initializing process after power-on. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, "Error indication" lights, and it is also displayed in the "010: Error Information window". Contact signal is not output. 	<p>Cause</p> <ul style="list-style-type: none"> Initial sequence program is not copied on the memory (ROM) of the control part. <p>Countermeasure</p> <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A20 Span solution failure [Minor alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether the span calibration solution volume in the calibration solution tank is below the set rate (%) of “B26 Span solution alarm level” upon starting of automatic/manual span calibration and manual span calibration solution measurement. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. “Error indication” lights, and it is also displayed on the “010: Error Information window”. Automatic calibration is paused and waits for the next start signal. Manual measurement or calibration is stopped and returns to “000: Home window”. 	<p>Cause</p> <ul style="list-style-type: none"> There is little span calibration solution left. <p>Countermeasure</p> <ul style="list-style-type: none"> Fill the solution. <hr/> <p>Causes</p> <ul style="list-style-type: none"> The setting of B25 Calibration solution volume does not match the rate of the remaining volume of the span calibration solution. <p>Countermeasures</p> <ul style="list-style-type: none"> ▷ See 4.4(22) “Changing the calibration solution volume”. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”. If the setting of B25 Calibration solution volume exceeds the setting of B26 Span solution alarm level, it is self-canceled.
A21 Nozzle motor error 1 [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether ON/OFF of the photo sensor (PS23) underrun the required times in the process. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed on the “010: Error Information window”. Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after Restore sequence 3. Manual operations (measurement, calibration, and cleaning) are stopped and return to “000: Home window”. 	<p>Causes</p> <ul style="list-style-type: none"> Tangle and bending of the tube of the dripping part. <p>Countermeasure</p> <ul style="list-style-type: none"> Set the tube to the proper state. <hr/> <p>Cause</p> <ul style="list-style-type: none"> Nozzle motor failure. <p>Countermeasure</p> <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”.
A22 Nozzle motor error 2 [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether ON/OFF of the photo sensor (PS24) underrun the required times in the process. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed on the “010: Error Information window”. Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after Restore sequence 2. Manual operations(measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	<p>Causes</p> <ul style="list-style-type: none"> Tangle and bending of the tube of the dripping part. <p>Countermeasures</p> <ul style="list-style-type: none"> Set the tube to the proper state. <hr/> <p>Cause</p> <ul style="list-style-type: none"> Nozzle motor failure. <p>Countermeasure</p> <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A23 Sampling pump error 1 [Major alarm] (Syringe pump)	Standards <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether ON/OFF of the photo sensor (PS21) under run the required times in the process. Functions <ul style="list-style-type: none"> When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed on the “010: Error Information window”. Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after Restore sequence 4. Manual operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	Cause <ul style="list-style-type: none"> Syringe pump failure. Countermeasure <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. Cancel <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”.
A24 Sampling pump error 2 [Major alarm] (Syringe pump)	Standards <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether ON/OFF of the photo sensor (PS22) underrun the required times in the process. Functions <ul style="list-style-type: none"> When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after Restore sequence 4. Manual operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	Cause <ul style="list-style-type: none"> Syringe pump failure. Countermeasure <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. Cancel <ul style="list-style-type: none"> Push Clear on “010: Error Information window”.
A25 Combustion Furnace temperature error [Major alarm]	Standards <ul style="list-style-type: none"> Constant self-diagnosis is conducted to check whether the temperature in the combustion furnace has continued to be 800°C and over or 600°C and below for 60 seconds and over. Functions <ul style="list-style-type: none"> When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. Turn off the heater of the combustion furnace. Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after the ongoing sequence is completed. Manual operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	Cause <ul style="list-style-type: none"> Nonconformity is caused in the heater. Countermeasures <ul style="list-style-type: none"> Contact the dealer or the manufacturer for technical service. Cancel <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A26 TN Cell temp error [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> • Constant self-diagnosis is conducted to check whether the temperature in the cell has continued to be 70°C and over or 40°C and below for 60 seconds and over. <p>Functions</p> <ul style="list-style-type: none"> • When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. • Turn off the heater of the cell. • Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after the ongoing sequence is completed. • Manual operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	<p>Cause</p> <ul style="list-style-type: none"> • Nonconformity is caused in the heater. <p>Countermeasures</p> <ul style="list-style-type: none"> • Contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> • Push Clear in the “010: Error Information window”.
A27 Ozonizer temp error [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> • Constant self-diagnosis is conducted to check whether the temperature of the ozonizer has continued to be 70°C and over or 40°C and below for 60 seconds and over. <p>Functions</p> <ul style="list-style-type: none"> • When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed on the “010: Error Information window”. • Turn off the heater of the Ozonizer. • Automatic operations(measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after the ongoing sequence is completed. • Manual operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	<p>Cause</p> <ul style="list-style-type: none"> • Nonconformity is caused in the heater. <p>Countermeasures</p> <ul style="list-style-type: none"> • Contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> • Push Clear in the “010: Error Information window”.
A28 Dehumidifier temp error [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> • Constant self-diagnosis is conducted to check whether the temperature of the dehumidifier has continued to be 10°C and over or -5°C and below for 60 seconds and over. <p>Functions</p> <ul style="list-style-type: none"> • When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed on the “010: Error Information window”. • Turn off the dehumidifier (electronic cooler). • Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after the ongoing sequence is completed. • Manual operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	<p>Cause</p> <ul style="list-style-type: none"> • Nonconformity is caused in the dehumidifier. <p>Countermeasures</p> <ul style="list-style-type: none"> • Contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> • Push Clear in the “010: Error Information window”.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A29 PMT temp error [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> • Constant self-diagnosis is conducted to check whether the temperature of the detecting part (photo acceptance part) has continued to be 10°C and over or -5°C and below for 60 seconds and over. <p>Functions</p> <ul style="list-style-type: none"> • When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. • Turn off the cooler (electronic cooler). • Automatic operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window” after the ongoing sequence is completed. • Manual operations (measurement, calibration, and cleaning) are stopped and return to the “000: Home window”. 	<p>Cause</p> <ul style="list-style-type: none"> • Nonconformity is caused in the cooler of the detecting part. <p>Countermeasures</p> <ul style="list-style-type: none"> • Contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> • Push Clear in the “010: Error Information window”.
A30 Press Error [Major alarm]	<p>Standards</p> <ul style="list-style-type: none"> • Self-diagnosis is conducted to check whether the pressure of the cell has continued to be 70 kPa and over for 5 seconds upon executing the sequence of automatic/manual measurement or calibration. <p>Functions</p> <ul style="list-style-type: none"> • When it occurs, Major alarm signal turns to close. “Error indication” lights, and it is also displayed in the 010: Error Information window”. • Automatic operations (measurement and calibration) are stopped and return to the “000: Home window ” • Manual operations (measurement and calibration) are stopped and return to the “000: Home window”. 	<p>Causes</p> <ul style="list-style-type: none"> • Nonconformity is caused in P23 or the pressure regulator. <p>Countermeasures</p> <ul style="list-style-type: none"> • Contact the dealer or the manufacturer for technical service. <p>Cancel</p> <ul style="list-style-type: none"> • Push Clear in the “010: Error Information window”.
A31 TN1 Conc error [Conc error (stream1)]	<p>Standards</p> <ul style="list-style-type: none"> • Self-diagnosis is conducted to check whether concentration operation result of stream1 exceeds the setting value of the “B23 Upper limit1 ALM” after auto-measurement or concentration operation of the manual measurement of stream1. <p>Functions</p> <ul style="list-style-type: none"> • When it occurs, “Conc error (stream1)” signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. • Automatic or manual measurement is continued. 	<p>Causes</p> <ul style="list-style-type: none"> • Sample water quality of stream 1 has changed and the concentration has increased. <p>Countermeasure</p> <ul style="list-style-type: none"> • Change the measurement range. <hr/> <p>Causes</p> <ul style="list-style-type: none"> • The value of “B23 Upper limit1 ALM” was set rather low. <p>Countermeasures</p> <ul style="list-style-type: none"> • Change the setting value of “B23 Upper limit1 ALM”. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> • Push Clear in the “010: Error Information window”. • If the next concentration operation result of stream1 underruns the setting value of the “B23 Upper limit1 ALM”, it is self-canceled.

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Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
A32 TN2 Conc error [Conc error (stream2)]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether concentration operation result of stream2 exceeds the setting value of the “B24 Upper limit2 ALM” after auto-measurement or concentration operation of the manual measurement of stream 2. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, “Conc error (stream2)” signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. Automatic or manual measurement is continued. 	<p>Causes</p> <ul style="list-style-type: none"> Sample water quality of stream 2 has changed and the concentration has increased. <p>Countermeasures</p> <ul style="list-style-type: none"> Change the measurement range. <hr/> <p>Causes</p> <ul style="list-style-type: none"> The value of “B24 Upper limit2 ALM” was set rather low. <p>Countermeasures</p> <ul style="list-style-type: none"> Change the setting value of “B24 Upper limit2 ALM”. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”. If the next concentration operation result of stream2 underruns the setting value of the “B24 Upper limit2 ALM”, it is self-canceled.
A33 Zero calibration error [Minor alarm]	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether the result of the zero calibration exceeds the setting value of “C24 Zero upper limit window” and “C25 Zero lower limit window” upon completion of the automatic/manual zero calibration. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. If automatic/manual span calibration can be conducted without rewriting Zero deviation, continue the operation. When the above operation cannot be conducted, wait the next start signal. 	<p>Causes</p> <ul style="list-style-type: none"> Nonconformity in the zero water quality. <p>Countermeasures</p> <ul style="list-style-type: none"> Normalize the pure water quality. <hr/> <p>Causes</p> <ul style="list-style-type: none"> Nonconformity in the setting value of the calibration conditions. <p>Countermeasures</p> <ul style="list-style-type: none"> Change to the proper setting value. ▷ See 4.5” Manipulation of Calibration Conditions in Setting Mode”. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”. If the result of the next zero calibration underruns the setting value of “C24 Zero upper limit” and “C25 Zero lower limit”, it is self-canceled.

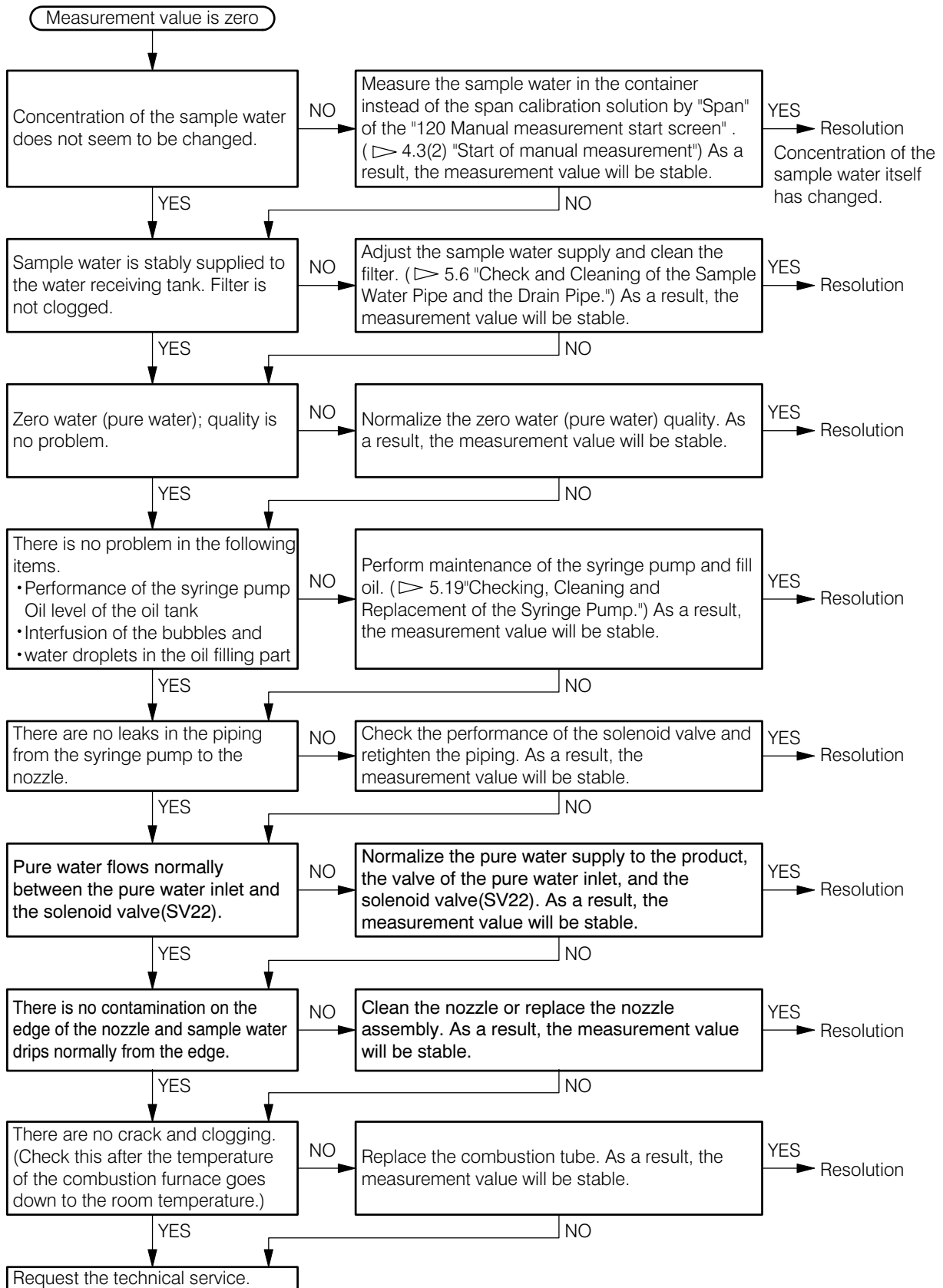
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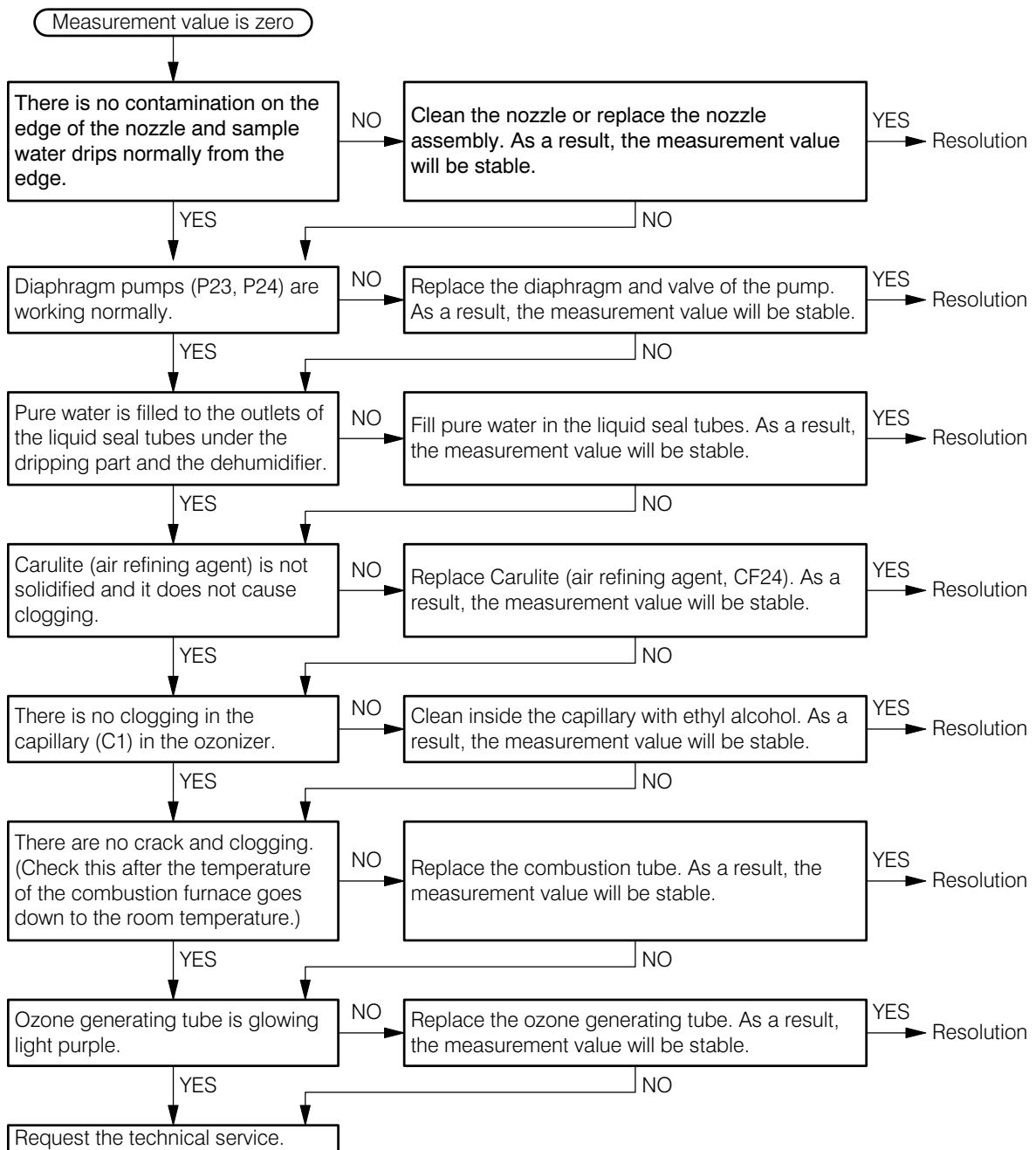
Alarm number and item name [Contact output]	Standards and functions of the alarm	Causes and countermeasures
<p>A34 Span calibration error [Minor alarm]</p>	<p>Standards</p> <ul style="list-style-type: none"> Self-diagnosis is conducted to check whether the result of the span calibration exceeds the setting value of “C26 Span upper limit window” and “C27 Span lower limit window” upon completion of the automatic/manual zero calibration. <p>Functions</p> <ul style="list-style-type: none"> When it occurs, Minor alarm signal turns to close. “Error indication” lights, and it is also displayed in the “010: Error Information window”. If automatic/manual zero calibration can be conducted without rewriting Span factor, continue the operation. When the above operation cannot be conducted, wait the next start signal. 	<p>Causes</p> <ul style="list-style-type: none"> Nonconformity in the span calibration solution. <p>Countermeasures</p> <ul style="list-style-type: none"> Replace with the proper span calibration solution. <hr/> <p>Causes</p> <ul style="list-style-type: none"> Nonconformity in the setting value of the calibration conditions. <p>Countermeasures</p> <ul style="list-style-type: none"> Change to the proper setting value. <ul style="list-style-type: none"> ▷ See 4.5 “Manipulation of Calibration Conditions in Setting Mode”. <hr/> <p>Cancel</p> <ul style="list-style-type: none"> Push Clear in the “010: Error Information window”. If the result of the next zero calibration underruns the setting value of “C26 Span upper limit window” and “C27 Span lower limit window”, it is self-canceled.

6.2 Troubleshooting

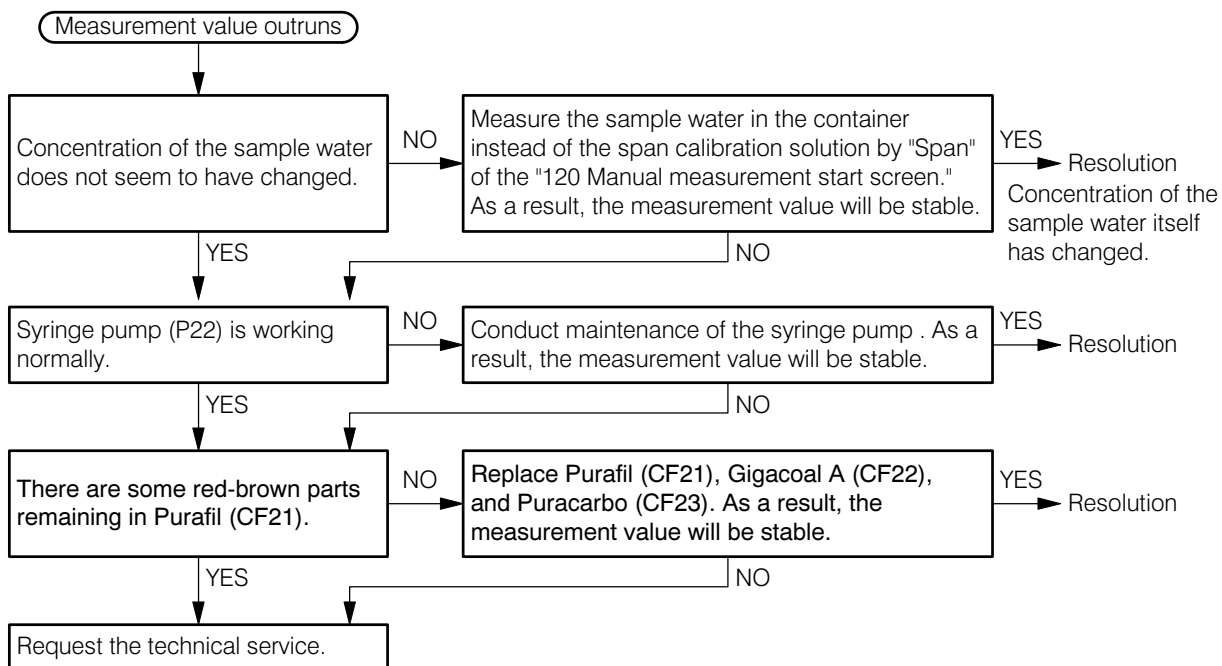
(1) Countermeasures for variations in the measurement value



(2) Countermeasures when the measurement value is zero



(3) Countermeasures when the measurement value outruns



6.3 Noise Suppression

(1) Abnormal noise phenomenon

If there is a strong noise source around the measuring system, the following phenomenon can be caused.

- (a) Measurement value changes.
- (b) Indication flickers abnormally.
- (c) Indication freezes.

(2) Noise source

When noise causes abnormal phenomena, check for the following devices and implement countermeasure. ▷ See 6.3(3) “Countermeasures by surge absorbing element”.

These types of inductive control equipment can generate pulse surge voltages of 4000V and over for opening/closing of the circuit. This can be a noise source.

- (a) Electromagnetic switch
- (b) Electromagnetic valve
- (c) Pump
- (d) Motor

(3) Countermeasures by surge absorbing element

When equipment appears to be the noise sources described in the section above, install the surge absorbing element using the following procedures.

- (a) Use the surge-absorbing element of the CR filter type. Semiconductor type such as varistor has a rather shorter life.
- (b) Use the surge-absorbing element with higher regular voltage than the drive voltage of the target equipment.
- (c) We offer the following surge-absorbing element.
Spark killer 2S1201 (Part code No. 112Z009)
- (d) Install the surge-absorbing element between the drive terminals closest to the noise generating component.

●Repair contact

If a repair is required, please contact your sales representative or directly our sales office, or our service department. In this case, let us know the following information:

- Model name (MODEL)
- Serial number (SER. No.)
- Manufacturing date (DATE)

7. Specifications and Performance

7.1 Standard Specifications

- | | |
|--|--|
| 1.Product name | : Automatic Total Nitrogen Analyzer |
| 2.Model | : TNC-250 (Special specifications; TNC-250(S)) |
| 3.Purpose | : Water quality control and process monitoring |
| 4.Measurement object | : Total nitrogen in the water (ex. Process water of the denitrogenation plant) |
| 5.Measurement method | : Contact heat decomposition, chemiluminescence method |
| 6.Measurement range | : Minimum 0 to 20mg/L Max. 0 to 1000mg/L

One measurement range of one stream as for 2 Streams. Difference between the streams should be within 10 times. |
| 7.Measurement period | : Shortest 5min/ 1 measurement

However, shortest period is 6min for the measurement with diluting.
(For 2 streams specifications, shortest period is 6 min when diluting is provided to either of streams)

5, 6, 10, 12, 15, 20, 30, 60, or 120 selectable by user.

Or measurement start by the external contact input |
| 8.The number of the measurement points | : 1 stream (2 streams, option) |
| 9.Repeatability | : Measurement range 0 to 20mg/L Within $\pm 3\%$ FS

Other measurement range Within $\pm 4\%$ FS |
| 10.Stability | : Zero/Span drift with measurement range 0 to 20mg/L Within $\pm 3\%$ FS/24h

Zero/Span drift with other measurement range Within $\pm 4\%$ FS/24h |
| 11.Warming-up time | : Approximately 1 hour after turning on electricity and running water |
| 12.Detector | : Chemiluminescence detector |
| 13.Display system | : Touch panel system

Minimum display of the measurement value...0.001mg/L for measurement value less then 10mg/L

Contents of display...Y/M/D, Time, Measurement value, etc. |
| 14.Memory system | : Compact flash (Save: Approx. 5 years)

Memory contents Y/M/D•H/M, Measurement value/Calibration value, Alarm number |
| 15.Printer (option) | : Printer with auto-winder (option)

Printing contents...Y/M/D•H/M, Measurement value/Calibration value, Measurement conditions, Alarm number, Daily report (Maximum value, minimum value, average value mg/L) |
| 16.Auto-calibration | : Conduct several measurements of Zero/Span calibration solution at set |

- time to auto-calibrate to the average value.
- Calibration period 0 to 31 days (by the day: user selectable), 0: no auto-calibration
- Calibration time 0 to 23 o'clock (by the hour: user selectable)
- Measurement times for one calibration...1 to 9 time (s) (user selectable)
- Zero calibration solution Pure water
- Span calibration solution Potassium nitrate solution
- Calibration start (manual calibration) by the manual operation and calibration start (external start automatic calibration) by input of the calibration start signal are valid.
- 17.Cleaning system : Auto- cleaning by internal start Cleaning with oxalic acid solution by the internal timer
- Auto- cleaning by external start Cleaning with oxalic acid solution by the cleaning start signal
- Manual cleaning Cleaning with oxalic acid solution or hypochlorous acid solution or combination of the both by the key operation.
- Cleaning in the auto-measurement process Cleaning with city water by the auto-measurement sequence
- 18.Surrounding temperature/ humidity : 2 to 40°C, 85% (HR) or less (No condensation and freeze.)
- 19.Installation site : Install indoor or in the cubicle.
- Choose a place where oscillation and shock are minimized, space for maintenance is secured, direct sunlight can be avoided and where noise sources (ex. power) are kept away. In a corrosive atmosphere, adequate ventilation such as installation of ventilation fan is required.
- 20.Sample water conditions : Temperature...2°C to 40°C (No freeze.)
- Pressure...0.02 to 0.05MPa
- Flow speed 1 to 3L/min
- Pre-treatment is necessary depending on the sample water property. (Please contact us.)
- 21.City water conditions : Temperature 2°C to 40°C (No freeze.)
- Pressure 0.1 to 0.5MPa
- However, when optional deionizer is connected 2°C to 35°C (No freeze.)
- Consumption Approx. 170L/day(Measurement period; 6 min)
- Purpose Cleaning water, Material water for deionizer (option)
- When supplying other than city water, satisfy the following standards.
- Hypochlorous acid supplementation function (option) is added.
 - Water quality:
Ministerial ordinance regarding the water quality standard (May

30, 2003; Ministry of Health, Labour and Welfare Ordinance No.101)

Regarding the enactment of the ministerial ordinance regarding water quality and the partial revision of the Water Supply Act enforcement regulations (October 10, 2003; HSB Notification No.1010004)

22.Pure water conditions

: Temperature 2°C to 35°C (No freeze.)

Pressure 0.1 to 0.5MPa

Purpose Zero water, Cleaning water and dilution water

Consumption Necessary for measurement and cleaning as shown below table.

Pure water consumption by measurement (Measurement period: 6 min)

Dilution magnification	Measuring range (mg/L)	One-time consumption (mL)	Daily consumption (L)	Monthly consumption (L)
1	20	19	4.5	139
2.5	50	71	17	529
5	100	89	21	659
10	200	97	23	723
25	500	102	25	762
50	1000	104	25	775

• When measurement period becomes double (12 min), daily consumption and monthly consumption become half in the above table.

Pure water consumption by auto-cleaning

Cleaning period	One-time consumption (mL)	Daily consumption (L)	Monthly consumption (L)
1	102	2.89	90
3		0.96	30
6		0.48	15
12		0.24	7.5
24		0.12	3.7

23.Drainage

: Drain the surplus sample water, dilution water and cleaning water.

Drained by natural dripping system. To avoid back pressure, use the piping of 30A and over, set a gradient and open the pipe end to the air.

24.Water receiving tank

: Material...Hard PVC

Volume...Approx. 1L

Others...With filter. Alarms (minor alarm) of “Water receiving tank 1 failure” and “Water receiving tank 2 failure” (for 2 Streams) are installed.

25.Input signals

: Measurement start signal: Measurement starts by input of closed contact pulse (pulse width: 1 s and over)

- Measurement stop signal: Measurement stops by input of closed contact pulse (pulse width: 1 s and over)
- Calibration start signal: Calibration starts by input of closed contact pulse (pulse width: 1 s and over)
- Cleaning start signal: Cleaning starts by input of closed contact pulse (pulse width: 1 s and over)
- Stream select signal: Measure Stream 1 by open contact and measure Stream 2 by closed contact (for 2 Streams).
- External device busy signal: Stand-by the measurement by closed contact input.
- Signals above (excluding the external device busy signal) are valid only by the external control. Contact capacity: 24VDC, 0.1A and over
26. Output signal : Analog output signal (2CH)
- 4 to 20mADC (for each stream): load resistance 600 Ω or less, insulated type (non-insulated between CH)
- Concentration error signal (for each stream): Closed contact is output upon the measurement value error.
- Power off signal: Closed contact is output upon power-off.
- Maintenance signal: Closed contact is output during maintenance.
- Calibration signal: Closed contact is output during auto-calibration.
- Cleaning signal: Closed contact is output during auto-cleaning.
- Minor alarm signal: Closed contact is output upon minor alarm.
- Major alarm signal: Closed contact is output upon major alarm.
- Signal for measurement in progress (for each stream): Closed contact is output during measurement in progress.
- Contact capacity for the signals; 24VDC / 0.8A or 100VAC / 0.2 A or less
27. Power : 100VAC \pm 10% 50/60Hz
28. Power consumption : Max. 400VA, Ave. 120VA (with the room temperature of 25°C)
29. Wiring connection opening : Cable ground (diameter of the prepared hole: 2.1mm) for the cable with the external diameter of 5 to 10mm
30. Piping connection openings : Sample water inlet Rc1/2
City water inlet Rc1/2
City water outlet Rc1/2
Pure water inlet Rc1/2
Drain outlet Plug-in socket for VP30 pipe
Exhaust outlet Rc1/4
31. Structure : Equivalent to IP11 (Drip-proof type I). Indoor installation.
32. Main materials : SS400 (steel product), SPCC (steel plate)
33. Surface finish : Equivalent to Munsell 5PB8/1

34. Material for solution contacting part : Acrylic, ceramics, hard PVC, fluorine resin, silicon, SUS304
35. Weight : Approx. 120kg
36. Others : Options
- Printer with auto-winder
 - Cleaning system Hypochlorous acid supplementation when water other than city water (ex. groundwater) is used
 - Stream switching Enable of switching streams up to 2 streams
 - Deionizer cartridge deionizer (separate installation)
 - Cubicle for outdoor installation
37. Standard accessories : One set/unit (excluding the case when it is specified as unnecessary)

7.2 Principles and Performance

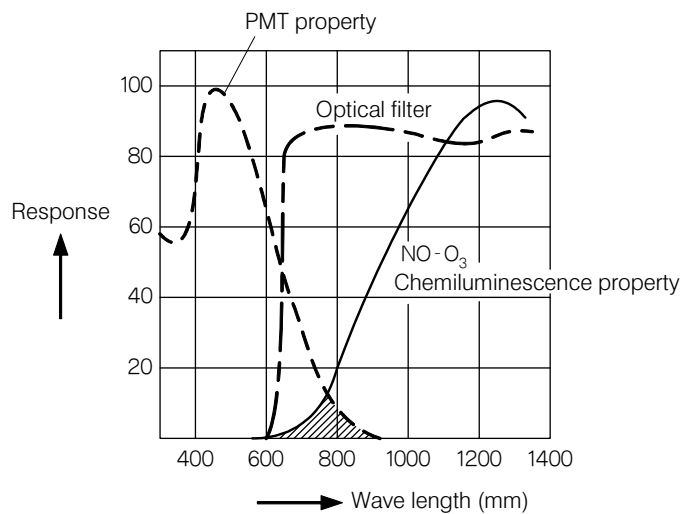
(1) Measurement principles

This product (TNC-250) adopts the contact heat decomposition/chemiluminescence method.

By dripping the sampling water containing small amounts of nitrogen (15uL) into the combustion furnace, the contained nitrogen compound is oxidized to nitric oxide gas (NO) by the oxidation catalyst under high temperature (700°C). NO gas infused to the detector reacts to ozone gas (O₃) as in the following formula, and it generates chemiluminescence (wave length: 590 to 2500nm) in the process.



As the concentration of NO is proportional to the luminescence intensity, luminescence is measured by photomultiplier tube (PMT) and then it is converted into concentration.



Example of Spectroscopic Property of NO – O₃ Chemiluminescence

This measurement principle has the following main features.

- Reagents are not used for the measurement.
- Measurement can be conducted with the sample water containing sea water, suspended particulate matter (SS) and metallic ion.
- As the measurement period (6 minutes for this product) can be shortened, it can respond to the process where the concentration change is relatively frequent.

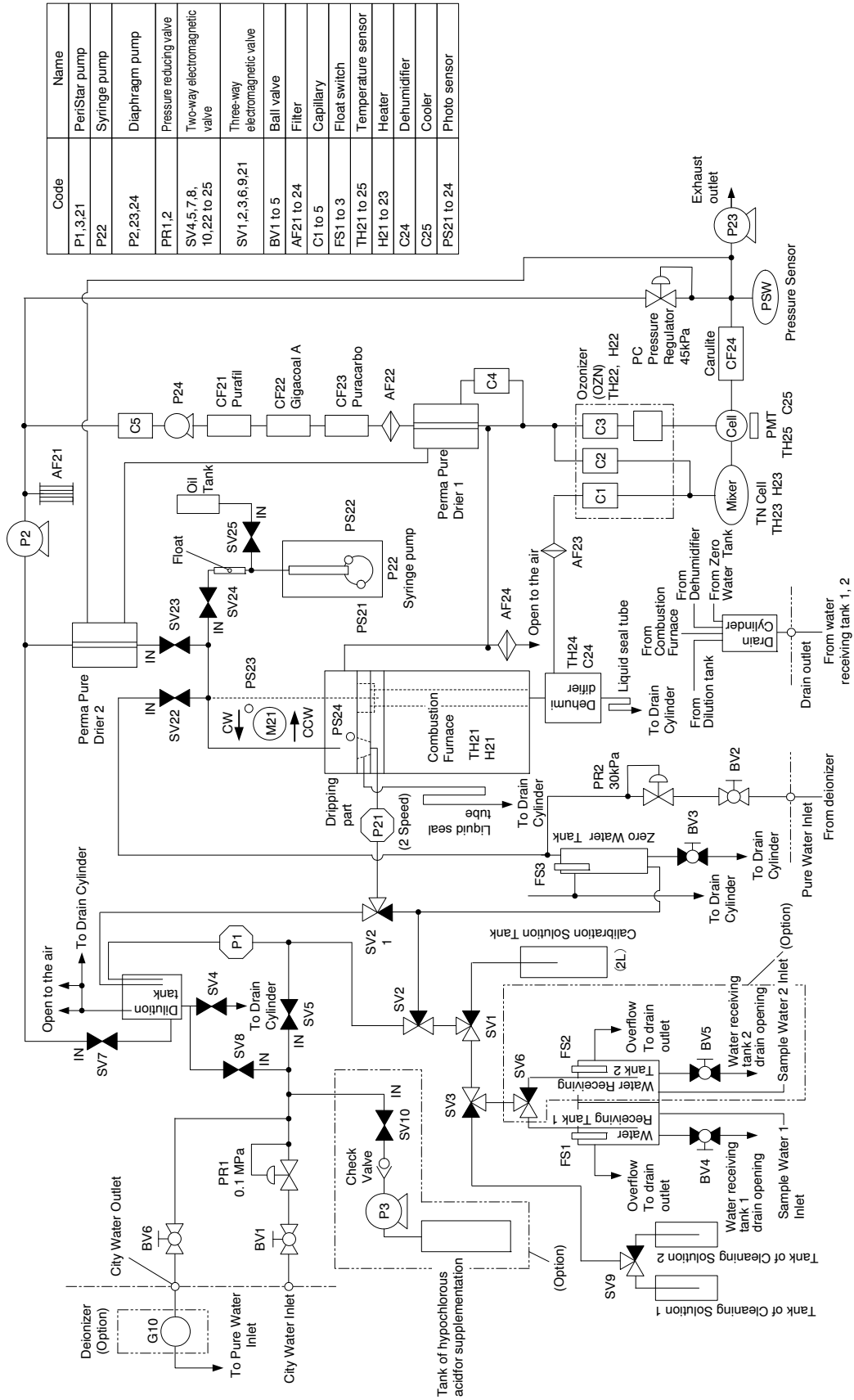
(2) Flow sheet and performance

Measurement performance is explained along with the figure: Flow sheet.

① **Dilute sample water.** Sample water comes from the water receiving tank and goes through the electromagnetic valves SV6 (for 2 Streams), SV3, SV1 and SV2. Then, it is infused to the dilution tank by the PeriStar pump P1 to be diluted to the set dilution ratio with pure water.

- When measurement range is within 0 to 20mg/L, measurement is conducted without dilution. On the other hand, when the range exceeds the range above, sample water or span calibration solution is diluted to the concentration of 20mg/L and below for the measurement.

② **Infused to the sample pot.** Diluted sample water goes through the electromagnetic valve SV21 and it is infused to the sample pot of the dripping part by the PeriStar pump P21.



Code	Name
P1,3,21	PeriStar pump
P22	Syringe pump
P2,23,24	Diaphragm pump
PR1,2	Pressure reducing valve
SV4,5,7,8,10,22 to 25	Two-way electromagnetic valve
SV1,2,3,6,9,21	Three-way electromagnetic valve
BV1 to 5	Ball valve
AF21 to 24	Filter
C1 to 5	Capillary
FS1 to 3	Float switch
TH21 to 25	Temperature sensor
H21 to 23	Heater
C24	Dehumidifier
C25	Cooler
PS21 to 24	Photo sensor

Flow Sheet

- ③ **Weigh the sample water.** Diluted sample water in the sample pot is absorbed to the descended sample injection nozzle by the performance of syringe pump (P22) for the weight measurement.
- ④ **Drip to the combustion furnace.** After the weight measurement, diluted sample water is moved to the upper part of the combustion furnace and dripped from the sample injection nozzle.
- ⑤ **Clean the nozzle.** After dripping, sample injection nozzle moves again to the sample pot side. Then, it is cleaned with pure water to prepare for the next measurement. Sample water injection nozzle is kept in good condition by moving away from the upper part of the combustion furnace, which is the heat source.
- ⑥ **Oxidized by catalysts.** Nitrogen compound in the diluted sample water after dripping is oxidized by catalysts in the combustion tube and turns to nitric oxide (NO). Moisture content is cooled in the dehumidifier and discharged to the liquid seal.
- ⑦ **Detect chemiluminescence.** Nitric oxide (NO) is carried to the cell and reacts with the ozone gas. Then, chemiluminescence is generated and is detected in the photomultiplier (PMT).
- ⑧ **Calculate the total nitrogen concentration.** Detected luminescence intensity shows the peak waveform and the total nitrogen concentration of the sample water is calculated from the area value.

(3) Time chart

(a) Main time chart of the auto-measurement

Main sequence of the auto-measurement (1/2)

(Continued on the next page)

Process number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Process name	Dilution Stand-by	Air Substitution	Depressure	Syringe HP	Air Absorption	Stand-by 1	Stand-by 2	Nozzle Descent	Stand-by 3	Sample Absorption	Stand-by 4	Nozzle Ascent	Air Absorption 2	Nozzle Moving to the right	Stand-by 5	Sample Dripping	
Preceding process number		B08	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
50Hz	TIME(sec)	15.0	7.0	3.4	10.0	5.0	0.0	3.5	0.5	1.7	5.0	3.0	1.7	10.0	0.5	7.0	
	TIME Σ (sec)	106.0	128.0	131.4	141.4	146.4	146.4	149.9	150.4	152.1	157.1	160.1	161.7	171.7	172.2	179.2	
	TIME Σ (min)	1.8	2.1	2.2	2.4	2.4	2.4	2.5	2.5	2.5	2.6	2.7	2.7	2.9	2.9	3.0	
	Set time (sec)	1000	300	300	150			300						500			
60Hz	TIME(sec)	106.0	15.0	7.0	8.3	5.0	2.0	2.9	0.5	1.4	7.0	2.5	1.4	8.3	0.5	5.8	
	TIME Σ (sec)	106.0	121.0	128.0	130.8	144.2	146.2	149.1	149.6	151.0	158.0	160.5	161.9	170.2	170.7	176.5	
	TIME Σ (min)	1.8	2.0	2.1	2.2	2.3	2.4	2.5	2.5	2.5	2.6	2.7	2.7	2.8	2.8	2.9	
	Set time (sec)	1000	300	300	150			300						500			
50Hz	TIME(sec)	130.0	15.0	7.0	3.4	10.0	0.0	3.5	0.5	1.7	5.0	3.0	1.7	10.0	0.5	7.0	
	TIME Σ (sec)	130.0	145.0	152.0	155.4	165.4	170.4	173.9	174.4	176.1	181.1	184.1	185.7	195.7	196.2	203.2	
	TIME Σ (min)	2.2	2.4	2.5	2.6	2.8	2.8	2.9	2.9	2.9	3.0	3.1	3.1	3.3	3.3	3.4	
	Set time (sec)	1000	300	300	150			300						500			
60Hz	TIME(sec)	130.0	15.0	7.0	2.8	8.3	5.0	2.0	0.5	1.4	7.0	2.5	1.4	8.3	0.5	5.8	
	TIME Σ (sec)	130.0	145.0	152.0	154.8	163.2	168.2	170.2	173.6	175.0	182.0	184.5	185.9	194.2	194.7	200.5	
	TIME Σ (min)	2.2	2.4	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.0	3.1	3.1	3.2	3.2	3.3	
	Set time (sec)	1000	300	300	150			300						500			
		SV21				SV21		SV21		SV21	SV21						
		SV22															
		SV23	SV23														
		SV24		SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	
		SV25															
		P21	P21	P21	P21	P21	P21										
		P21 H	P21 H	P21 H	P21 H	P21 H	P21 H										
		P22															
		P22	P23	P23	PS22=2	PS21=2											
		P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	
		P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	
		P2															
		M21						PS24=2				M21		PS23=2			
		M21 C										M21C		M21C			
		Ozonizer	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	
		HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	
		Chlorine addition	P3														
		SV10															
		PS21			PS21												
		PS22(HP)			PS22 HP												
		PS23															
		PS24						PS24									

Syringe HP; Set the syringe pump to the home position.
 P21H; If the pump 21 is "ON" together with "P21", it turns to high-speed operation.
 PS21 = 2; When the photo sensor 21 turns to "OFF" from "ON", it is advanced to the next process. Same applies to PS22 = 2 to PS24 = 2.

M21; Nozzle moves to the left by the rotation of the arm.
 M21C; Nozzle moves to the right by the rotation of the arm together with "MC21".
 HV; High voltage is applied to Photomultiplier (PMT).

Main sequence of the auto-measurement (2/2)

(Continued from the preceding page)

Process number	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Process name	Stop	Compression	Discharge	Nozzle Moving to the left	Nozzle Cleaning 1	Nozzle Cleaning 2	Nozzle Cleaning 3	Nozzle Ascent	Air Substitution	Stand-by 6	Stand-by 7	Nozzle Descent	Nozzle Ascent	Port stop	Completion (Stand-by)
without diluting	Preceding process number	16	17	18	19	20	21	22	23	24	25	26	27	28	29
	50Hz TIME(sec)	1.0	5.0	2.0	9.0	7.0	6.0	7.0	3.0	15.0	8.0	43.0	3.0	3.5	0.1
	TIME Σ (sec)	180.2	185.2	187.2	196.2	203.2	209.2	216.2	219.2	234.2	242.2	285.2	288.2	291.7	291.8
	TIME Σ (min)	3.0	3.1	3.1	3.3	3.4	3.5	3.6	3.7	3.9	4.0	4.8	4.8	4.9	4.9
Set time (sec)		10.0		55.0								30.0			
with diluting	60Hz TIME(sec)	1.0	4.2	5.0	7.5	7.0	6.0	7.0	2.5	15.0	8.0	45.0	2.5	2.9	0.1
	TIME Σ (sec)	177.5	181.7	186.7	194.2	201.2	207.2	214.2	216.7	231.7	239.7	284.7	287.2	290.1	290.2
	TIME Σ (min)	3.0	3.0	3.1	3.2	3.4	3.5	3.6	3.6	3.9	4.0	4.7	4.8	4.8	4.8
	Set time (sec)		10.0		55.0								30.0		
with diluting	50Hz TIME(sec)	1.0	5.0	2.0	9.0	7.0	6.0	7.0	3.0	15.0	8.0	43.0	3.0	3.5	0.1
	TIME Σ (sec)	204.2	209.2	211.2	220.2	227.2	233.2	240.2	243.2	258.2	266.2	309.2	312.2	315.7	315.8
	TIME Σ (min)	3.4	3.5	3.5	3.7	3.8	3.9	4.0	4.1	4.3	4.4	5.2	5.2	5.3	5.3
	Set time (sec)		10.0		55.0								30.0		
with diluting	60Hz TIME(sec)	1.0	4.2	5.0	7.5	7.0	6.0	7.0	2.5	15.0	8.0	45.0	2.5	2.9	0.1
	TIME Σ (sec)	201.5	205.7	210.7	218.2	225.2	231.2	238.2	240.7	255.7	263.7	308.7	311.2	314.1	314.2
	TIME Σ (min)	3.4	3.4	3.5	3.6	3.8	3.9	4.0	4.0	4.3	4.4	5.1	5.2	5.2	5.2
	Set time (sec)		10.0		55.0								30.0		
SV21					SV22	SV22	SV22								
SV22								SV23	SV23						
SV23										SV24	SV24				
SV24	SV24		SV24												
SV25											SV25				
P21															
P21 H															
P22		PS22=2													
P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23
P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24
P2				PS24=2					P2						
M21								M21				PS24=2	M21		
M21 C								M21C					M21C		
Ozonizer	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN	OZN
HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV	HV
Chlorine addition	P3														
SV10															
PS21															
PS22(HP)		PS22 HP													
PS23															
PS24				PS24											

(b) Sub time chart of the auto-measurement

Sub sequence of the auto-measurement

Process number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Process name	Alarm Signal Check	Sample Intusion	Pure Water Intusion	Drainage 1	Sampling	Sampling	Sampling	Stand-by	Main Sequence Stand-by	Drainage 2	Dilution Tank 1 Cleaning	Drainage 3	Dilution Tank 2 Cleaning	Line Cleaning	Stop	Completion (Stand-by)
Preceding process number: (5 min)	50Hz TIME(sec)	200	00	270	500	500		60	732	N16	10	11	12	13	14	15
	TIME Σ (sec)	3.0	23.0	23.0	500	1000		106.0	179.2	199.2	217.2	244.2	251.2	258.2	258.3	
	TIME Σ (min)	0.1	0.4	0.4	0.8	1.7	1.7	1.7	1.8	3.0	3.3	4.1	4.2	4.3	4.3	
	Set time (sec)								50.0					50.0		
	60Hz TIME(sec)	3.0	200	00	270	500	500		60	70.5	200	18.0	27.0	7.0	7.0	0.1
	TIME Σ (sec)	3.0	23.0	23.0	500	1000	1000		106.0	176.5	196.5	214.5	241.5	248.5	255.5	255.6
	TIME Σ (min)	0.1	0.4	0.4	0.8	1.7	1.7	1.7	1.8	2.9	3.3	3.6	4.0	4.1	4.3	4.3
	Set time (sec)								50.0							
	50Hz TIME(sec)	3.0	200	60	270	680	680		60	73.2	200	18.0	27.0	7.0	7.0	0.1
	TIME Σ (sec)	3.0	23.0	290	560	1240	1240		130.0	203.2	223.2	241.2	268.2	275.2	282.2	282.3
TIME Σ (min)	0.1	0.4	0.5	0.9	2.1	2.1	2.1	2.2	3.4	3.7	4.0	4.5	4.6	4.7	4.7	
Set time (sec)								50.0								
60Hz TIME(sec)	3.0	200	60	270	680	680		60	70.5	200	18.0	27.0	7.0	7.0	0.1	
TIME Σ (sec)	3.0	23.0	290	560	1240	1240		130.0	200.5	220.5	238.5	265.5	272.5	279.5	279.6	
TIME Σ (min)	0.1	0.4	0.5	0.9	2.1	2.1	2.1	2.2	3.3	3.7	4.0	4.4	4.5	4.7	4.7	
Set time (sec)								50.0								
Standard (with diluting)	SV1	SPAN	SPAN	SV2	SV2	SPAN	SPAN									
	SV2	ZERO	SV2	SV2	SV2	ZERO	SV2									
	SV3															
	SV4				SV4					SV4						
	SV5									SV5	SV5					
	SV6	L2	L2	L2	L2	L2	L2	L2		L2	L2	L2	L2	L2	L2	
	SV7	SV7	SV7	SV7	SV7	SV7	SV7	SV7		SV7	SV7	SV7				
	SV8												SV8			
	P1	P1	P1	P1	P1	P1	P1	P1			P1				P1	
	P2	P2	P2	P2	P2	P2	P2	P2			P2				P2	
Port for chlorine addition	P3												P3	P3		
SV10													SV10	SV10		
FS1								FS1								
FS2								FS2								
FS3	FS3															

L2; It is operated when Stream 2 is selected.
 SPAN; It is operated during span measurement or span calibration.
 ZERO; It is operated during zero measurement or zero calibration..

(c) Time chart for auto-cleaning

Sequence of the auto-cleaning (1/4)

(Continued on the next page)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Stand-by 1	Nozzle Moving to the left	Nozzle Ascent	Solenoid Valve Switching	Air Substitution	Solenoid Valve Switching	Syringe HP	Stand-by 2	Pure Water Infusion	Cleaning Solution 1 Infusion	Pure Water Infusion	Cleaning 1/Supply	Cleaning 1/Air Absorption	Cleaning 1/Nozzle descent	Cleaning 1/Absorption	Cleaning 1/Stand-by	Cleaning 1/Nozzle Ascent
50Hz	6.0	14.0	3.0	0.0	12.0	5.0	4.0	2.0	33.5	7.0	33.5	6.0	10.0	3.0	6.0	10.0	3.0
TIME Σ (sec.)	6.0	20.0	23.0	23.0	35.0	40.0	44.0	46.0	79.5	86.5	120.0	180.0	190.0	193.0	199.0	209.0	212.0
TIME Σ (min.)	0.1	0.3	0.4	0.4	0.6	0.7	0.7	0.8	1.3	1.4	2.0	3.0	3.2	3.3	3.5	3.5	3.5
Set time (sec.)		30.0				30.0							15.0	20.0	10.0		
60Hz	6.0	11.7	2.5	0.0	12.0	5.0	3.3	2.0	33.5	7.0	33.5	6.0	8.3	2.5	5.0	10.0	2.5
TIME Σ (sec.)	6.0	17.7	20.2	20.2	32.2	37.2	40.5	42.5	76.0	83.0	116.5	176.5	184.8	187.3	192.3	202.3	204.8
TIME Σ (min.)	0.1	0.3	0.3	0.3	0.5	0.6	0.7	0.7	1.3	1.4	1.9	2.9	3.1	3.1	3.2	3.4	3.4
Set time (sec.)		30.0					30.0						15.0	20.0	10.0		
SV21													SV21	SV21	SV21	SV21	
SV22																	
SV23					SV23	SV23											
SV24							SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24
SV25																	
P21												P21					
P21 H												P21 H					
P22																	
P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	PS21=2	P23	P23	P23	P23
P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24
P2					P2												
M21																	M21
M21 C																	M21 C
Ozonizer																	
OZN																	
HV																	
PS21																	
PS22																	
PS22(HP)							PS22 HP										
PS23																	
PS24																	
SV1																	
SV2											SV2						
SV3																	
SV4												SV3					
SV5																	
SV6																	
SV7																	
SV8																	
SV9																	
P1																	
P2																	
Chlorine addition																	
P3																	
SV10																	
FS1																	
FS2																	
FS3																	

Sequence of the auto-cleaning (2/4)

										(Continued on the next page)									
(Continued from the preceding page)																			
	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34		
	Cleaning 1 / Dripping	Cleaning 1 / Solenoid Valve Switching	Cleaning 1 / Air	Cleaning 1 / Stand-by	Cleaning 2 / Supply	Cleaning 2 / Air Absorption	Cleaning 2 / Nozzle Descent	Cleaning 2 / Absorption	Cleaning 2 / Stand-by	Cleaning 2 / Nozzle Ascent	Cleaning 2 / Dripping	Cleaning 2 / Solenoid Valve Switching	Cleaning 2 / Air	Cleaning 2 / Stand-by	Cleaning 3 / Supply	Cleaning 3 / Air Absorption	Cleaning 3 / Nozzle descent		
50Hz	16.0	1.0	15.0	5.0	5.0	8.5	3.0	6.0	10.0	3.0	16.0	1.0	15.0	5.0	5.0	8.5	3.0		
TIME Σ (sec)	228.0	229.0	244.0	249.0	254.0	262.5	265.5	271.5	281.5	284.5	300.5	301.5	316.5	321.5	326.5	335.0	338.0		
TIME Σ (min)	3.8	3.8	4.1	4.2	4.2	4.4	4.4	4.5	4.7	4.7	5.0	5.0	5.3	5.4	5.4	5.6	5.6		
Set time (sec)	20.0					20.0	20.0	10.0			20.0						20.0		
60Hz	13.3	1.0	15.0	5.0	5.0	7.1	2.5	5.0	10.0	2.5	13.3	1.0	15.0	5.0	5.0	7.1	2.5		
TIME Σ (sec)	218.2	219.2	234.2	239.2	244.2	251.3	253.8	258.8	268.8	271.3	284.6	285.6	300.6	305.6	310.6	317.7	320.2		
TIME Σ (min)	3.6	3.7	3.9	4.0	4.1	4.2	4.2	4.3	4.5	4.5	4.7	4.8	5.0	5.1	5.2	5.3	5.3		
Set time (sec)	20.0					20.0	20.0	10.0			20.0						20.0		
SV21						SV21	SV21	SV21	SV21							SV21	SV21		
SV22																			
SV23			SV23	SV23								SV23	SV23	SV23					
SV24	SV24				SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24		
SV25																			
P21															P21				
P21 H																			
P22	PS22=2																		
P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	PS22=2	P23	P23	P23	P23	P23	P23		
P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24		
P2			P2										P2						
M21										M21							PS24=2		
M21 C										M21 C									
Ozonizer																			
OZN																			
HV																			
PS21																			
PS22(HP)	PS22 HP										PS22 HP								
PS23																			
PS24							PS24										PS24		
SV1																			
SV2																			
SV3																			
SV4																SV4	SV4		
SV5																			
SV6																			
SV7																			
SV8																			
SV9																			
P1																			
P2																			
Chlorine addition																			
P3																			
SV10																			
FS1																			
FS2																			
FS3																			

Sequence of the auto-cleaning (3/4)

	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
	Cleaning 3 / Absorption	Cleaning 3 / Stand-by	Cleaning 3 / Nozzle Ascent	Cleaning 3 / Dripping	Cleaning 3 / Solenoid valve Switching	Cleaning 3 / Air	Cleaning 3 / Stand-by	Cleaning With Pure Water / Supply 1	Cleaning With Pure Water / Supply 2	Cleaning With Pure Water / Supply 3	Cleaning With Pure Water / Supply 4	Cleaning With Pure Water / Air Absorption	Cleaning With Pure Water / Nozzle descent	Cleaning With Pure Water / Absorption	Cleaning With Pure Water / Stand-by	Cleaning With Pure Water / Nozzle Ascent	Cleaning With Pure Water / Dripping
50Hz	6.0	10.0	3.0	16.0	1.0	15.0	5.0	12.0	34.0	7.0	7.0	8.2	3.0	6.0	10.0	3.0	16.0
TIME Σ (sec)	344.0	354.0	357.0	373.0	374.0	389.0	394.0	406.0	440.0	447.0	454.0	462.2	465.2	471.2	481.2	484.2	500.2
TIME Σ (min)	5.7	5.9	6.0	6.2	6.2	6.5	6.6	6.8	7.3	7.5	7.6	7.7	7.8	7.9	8.0	8.1	8.3
Set time (sec)	10.0			20.0									20.0	10.0			20.0
60Hz	5.0	10.0	2.5	13.3	1.0	15.0	5.0	12.0	34.0	7.0	7.0	6.8	2.5	5.0	10.0	2.5	13.3
TIME Σ (sec)	325.2	335.2	337.7	351.0	352.0	367.0	372.0	384.0	418.0	425.0	432.0	438.8	441.3	446.3	456.3	458.8	472.2
TIME Σ (min)	5.4	5.6	5.6	5.9	5.9	6.1	6.2	6.4	7.0	7.1	7.2	7.3	7.4	7.4	7.6	7.6	7.9
Set time (sec)	10.0			20.0									20.0	10.0			20.0
SV21	SV21	SV21						SV21	SV21	SV21	SV21	SV21	SV21	SV21	SV21		
SV22																	
SV23						SV23	SV23										
SV24	SV24	SV24	SV24	SV24				SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24	SV24
SV25																	
P21 H								P21 H	P21 H	P21 H	P21 H						
P22 (PS21=2) × 2														(PS21=2) × 2			
P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23	P23
P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24	P24
P2						P2											
M21																M21	
M21 C																M21 C	
Ozonizer OZN																	
HV																	
PS21	PS21													PS21			
PS22(HP)				PS22 HP													PS22 HP
PS23																	
PS24													PS24				
SV1																	
SV2																	
SV3																	
SV4	SV4	SV4	SV4	SV4	SV4	SV4	SV4	SV5	SV4	SV4	SV5						
SV5																	
SV6																	
SV7								SV7		SV7							
SV8								SV8		SV8							
SV9																	
P1																	
P2																	
Chlorine addition P3																	
SV10																	
FS1																	
FS2																	
FS3																	

(Continued from the preceding page)

(Continued on the next page)

Sequence of the auto-cleaning (4/4)

(Continued from the preceding page)

	52	53	54	55	56	57	58	59	60
Cleaning With Pure Water /Solenoid Valve	51	52	53	54	55	56	57	58	59
Cleaning With Pure Water /Air	51	52	53	54	55	56	57	58	59
Completion (Stand-by)									60
50Hz TIME(sec)	1.0	15.0	5.0	3.0	3.5	25.0	60.0	0.1	0.0
TIME Σ (sec)	501.2	516.2	521.2	524.2	527.7	552.7	612.7	612.8	
TIME Δ (min)	8.4	8.6	8.7	8.7	8.8	9.2	10.2	10.2	
Set time (sec)		20.0				30.0			
60Hz TIME(sec)	1.0	15.0	5.0	2.5	2.9	20.8	60.0	0.1	0.0
TIME Σ (sec)	473.2	488.2	493.2	495.7	498.6	519.4	579.4	579.5	
TIME Δ (min)	7.9	8.1	8.2	8.3	8.3	8.7	9.7	9.7	
Set time (sec)			20.0			30.0			
SV21									
SV22									
SV23		SV23	SV23						
SV24						SV24	SV24		
SV25						SV25	SV25		
P21							P21		
P21 H							P21 H		
P22						(PS22-2) × 2			
P23	P23	P23	P23	P23	P23	P23	P23	P23	P23
P24	P24	P24	P24	P24	P24	P24	P24	P24	
P2		P2							
M21				PS24=2	M21				
M21 C					M21 C				
Ozonizer_OZN									
HV									
PS21									
PS22(HP)						PS22_HP			
PS23									
PS24				PS24					
SV1									
SV2									
SV3									
SV4									
SV5									
SV6									
SV7									
SV8									
SV9									
P1									
P2									
Chlorine addition									
SV10									
FS1									
FS2									
FS3									

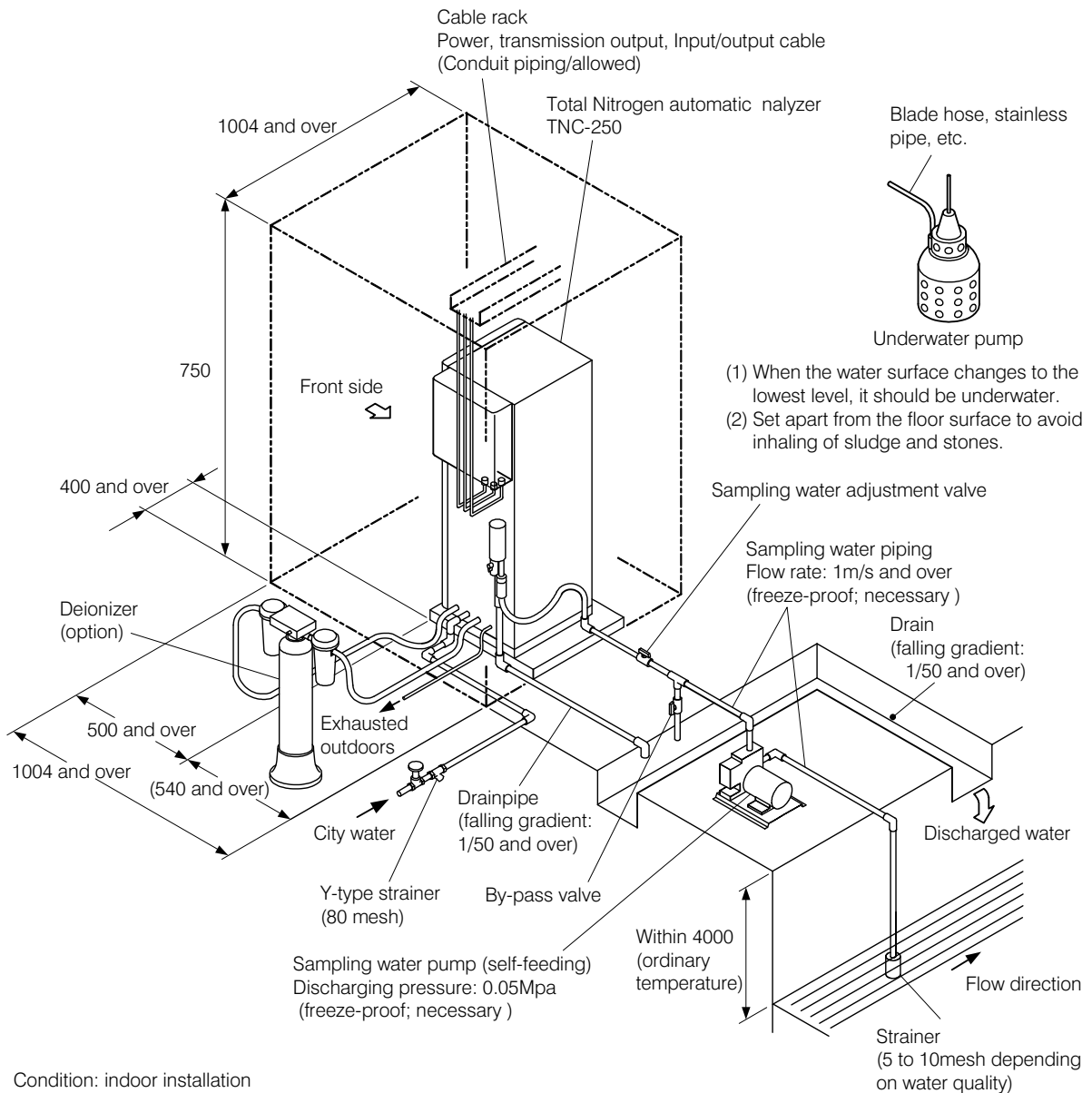
PS21 = 2; When the photo sensor 21 turns to "OFF" from "ON", it is advanced to the next process. Same applies to PS22 = 2 to PS=24.
 PS24 = 1 + PS24 = 2; When the photo sensor 24 is "ON", or when it turns to "OFF" from "ON", it is advanced to the next process.
 (PS21=2) × 2; If the photo sensor 21 turns to "ON" from "OFF" 2 times, it is advanced to the next process.
 P21H; If the pump 21 is "ON" together with "P21", it turns to high-speed operation.
 M21; Nozzle moves to the left by the rotation of the arm.
 M21C; If it is "ON" together with "MC21", nozzle moves to the right by the rotation of the arm.

8. Installation

8.1 Installation Example and Conditions

(1) Installation example

Combine this product (Automatic Total Nitrogen Analyzer TNC-250) with peripheral devices and align with reference to the installation example drawing. Among the peripheral devices in the drawing, a deionizer (option) can be added to the product depending on the specifications of the order; however, the pump, strainer, valve, piping and wiring are not added.



Condition: indoor installation

Unit: mm

Installation Example

(2) Conditions of water sampling point

Water sampling for water quality measurement is so critical as to affect the reliability of the measurement value.

Choose the water sampling point under the following conditions;

- (a) Choose a place where water quality is homogeneous and represents the sampling water. Avoid a place where water quality is unusual.
- (b) Choose a place where sampling water for manual analysis is easily obtained.
- (c) Choose a place where water depth for sampling is secured even when the water quantity decreases.
- (d) Choose a place where the disturbing elements for the measurement can not be mixed in.

(3) Installation conditions

Install in a location that satisfies the specifications and following conditions. Note that conditions set in the individual installation procedure drawing, if any, should be prioritized.

Do not install outdoors although this product is drip-proof type 1 (IP11).

- (a) Choose an indoor location where the temperature and humidity are within the specified ranges, free from sudden changes in temperature from exposure to direct sunlight and local temperature variations.
- (b) Choose a location where there is no device generating electric noise nearby.
- (c) Choose a location where installation and maintenance can be done easily.
- (d) Choose a location that is free from corrosive gas and well-ventilated.
- (e) Do not expose the instrument to salty water nor chemicals.
- (f) Choose a location that allows horizontal and stable installation, free from mechanical vibration and shock.
- (g) Choose a floor face that has a drain for liquid waste and is not affected by chemical spills.
- (h) Choose a location that has access to city water and pure water.

WARNING

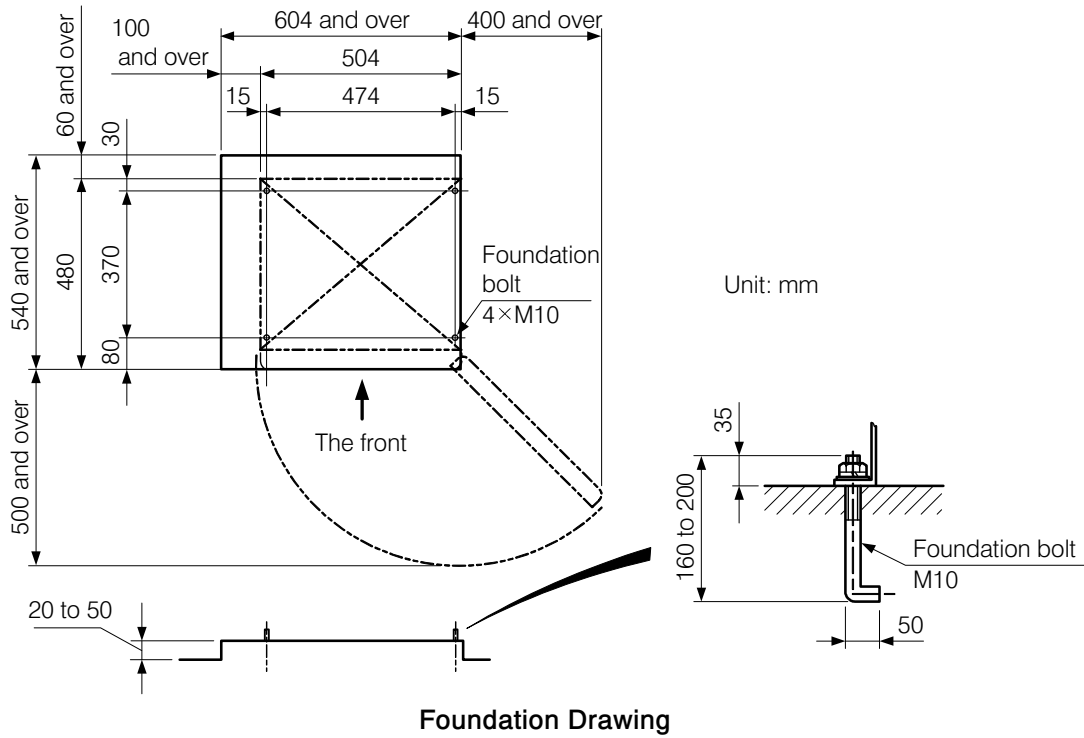
Gas

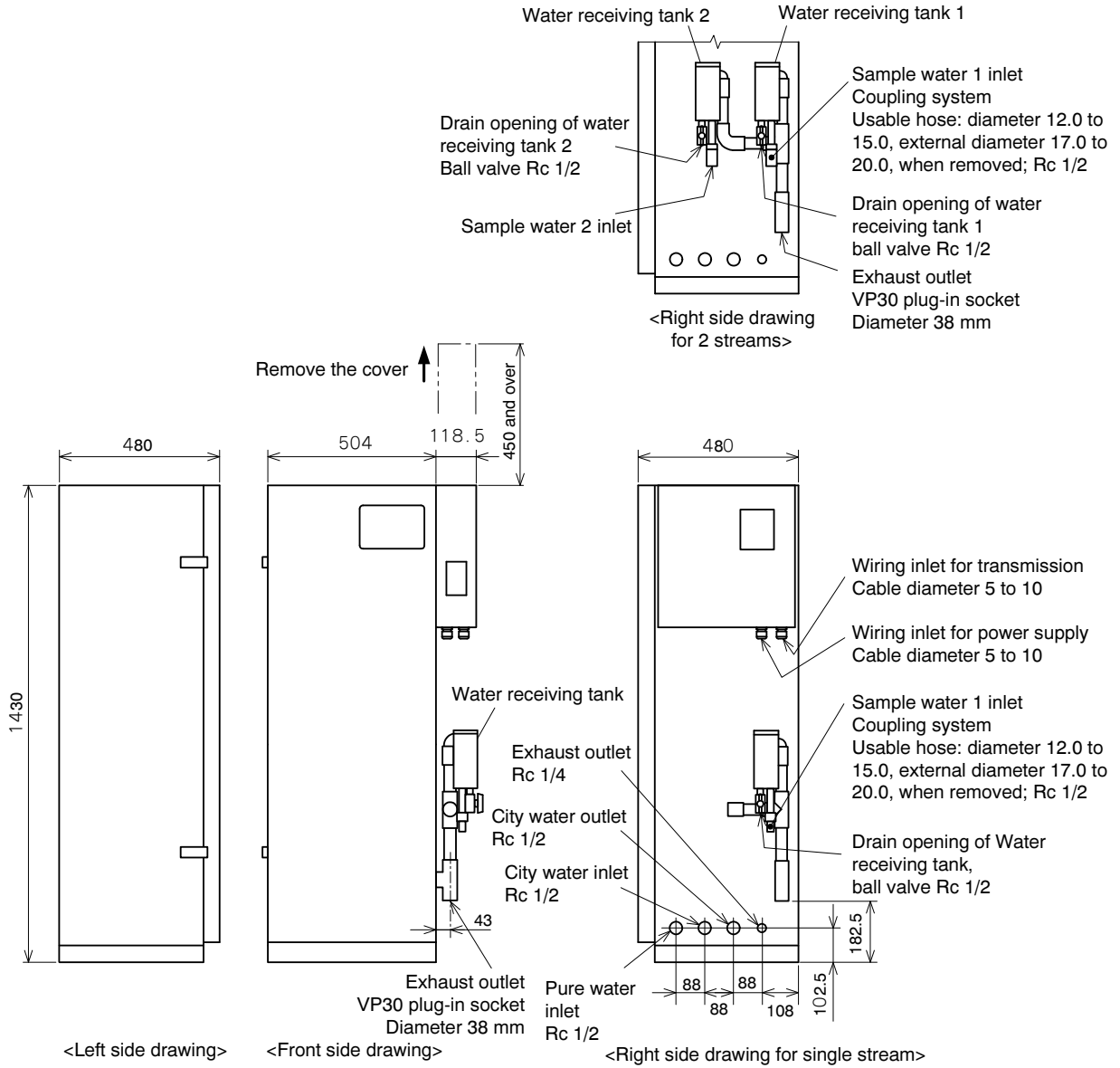
- Do not install the instrument near explosive or inflammable gas. Failure to comply may result in an explosion or ignition.
-

8.2 Installation

Install the instrument with reference to the drawings (installation example, foundation drawing, and dimensional outline drawing, etc.)

-
- 【IMPORTANT】** • Secure the product with foundation bolts to prevent the equipment from falling.
-





Dimensional Outline Drawing

8.3 Piping

(1) Sampling water inlet

- (a) Sampling water inlet is on the lower surface of the water receiving tank. Connect the sampling water piping. As for 2 streams, pipe arrangement is needed for both sampling water inlet 1 and 2.

Connecting diameter: coupling system, usable hose diameter ϕ 12.0 to 15.0, external diameter ϕ 17.0 to 20.0, when removed; Rc1/2

Piping material example: blade hose or hard vinyl chloride tube (VP16).

Transparent piping material has an advantage in monitoring contamination; however, it can promote algae growth because of external light. Choose the material depending on the water quality.

- (b) Sampling water conditions at the sampling water inlet are as indicated below. When sampling water contains contamination, the flow velocity should be increased to prevent adhesion and deposition of contamination.

Temperature: 2 to 40°C (Avoid freezing.)

Pressure: 0.02 to 0.05MPa

Flow velocity: 1 to 3L/min

Pretreatment is necessary depending on the characteristics of the sampling water (Please contact us).

- (c) Set the sampling water adjusting valve and bypass-valve for the sampling water piping around the product to adjust flow rate. These valves can be used to check the pumping operation and to extract sampling water for manual analysis.

- (d) Piping should be removable from the product to enable flushing-cleaning of the sampling water piping. Also, make no pool in the water sampling path to minimize bending.

- (e) Water sampling inlet should be below water when the water surface decreases to the lowest level. Keep away from the floor surface to avoid inhaling stones and dirt. Attach a strainer (5 to 10mesh) depending on the water quality.

- (f) Power supply cable and hose of the sampling water pump should be well protected and impervious to damage.

(2) City water inlet

- (a) Plumb city water to the city water inlet.

Connecting diameter: Rc1/2

Piping material example: hard vinyl chloride tube (VP13 and over) or blade hose

[When supplying other than city water]

Satisfy the following standards.

- Hypochlorous acid supplementation function (option) is added..

- Water quality:

Ministerial ordinance regarding the water quality standard (May 30, 2003; Ministry of Health, Labour and Welfare Ordinance No.101)

Regarding the enactment of the ministerial ordinance regarding water quality and the partial revision of the Water Supply Act enforcement regulations (October 10, 2003; HSB Notification No.1010004)

(b) Sampling water conditions at the city water inlet are as indicated below.

Temperature: 2°C to 40°C (Avoid freezing.)

Pressure: 0.1 to 0.5MPa

Consumption: approximately 170 L/day (measurement cycle: 6 min)

Application: material water for cleaning and deionizer (option)

(c) 80 mesh strainer (Y type) should be attached to the city water piping for the product.

【IMPORTANT】 • Failure to install strainers to the city water piping may cause inflow of dust into the product and blockage in the electromagnetic valve.

(d) Stop valve should be installed to the city water piping around the product to remove the piping from the product for flushing and maintenance work.

(3) Pure water inlet

(a) Plumb pure water to the pure water inlet. When deionizer is used, connect the discharge opening.

Connecting diameter: Rc1/2

Piping material example: hard vinyl chloride tube (VP13 and over) or blade hose

Deionizer (option): cartridge deionizer (type: G-10B)

(b) Pure water conditions at the pure water inlet are as indicated below.

Temperature: 2°C to 35°C

Pressure: 0.1 to 0.5MPa

Consumption: Refer to 25 “Pure water conditions” of 7.1 “Standard Specifications”.

Application: zero water, cleaning water, and dilution water

(c) Piping should be removable from the pure water inlet for flushing upon flowing.

(4) Other piping

(a) Drain outlet; Surplus sampling water and cleaning water after cleaning are discharged. Plumb from the drain outlet to the drain.

Connecting diameter: VP30 plug-in socket (diameter: 38mm)

Piping material example: hard vinyl chloride tube (VP30 and over)

Gradient: falling gradient (1/50 and over)

Pipe end: open to the air

Other conditions: Piping should be as short as possible. Minimize bending.

(b) City water outlet: When a deionizer is combined and city water supplied to the product is used for material water, plumb from the city water outlet to the deionizer.

Connecting diameter: Rc1/2

Piping material example: blade hose and etc.

(c) Exhaust outlet: Surplus ozone generated from the ozonator is processed by Carulite (CF24) and discharged from the exhaust outlet. Plumb from the exhaust outlet to the outside of the room. The length of the piping should be as short as possible and the pipe resistance should be minimized.

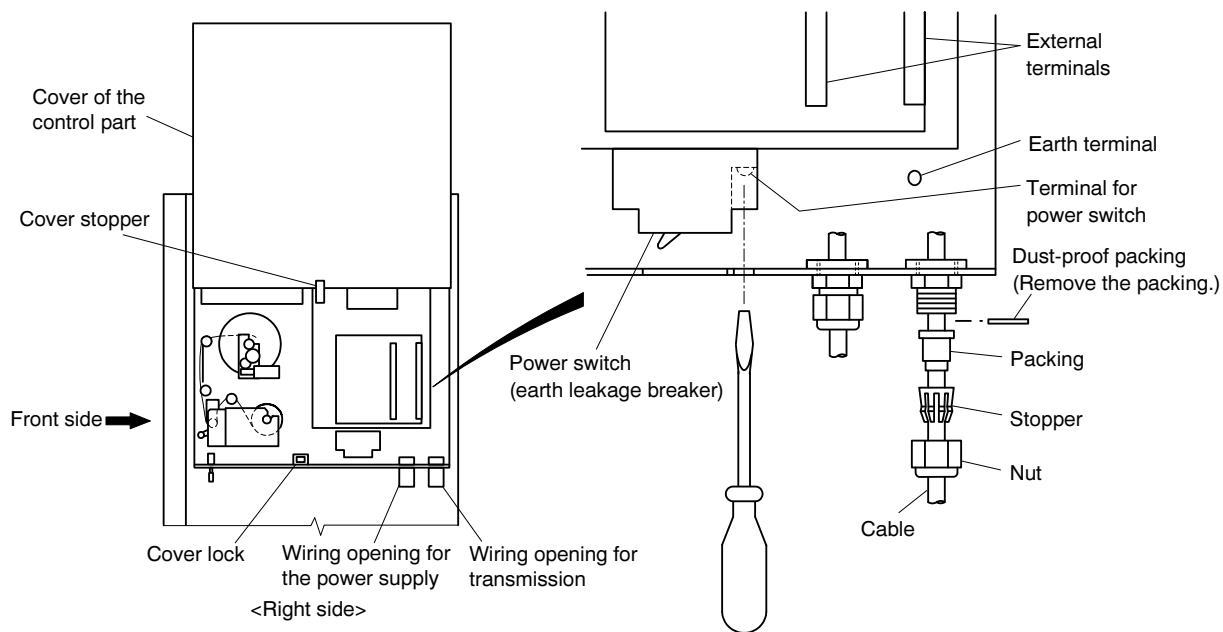
Connecting diameter: Rc1/4

Piping material example: Teflon tube, blade hose, etc (external diameter $\phi 6$ to 10)

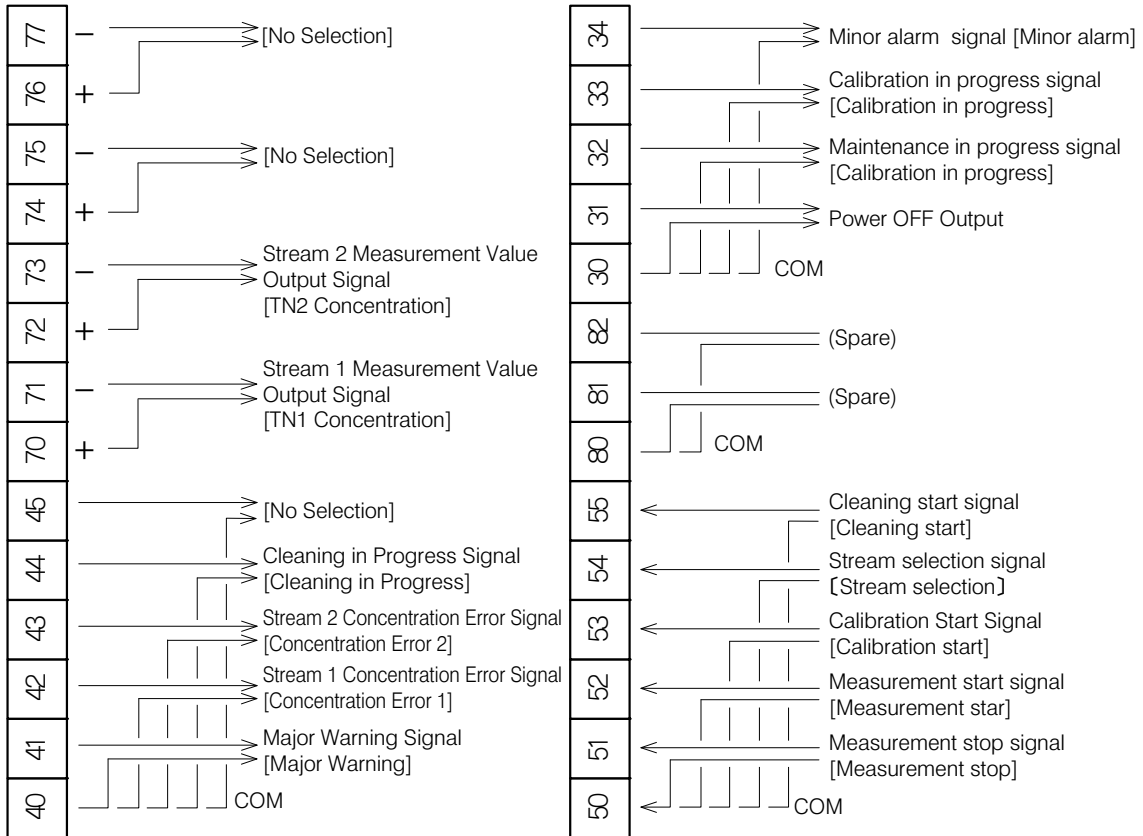
8.4 Wiring

(1) Wiring opening and terminal

(a) Terminals requiring wiring are in the control part. Slide the knob of the cover lock on the lower surface of the control part to unlock, lift the cover of control part slowly, and put the cover on the gutter of the cover stopper where the cover stopper protrudes.



Position of the Wiring Openings and Terminals



- No Selection; Terminals to which signals are not allocated.
- This is subject to change by the specifications of the order.

External Terminals

(b)Put the cable in the control part through the wiring opening. With the reference to the following pages, connect the power supply to the power switch and other input/output switches to the external terminals.

【IMPORTANT】 • The allocation of the communication items to the terminals is subject to change by the specifications of the order. Check it is not changed upon loop check of the trial operation. ▷ See “3.2 External Input/Output Signals and Loop Check”.

(2) Transmission output terminal

(a)Functions and other items of this terminal are as indicated below.

- Communication item and terminal number
 Stream 1 measurement value output [70 (+)-71 (-)]
 Stream 2 measurement value output [72 (+)-73 (-)]
 No Selection [74 (+)-75 (-)]
 No Selection [76 (+)-77 (-)]
- Function Send measurement value of all nitrogen to the control room by analog signal.
- Specifications 4 to 20mADC, load resistance; 600Ω and below, insulation type (non-insulated between channels).

- Wire rod Cap tire cable; $0.75^{\text{sq}} \times 2^{\text{c}}$ and over
- (b) The transmission output range (4 to 20mADC) corresponds to B21 measurement range 1 or B22 measurement range 2, and the present measurement value is held until the next measurement value is provided.
- (c) Lay the cable from the transmission wiring opening and connect to the transmission output terminal of the external terminal to which the transmission item is allocated.

【IMPORTANT】 • Keep the cable for transmission output away from the noise source such as power cable, motor and pump to suppress noise.

(3) Contact output terminal including power OFF output

- (a) Functions and other items of this terminal are as indicated below.
- Signal item and terminal number
 - Power OFF Signal (30-31)
 - Maintenance in Progress Signal (30-32)
 - Calibration in Progress Signal (30-33)
 - Minor Alarm Signal (30-34)
 - Major Warning Signal (40-41)
 - Stream 1 Concentration Error Signal (40-42)
 - Stream 2 Concentration Error Signal (40-43)
 - Cleaning in Progress Signal (40-44)
 - No Selection (40-45)
 - Stream 1 Signal for measurement in progress (-)
 - Stream 2 Signal for measurement in progress (-)
 - Function This sends the signal indicating the product state to the control room.
 - Specifications Contact capacity; 100VAC 0.2A and below and 24VDC 0.8A and below
 - Wire rod Cap tire cable; $0.75^{\text{sq}} \times 2^{\text{c}}$ and over
- (b) Output items allocated to contact output 1 to 8 vary depending on the specifications of order. Check the service mode 550 contact check window. \triangleright See section 3.2(3) “Contact output and loop check”.
- (c) Lay the cable from the transmission wiring opening and connect to the contact output terminal of the external terminal to which the item is allocated.

(4) Contact input terminal

- (a) Functions and other items of this terminal are as indicated below.
- Signal item and terminal number
 - Measurement Stop Signal (50-51)
 - Measurement Start Signal (50-52)
 - Calibration Start Signal (50-53)
 - Stream Selection Signal (50-54)
 - Cleaning Start Signal (50-55)
 - External device Busy Signal
 - No Selection
 - Function This sends the operation order such as measurement-start from the control room to the product.

- Specifications Contact capacity; 24VDC 0.1A and below. Effective contact time is 1s and over.
- Wire rod Cap tire cable; $0.75^{\text{sq}} \times 2^{\text{c}}$ and over

(b) Lay the cable from the transmission wiring opening and connect to the contact output terminal of the external terminal to which the item is allocated.

(5) Terminal for the power switch

(a) Functions and other items of this terminal are as indicated below.

- Function This terminal is for inputting the power supply to the product.
- Specifications 100VAC $\pm 10\%$ 50/60Hz
Power variation should be small enough. There should be no noise.
- Power consumption 400VA and below (when the room temperature is 25°C)
- Wire rod cap tire cable; $1.25^{\text{sq}} \times 3^{\text{c}}$ and over

-
- 【IMPORTANT】**
- For safety, do not supply power to the product here. Supply power according to section 3.1(1) "Procedures for test run adjustment".
 - Do not connect the power over the range designated in the specifications. Do not connect power to the other terminal by mistake.
-

(b) Lay the cable from the power wiring opening and connect to the contact to the input terminal of the power switch (earth leakage breaker).

(c) Install a switch on the power supply system to stop power supply to the product.

(d) Implement the lightning protection measures in the areas susceptible to lightning strikes.

(6) Earth terminal

(a) Functions and other items of this terminal are as indicated below.

- Function This terminal is for electrical discharge of abnormal power current to ground.
- Specifications D-type earth (earth resistance; 100Ω and below)
- Wire rod $1.25^{\text{sq}} \times 2^{\text{c}}$ and over



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- For safety, connect the earth terminal to the ground. Failure to properly ground the equipment may disable the operation of the breaker upon electrical leakage.
-

(b) Connect the earth terminal.

(c) Connect to the ground separately from the earth for power to avoid noise.

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ATD



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/>