Service Manual

Celltac G

Automated Hematology Analyzer

MEK-9100

0634-901044G

NIHON KOHDEN

About This Manual

In order to use this product safely and fully understand all its functions, read this manual before using the product. Keep this manual near the instrument or in the reach of the operator and refer to it whenever the operation is unclear.

Accompanying Documentation

The automated hematology analyzer comes with the following manuals. Refer to the manual depending on your needs.

Operator's Manual

Describes the operation and settings of the automated hematology analyzer. Read this manual before use.

Data Management and Setting Guide

Describes the setting procedures performed by administrators. Analyzer administrators should read the Operator's Manual together with this guide. Manage this guide so that it can only be accessed by analyzer administrators.

Service Manual (this manual)

For qualified service personnel. Describes information on servicing the automated hematology analyzer. Only qualified service personnel can service the automated hematology analyzer.

Trademark

The company name and model name are trademarks and registered trademarks of each company.

TM

The mark printed on the SD card that is used in this instrument is a trademark.

This product stores personal patient information. Manage the information appropriately.

Patient names on the screen shots and recording examples in this manual are fictional and any resemblance to any person living or dead is purely coincidental.

The contents of this manual are subject to change without notice. If you have any comments or suggestions on this manual, please contact us at: https://www.nihonkohden.com/

Contents

Precautions

In order to operate this device safely and correctly, read the following precautions thoroughly before operation.

These precautions are a list of general provisions for ensuring the safe operation of medical devices and the safety of patients and operators and may include some items that are not relevant to the operation of this device.

For precautions related to the operation of this device, refer to the other sections of this manual.

1. **This device is for use by qualified medical personnel only.**
2. **When using, installing or storing the device, take the following precautions:**
   (1) Place the device in a location where the specified environment conditions are satisfied.
   (2) Avoid moisture or contact with water, direct sunlight, dust, and saline or sulphuric air.
   (3) Place the device on an even, level floor. Avoid vibration and mechanical shock, even during transport.
   (4) Avoid placing the device in an area where chemicals are stored or where there is possibility of gas leakage.
   (5) Connect the device to a grounded 3-pin medical power supply that satisfies the requirements of the device specifications.
3. **Before Operation**
   (1) Check that the specified power cord is used.
   (2) Check that all cables and cords are connected properly. Make sure that sensors and electrodes are properly connected to the device and correctly attached to the patient.
   (3) When the device is used in combination with other devices, check that there is no interference between any of the devices and that all of the devices can be used safely together.
4. **During Operation**
   (1) Only use the device for the time period or number of times necessary for the current examination or other medical procedure.
   (2) Both the device and the patient must receive continual, careful attention.
   (3) Take all appropriate measures to assure the safety of the patient whenever any abnormality is detected in the operation of the device or in the patient condition.
   (4) Avoid direct contact between the device housing and the patient.
5. **After Operation**
   (1) Turn the power off by following the specified procedures.
   (2) Remove the cords gently. Do not use force to remove them or unplug them by pulling the cable.
   (3) Clean all accessories, cords and electrodes and store them appropriately.
   (4) Clean the device for its next use.
6. **When trouble occurs**
   (1) Remove all electrodes and sensors from the patient.
   (2) Turn the power off and remove the power cord from the AC power source.
   (3) Attach an “Out of Order” or “Do Not Use” warning label to the device and immediately contact your Nihon Kohden representative.
7. **The device must not be altered or modified in any way.**
8. **Ensure that the device receives daily checks and periodic inspections and check that it can be used properly and safely.**
9. **Always have an alternative method of performing the device’s function prepared in case of an accident or malfunction affecting the operation of the device.**
10. **Be careful of malfunctions that may occur when the device is exposed to strong electromagnetic fields.**
    Interference from a strong electromagnetic field may cause the device to malfunction or noise to appear in the waveforms. If an unexpected malfunction occurs during operation of the device, check the electromagnetic environment and take the necessary measures to rectify the situation.

    The following items describe some common causes of interference and the recommended actions to take in response.

    (1) Use of cellular phones
    Electromagnetic interference can cause errors in the operation of the device. Turn off cellular phones and other wireless devices, remove them from the location where the device and/or system is installed, or exclude them from the facility altogether.

    (2) Radio-frequency interference from other devices through the AC power supply of the device and/or system
    - Identify the source of the interference and apply measures such as noise reduction circuits to reduce the interference.
    - If the source of the interference is a device that can be turned off, stop using that device and turn its power off.
    - Connect the device to different AC power supply.

    (3) Effect of direct or indirect discharge of electrostatic energy to the device or the surrounding area
    - Make sure all users and patients in contact with the device and/or system are free from electrostatic energy before using it.
    - A humid room can help lessen this problem.

    (4) Lightning
    When lightning occurs near the location where the device and/or system is installed, it may induce an excessive voltage in the device and/or system. In such a case, take the following measures when using the device.
    - Remove the power cord from the AC outlet and operate the device using the internal battery.
    - Use an uninterruptible power supply.

    (5) If the device and/or system interferes with any radio wave receiver such as a radio or television set, locate the device and/or system as far as possible from the radio wave receiver.

    (6) Warning: Use adjacent to or stacked with other equipment
    Malfunctions may occur during operation when the device and/or system is adjacent to or stacked with other equipment. Before use, check that the device and/or system operates normally with the other equipment.

    (7) Warning: Use of unspecified devices and/or cables
    When an unspecified device and/or cable is connected to this device and/or system, it may cause increased electromagnetic emissions or decreased electromagnetic immunity.
    This device and/or system complies with all requirements of the relevant EMC standards when used with the specified accessories and cables. Only use this device and/or system with the specified accessories and cables.

    (8) Measurement with excessive sensitivity
    The device and/or system is designed to measure bioelectrical signals with a specified sensitivity. If the device and/or system is used with excessive sensitivity, artifact may appear as a result of electromagnetic interference and this may cause mis-diagnosis. When unexpected artifact appears, inspect the surrounding electromagnetic conditions and remove the source of the artifact.

    (9) Use with radiation therapy devices
    When the device and/or system is used in a radiotherapy room, it may cause failure or malfunction due to electromagnetic radiation or corpuscular radiation. When you bring the device and/or system into a radiotherapy room, constantly observe the operation of the device and/or system. Prepare countermeasures in case of failure or malfunction.

    (10) Other
    When the device and/or system is used in an unspecified system configuration different from the configuration used for EMC testing, it may cause increased electromagnetic emissions or decreased electromagnetic immunity.

Warranty Policy

Nihon Kohden Corporation (NKC) shall warrant its products against all defects in materials and workmanship for one year from the date of delivery. However, consumable materials such as recording paper, ink, stylus and battery are excluded from the warranty.

NKC or its authorized agents will repair or replace any products which prove to be defective during the warranty period, provided these products are used as prescribed by the operating instructions given in the operator's and service manuals.

No other party is authorized to make any warranty or assume liability for NKC's products. NKC will not recognize any other warranty, either implied or in writing. In addition, service, technical modification or any other product change performed by someone other than NKC or its authorized agents without prior consent of NKC may be cause for voiding this warranty.

Defective products or parts must be returned to NKC or its authorized agents, along with an explanation of the failure. Shipping costs must be pre-paid.

This warranty does not apply to products that have been modified, disassembled, reinstalled or repaired without Nihon Kohden approval or which have been subjected to neglect or accident, damage due to accident, fire, lightning, vandalism, water or other casualty, improper installation or application, or on which the original identification marks have been removed.

In the USA and Canada other warranty policies may apply.

Responsibilities – Professional Users

This instrument must be used by a professional user with a full knowledge of operating this instrument, only for his/her intended use and according to the instructions for use. Instructions in the operator's manual must be followed, especially the following points.

- Storage and stability of reagents
- Handling of reagents
- Instrument installation
- Connection of all tubes to inlets and outlets
- Connection of all tubes to reagents and waste container
- Checking the amount of reagents and waste fluid
- Calibration
- Quality control
- Maintaining and servicing

If deviating from the instructions, the professional user does it at the risk and liability of the laboratory and only after validation by the laboratory. Nihon Kohden has no responsibility over such deviations.

EMC Related Caution

This equipment and/or system complies with the International Standard EN 61326-2-6 for electromagnetic compatibility for electrical equipment and/or system for measurement, control and laboratory use. However, an electromagnetic environment that exceeds the limits or levels stipulated in the EN 61326-2-6, can cause harmful interference to the equipment and/or system or cause the equipment and/or system to fail to perform its intended function or degrade its intended performance. Therefore, during the operation of the equipment and/or system, if there is any undesired deviation from its intended operational performance, you must avoid, identify and resolve the adverse electromagnetic effect before continuing to use the equipment and/or system.

The following describes some common interference sources and remedial actions:

1. Strong electromagnetic interference from a nearby emitter source such as an authorized radio station or cellular phone:

   Install the equipment and/or system at another location if it is interfered with by an emitter source such as an authorized radio station. Keep the emitter source such as cellular phone away from the equipment and/or system.

2. Radio-frequency interference from other equipment through the AC power supply of the equipment and/or system:

   Identify the cause of this interference and if possible remove this interference source. If this is not possible, use a different power supply.

3. Effect of direct or indirect electrostatic discharge:

   Make sure all users and patients in contact with the equipment and/or system are free from direct or indirect electrostatic energy before using it. A humid room can help lessen this problem.

4. Electromagnetic interference with any radio wave receiver such as radio or television:

   If the equipment and/or system interferes with any radio wave receiver, locate the equipment and/or system as far as possible from the radio wave receiver.

5. Use with radiation therapy equipment:

   When the equipment and/or system is used in a radiotherapy room, it may cause failure or malfunction due to electromagnetic radiation or corpuscular radiation. When you bring the equipment and/or system into a radiotherapy room, constantly observe the operation. Prepare countermeasures in case of failure or malfunction.

If the above suggested remedial actions do not solve the problem, consult your Nihon Kohden representative for additional suggestions.

This equipment complies with International Standard EN 55011: 2002 Group 1, Class B. Class B EQUIPMENT is equipment suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Conventions Used in this Manual and Instrument

Warnings and Cautions

Level	Description
⚠ **WARNING**	A warning alerts the user to the possible injury or death associated with the use or misuse of the instrument.
⚠ **CAUTION**	A caution alerts the user to possible injury or problems with the instrument associated with its use or misuse such as instrument malfunction, instrument failure, damage to the instrument, or damage to other property.

Icons in this Manual

Icon	Description
	Indicates alternative operation methods and other information.
	Indicates related pages in this or other manuals which give more details.

Safety Standards

Safety Standard Classification of the Analyzer

Type of protection against electrical shock:

CLASS I EQUIPMENT

Degree of protection against harmful ingress of water:

IPX0 (non-protected)

Degree of safety of application in the presence of FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE:

Equipment not suitable for use in the presence of FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE

Mode of operation:

CONTINUOUS OPERATION

ME EQUIPMENT type:

STATIONARY type

Pollution degree:

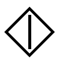
2 EQUIPMENT

Symbols

The following symbols are used with the analyzer.

The names and descriptions of each symbol are as shown in the table below.

Analyzer

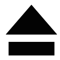
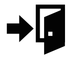
Symbol	Description
	AC power off
	AC power on
	Stand-by
	“Off” only for part of the equipment
	“On” only for part of the equipment
	Laser on
	Reset
	Start
	Do not touch
	Attention, see instructions for use
	Consult instructions for use
	Inlet
	Outlet
ISO 3/4	ISOTONAC•3/4 inlet
CLN 710	CLEANAC•710 inlet
HEMO 310	HEMOLYNAC•310 inlet

Symbol	Description
HEMO 510	HEMOLYNAC•510 inlet
WASTE	Waste outlet
	Alternating current
	Equipotential terminal
	Fuse (time lag)
	USB socket
IVD	In vitro diagnostic medical device
	Biohazard
	LAN socket
IOIOI	Serial interface
CE	The CE mark is a protected conformity mark of the European Union.
	Products marked with this symbol comply with the European WEEE directive 2012/19/EU and require separate waste collection. For Nihon Kohden products marked with this symbol, contact your Nihon Kohden representative for disposal.

On Screen and Recorded Data

On Screen

Symbol	Description
	Home key
	Information key
	Manual Measurement key

Symbol	Description
	Eject key
	Change Operator key

1 General

Introduction

> ⚠ **CAUTION**
> Do the maintenance procedure according to the schedule specified by Nihon Kohden. Otherwise, maximum performance cannot be guaranteed. Refer to Section 6 "Maintenance" for details.

This service manual provides useful information to qualified service personnel to understand, troubleshoot, service, maintain and repair the MEK-9100 automated hematology analyzer.

The maintenance must be periodically performed because the analyzer has fluid paths and precision parts. Accordingly, the user is responsible for performing the periodic maintenance. The "Maintenance" section in this service manual describes the maintenance that should be performed by qualified service personnel. The "Maintenance" section in the operator's manual describes the maintenance that can be performed by the user.

NOTE: If the analyzer has a problem and there has been no periodic maintenance, the analyzer will usually be normal again by cleaning the fluid paths or replacing a consumable with a new one.

The information in the operator's manual is primarily for the user. However, it is important for service personnel to thoroughly read the operator's manual and service manual before starting to troubleshoot, service, maintain or repair this analyzer. This is because service personnel needs to understand the operation of the analyzer in order to effectively use the information in the service manual.

Service Policy

> ⚠ **WARNING**
> - Be careful not to directly touch any place where blood is or may have contacted.
> - Protect yourself from infection before cleaning and doing maintenance.

Nihon Kohden’s basic policy for technical service is to replace faulty units, printed circuit boards or parts. We do not support component level repair of boards and units outside the factory.

NOTE
- When ordering parts or accessories from your nearest Nihon Kohden representative, please quote the code number and part name which are listed in this service manual, and the name or model of the unit in which the required part is located. This will help us to promptly attend to your needs.
- Always use parts and accessories recommended or supplied by Nihon Kohden to assure maximum performance from your instrument.

Overview of Design Changes

This section explains the design changes for the MEK-9100 automated hematology analyzer.

Design Changes for DATA PROCESSING UNIT and FRONT PANEL UNIT

NOTE: The new and old units and their various parts (PC board, SSD, LCD BD) are not compatible with each other, and they can be used only in the specified combinations.

Design changes for DATA PROCESSING UNIT

- The PC board and SSD installed in the DATA PROCESSING UNIT have been changed.
- The OS has been changed from Windows 7 to Windows 10, and some screen operations have been modified.

Design changes for FRONT PANEL UNIT

- Due to changes in the PC board, the LCD BD installed in the FRONT PANEL UNIT has been changed.

Old Configuration
(MEK-9100K unit version AA to AL / MEK-9100C unit version AA to AF)

No.	Component	Part Name	Remarks
1	DATA PROCESSING UNIT	PC-910W	
1-1	PC board	IT7D	Built-in PC-910W
1-2	SSD	MFDHSS-008GV-MEK91	Built-in PC-910W
2	FRONT PANEL UNIT	PV-910W	
2-1	LCD BD	UT-7285	Built-in PV-910W

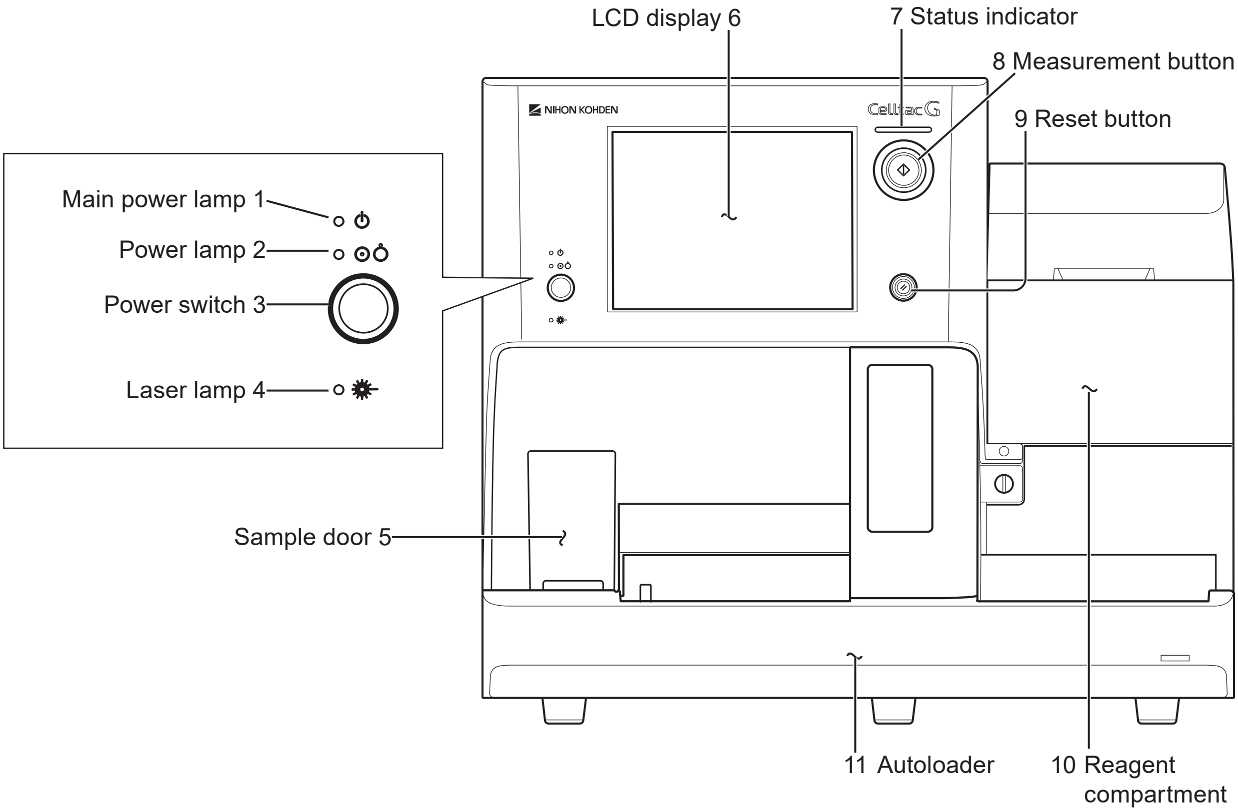
New Configuration
(MEK-9100K unit version AM or later / MEK-9100C unit version AG or later)

No.	Component	Part Name	Remarks
1	DATA PROCESSING UNIT	PC-911W	
1-1	PC board	IT10	Built-in PC-911W
1-2	SSD	RN2S-040GP02JI-NK1-MEK91	Built-in PC-911W
2	FRONT PANEL UNIT	PV-920W	
2-1	LCD BD	UT-7317	Built-in PV-920W

2 Technical Information

Panel Description

Front Panel



1 Main power lamp

Lights when the Main power switch on the rear panel is turned on.

2 Power lamp

Lights when the Main power switch on the rear panel and Power switch on the front panel are turned on.

3 Power switch

Turns the analyzer power on or off when the Main power switch on the rear panel is turned on.

4 Laser lamp

Lights when the laser switch is turned on.

5 Sample door

Opens during manual measurement, and the sample tube holder slides out.
After you set the sample tube and touch [Measure], the sample tube holder slides in and measurement begins.
After blood aspiration, the sample door opens automatically and the sample tube holder is ejected.

6 LCD display

Displays messages, ID numbers, measured parameters, measurement values and setting values. It has a touchscreen function for changing settings.

7 Status indicator

The indicator color displays the status of the analyzer such as standby, normal operation, out of reagent, or paused with error.

Operator’s Manual:
“Checking Analyzer Status” in Section 5

8 Measurement button (Auto measurement)

When the button is pressed, measurement of the sample set in the rack begins.

9 Reset button

Stops operation when pressed during operation.

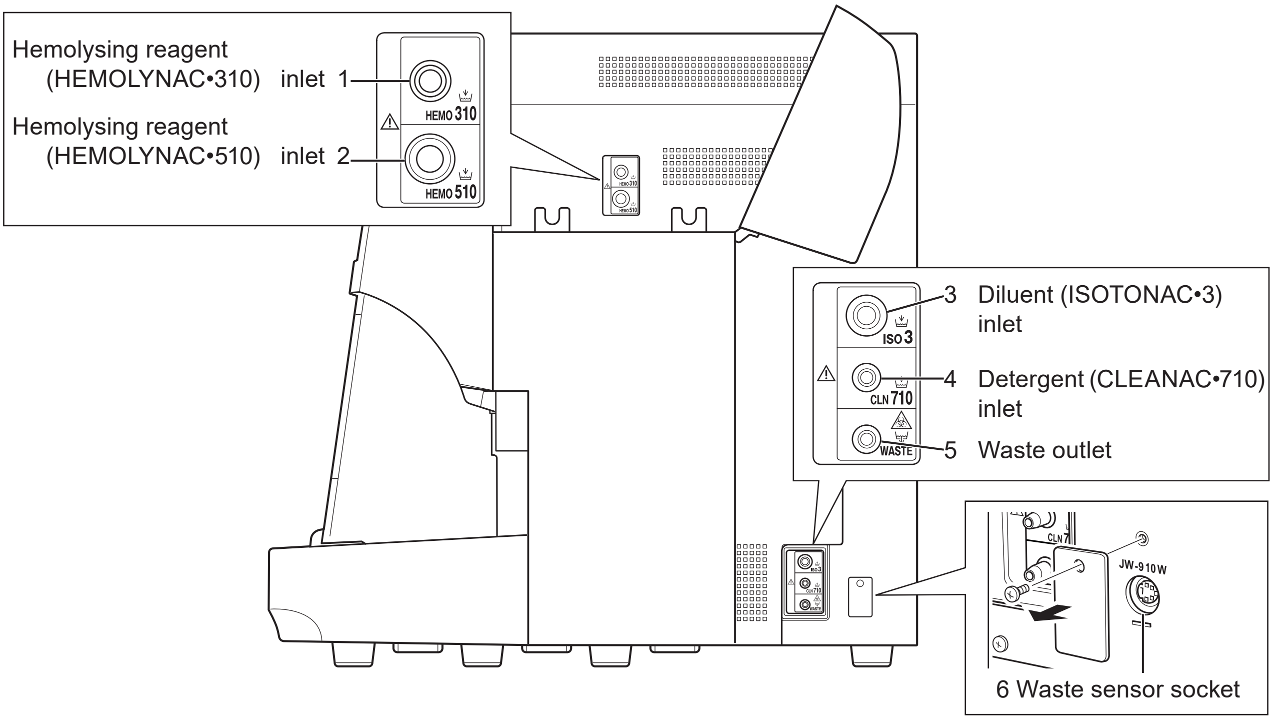
10 Reagent compartment

Stores the hemolysing reagent container.

11 Autoloader

Sets the rack.

Right Side Panel



1 Hemolysing reagent (HEMOLYNAC•310) inlet

Connects the hemolysing reagent container (HEMOLYNAC•310) using the provided HEMOLYNAC•310 tube assy.

2 Hemolysing reagent (HEMOLYNAC•510) inlet

Connects the hemolysing reagent container (HEMOLYNAC•510) using the provided HEMOLYNAC•510 tube assy.

3 Diluent (ISOTONAC•3/4) inlet

Connects the diluent container (ISOTONAC•3/4) using the provided ISOTONAC tube assy.

4 Detergent (CLEANAC•710) inlet

Connects the detergent container (CLEANAC•710) using the provided CLEANAC tube assy.

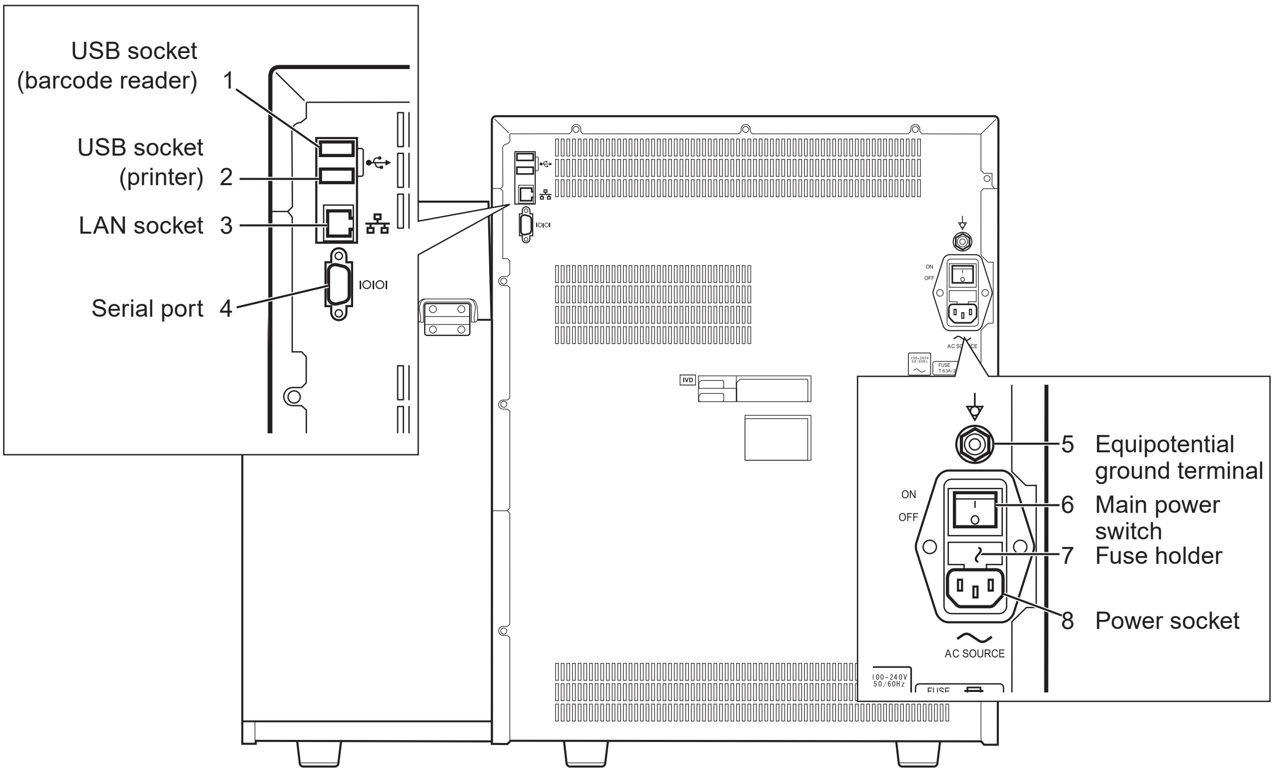
5 Waste outlet

Discharges the used diluent, detergent and aspirated sample.
Connects the waste container using the provided waste tube assy.

6 Waste sensor socket

Connects the optional waste sensor.

Rear Panel



1 USB socket (barcode reader)

Connects to a ZK-910W bar code reader.

2 USB socket (printer)

Connects to an optional WA-714W impact printer or the equivalent.

3 LAN socket

Connects to the hospital network and sends/receives order info and measurement data to and from the system.

4 Serial port

Connects to an optional WA-461V card printer with serial communication.

5 Equipotential ground terminal

Used when the analyzer is grounded equipotentially to other devices using the provided earth.

6 Main power switch

Supplies power (100 - 240 V) to the analyzer when it is turned on. Under normal conditions, keep this switch turned on.

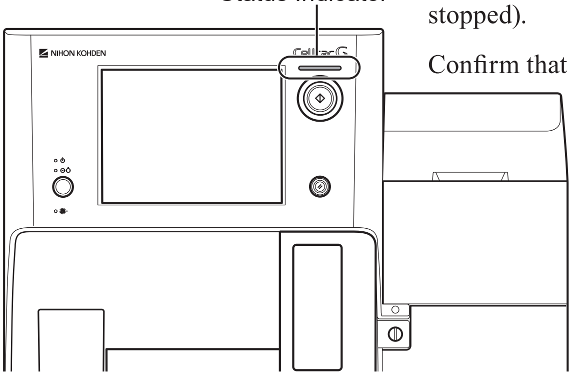
7 Fuse holder

Contains the time-lag fuses.

8 Power socket

Connects the AC power cord to supply AC power (100 - 240 V) to the analyzer.

Status Indicator



The color of the indicator displays the operation status (starting, operating and stopped).

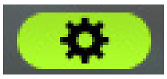
Confirm that the indicator is green (standby) before a measurement.

Display		Status
Green	Lit	Standby
	Blinking	Operating
Orange or Red	Lit	Stopped due to error
Blue	Blinking	Starting
Off		Power off

Status Indication

The status indication at the top of the screen displays the status of the reagents, quality control and user maintenance.

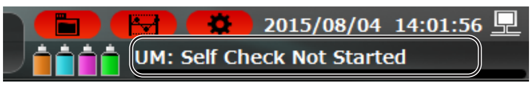
Confirm that all statuses are green before starting a measurement.

Status Indication	Status
Reagent Management 	Green when all the following conditions are met: • All reagents are within the valid period (before their expiration date and expiration after opening date). • All reagents have more than 0% remaining. • The waste amount is below the warning level.
Quality Control 	Green when all the following conditions are met: • Quality control measurement is performed for all control samples in use. • The last quality controlled measured results of all control samples in use meet the quality control judgment criteria or are approved by the operator.
User Maintenance 	Green when all the following conditions are met: • No user inspection items are past their regular user maintenance dates. • No service inspection items are past their regular service maintenance dates. • The analyzer current status does not need any maintenance. • The analyzer self check has been performed and all items passed.

NOTE: Even if the above conditions are met, the quality control and user maintenance status is red if the following conditions apply.

- When power is turned on (when starting)
- More than 24 hours since the last quality control measurement (quality control status) or self check (user maintenance status).

A message showing the cause appears when the status is displayed in red.



Principle of Operation

Blood Cell Counting

1 Constant current flows between 2 electrodes on both sides of the aperture cap. The electrolytic solution (sample) containing blood cells is aspirated from the aperture caps.

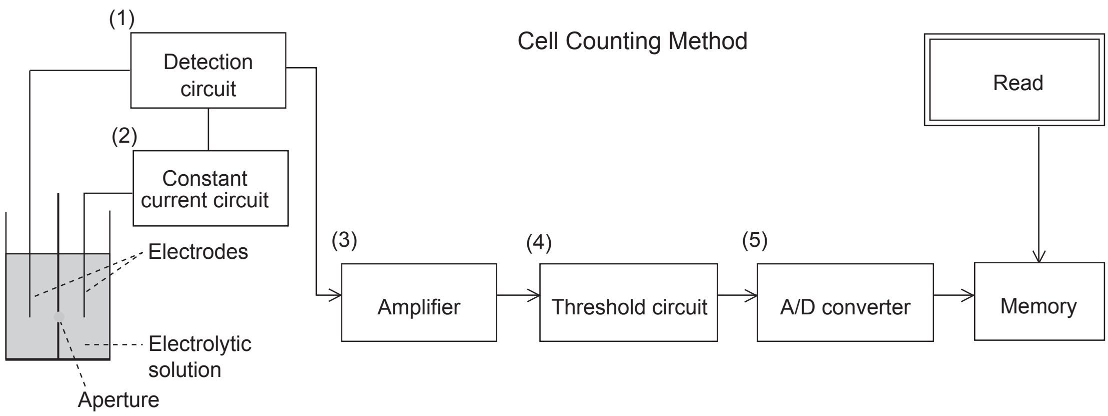
2 The resistance between the electrodes increases when a blood cell passes through the aperture between the electrodes because the DC resistance of the cells is high.

3 When the resistance changes, the amplifier generates a signal of several volts. The peak voltage is proportional to the volume of the blood cell passing through the aperture.

4 The amplified signal is sent to the threshold circuit (discrimination circuit). Here, a constant voltage is applied (threshold level) to eliminate the signals and electrical noise that are generated by non-blood cell material such as dust particles and only signals that exceed the threshold value are passed.

5 To find the peak values, the blood cell signal are sent to the A/D converter. The acquired data is stored in memory for each individual peak value.

6 The data of the blood cell count is calculated and displayed on the screen.



Platelet Measurement

RBC signals and PLT signals are saved in the analyzer memory in the form of voltage peak values.

This information is ultimately organized into a histogram in the analyzer.

There is no problem if the PLT and RBC distributions are clearly separated as in Fig. 1 but the distributions overlap in the case of small red blood cells (Fig. 2) or large platelets (Fig. 3). In these cases, the analyzer automatically moves the threshold level to the lowest distribution position, changes the PLT volume range, and performs a highly accurate PLT count.

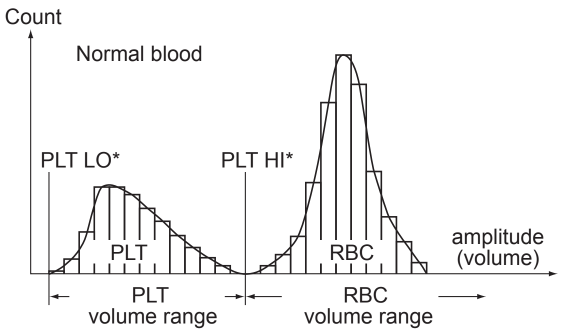


Fig.1

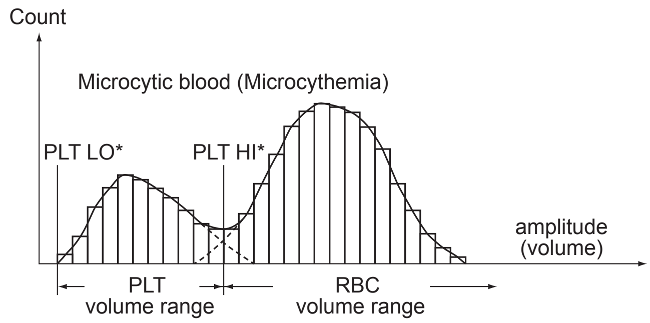


Fig.2

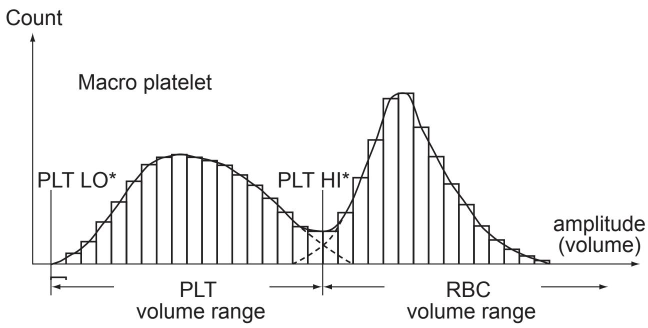


Fig.3

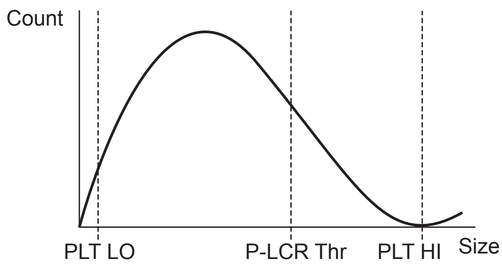
PLT LO*: Lower threshold
PLT HI*: Upper threshold

P-LCR

P-LCR is the ratio of large platelets equal to or larger than P-LCR Thr count to the platelet count.

As shown in the figure below, the ratio of the number of particles between PLT LO and PLT HI (platelet count) to the number of particles between P-LCR Thr and PLT HI (large platelet count) is calculated.

$$\text{P-LCR (\%)} = \frac{\text{Large (P-LCR Thr or more) platelet count}}{\text{Platelet count}} \times 100$$



Hemoglobin Measurement

1 HEMOLYNAC•310 is added to the diluted sample to elute the hemoglobin in the RBC. The eluted hemoglobin reacts with class 4 ammonium salt in the reagent and changes to a hemoglobin compound. The absorbance of the hemoglobin compound is proportional to the hemoglobin concentration so the concentration is determined by measuring the absorbance.

2 The transmittance of light from the LED changes according to the sample in the measurement cell. This light enters the light-receiving element.

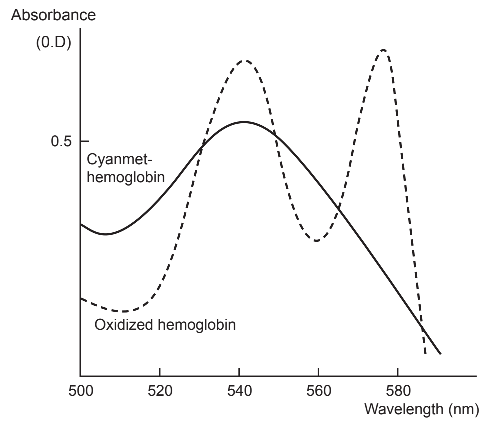
3 The light receiving element amplifies the electrical signal corresponding to the light intensity and converts this voltage to a digital value.

4 Measurement of the hemoglobin concentration requires signals of both the diluent and the sample. The sample data is acquired when starting the measurement. The ratio of sample data and diluent data is subjected to logarithmic conversion, multiplied by the coefficient, and displayed on the screen.

5 Samples that are no longer needed are ejected to an direct external device by a pump or a pressure source.

6 The sample is a highly concentrated protein solution. If the sample is left in the measurement baths for a long time, the measurement baths gradually become dirty. To prevent this problem, the measurement baths are automatically cleaned with diluent after each measurement.

Hemoglobin absorption characteristics



Principle of WBC Differential

White blood cells in the sample pass through a very thin flow cell one by one, are irradiated with a laser, and the scattered laser light is detected. (Fig. 1)

The strength and direction of the scattered light indicates the volume and complexity of the blood cells (such as the presence or absence of granules or the structure of the nucleus). The lymphocytes, monocytes, neutrophils, eosinophils, and basophils can be classified from the scattergram with 3 parameters: lowangle scattering in the same direction as the laser linear direction (“Size”), large-angle scattering in the same direction as the laser linear direction (“Complexity”), and vertical direction scattering against the laser linear direction (“Granularity”). (Fig. 2)

Size is the size of the blood cells, Complexity is the complexity of the blood cells, and Granularity is the amount of granules in the blood cells.

Fig. 1. White blood cell differential

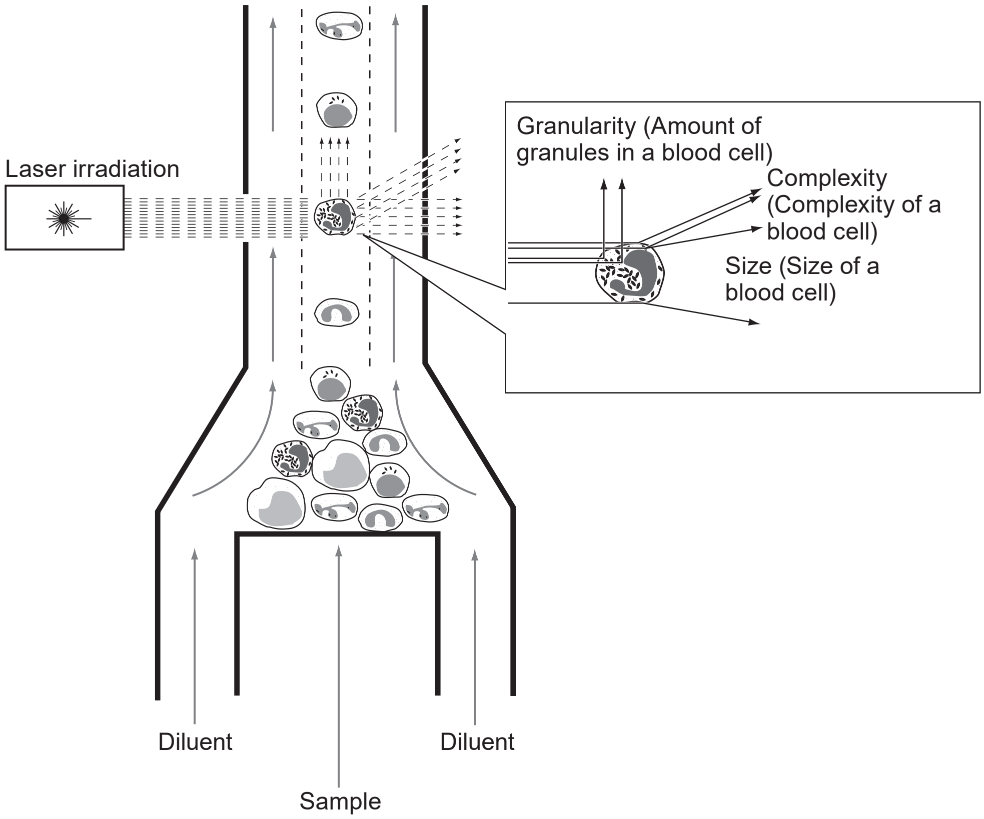
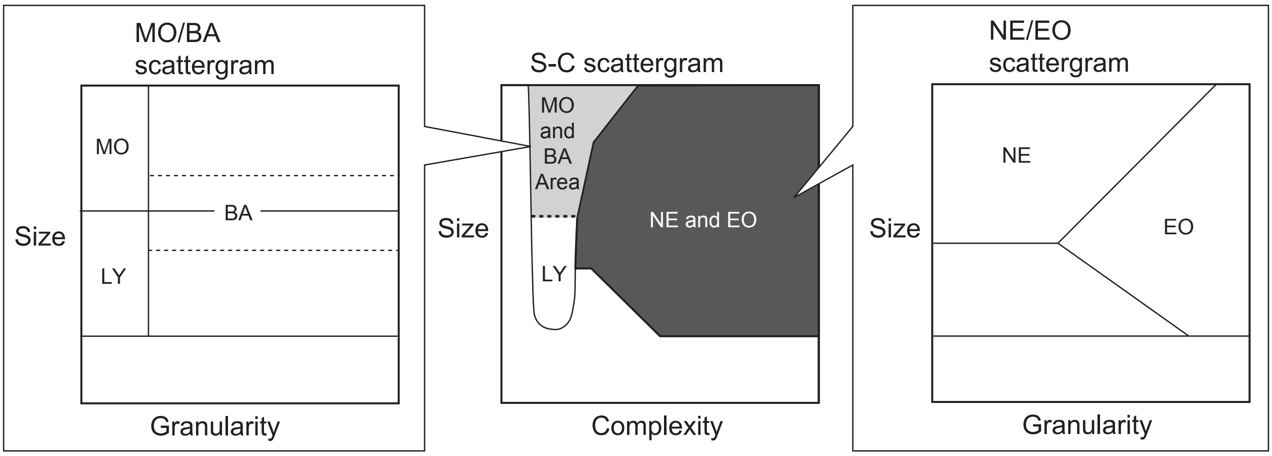


Fig. 2. Scattergram



Name	
NE	Neutrophil Count
LY	Lymphocyte Count
MO	Monocyte Count
EO	Eosinophil Count
BA	Basophil Count

There are scattergrams with Size for the vertical axis and Complexity for the horizontal axis (S-C scattergrams), scattergrams with Size for the vertical axis and monocyte and basophils classifications of Granularity for the horizontal axis (scattergrams for MO/BA classification), and scattergrams with Size for the vertical axis and neutrophil and eosinophil classifications of Granularity for the horizontal axis (scattergrams for NE/EO classification).

Lymphocytes are distributed in the LY area of the S-C scattergram. Monocytes and basophils are distributed in the MO/BA area of the S-C scattergram and when the scattergram for MO/BA classification is expanded, the monocytes are distributed in the MO area and the basophils are distributed in the BA area. Neutrophils and eosinophils are distributed in the NE/EO area of the S-C scattergram. When the scattergram for NE/EO classification is expanded, the neutrophils are distributed in the NE area and the eosinophils are distributed in the EO area.

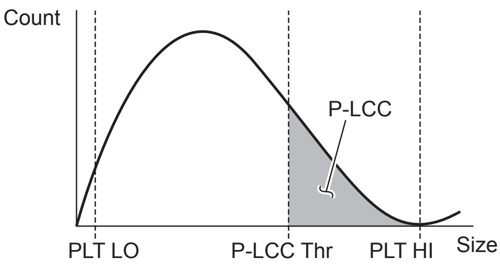
Research Parameters

P-LCC

P-LCC is the number of large platelet cells.

It corresponds to the number of particles between P-LCC Thr and PLT HI.

P-LCC = the number of platelets (P-LCC Thr or more)



Mentzer Index

The Mentzer Index is a parameter related to β-thalassemia and iron deficiency anemia. It is provided for reference purposes.

It is the RBC volume divided by the RBC count.

$$\text{Mentzer Index} = \frac{\text{Red blood cell volume}}{\text{Red blood cell count}}$$

RDWI

RDWI is a parameter related to β-thalassemia and iron deficiency anemia, provided for reference purposes.

It is calculated using the RBC volume, RBC distribution width and RBC count.

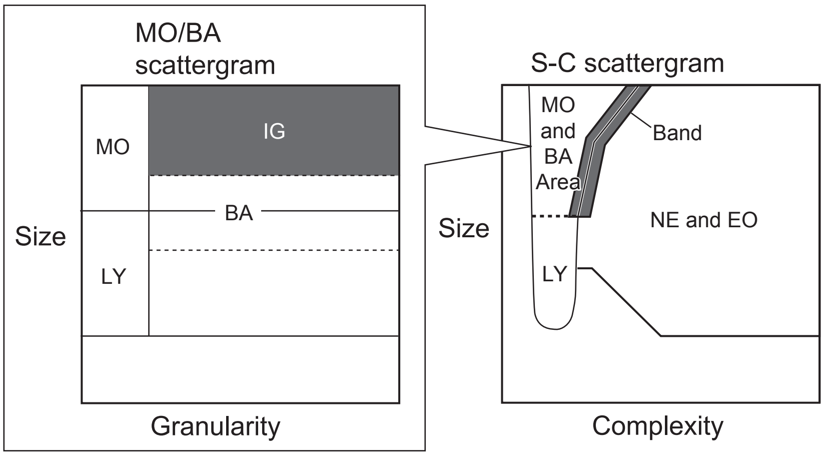
$$\text{RDWI} = \frac{\text{RBC volume} \times \text{RBC distribution width}}{\text{Red blood cell count}}$$

IG, Band, Seg

IG, Band and Seg are parameters related to neutrophils. These are provided for reference purposes.

Name	
IG%	Immature Granulocyte Percent
IG#	Immature Granulocyte Count
Band%	Band Neutrophil Percent
Band#	Band Neutrophil Count
Seg%	Segmented Neutrophil Percent
Seg#	Segmented Neutrophil Count

As shown in the figure below, immature granulocytes are distributed in the IG area of the scattergram for MO/BA classification and band neutrophil are distributed in the Band area of the S-C scattergram.



IG% is calculated from how much the IG area count accounts for in the optical WBC count.

$$IG\% = \frac{\text{IG area count}}{\text{Optical WBC count}}$$

IG# is calculated by the WBC count and the IG%.

IG# = WBC count × IG%

Band% is calculated from how much the Band area count accounts for in the optical WBC count.

$$Band\% = \frac{\text{Band area count}}{\text{Optical WBC count}}$$

Band# is calculated from the WBC count and the Band%.

Band# = WBC count × Band%

Seg% is calculated from the neutrophil ratio and the Band%.

Seg% = NE% − Band%

Seg# is calculated from the neutrophil count and the Band#.

Seg# = NE# − Band#

Interfering Substances

Measuring Parameter and Interfering Substances		Description
WBC	High WBC levels	When WBC is abnormally high and exceeding 100,000/μL, measure the sample in WBC high concentration mode. If the measurement range is exceeded, dilute with diluent and measure again.
	Nucleated erythrocyte	Nucleated erythrocytes are detected as white blood cells and this causes a falsely high WBC count.
	Poor Hemolyzation	On some rare occasions, the red blood cells in the blood sample might not completely lyse. These non-lysed RBC may be detected as WBC and cause increase in WBC count.
	Leukemia	White blood cells may be fragile in leukemia patients and may be destroyed during measurement and this may cause a falsely low WBC count and WBC differential cannot be accurately determined.
	Chemotherapy	White blood cells become fragile due to anti-cancer agents and immunosuppressive agents and may be destroyed during measurement and the WBC count may become a falsely low value and WBC differential cannot be accurately determined.
	Cryoglobulins	Cryoglobulins may increase and cause falsely high values of WBC, RBC, platelets, and hemoglobin. Increase of cryoglobulins is caused by myeloma, cancer, leukemia, macroglobulinemia, lymphoproliferative disorders, metastatic tumors, autoimmune abnormalities, infection, aneurysm, pregnancy, blood clots, diabetes and other conditions. In such cases, warm the blood sample to 37°C (98.6°F) in a water bath for 30 minutes and measure the sample immediately.
RBC	Leukemia	An increase in white blood cells in leukemia patients causes an increase in red blood cells. If the WBC count is 50,000/μL or more, correct the number of RBC by subtracting the number of WBC.
	Hemagglutination	If hemagglutination is observed, the RBC count becomes falsely low and MCV becomes falsely high. In such cases, you will notice because the values of MCH and MCHC become abnormal. In such samples, when you observe the tube wall while gently tilting the sample tube, the blood appears to be a rough texture. Hemagglutination can also be confirmed by observing a blood smear.
	Cold agglutination	If cold agglutination of blood cells is observed, the RBC count becomes falsely low and MCV becomes falsely high. In such cases, warm the blood sample to 37°C (98.6°F) in a water bath for 30 minutes and measure the sample immediately. When the cold agglutination value is significantly high, blood appears to clot in the blood smear.
	Hemolysis	When a sample is hemolyzed, RBC becomes falsely low.
HGB	Turbidity of the blood sample	Any physiologic or therapeutic factors may increase HGB concentration. In such a case, determine the cause of turbidity and take the appropriate action described below. Hemoglobin concentration affects the MCH and MCHC. Therefore, MCH and MCHC values become abnormal. • Increased lipids The plasma of blood with increased lipids is cloudy. This is caused by increased protein and increased lipids. Accurate HGB measurement can be achieved by using a plasma blank. • Increased turbidity When the sample is poor hemolyzation or hyperbilirubinemia, turbidity may increase and cause increase in HGB. Accurate HGB measurement can be achieved by using a plasma blank. • High WBC levels Turbidity of blood increases and the hemoglobin concentration value becomes falsely high if WBC level of the blood sample is abnormally high. Centrifuge the diluted sample and measure the supernatant fluid with a spectrophotometer.
HCT / MCV	Hemagglutination	RBC agglutination may cause false HCT and MCV values. This can be checked by abnormal MCH and MCHC values and examination of the blood smear. In this case, measure by centrifugation.
MCV	Excessive number of large PLT	An excessive number of large PLT or excessively high WBC may affect the MCV value. A blood smear observation is required.

Measuring Parameter and Interfering Substances		Description
MCH	Hemoglobin Concentration and RBC count abnormalities	MCHC is determined from HGB and HCT values. Therefore, the limitations for HGB and HCT also affect MCHC value.
MCHC	Hemoglobin Concentration and Hematocrit abnormalities	MCHC is determined from HGB and HCT values. Therefore, the limitations for HGB and HCT also affect MCHC value.
PLT	Very small fragments	Fragments of small red blood cells, red blood cells, and white blood cells are counted as platelets, and this may cause a falsely high platelet count.
	Excessive number of large PLT	For Bernard-Soulier syndrome, which is a congenital platelet function disorder, platelets of the same size as RBC will appear. If these large platelets cause PLT to exceed the high threshold of the PLT histogram, the PLT count will be falsely low.
	Hemolysis	Hemolyzed samples contain red cell stroma which may increase PLT count.
	Anticoagulated blood	If blood contains anticoagulant other than EDTA (ethylenediaminetetraacetate), PLT agglutination may cause the PLT count to become falsely low.
	PLT Clumps	The agglutinated PLT count value becomes falsely low, and the WBC count value becomes falsely high. For these samples, use a different anticoagulant such as sodium citrate anticoagulant to re-collect the sample then remeasure the PLT only.
MPV	Very small fragments	Very small RBC, RBC, and WBC fragments may interfere with MPV measurement.
	Excessive number of large PLT	If large PLT exceeds the high threshold of the PLT histogram, the MPV count will be falsely low.
	Hemolysis	Hemolyzed samples contain red cell stroma which may interfere with MPV measurement.
	Anticoagulated blood	If blood contains anticoagulant other than EDTA (ethylenediaminetetraacetate), PLT agglutination occurs, potentially causing interference with the MPV measurement.
	PLT Clumps	Samples with agglutinated PLT may interfere with MPV measurement. WBC differential values are derived from the number of WBC. The WBC count will affect the differential of these values.
LY LY%	NRBC, some type of parasite, Hemolysing reagent resistant red blood cells	NRBC, certain parasites, and RBC that are resistant to lysis may interfere with an accurate LY count.
MO MO%	Large lymphocyte, atypical lymphocytes, blasts, excessive number of basocytes	Large lymphocytes, atypical lymphocytes, blasts, and excessive number of basophils may interfere with an accurate MO count.
NE NE%	A large number of eosinophils, metamyelocytes, myelocytes, promyelocytes, blasts, plasmacyte	Excessive eosinophils, metamyelocytes, myelocytes, promyelocytes, blasts may interfere with an accurate NE count.
EO EO%	Abnormal granules	Abnormal granules may interfere with an accurate EO count.
BA BA%	Juvenile cell, metamyelocyte, myelocytes, promyelocytes, blasts, plasmacyte	Immature cell, metamyelocytes, myelocytes, promyelocytes, blasts, and plasma cells may interfere with an accurate BA count and BA%.

Displayed Data

Explanation of Data (Messages and Flags)

The following identifiers are added to the parameter on the analyzer. The identifiers added to the parameter related to the flags are "*", "C", and "!".

Classification	Data Identifier	Measurement Value	Description
Data cannot be analyzed	None	Related parameter measurement value not displayed	The data cannot be analyzed.
Measurement condition error detected	None	Related parameter measurement value not displayed	Measurement operation error is detected.
Data with low reliability (Error found during measurement)	?	Measurement value displayed	The analyzer condition is out of the specified range and the reliability of the data is low. The measurement value is the reference value.
Data with low reliability (Abnormal flag detected)	! *	Measurement value displayed	Abnormal flag is detected in the sample. The reliability of measured data is low because abnormal cells exist. If the WBC and PLT values are low, count them with a blood smear.
	C	Measurement value displayed	The reliability of measured data is low because PLT clumps are detected.
Out of normal range	H L	Measurement value displayed	The measurement value is out of the upper and lower limits range set in the "Sample Type" in System Setting.
Out of measuring range	None	"OVER" message displayed	The measurement value exceeds the measurable range.

Abnormal Flags

The following table shows the parameter parameters which can also have an identifier related to the abnormal flag.

The flag display ON/OFF and its judgment conditions can be changed in “Flags” in System Setting.

Flag	Identifier																	Judgment Condition
	WBC	RBC	HGB	HCT	MCHC	PLT	PCT/MPV/PDW	NE	LY	MO	EO	BA	NE%	LY%	MO%	EO%	BA%	
PLT clumps[1]	C					C												Presence of PLT clumps is suspected
Poor Hemolyzation[1]	!																	There are many RBC ghosts
Abnormal MCHC[1]					!													MCHC is below 28.0 g/dL or above 38.0 g/dL
Blasts								*	*	*	*	*	*	*	*	*	*	Presence of small nucleated cells is suspected
Immature granulocyte								*		*			*		*			Presence of immature granulocytes is suspected
Left Shift								*		*			*		*			Left shifted neutrophil is suspected
Atypical Ly									*	*				*	*			Presence of atypical lymphocytes is suspected
Ly-Mo Interference									*	*				*	*			Overlap of lymphocytes and monocytes is suspected
Small Nucleated Cell	*																	Presence of small nucleated cells is suspected
Ne-Eo Interference								*			*		*			*		Overlap of neutrophil and eosinophil is suspected
PLT-RBC Interference		*				*												Overlap of population of PLT and RBC is suspected
Leukocytosis																		WBC: 180 × 10²/µL or more
Leukopenia																		WBC: less than 25 × 10²/µL
Neutrophilia																		NE: 110 × 10²/µL or more
Neutropenia																		NE: less than 10 × 10²/µL
Lymphocytosis																		LY: 40 × 10²/µL or more
Lymphopenia																		LY: less than 8 × 10²/µL
Monocytosis																		MO: 10 × 10²/µL or more
Eosinophilia																		EO: 7 × 10²/µL or more
Basophilia	Identifiers cannot be added																	BA: 2 × 10²/µL or more
Erythrocytosis																		RBC: 650 × 10⁴/µL or more
Anemia																		HGB: 10.0 g/dL or less
Anisocytosis																		RDW: 20.0% or less
Microcytosis																		MCV: less than 70 fL
Microcytosis																		MCV: 110 fL or more
Hypochromia																		MCHC: 29.0 g/dL or less
Thrombocytosis																		PLT: 60.0 × 10⁴/µL or more
Thrombocytopenia																		PLT: less than 6.0 × 10⁴/µL

[1] When the flag of “PLT Clumps”, “Poor Hemolyzation” or “Abnormal MCHC” are displayed, measure a hematology control and check that the analyzer operates correctly. Then measure the abnormal sample again.

Reference Method

WBC

ICSH 1988

The assignment of values to fresh blood used for calibrating automated blood cell counters. Clin Lab Hematol. 1988;10:203-212

RBC

ICSH 1988

The assignment of values to fresh blood used for calibrating automated blood cell counters.Clin Lab Hematol. 1988;10:203-212

HGB

CLSI H15-A3 Vol.20 No.28;

Reference and Selected Procedures for the Quantitative Determination of Hemoglobin in Blood;Approved Standard - Third Edition, 2000

HCT

CLSI H07-A3 Vol.20 No.18;

Procedure for Determining Packed Cell Volume by the Microhematocrit Method;Approved Standard - Third Edition, 2000

PLT

ICSH/ISLH 2001:

International Council for Standardization in Hematology Expert Panel on Cytometry and International Society of Laboratory Hematology Task Force on Platelet Counting. Platelet counting by RBC/platelet ratio method.A reference method. Am Journal of Clinical Pathology 115:460-464 2001

WBC Differential

CLSI H20-A2:Vol.27 No.4;

Reference Leukocyte (WBC) Differential Count (proportional) and Evaluation of Instrumental Methods;Approved Standard - Second Edition, 2007

CLSI H26-A2:Vol.29 No.40;

Validation,Verification,and Quality Assurance of Automated Hematology Analyzers;Approved Standard - Second Edition, 2010

Specifications

Function and Performance

Measured Parameters

- Blood cell count (WBC, RBC, PLT): Electrical resistance detection
- Hemoglobin concentration (HGB): Colorimetric method (surfactant method)
- Hematocrit (HCT): Peak integration method using blood cell pulses (calculated from RBC histogram)
- RBC distribution width (MCV, MCH, MCHC): Calculated from RBC, HGB and HCT
- WBC blood cell differential (NE%, LY%, MO%, EO%, BA%, NE, LY, MO, EO, BA): Calculated from scattergram
- Platelet crit (PCT): Peak integration method using blood cell pulses (calculated from PLT histogram)
- Mean platelet volume (MPV): Calculated from PLT and PCT
- RBC distribution width (RDW-CV, RDW-SD): Calculated from RBC histogram
- Platelet distribution width (PDW): Calculated from PLT histogram
- Platelet large cell ratio (P-LCR): Calculated from PLT histogram

Measuring Range (Display Range)

<table>
<tr><th>Measured Parameters</th><th>Name</th><th>Measuring Range (Display Range)</th></tr>
<tr><td>White Blood Cell Count</td><td>WBC</td><td>0.0 to 999×10²/μL
0.0 to 2999×10²/μL (high concentration mode)</td></tr>
<tr><td>Neutrophil percent</td><td>NE%</td><td rowspan="5">0.00 to 100%</td></tr>
<tr><td>Lymphocyte Percent</td><td>LY%</td></tr>
<tr><td>Monocyte Percent</td><td>MO%</td></tr>
<tr><td>Eosinophil Percent</td><td>EO%</td></tr>
<tr><td>Basophil Percent</td><td>BA%</td></tr>
<tr><td>Neutrophil Count</td><td>NE</td><td rowspan="5">0.0 to 999×10²/μL
0.0 to 2999×10²/μL (high concentration mode)</td></tr>
<tr><td>Lymphocyte Count</td><td>LY</td></tr>
<tr><td>Monocyte Count</td><td>MO</td></tr>
<tr><td>Eosinophil Count</td><td>EO</td></tr>
<tr><td>Basophil Count</td><td>BA</td></tr>
<tr><td>Red Blood Cell Count</td><td>RBC</td><td>0 to 999×10⁴/μL</td></tr>
<tr><td>Hemoglobin Concentration</td><td>HGB</td><td>0.00 to 29.9 g/dL</td></tr>
<tr><td>Hematocrit</td><td>HCT</td><td>0.0 to 99.9%</td></tr>
</table>

Measured Parameters	Name	Measuring Range (Display Range)
Mean Corpuscular Volume	MCV	20.0 to 199 fL
Mean Corpuscular Hemoglobin	MCH	10.0 to 50.0 pg
Mean Corpuscular Hemoglobin Concentration	MCHC	10.0 to 50.0 g/dL
Red Blood Cell Distribution Width in Coefficient of Variation	RDW-CV	0.0 to 50.0%
Red Blood Cell Distribution Width in Standard Deviation	RDW-SD	0.0 to 199 fL
Platelet Count	PLT	0.00 to 149×10^4/µL
Platelet Crit	PCT	0.00 to 2.99%
Mean Platelet Volume	MPV	0.0 to 20.0 fL
Platelet Distribution Width	PDW	0.0 to 50.0%
Platelet Large Cell Ratio	P-LCR	0.0 to 100%

Precision (Reproducibility)

- Normal mode (difference from CV or mean value)

WBC:	2.0% or less (WBC 40.0×10^2/µL or more)
RBC:	1.5% or less (RBC 400×10^4/µL or more)
HGB:	1.5% or less
HCT:	1.5% or less
MCV:	1.0% or less
MCH:	2.0% or less
MCHC:	2.0% or less
RDW-CV:	3.0% or less
RDW-SD:	3.0% or less
PLT:	4.0% or less (PLT 10.0×10^4/µL or more)
PCT:	6.0% or less
MPV:	4.0% or less
PDW:	10.0% or less
P-LCR:	18.0% or less
NE%:	5.0% or less (NE%: 30.0% or more AND WBC: 40.0 × 10^2/µL or more)
LY%:	5.0% or less (LY%: 15.0% or more AND WBC: 40.0 × 10^2/µL or more)
MO%:	12.0% or less (MO%: 5.0% or more AND WBC: 40.0 × 10^2/µL or more)
EO%:	20.0% or less OR within ±1.0 Eo% (WBC: 40.0 × 10^2/µL or more)

BA%:	30.0% or less OR within ±1.0 Ba% (WBC: 40.0 × 10^2/μL or more)
NE:	8.0% or less (NE: 12.0 × 10^2/μL or more)
LY:	8.0% or less (LY: 6.0 × 10^2/μL or more)
MO:	20.0% or less (MO: 2.0 × 10^2/μL or more)
EO:	25.0% or less OR within ±1.0 × 10^2/μL (WBC: 40.0 × 10^2/μL or more)
BA:	30.0% or less OR within ±1.0 × 10^2/μL (WBC: 40.0 × 10^2/μL or more)

• Pre-dilution mode (CV)

WBC:	6.0% or less (WBC: 40.0 × 10^2/μL or more)
RBC:	4.5% or less (RBC: 400 × 10^4/μL or more)
HGB:	4.5% or less
HCT:	4.5% or less
MCV:	4.5% or less
MCH:	4.5% or less
MCHC:	4.5% or less
PLT:	12.0% or less (PLT: 10.0 × 10^4/μL or more)

Linearity

• WBC:	within ±3.0% OR ±3 × 10^2/μL (WBC: 2.0 to 999 × 10^2/μL)
• RBC:	within ±3.0% OR ±8 × 10^4/μL (RBC: 2 to 800 × 10^4/μL)
• HGB:	within ±1.5% OR ±0.2 g/dL (HGB: 0.10 to 25.0 g/dL)
• HCT:	within ± 3.0% OR ±1.0% (HCT: 20.0 to 60.0%)
• PLT:	within ±10.0% OR ±2.0 × 10^4/μL (PLT: 1.00 to 149 × 10^4/μL)

(Specifications above applies to the normal mode)

Background Noise

• WBC:	2.0 × 10^2/μL or less
• RBC:	2 × 10^4/μL or less
• HGB:	0.1 g/dL or less
• PLT:	1.00 × 10^4/μL or less
• TOC:	100 count or less

(The background noise of the flow cytometry measurement system is evaluated with Total Optical Count (TOC))

Carryover

• WBC:	1.0% or less
• RBC:	1.0% or less

- HGB: 1.0% or less
- PLT: 1.0% or less
- TOC: 1.0% or less

(The carryover of the flow cytometry measurement system is evaluated with the TOC)

Counting Time

- Auto measurement: 90 samples/hr (40 s/sample)
- Manual measurement: 90 s/sample

Sample Volume

- Normal mode (CBC+DIFF): 40 µL
- Normal mode (CBC): 25 µL
- Pre-dilution mode: 20 µL

Laser

Class 1 (built-in laser class: Class 3B)

Applicable Directives and Standards

Applicable Directives

- IVD directive
- WEEE directive
- RoHS directive

Safety Standards

- IEC 60825-1:2014
- IEC 61010-1:2001, IEC 61010-1:2010 + Amendment 1:2016
- IEC 61010-2-101:2002, IEC61010-2-101:2018
- IEC 61010-2-081:2001 + Amendment 1:2003, IEC61010-2-081:2019
- IEC 61326-1:2005, IEC61326-1:2012
- IEC 61326-2-6:2005, IEC61326-2-6:2012
- CISPR 11:2003 Group 1 Class B
- CISPR 11:2009 + Amendment 1: 2010 Group 1 Class B
- EN 55011:2002 Group 1 Class B
- EN 60825-1:2014
- EN 61010-1:2001
- EN 61010-2-101:2002
- EN 61010-2-081:2001 + Amendment 1:2003

- EN 61326-1:2006
- EN 61326-2-6:2006

Classification

Type of protection against electrical shock

CLASS I EQUIPMENT

Degree of protection against harmful ingress of water:

IPX0 (non-protected)

Degree of safety of application in the presence of FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE:

Equipment not suitable for use in the presence of FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE

Mode of operation:

CONTINUOUS OPERATION

ME EQUIPMENT type:

STATIONARY type

Pollution degree:

2 EQUIPMENT

Environment

Storage Environment

- Temperature: –20 to +60°C (–4 to +140°F)
- Humidity: 10 to 95% (noncondensing)
- Atmospheric pressure: 700 to 1060 hPa (Altitude: < 3000 m)

Transport Environment

- Temperature: –20 to +60°C (–4 to +140°F)
- Humidity: 10 to 95% (noncondensing)
- Atmospheric pressure: 700 to 1060 hPa (Altitude: < 3000 m)

Operating Environment and Power

Operating environment

• Temperature:	15 to 30°C (59 to 86°F)
• Humidity:	30 to 85%
• Atmospheric pressure:	700 to 1060 hPa (Altitude: < 3000 m)

Power Requirements

	AC only
• Line voltage:	AC 100 to 240 V
• Allowable fluctuation range:	±10%
• AC type:	Switching regulator
• Power input:	330 VA
• Line frequency:	50/60 Hz
• Allowable fluctuation range:	±5%
• Safety standards for power supply unit:	IEC 61010-1:2001, IEC 61010-1:2010 + Amendment 1:2016

Noise

IEC 61010-1:2001, IEC 61010-1:2010 + Amendment 1:2016

Cooling System

Natural cooling

EMC Standards

- CISPR 11:2003 Group 1 Class B
- CISPR11:2009 + Amendment 1:2010 Group 1 Class B
- IEC 61326-1:2005, IEC 61326-1:2012
- IEC 61326-2-6:2005, IEC 61326-2-6:2012
- EN 55011:2002 Group 1 Class B
- EN 61326-1:2006
- EN 61326-2-6:2006

Dimensions and Weight

• Dimensions	675 W × 589 D × 576 H (mm) ±10%
	(Main unit only, excluding protruding parts)
• Weight:	66 kg ±10%

Options and Consumables

Standard Accessories

⚠ CAUTION

Only use Nihon Kohden specified reagents and consumables. Otherwise the measurement result cannot be guaranteed and incorrect reagent concentration can cause equipment damaged.

Name and Model		Qty	Supply Code
Power cord W		1	—
Ground lead D		1	—
6.3 A time-lag fuse		2	—
ISOTONAC tube assy		1	—
CLEANAC tube assy		1	—
HEMOLYNAC•310 tube assy		1	—
HEMOLYNAC•510 tube assy		1	—
Waste tube assy		1	—
Open loader adapters set	For samples	1	—
	For micro tubes	1	—
	For capillary blood collection tubes	1	—
	For detergent	1	—
Overflow tray		1	—
Rack		1 set	—
Partition plate		1	—
Maintenance brush		1	T603A
ZK-910W barcode reader		1	—
Stopper plate		1	—

Options

Name and Model		Qty	Supply Code
WA-714W impact printer (Seiko Epson VP-500, LQ-310 or equivalent)		1	—
WA-461V card printer		1	—
JW-910W waste sensor		1	—
Extra sample racks		8	T411A
Waste container (Selectable option, 10 or 20 L)	10L	1	T417B
	20L	1	T417C
Serial DB9-DB9 crossover cable		1	—
LAN cable, 2.0 m		1	—
USB cable, 2.0 m		1	—
SARSTEDT Kit		1	YZ-008B1
KABEVETTE G Kit		1	YZ-008B2
Holder BD 0.5mL		1	YZ-008B3
QS-023W software kit		1	—

Socket Pin Assignment

USB Socket (Barcode Reader and Printer)

No.	Signal
1	VBus
2	–Data (D–)
3	+Data (D+)
4	GND

LAN Socket

No.	Signal
1	TD+
2	TD–
3	RD+
4	NC

No.	Signal
5	NC
6	RD–
7	NC
8	NC

Serial Port

No.	Signal
1	NC
2	RxD
3	TxD
4	DTR
5	GND (SG)

No.	Signal
6	DSR
7	RTS
8	CTS
9	NC

Board/Unit Description

UT-7282 MAIN BD

Overview

This is the main control board for the measurement section. It is equipped with a 32-bit Renesas CPU and uses a program installed in flash memory to control the following.

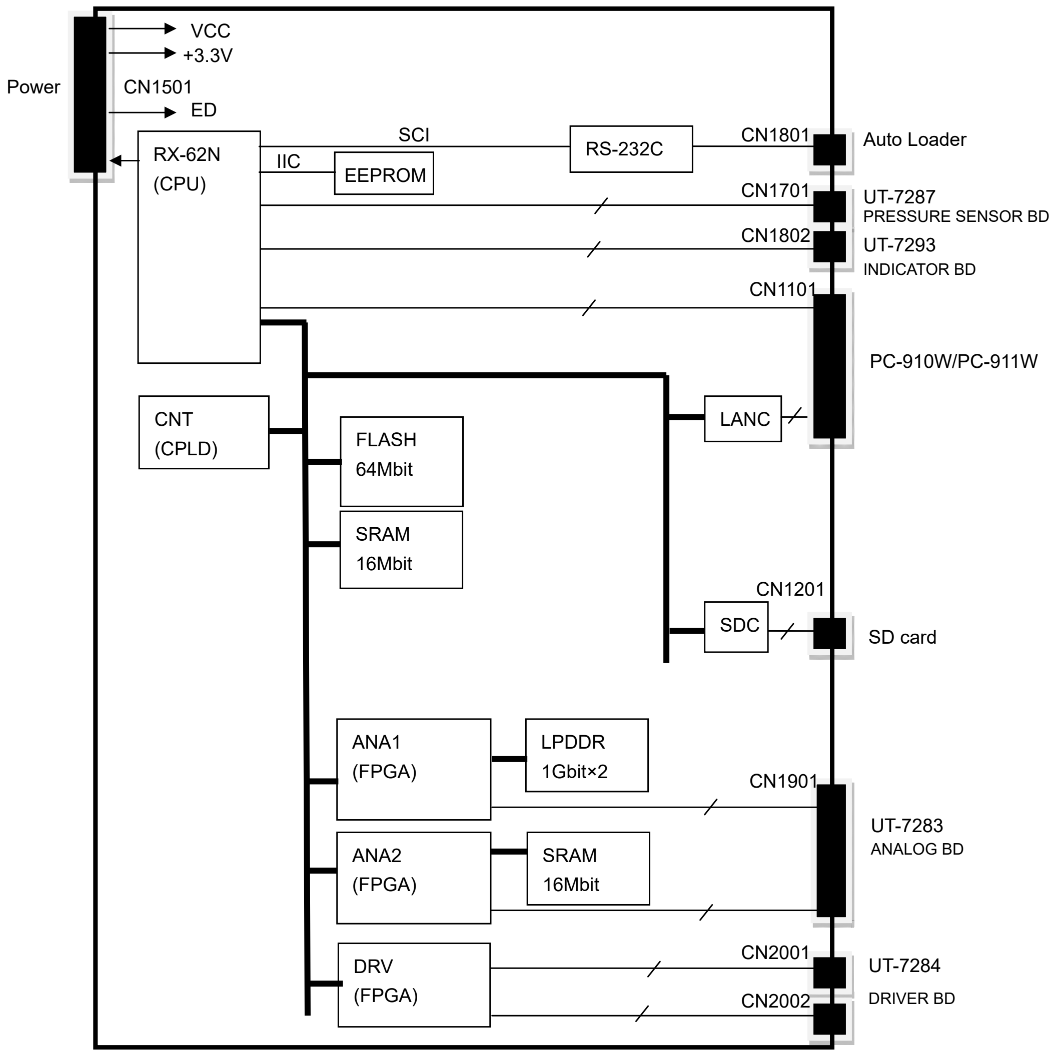
- Actuator systems
- Signal processing for measurement
- Signal processing of external inputs and outputs

Actuators are controlled by 3 programmable logic ICs (FPGA) and their programming is stored in ROM on this board.

Software must be installed by SD card when replacing this board.

Functions

- Communicates with PC-910W/PC-911W via Ethernet (10/100base-TX) to operate the unit by window control
- Motor control, electromagnetic valve control and sensor monitoring via the UT-7284 DRIVER BD
- Heater control and temperature monitoring via the UT-7287 PRESSURE SENSOR BD
- Autoloader control as well as status signal input processing and control of output signals such as power control system signals via serial port connection
- LED and key input monitoring via the Indicator BD and KEY BD
- Controls A/D converter mounted on the UT-7283 ANALOG BD to obtain A/D conversion values from measurement data
- System programs and FPGA data can be installed via SD card


Power
CN1501
VCC
+3.3V
ED
RX-62N
(CPU)
SCI
IIC
EEPROM
RS-232C
CN1801
Auto Loader
CN1701
UT-7287
PRESSURE SENSOR BD
CN1802
UT-7293
INDICATOR BD
CN1101
PC-910W/PC-911W
CNT
(CPLD)
FLASH
64Mbit
SRAM
16Mbit
LANC
CN1201
SDC
SD card
ANA1
(FPGA)
LPDDR
1Gbit×2
CN1901
UT-7283
ANALOG BD
ANA2
(FPGA)
SRAM
16Mbit
DRV
(FPGA)
CN2001
UT-7284
DRIVER BD
CN2002

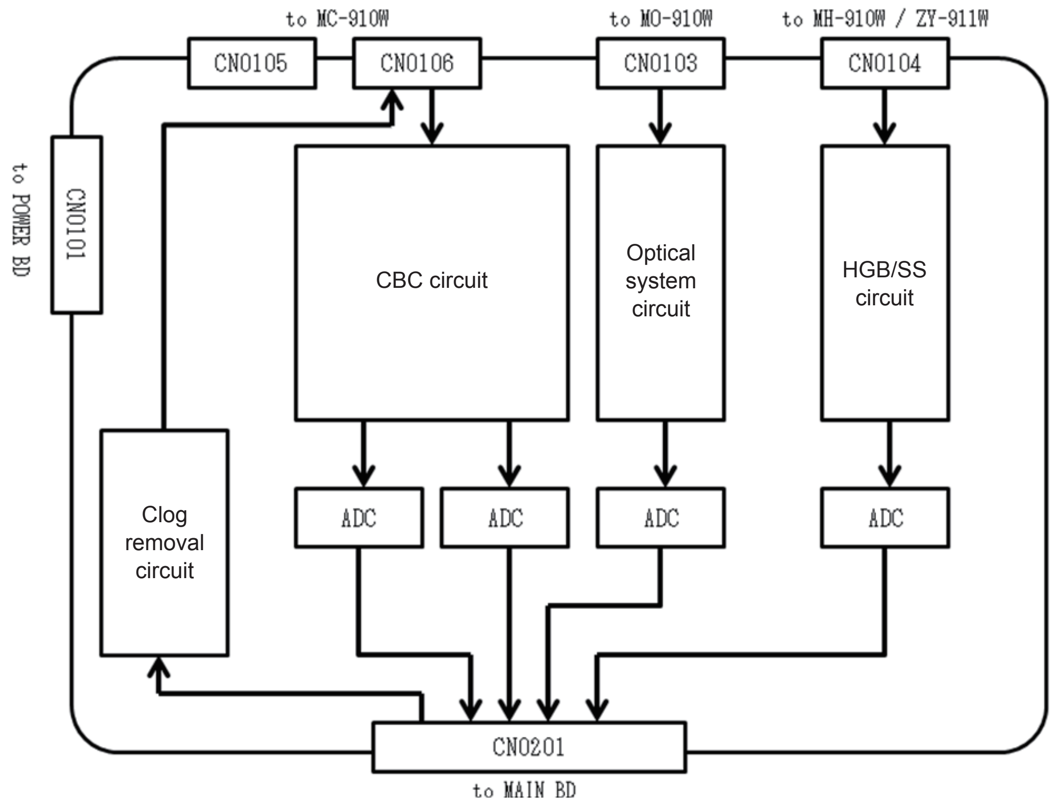
UT-7283 ANALOG BD

Overview

This board takes in the CBC blood cell pulse signals, WBC 5 part differential (optical system) scattered light data, HGB voltage and SS voltage data from each unit and sends the data to the MAIN BD after AD conversion.

Functions

- The CBC measurement circuit (active filter, amplification circuit and AD converter) measures the blood cell pulse signals from the MC-910V.
- The optical system measurement circuit (active filter, amplification circuit, peak hold circuit and AD converter) measures the scattered light data from the MO-910V.
- Receives 40 kHz control signals from the MAIN BD and generates an aperture cap clog removal voltage in the transformer and amplification circuit on the board



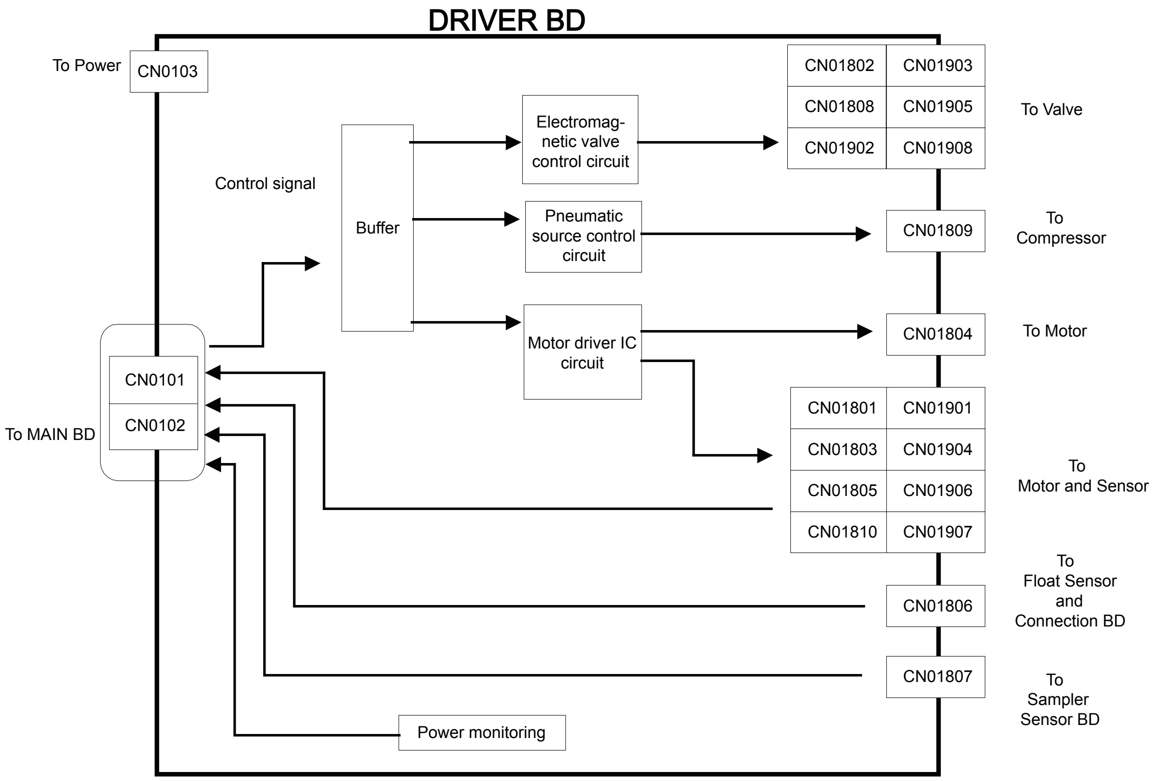
UT-7284 DRIVER BD

Overview

This board controls actuators from each unit through actuator control signals from the UT-7282 MAIN BD and motor driver IC reset signals.

Functions

- Controls 31 electromagnetic valves, 13 stepping motors and one compressor
- Sends signals from 24 position sensors and 5 float sensors as well as +5 V and +24 V power monitoring signals to the MAIN BD
- Relays sensor signals from the SAMPLER SENSOR BD to the MAIN BD



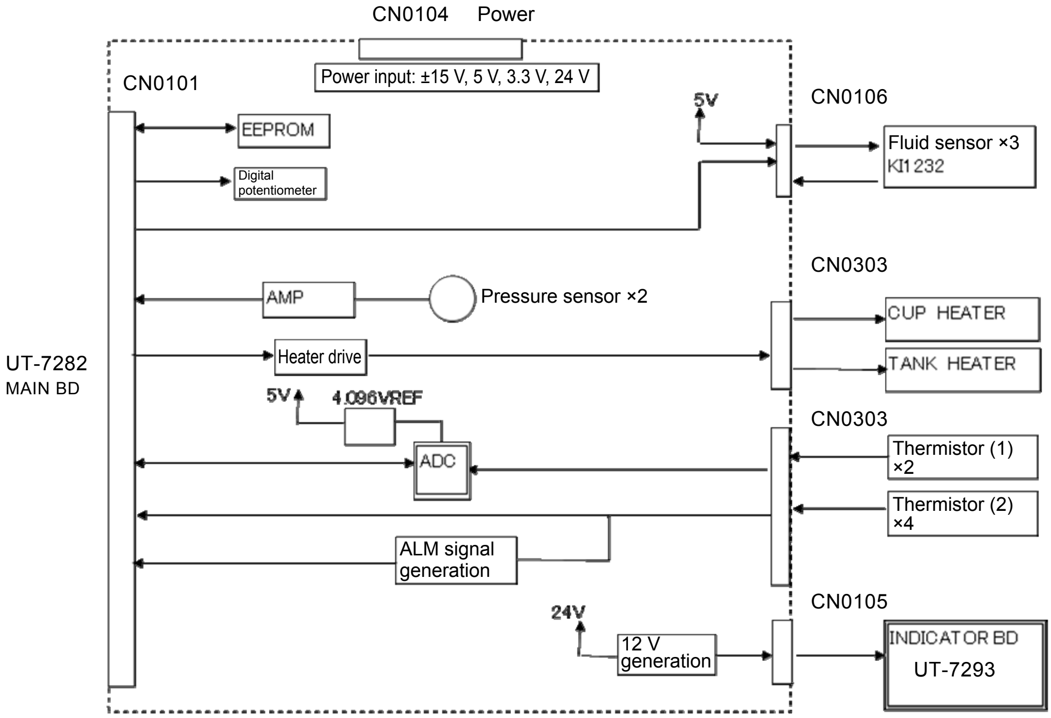
UT-7287 PRESSURE SENSOR BD

Overview

This board is connected to the UT-7282 MAIN BD and INDICATOR BD to control temperature and pressure inside the MEK-9100, fluid in the fluid path, and heater temperature.

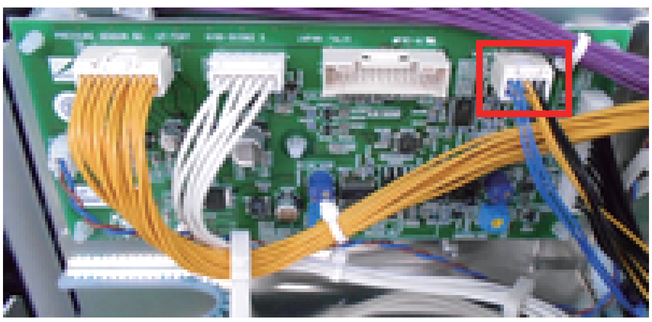
Functions

- Detects temperature inside the MEK-9100 from thermistors
- Detects sensors signals from sensors indicating fluid in the fluid path
- Detects internal pressure with pressure sensors mounted to board
- Controls the heater for the sample cup and tank heater



NOTE

When there are problems with the sensor, check that the thermistor cable is connected.



UT-7288 BACKPANEL BD

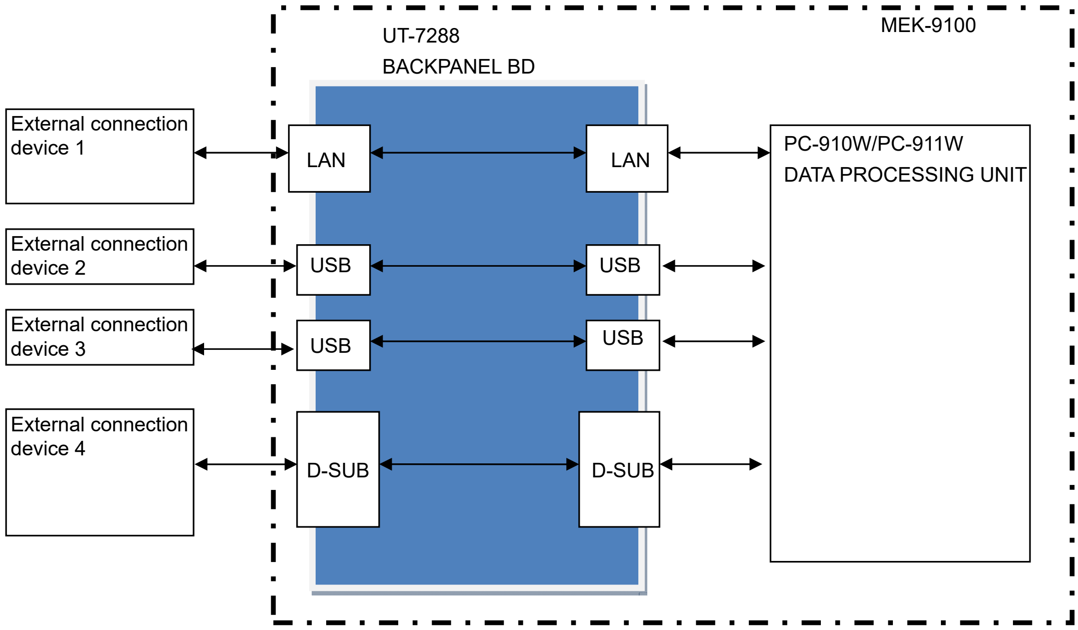
Overview

This board relays data between the PC-910W/PC-911W and external units.

Functions

Relays data by the following connectors

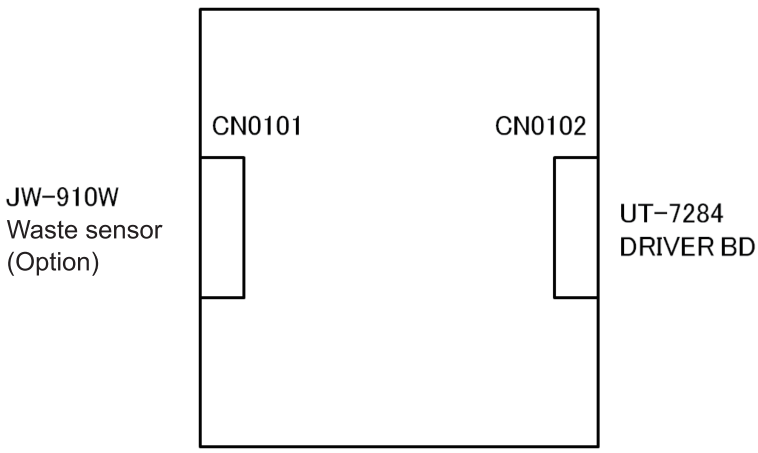
- 1 LAN port
- 2 USB ports
- 1 serial port (RS-232C)



UT-7292 CONNECTION BD

Overview and Functions

This board relays data between the JW-910 waste sensor (optional) installed in the waste container and the UT-7284 DRIVER BD.

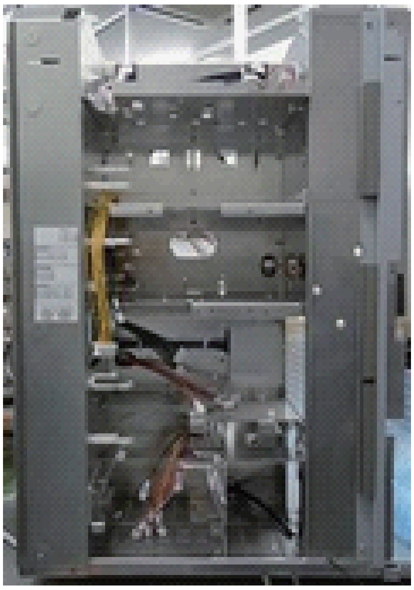


CD-910W CHASSIS UNIT

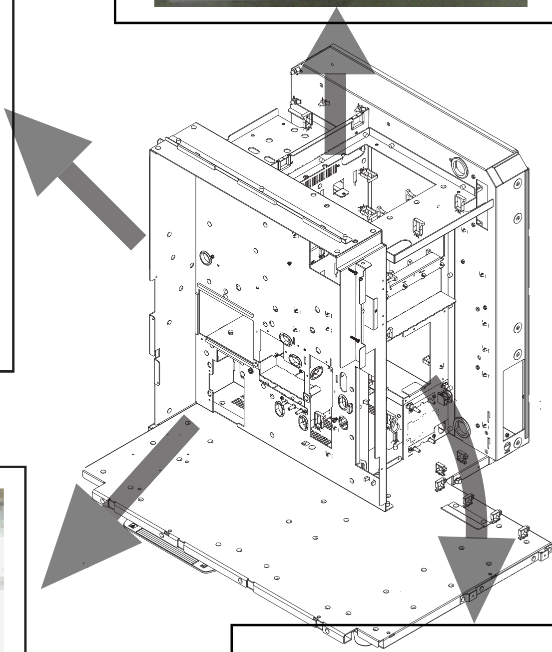
Overview and Functions

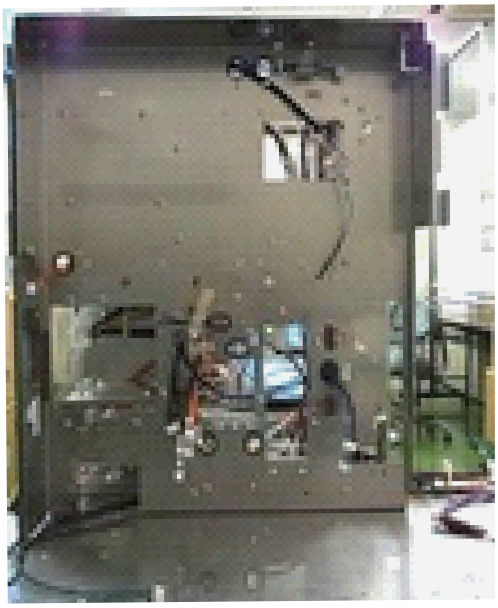
This is the main unit chassis that houses the components.

Left side facing the unit



Top

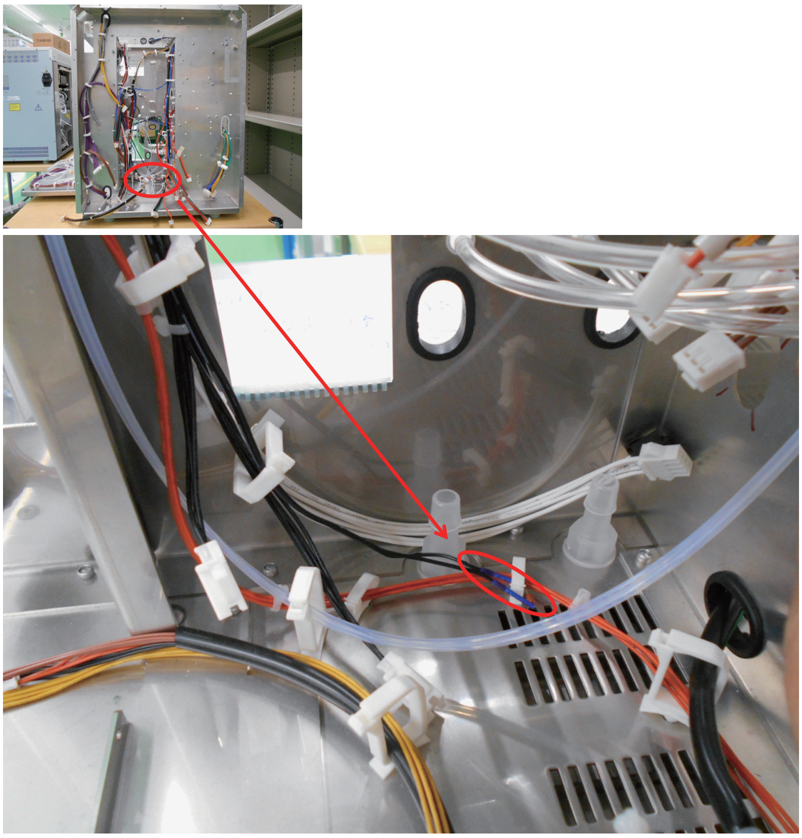


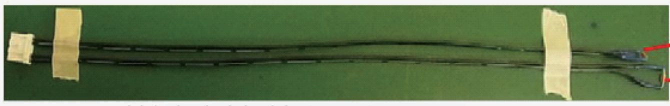


Front

Right side facing the unit

- **The thermistor sensor is located on the rear panel of the CD-910W.**





100-052-01723 thermistor sensor

Shorter one: HGBCAL (hemoglobin)

Longer one: Internal chassis temperature

MC-910W CBC MEASURING UNIT

Overview

- This unit performs a complete blood cell count (CBC) of WBC, RBC, HCT and PLT.
- Equipped with 2 aperture caps: WBC and RBC
- Blood samples undergo sweep flow and swirl flow and are passed through the aperture cap.
- Blood cell pulse information is detected as the blood sample passes through the aperture cap.

Functions

- When blood cells pass through the aperture cap, the pulse signal is amplified based on their size and is sent to the UT-7283 ANALOG BD.

  WBC aperture cap: 100 µm, diluted approximately 220 times, measurement time: about 12 seconds

  RBC aperture cap: 75 µm, diluted approximately 500 times, measurement time: about 12 seconds

- Data confirmed by circuit check

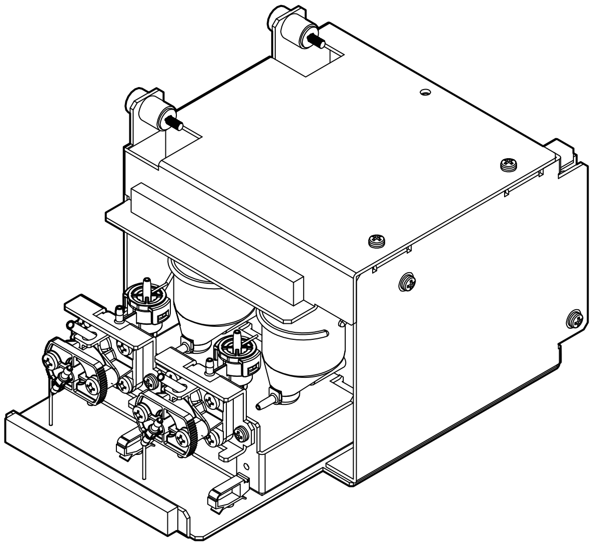
  WBC: 73.9 ±5% (70.2 to 77.5 × 10^2/μL)

  RBC: 56 ±5% (53 to 59 × 10^4/μL)

  MCV: 39.7 ±5% (37.7 to 41.7 fL)

  W-ELE: 18.1 ±0.3 V (17.5 to 18.7 V)

  R-ELE: 18.1 ±0.3 V (17.5 to 18.7 V)



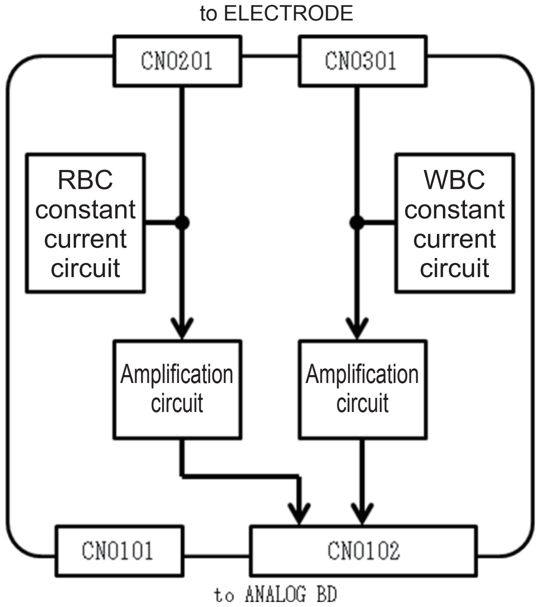
UT-7286 MEASURING BD

Overview

This board is installed in the MC-910W CBC MEASURING UNIT and detects the CBC blood cell pulses.

Functions

- Equipped with a constant current circuit for detecting electrode voltage fluctuations
- Amplifies the blood cell pulse signal from the aperture cap and transmits the signal to the UT-7283 ANALOG BD
- Equipped with a circuit for enabling voltage for electrodes, test (CAL) pulse and removing clogs in the aperture cap
- Amplifies detection signals and sends data to the ANALOG BD



MO-910W LASER OPTICAL UNIT

Overview

- This unit performs WBC 5 part differentiation.
- Composed of a laser diode and flow cell unit to detect scattered light from the laser by flow cytometry and converts it to an electric signal

Functions

- Shines a laser beam at white blood cells passing through the flow cell unit

  Laser wavelength: 660 nm

  Laser amplitude: 80 to 120 µm
- Light reflected from white blood cells is received by the lens of the 3-channel detector unit. Information on white blood cell size, nucleus shape and cytoplasm granularity is collected and sent to the UT-7283 ANALOG BD.
- A switch detects whether the cover is open and if open it automatically shuts off the laser for safety.

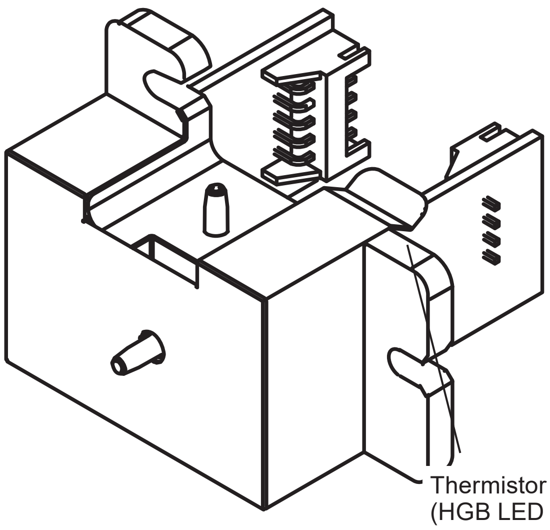
MH-910W HGB MEASURING UNIT

Overview

This unit performs HGB measurement on a dispensed sample. It composed of the HGB flow cell unit, UT-7289 LED emitter and UT-7290 light receiving section.

Functions

- Measures the change in spectral absorbance of a diluent and hemolyzed blood sample and obtains the HGB sensor voltage according to the hemoglobin concentration. (Measurement wavelength: 520 nm)
- The HGB sensor voltage is compared to the SS voltage obtained from the ZY-910W to detect short samples
- Sample temperature correction



Thermistor
(HGB LED Temperature)

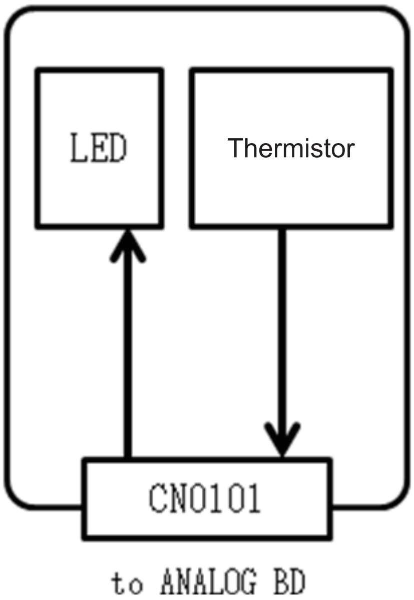
During assembly

Thermistor
(diluent temperature)

UT-7289 HGB/SS LED BD

Overview

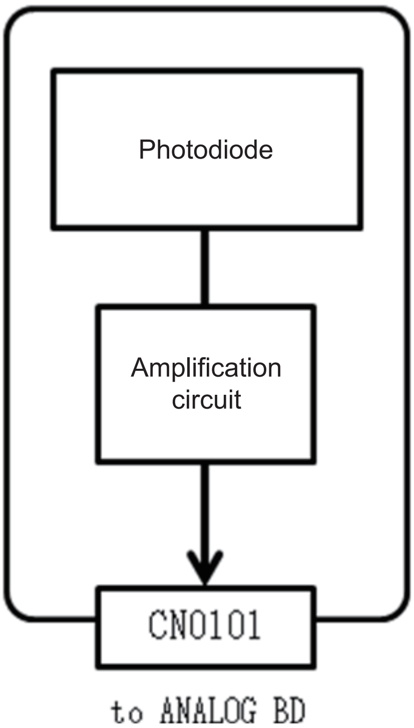
- This board is equipped with an HGB measurement LED.
- An onboard LED lights for HGB measurement and SS confirmation.
- Sends board temperature signals from the thermistor signal to the ANALOG BD



UT-7290 HGB/SS AMP BD

Overview

- This board converts the HGB measurement and SS confirmation LED light voltage and sends the signal to the ANALOG BD.



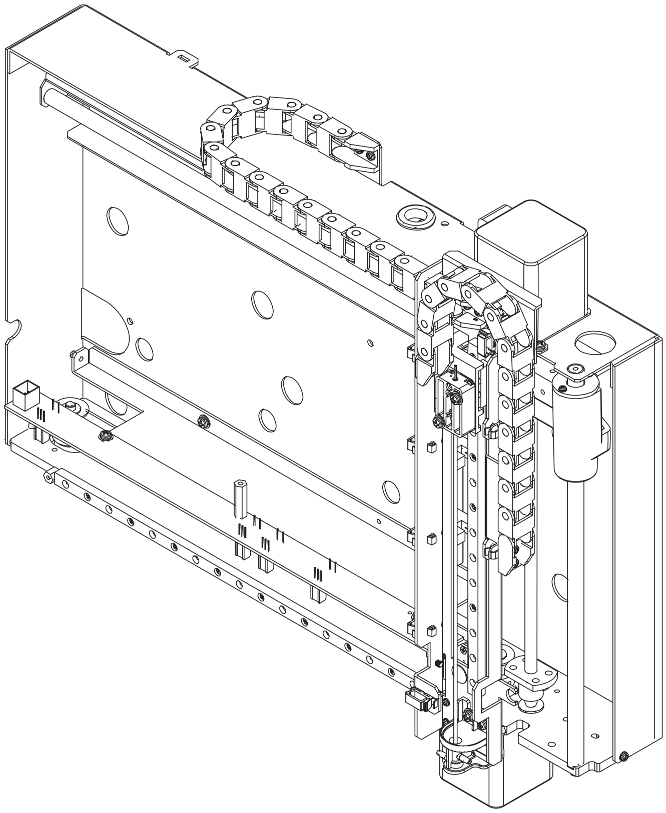
MS-910W SAMPLER UNIT

Overview

This unit moves the sampling needle to the aspiration and discharge positions to aspirate blood samples and dispense them into the cups.

Functions

- Controls signals from the UT-7284 DRIVER BD to rotate the motor and move the sampling needle to the designated position
- The position sensor on the UT-7294/UT-7294-01 SAMPLER SENSOR BD transmits sample tube position data to the MAIN BD.
- Performs aspirating and discharge in conjunction with the MP-912W RBC/ SAMPLE PUMP UNIT
- Cleans the outside of the sampling needle with the rinse chassis



UT-7294/UT-7294-01 SAMPLER SENSOR BD

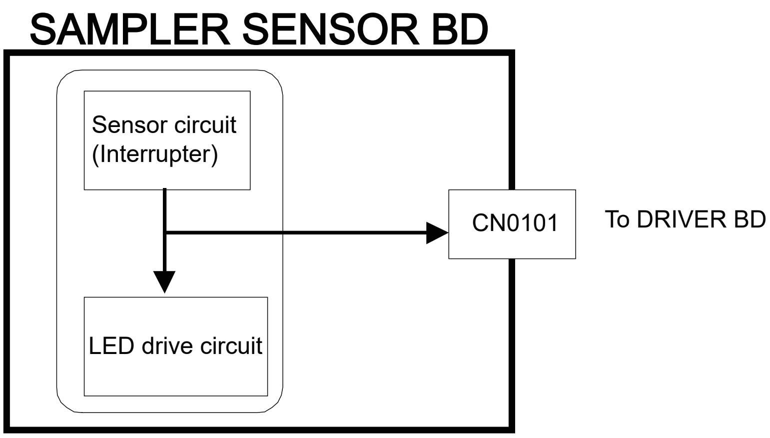
Overview

This board detects the lateral position of the sampling needle.

Functions

- The photo interrupter installed on the board detects the position information of the sample needle in the left and right directions and sends it to UT-7284 (DRIVER BD).
- Equipped with LEDs linked to each sensor to visually confirm the state of the sensors

Initial position:	Photo interrupter PD0101
IWBC position:	Photo interrupter PD0104
OWBC position:	Photo interrupter PD0102
RBC position:	Photo interrupter PD0103
OL position:	Photo interrupter PD0105
Not used:	Photo interrupter PD0106 (UT-7294-01 only)



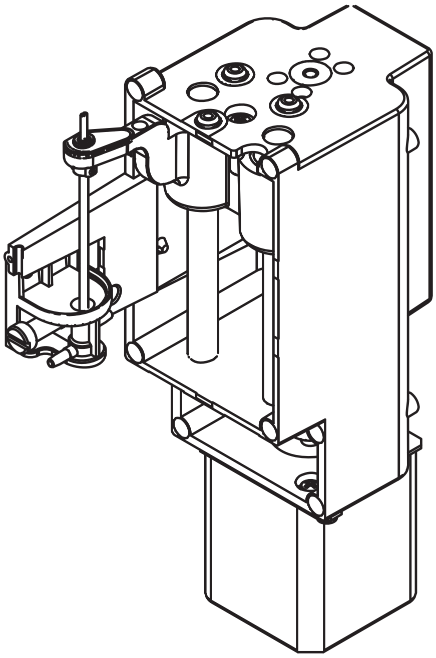
MS-911W OPEN AIR UNIT

Overview

This unit exposes positive pressures and negative pressures in the sampling tube to atmospheric pressure.

Functions

- After being carried to the aspiration position by the autoloader, the sampling tube is pierced by the pressure release needle.
- Keeps sampling tube internal pressure constant by releasing air into the atmosphere through the pressure release needle
- Cleans the outside of the pressure release needle with the rinse chassis



MS-912W OPEN LOADER UNIT

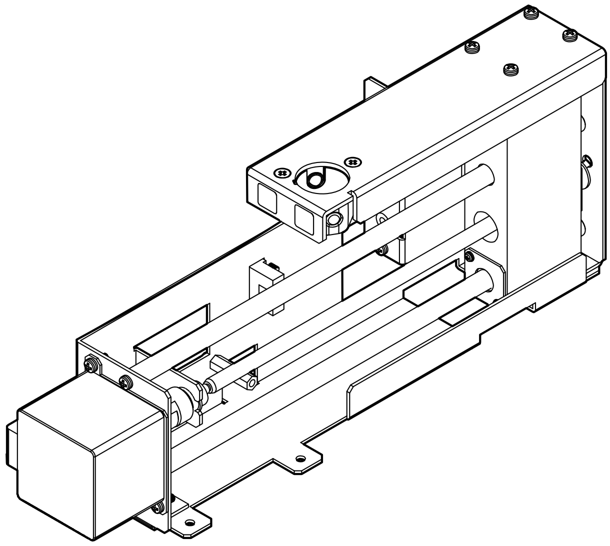
Overview

This unit transports small samples of blood.

It moves samples on the adapter to the sample nozzle aspiration position.

Functions

- When the [Manual Measurement] key is touched, the sample tube adapter is ejected and measurement of emergency samples and small blood samples begins. Control signals from the DRIVER BD rotate the motor and move the adapter to the designated position.



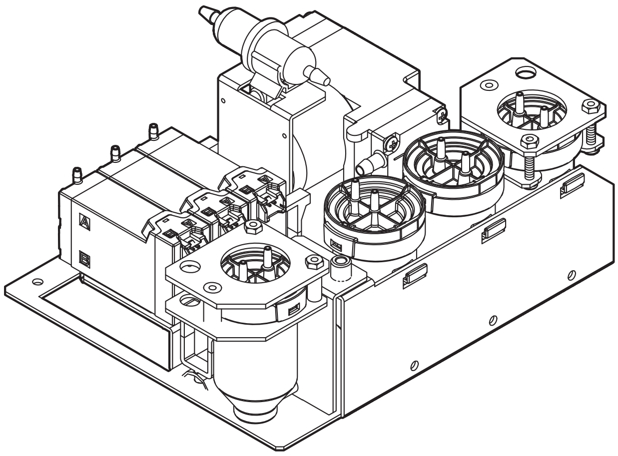
MP-910W PNEUMATIC UNIT

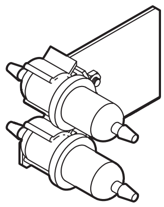
Overview

This pneumatic unit supplies positive pressure and negative pressure to the analyzer.

Functions

- Supplies pressure to the diluent tank, pressurizing the surface of the sample to move it or supply water by negative pressure
- Supplies pressure to the diaphragm pump to move the diaphragm
- Supplies pressure to the waste chamber, pressurizing the surface of the sample to drain it or rinse by negative pressure





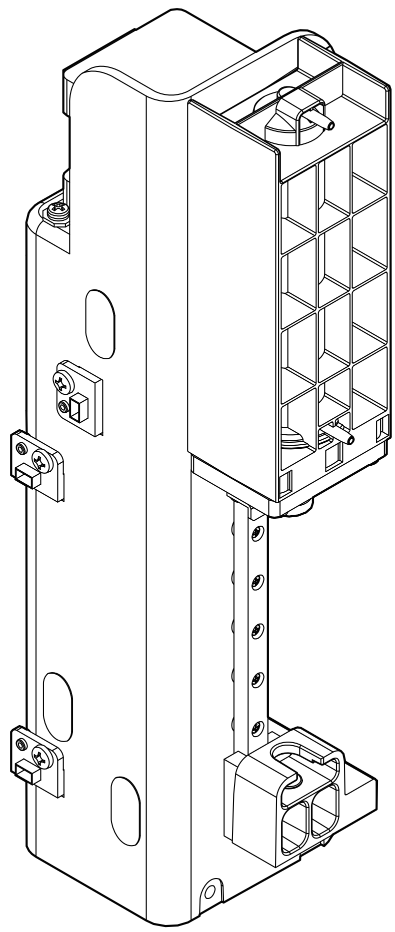
MP-911W ISO PUMP UNIT

Overview

- This diluter unit uses pistons to dilute samples.

Functions

- Aspirates the diluent and discharges it into cups
- Control signals from the UT-7284 DRIVER BD rotate the motor and move the piston up and down.
- Transmits piston position information from each position sensor through the DRIVER BD to the MAIN BD
- Discharges diluent for IWBC (diluted approximately 220 times), RBC (diluted approximately 500 times) and OWBC (diluted approximately 100 times) in a single stroke
- When cleaning proteins, it transports CLEANAC•810 to each unit.



MP-912W SAM/RBC PUMP UNIT

Overview

This unit aspirates and discharges whole blood samples.

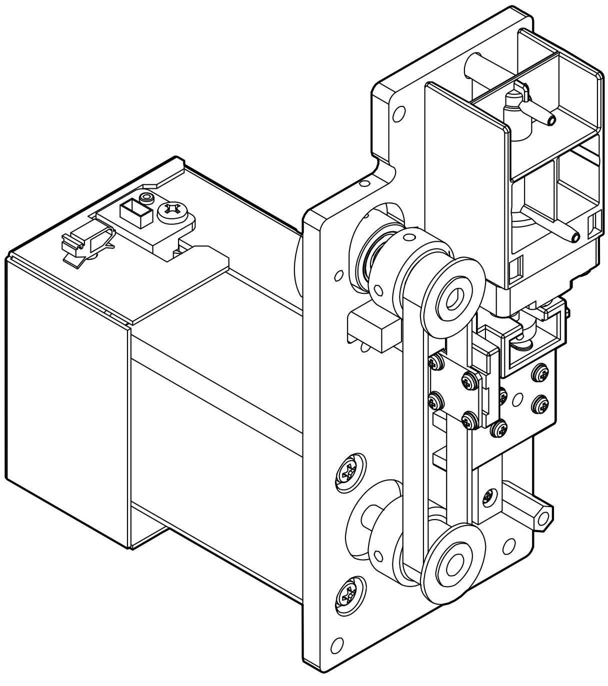
Functions

RBC pump:

- During blood cell measurement, this unit sends sample diluted in the reaction chamber to the MC-910W CBC MEASURING UNIT at a constant speed through a syringe pump and quantifies the amount that passes through the aperture.

SAMPLE pump:

- Aspirates approximately 40 µL samples from the sample tubes
- Discharges whole blood or preprocessed sample into each chamber (IWBC: 12.5 µL, RBC: 5 µL, OWBC: 15 µL)



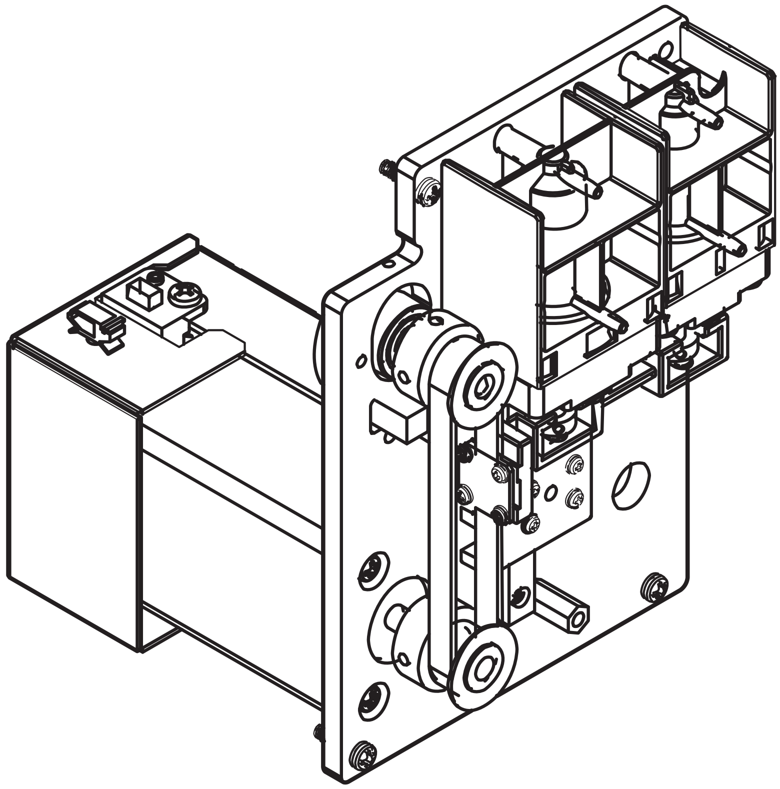
MP-913W OWBC/IWBC PUMP UNIT

Overview

During blood cell measurement, this unit transports the sample which was diluted in the reaction chamber at a constant speed through a syringe pump and quantifies the amount. The MP-913W consists of a double pump that can operate two syringe pumps with a single stepping motor.

Functions

- Transports samples to the IWBC measurement section (impedance) by piston
- Transports samples to the OWBC measurement section (optical) by piston



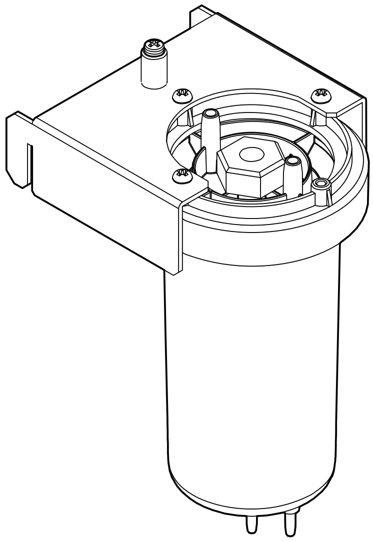
JQ-910W ISO CHAMBER UNIT

Overview

This chamber holds primed diluent from the reagent port inside the analyzer.

Functions

- The chamber holds a 2 measurement portion of diluent aspirated from the diluent port.
- Approximately 100 mL capacity
- Chamber capacity detected by float sensor



JQ-911W WASTE CHAMBER 1 UNIT

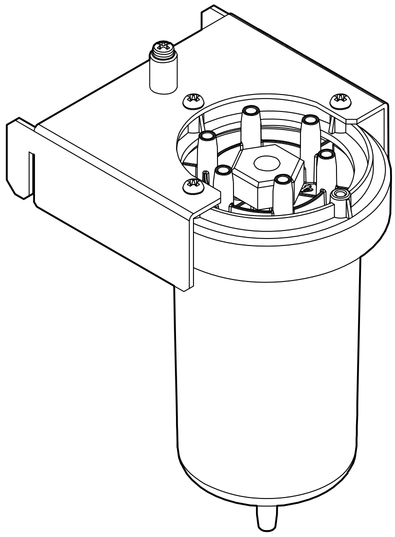
Overview

This unit holds waste fluid from inside the analyzer in a chamber and expels the fluid outside the analyzer.

Functions

- Temporarily holds waste fluid from inside the analyzer
- When operation is complete, pressure from the MP-910W PNEUMATIC UNIT expels the waste fluid from the analyzer through the waste fluid port.
- Chamber capacity detected by float sensor

JQ-911W



JQ-912W WASTE CHAMBER 2 UNIT

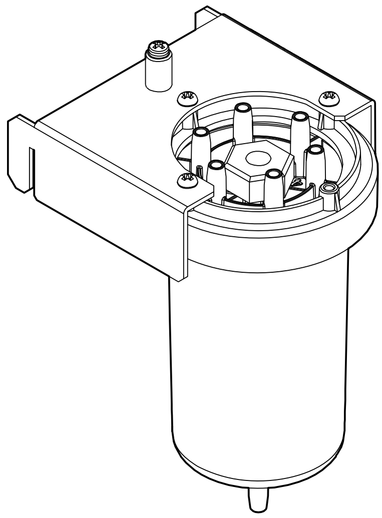
Overview

This unit holds waste fluid from inside the analyzer in a chamber and sends the fluid to the JQ-911W.

Functions

- Temporarily holds waste fluid from the analyzer
- When operation is complete, negative pressure in the JQ-911W WASTE CHAMBER1 UNIT moves stored waste fluid to the JQ-911W.
- Chamber capacity detected by float sensor

JQ-912W



XP-910W PINCH VALVE UNIT

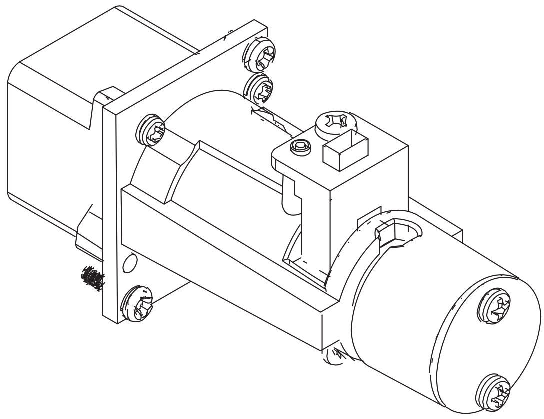
Overview

This unit controls the path of fluids and gases by opening and closing the PharMed tubing.

Control signals from the DRIVER BD to open and close the fluid path.

Functions

- PINCH VALVE UNIT (1): Opens and closes the drain path of the release tube rinsing cup
- PINCH VALVE UNIT (2): Opens and closes the drain path of the sampling needle rinsing cup
- PINCH VALVE UNIT (3): Opens and closes the diluent path from the diluent port to the ISO chamber
- PINCH VALVE UNIT (4): Opens and closes the waste fluid path from waste chamber 2 to waste chamber 1
- PINCH VALVE UNIT (5): Opens and closes the waste fluid path from waste chamber 1 to waste port (external waste tank)



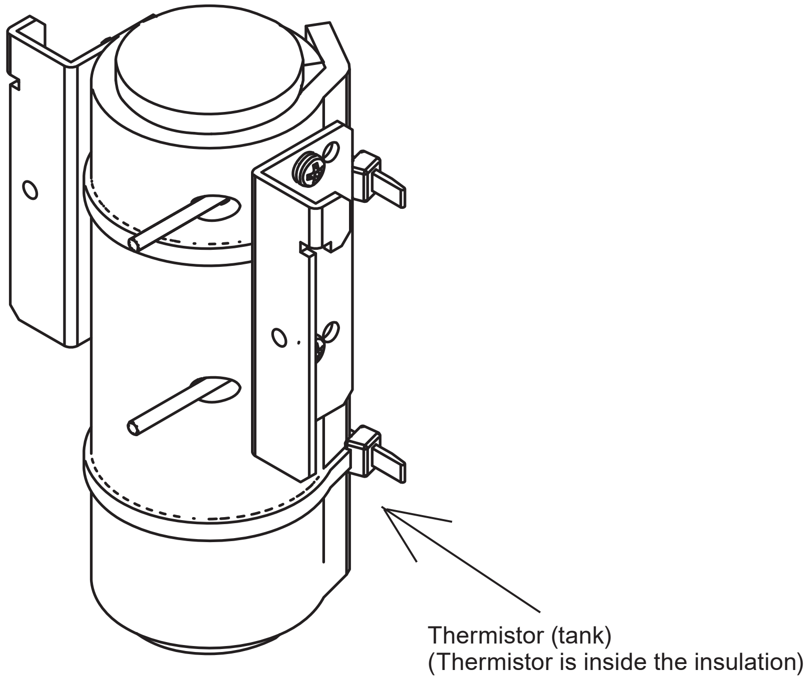
ZY-910W TANK HEATER UNIT

Overview

This unit heats the diluent and the 5-part diff lysing reagent and maintains a constant temperature.

Functions

- Heater to heat a temperature control mechanism (normally 39 ±1°C or 102 ±1.8°F)
- Temperature information from the temperature sensor activates the heater, changes the duty cycle ratio, and performs feedback control.



ZY-911W2 CUP HEATER UNIT

Overview

This unit keeps the temperature of the reagent in the cup constant during measurement and has heating, heat retention and photometry. It can detect short sample errors.

Functions

- Consists of a temperature control mechanism, photometry mechanism and reaction cup
- Mainly used to maintain temperature and is equipped with a temperature control mechanism (normally 39 ±1°C or 102 ±1.8°F) for the 5-part diff reaction cup
- Temperature information from temperature sensor activates the heater and changes the duty cycle ratio and performs feedback control at that time.

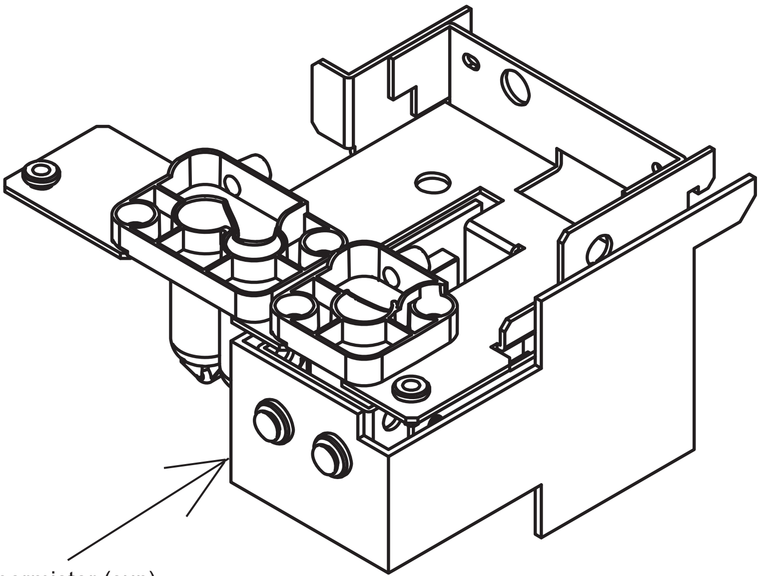
- Photometry (wavelength: 520 nm) measures the change in spectral absorbance of a diluent and hemolyzed blood sample and obtains the HGB sensor voltage from the hemoglobin concentration. The sensor voltage is compared to the voltage obtained from the MH-910W to detect short samples. Samples are created at the designated dilution ratio in each reaction cup.

(UT-7289 HGB/SS LED BD)

An onboard LED lights for HGB measurement and SS confirmation. The board also sends temperature signal from the thermistor signal to the ANALOG BD.

(UT-7290 HGB/SS AMP BD)

The board converts the HGB measurement and SS confirmation LED light voltage and sends the signal to the ANALOG BD.



Thermistor (cup)
Thermistor body is mounted to on the cup side of the LED board.

PV-910W/PV-920W FRONT PANEL UNIT

Overview

This unit displays data on the LCD display, provides screen operation for the touch screen, and controls alarm sound output, switch input and LED illumination.

Functions

- Displays examination data (numerical values, histogram data) and messages to the 10.4 inch TFT color LCD from signals from the PC-910W/PC-911W
- Controls LED illumination and alarm sounds using control signals from the UT-7282 MAIN BD transmitted via the LCD BD
- Has key switches and touch screen for operating the analyzer
- Auto or manual measurement can be easily determined from the illumination of the top of the key on the measurement switch.
- The status indicator visually displays the analyzer status in color.

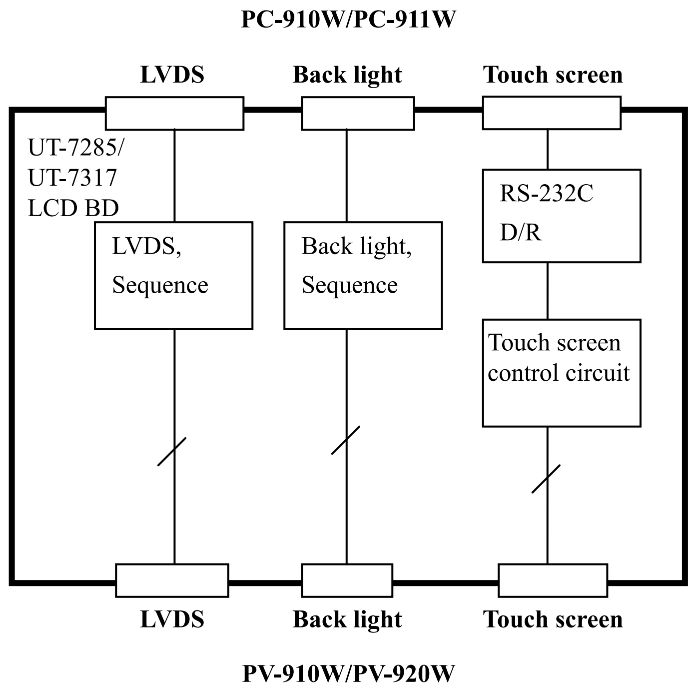
UT-7285/UT-7317 LCD BD

Overview

This board is mounted on the PV-910W/PV-920W and interfaces between the PC-910W/PC-911W and the LCD display.

Functions

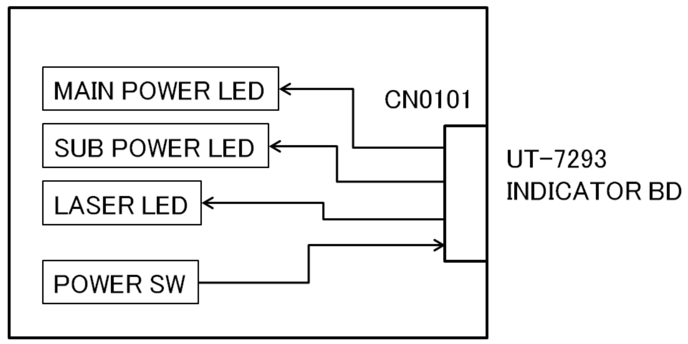
- Relays the LVDS signals (image signal) from the PC-910W/PC-911W to the LCD display
- Connects to the PC-910W/PC-911W by RS-232C and controls the touch screen
- Controls the ON and OFF status of the LCD back light inverter power supply



UT-7291 KEY BD

Overview and Functions

This board is mounted on the PV-910W/PV-920W and detects LED illumination (main power, secondary power and laser illumination) and switch press through signals from the UT-7282 MAIN BD.



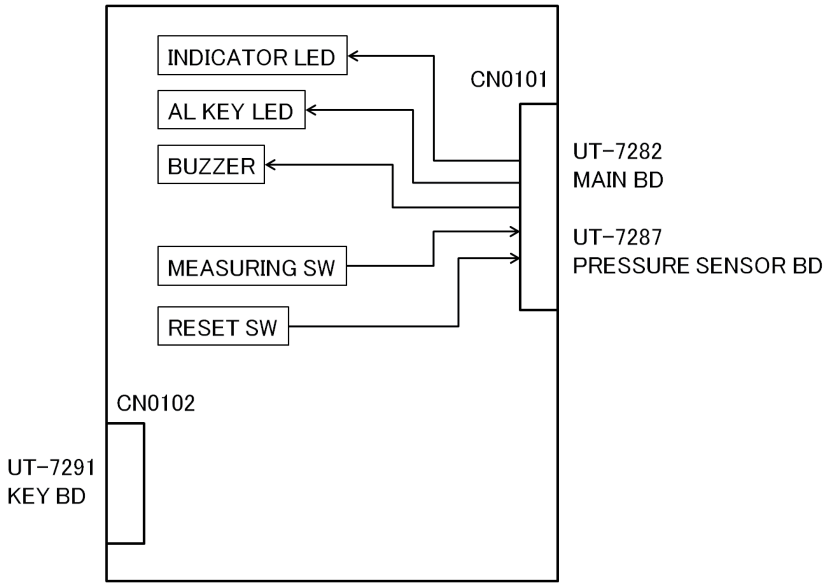
UT-7293 INDICATOR BD

Overview

This board is mounted on the PV-910W/PV-920W and controls LEDs, alarms and switches through signals from the UT-7282 MAIN BD.

Functions

- LED (status indicators, measurement) illumination
- Alarm sound output
- Switch press detection
- Relays key press information from the UT-7291 KEY BD



PC-910W/PC-911W DATA PROCESSING UNIT

Overview

- Uses a motherboard made by Ricoh equipped with an Intel ATOM processor to control the GUI
- Analyzes and processes blood cell pulse data (direct AD data), scattered light data and HGB absorbance data obtained through LAN connection to the UT-7282 MAIN BD
- For storage, the analyzer has a built-in system SSD (PC-910W: 8 GB, PC-911W: 40 GB) connected to the motherboard via Serial ATA and an OS (PC-910W: Windows Embedded 7E, PC-911W: Windows 10 IoT Enterprise LTSC 2019) for installing the MEK-9100 dedicated applications and holding the analyzed data.

  Software installation is required after replacement to maintain the internal software.

Functions

- LCD window control
- Key and touch screen control
- Measurement data analysis and storage
- External interface input and output

Performance and external interface

[PC-910W]

- CPU: N2600 (1.6 GHz) Intel
- Memory: 2 GB PC3-8500 (DDR3-1066)
- SSD capacity: 8 GB
- LVDS: 800×600 18 bit
- SATA: Serial ATA 1.0a/II
- LAN: 10/100Base-T interface 2ch
- USB: USB2.0 2ch
- Serial port: RS232C 3ch
- Battery: CR2032 FDK

[PC-911W]

- CPU: Intel Atom x5-E3940 (1.6 GHz)
- Memory: SK Hynix H5TC4G83EFR-RDA or equivalent
- SSD capacity: 40 GB
- LVDS: 1ch
- SATA: Compliant with Serial ATA rev. 3.0 (6.0, 3.0, 1.5 Gb/s)
- LAN: 100Base-TX/10Base-T interface, 2ch
- USB: USB 2.0 4ch
USB 3.0 2ch
- Serial port: RS-232C 2ch
- Battery: CR14250SE FDK

AUTOLOADER

Overview

This mechanism uses commands from the UT-7282 MAIN BD to carry the racks with the sampling tubes. The autoloader has a mechanism that grips the sampling tube on the rack, mixes the sample by inverting the tube, and moves the tube to the designated location. There is a barcode reader that reads a barcode on the sampling tube and rack and sends that information to the UT-7282 MAIN BD.

Software installation is required after replacement to maintain the internal software.

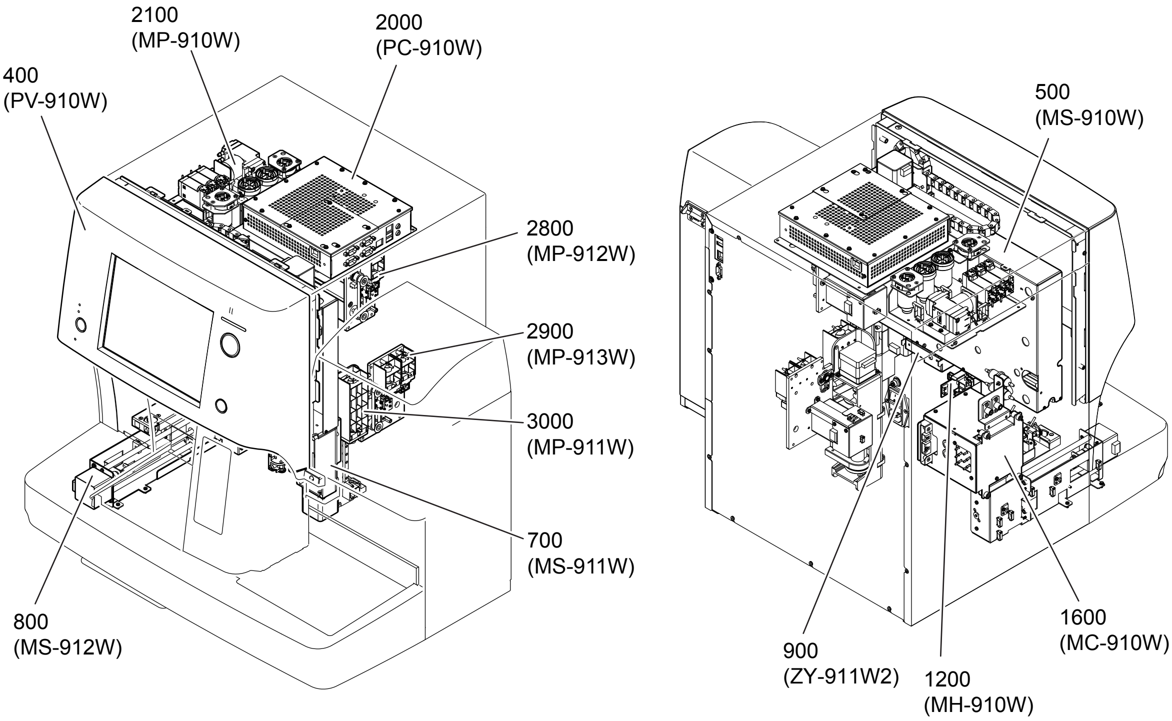
Functions

- Moves the rack to the designated position
- Detects rack movement with sensors and sends that information to the UT-7284 DRIVER BD
- Detects sample tubes on the racks
- Rotates the sampling tubes to read the barcodes
- A barcode reader reads the barcodes affixed to the sampling tubes
- A barcode reader reads the barcodes affixed to the racks
- Grips the sampling tubes and mixes the samples by inverting the tubes
- Holds the sampling tube when the samples are aspirated
- Sensors detect if the mixing cover is open

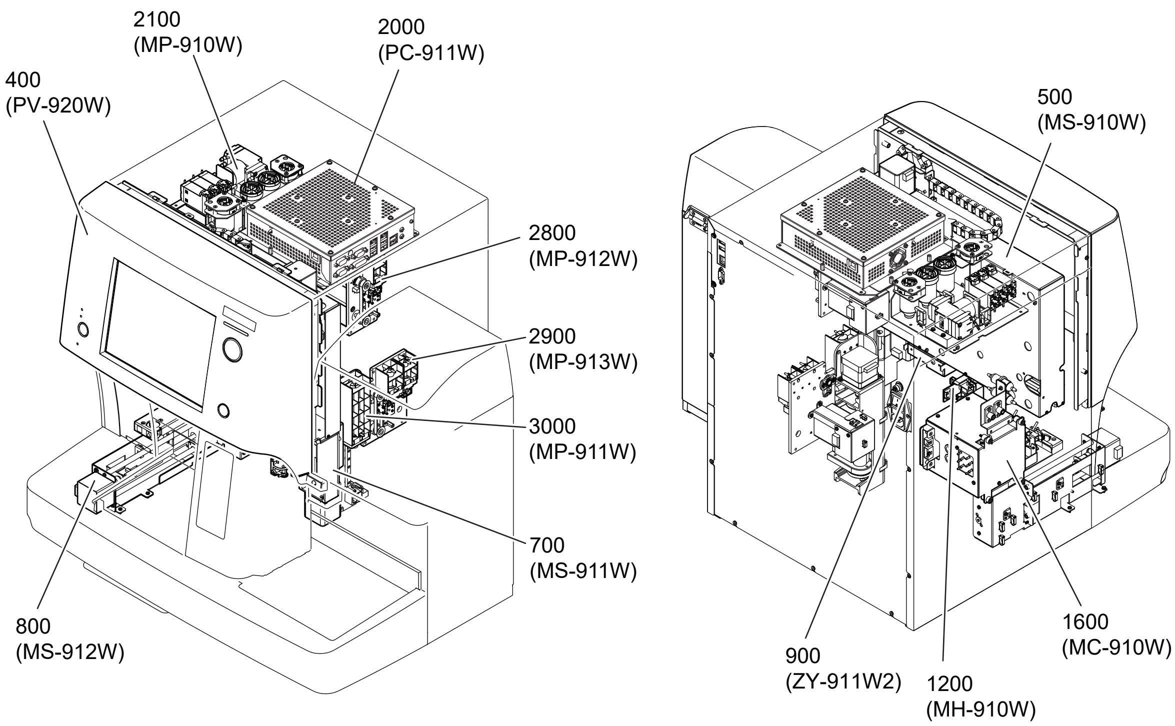
Units and Boards

Unit Location

Old Configuration
(MEK-9100K unit version AA to AL / MEK-9100C unit version AA to AF)

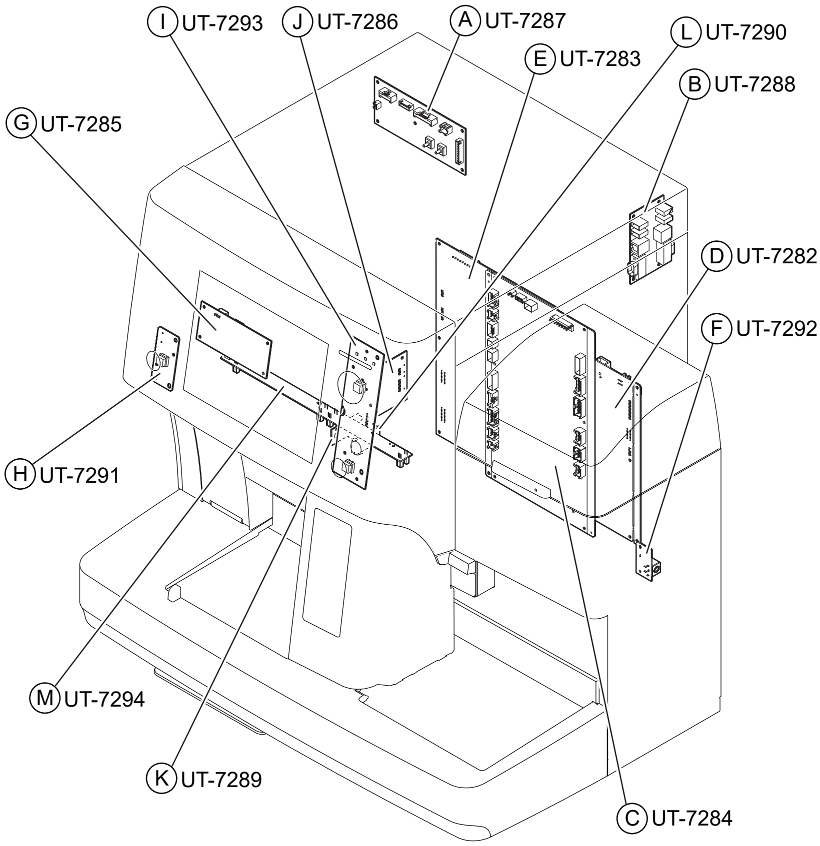


New Configuration
(MEK-9100K unit version AM or later / MEK-9100C unit version AG or later)

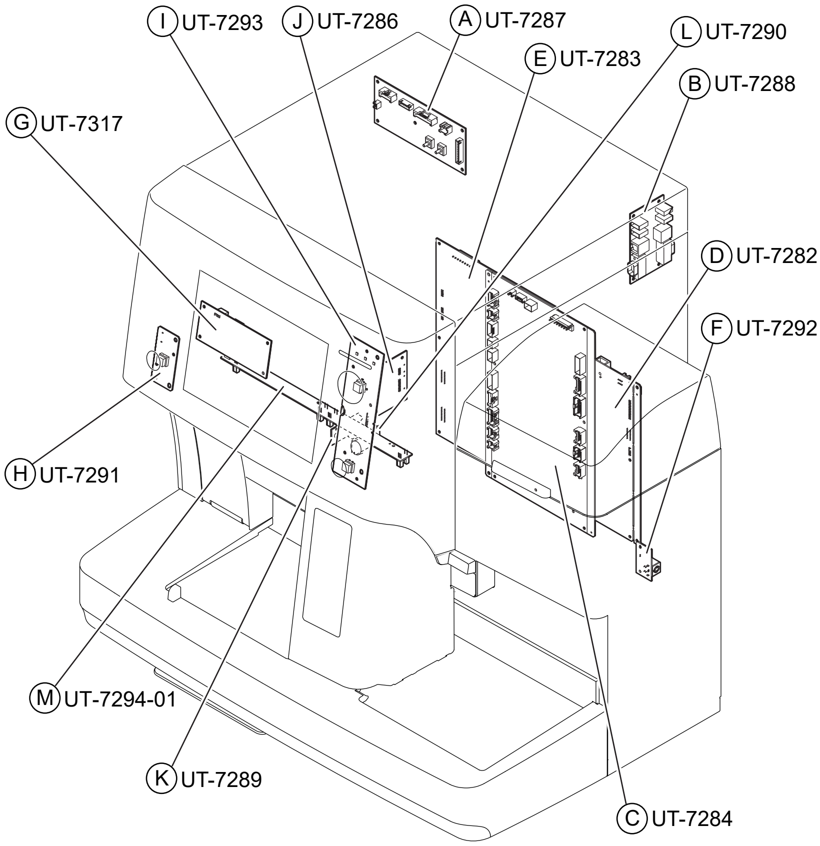


Board Location

Old Configuration
(MEK-9100K unit version AA to AL / MEK-9100C unit version AA to AF)



New Configuration
(MEK-9100K unit version AM or later / MEK-9100C unit version AG or later)



3 Troubleshooting

Check Procedure

When trouble occurs, check the following first.

1) There is no leak, abnormal noise, unusual smell and smoke.
2) There is no system error.
3) There is no alarm.

When a measurement data is not correct, check the following.

1) Measure particles and check the irradiation position of the laser.
2) Measure background noise and check if the value is acceptable.
3) The assay value is within the range.
4) The reproducibility of 10 times (CV%) is within the standard.

Checking the Measurement Environment and Sample Handling

Measurement Environment

The samples must be measured in the operating environment. Especially if the lysing reagent and diluent is low temperature, it affects hemoglobin concentration, WBC and WBC differentiation so that a poor hemolyzation flag and sample error alarm may occur.

Operating environment

Temperature:	15 to 30°C (59 to 86°F)
Humidity:	30 to 85%
Atmospheric pressure:	700 to 1060hPa

Even when the room temperature is within the above range in the winter, the diluent temperature may be low because the diluent gets cold at night. To eliminate cold temperature from the floor, put an insulator such as polystyrene foam under the diluent or use a pet heater. The diluent temperature must be managed carefully.

Notes for Sample Handling

1) If the sample is stored in a refrigerator or for 12 hours or more after collection, it may affect WBC differentiation.
2) Some samples may have poor hemolyzation when measured within 30 minutes after collection. In this case, measure the sample after 30 minutes or more have passed.
3) When measuring blood hours after collection, agitate the sample before measurement.
4) Too much agitation causes hemolyzation.
5) Do not measure aggregated or coagulated samples. This may damage the analyzer.
6) When the blood is stored in the refrigerator for 24 hours or more, return it to room temperature and agitate it thoroughly. In this case, WBC differentiation is not available.

Notes for Preparing Pre-dilution Samples

Data errors in pre-dilution measurement are mostly caused by the collection of blood and pre-dilution operation. Check the following points to prepare the pre-dilution samples. In most cases, pre-dilution samples cannot be remeasured. Do the pre-dilution operation correctly.

About 1 ml of pre-diluted sample is aspirated from the sampling nozzle in pre-dilution mode. If venous blood is aspirated by mistake, non-diluted blood flows into the fluid path and causes analyzer failure such as clogging or high background.

Special Samples

Be careful about "Interfering Substances" as described in p. 2-14. They may affect the measurement value.

Screen Messages

If the analyzer detects an alarm, the alarm message appears on the window.

The alarm message and their causes and their countermeasures are described in the tables on the following pages. After solving the problem, check that no error messages are displayed and that the analyzer functions properly before use.

Measurement Messages

The measurement message indicates a measurement error.

To check the message, touch [Flag] on the Data Details window.

An identifier (such as ?, ! or *) is displayed related to the detected error.

Depending on the detected error, the measurement value of the related parameter might not be displayed.

Measurement messages are displayed

The following data identifiers are added to the parameter on the analyzer.

The data identifiers for the measurement messages are “?” and “!”.

Classification	Data Identifier	Measurement Value	Description
Data cannot be analyzed	None	Related parameter measurement value not displayed	The data cannot be analyzed.
Measurement condition error detected	None	Related parameter measurement value not displayed	Measurement operation error is detected.
Data with low reliability (Error found during measurement)	?	Measurement value displayed	The analyzer condition is out of the specified range and the reliability of the data is low. The measurement value is the reference value.
Data with low reliability (Abnormal flag detected)	! *	Measurement value displayed	Abnormal flag is detected in the sample. The reliability of measured data is low because abnormal cells exist. If the WBC and PLT values are low, count them with a blood smear.
	C	Measurement value displayed	The reliability of measured data is low because PLT clumps are detected.

Classification	Data Identifier	Measurement Value	Description
Out of normal range	H	Measurement value displayed	The measurement value is out of the upper and lower limits range set in the “Sample Type” in System Setting.
	L		
Out of measuring range	None	“OVER” message displayed	The measurement value exceeds the measurable range.

Measurement Message List

Measurement Message	Cause	Countermeasure
HGB Circuit Message	LED OFF voltage is outside the range.	Follow instructions from “‘00162 HGB Circuit Abnormality’ in Analyzer Message List in Section 3 Troubleshooting” (p. 3-19).
SS Circuit Message		Follow instructions from “‘00163 SS Circuit Abnormality’ in Analyzer Message List in Section 3 Troubleshooting” (p. 3-20).
HGB LED Temp. Message	Temperature sensor cable is disconnected or sensor may be damaged.	Perform the following procedure. 1) Check the connection and cable of the applicable sensor. 2) Replace the applicable sensor. For information on sensor status, refer to “Checking the Sensors Inside the Analyzer” in Section 6 Maintenance (p. 6-65).
Diluent Temp. Message		
SS LED Temp. Message		
SS Cup Temp. Message		
Cup Temp. Message		
Cup Heater Temp. Message		
Tank Temp. Message		
Tank Heater Temp. Message		
Room Temp. Message		
WBC Noise [1,2]	Detector is dirty or power environment is unstable.	Follow instructions from “‘21052 WBC noise’ in Analyzer Message List in Section 3 Troubleshooting” (p. 3-25).
RBC Noise [1,2]		Follow instructions from “‘21053 RBC noise’ in Analyzer Message List in Section 3 Troubleshooting”(p. 3-25).
WBC Aperture Clog [1,2]	Electrode voltage after measurement is outside the range.	Follow instructions from “‘21050 WBC Detection Hole Clog’ in Analyzer Message List in Section 3 Troubleshooting” (p. 3-25).
RBC Aperture Clog [1,2]		Follow instructions from “‘21051 RBC Detection Hole Clog’ in Analyzer Message List in Section 3 Troubleshooting” (p. 3-25).
WBC Time-Series Message [1,2]	Maximum value and minimum value in the time series is outside the range.	Perform the following operation and remeasure the sample with an error. 1) Remove clogs in the aperture cap. “Removing Clogs” (p. 6-10) 2) Clean protein. “Cleaning Protein” (p. 6-6) 3) Clean the aperture cap. “Cleaning the Aperture Caps” (p. 6-126)
RBC Time-Series Message [1,2]		
PLT Time-Series Message [1,2]		
LaserKey Off	The laser key is OFF.	Change the laser output setting to [ON]. “Laser output” in Measurement Settings in Section 7 System Settings (p. 7-15)
OpticalCount Message [1]	Unspecified operation during optical count	Clean the flow cell. “Cleaning the Flowcell” (p. 6-8)

Measurement Message	Cause	Countermeasure
OpticalCount Low [1]	Optical count is too low and WBC 5-part was not differentiated.	Make a blood smear and count it visually with a microscope.
Short Sample [1,2]	Blood cannot be discharged in the IWBC cup and OWBC cup.	Remeasure the sample.
Cup Temp. Low	The OWBC cup temperature during measurement (except the SS measurement) is outside of specified range.	Perform the following procedure and remeasure the sample with an error. 1) Locate the analyzer so that the venting hole is not blocked. 2) Keep the room temperature at 15 to 30°C (59 to 86°F) and remeasure the sample. 3) If this occurs frequently, check that the sensor is installed to the correct position. "Checking the Sensors Inside the Analyzer" (p. 6-65)
Cup Temp. High		
HGB Voltage High	LED ON voltage is outside the range.	Adjust the HGB voltage. "Adjusting Gain" (p. 6-63)
HGB Voltage Low		Perform the following procedure and remeasure the sample with an error. 1) Keep the room temperature and diluent temperature at 15 to 30°C (59 to 86°F) and remeasure the sample. 2) If this occurs frequently adjust the HGB voltage. "Adjusting Gain" (p. 6-63)
HGB LED Temp. Low	HGB LED temperature is outside the specified range.	
HGB LED Temp. High		
Diluent Temp. Low	HGB CAL temperature is outside the specified range.	Perform the following procedure and remeasure the sample with an error. 1) Keep the room temperature and diluent temperature at 15 to 30°C (59 to 86°F) and remeasure the sample. 2) If this occurs frequently, check that the sensor is installed to the correct position.
Diluent Temp. Low		
SS Voltage Low	SS voltage is outside the specified range.	Adjust the SS voltage. "Adjusting Gain" (p. 6-63)
SS Voltage High		
SS LED Temp. Low	SS LED temperature is outside the range.	Perform the following procedure and remeasure the sample with an error. 1) Keep the room temperature and diluent temperature at 15 to 30°C (59 to 86°F). 2) If this occurs frequently, check that the sensor is installed to the correct position. For information on sensor status, refer to Section 6 "Maintenance".
SS LED Temp. High		
SS Cup Temp. Low	The OWBC cup temperature during SS measurement is outside of specified range.	
SS Cup Temp. High		
Cup Heater Temp. Low	The cup heater temperature during measurement is outside of specified range.	
Cup Heater Temp. High		
Tank Temp. Low	The tank temperature during measurement is outside of specified range.	
Tank Temp. High		
Tank Heater Temp. Low	The tank heater temperature during measurement is outside of specified range.	Perform the following procedure and remeasure the sample with an error. 1) Keep the room temperature and diluent temperature at 15 to 30°C (59 to 86°F). 2) If this occurs frequently, check that the sensor is installed to the correct position. For information on sensor status, refer to Section 6 "Maintenance".
Tank Heater Temp. High		

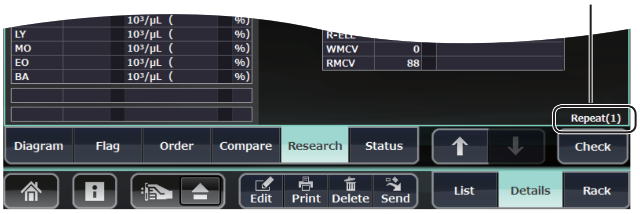
Measurement Message	Cause	Countermeasure
SD sensitivity drop [1]	A decrease in SD sensitivity occurs.	Perform optical adjustment from the Calibration window using the MEK-CAL. “Calibration” (p. 5-2) When the SD sensitivity decreases so much that the optical adjustment cannot be performed or additional errors appear after the optical adjustment, the optical unit is suspected to be faulty.
Detected small particles [1]	Small particles that interfere with the PLT value are detected.	Small particles are detected on the scattergram. The following causes are suspected. 1) Sample-derived causes such as PLT clumps 2) Bubbles in the diluent Perform a measurement again. When the error appears on only the specific samples, 1 is suspected. Wait awhile and perform a measurement again. It can be a solution. When the error appears on the multiple samples, 2 is suspected. If the amount of diluent is small, replace the diluent bottle. Also, run the self-check and check the background noise.
Room Temp. Low	The internal chassis temperature during measurement is outside of specified range.	Perform the following procedure and remeasure the sample with an error. 1) Locate the analyzer so that the venting hole is not blocked. 2) Keep the room temperature at 15 to 30°C (59 to 86°F) and remeasure the sample. 3) If this occurs frequently, check that the sensor is installed to the correct position. “Checking the Sensors Inside the Analyzer” (p. 6-65)
Room Temp. High		

1 The appropriate analyzer message is displayed on the Maintenance Log window.

“Analyzer Message List” (p. 3-11)

2 When this occurs during auto measurement, the sample is remeasured automatically, and the new measurement data is saved instead of the original data.
New measurement data can be checked from: [Data List] > [Details] > [Research].

“Repeat (1)” is displayed for new measurement data.



NOTE: Repeat (1) is displayed only for users with “Technical User” operator privileges.

Assigning and Hiding Identifiers to the Parameters for Measurement Messages

Measurement Message	Identifier																									
	WBC	RBC	HGB	HCT	MCV	MCH	MCHC	RDW-CV/RDW-SD	PLT	PCT/MPV/PDW/P-LCR	NE	LY	MO	EO	BA	NE%	LY%	MO%	EO%	BA%	P-LCC	MentzerIndex	RDWI	IG/IG%	Band/Band%	Seg/Seg%
HGB Circuit Message			–			–	–																			
SS Circuit Message	There are no assigned data identifiers or hidden parameters.																									
HGB LED Temp. Message			?																							
Diluent Temp. Message			?																							
SS LED Temp. Message	There are no assigned data identifiers or hidden parameters.																									
SS Cup Temp. Message																										
Cup Temp. Message											?	?	?			?	?	?						–	–	–
Cup Heater Temp. Message	There are no assigned data identifiers or hidden parameters.																									
Tank Temp. Message																										
Tank Heater Temp. Message																										
Room Temp. Message																										
WBC Noise	–										–	–	–	–	–											
RBC Noise		–		–	–		–	–	–	–											–	–	–			
WBC Aperture Clog	–										–	–	–	–	–											
RBC Aperture Clog		–		–	–		–	–	–	–											–	–	–			
WBC Time-Series Message	–										–	–	–	–	–											
RBC Time-Series Message		–		–	–		–	–														–	–			
PLT Time-Series Message									–	–											–					
LaserKey Off											–	–	–	–	–	–	–	–	–	–				–	–	–
OpticalCount Message											?	?	?	?	?	?	?	?	?	?				–	–	–
OpticalCount Low											–	–	–	–	–	–	–	–	–	–						
Short Sample	!		!								!	!	!	!	!	!	!	!	!	!				–	–	–
Cup Temp. Low											?	?	?			?	?	?						–	–	–
Cup Temp. High											?	?	?			?	?	?						–	–	–
HGB Voltage High			!																							
HGB Voltage Low			?																							
HGB LED Temp. Low			?																							
HGB LED Temp. High			?																							
Diluent Temp. Low			?																							
Diluent Temp. High			?																							

Measurement Message	Identifier																									
	WBC	RBC	HGB	HCT	MCV	MCH	MCHC	RDW-CV/RDW-SD	PLT	PCT/MPV/PDW/P-LCR	NE	LY	MO	EO	BA	NE%	LY%	MO%	EO%	BA%	P-LCC	MentzerIndex	RDWI	IG/IG%	Band/Band%	Seg/Seg%
SS Voltage Low	There are no assigned data identifiers or hidden parameters.																									
SS Voltage High																										
SS LED Temp. Low																										
SS LED Temp. High																										
SS Cup Temp. Low																										
SS Cup Temp. High																										
Cup Heater Temp. Low																										
Cup Heater Temp. High																										
Tank Temp. Low																										
Tank Temp. High																										
Tank Heater Temp. Low																										
Tank Heater Temp. High																										
SD sensitivity drop											–	–	–	–	–	–	–	–	–	–				–	–	–
Detected small particles									*	*											–					
Room Temp. Low	There are no assigned data identifiers or hidden parameters.																									
Room Temp. High																										

Measurement values with “–” are hidden parameters.

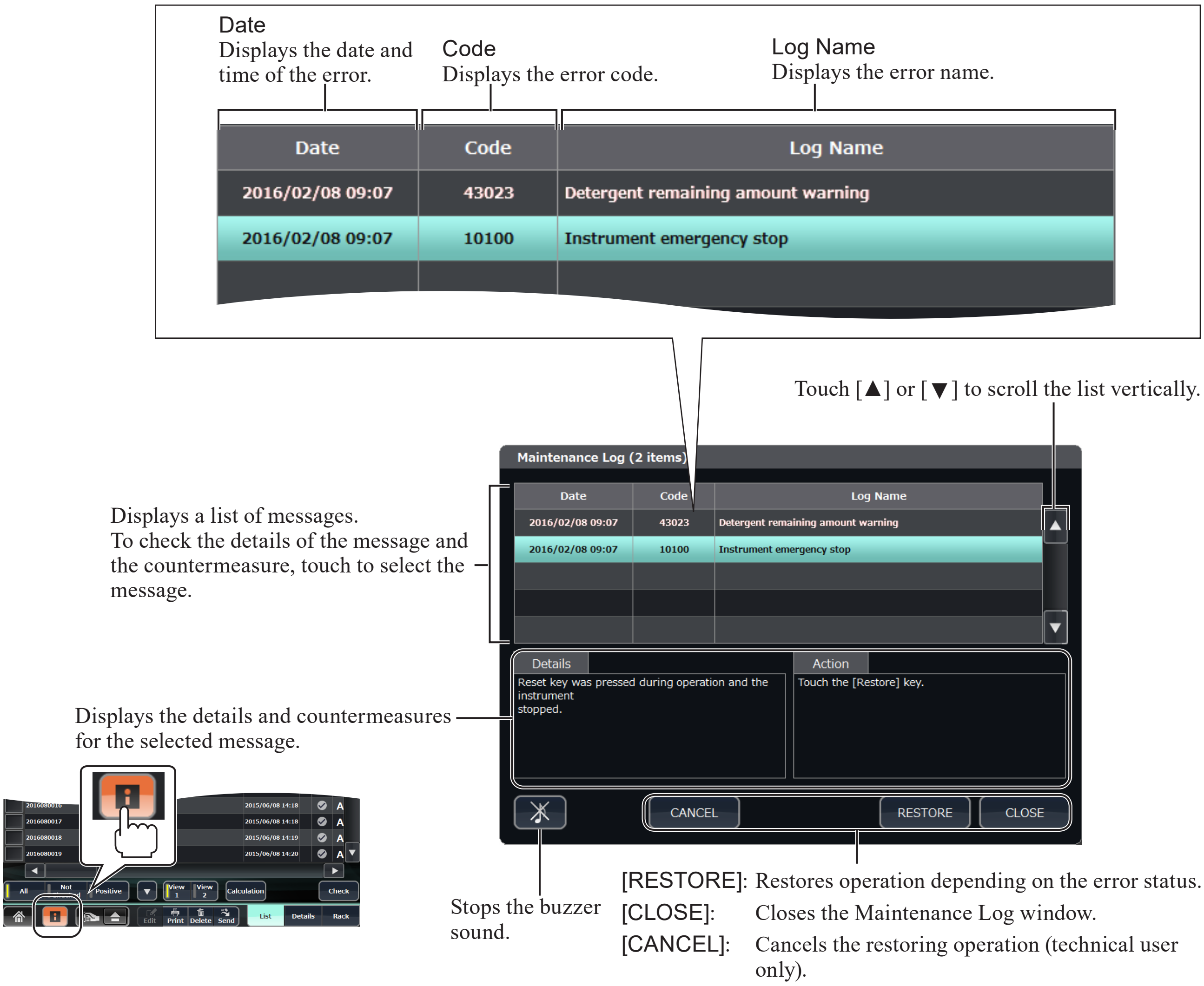
Analyzer Messages

If an error is detected during measurement, the Maintenance Log window appears and the buzzer sounds.

> The buzzer sound can be canceled.
> Data Management and Setting Guide: Section 5 “System Settings”.

The Maintenance Log window displays a message of the analyzer error and the countermeasures.

- A message right after detection appears in red (unread message status).
- When the message is touched and the details and countermeasures are checked, the message is displayed in white (read message status).



> For messages with low priority listed in the “4xxxx: Error Notifications during Operation” (p. 3-32), [ ] on the lower left may become orange without opening the Maintenance Log window. In this case, touch [ ] to open the Maintenance Log window.

> For details on the [CANCEL], refer to “Canceling Restoring Operation” (p. 3-11).

Restoring Operation

The analyzer can be restored to the normal condition in the following procedure.

1. Select the error message on the Maintenance Log window and display the details and countermeasures.
2. Perform the displayed countermeasure.

   Some messages require the countermeasure on other menu such as on the Reagents window.

3. Touch [RESTORE] on the Maintenance Log window.

Canceling Restoring Operation

The restoring operation can be canceled in the following procedure.

1. Touch [CANCEL] on the Maintenance Log window.

   NOTE: This operation can be performed with “Technical User”.

2. The displayed error message is considered as completing the restoration, and the Maintenance Log window is closed.

   NOTE: Performing this operation means to cancel the restoring procedure, so you need to fully understand the state of the analyzer before this operation. This may damage the analyzer.

Analyzer Message List

0xxxx: Emergency Stop and Unrecoverable Errors

Code	Error	Cause	Countermeasures or Recovery Operation
00001	Open Voltage Operation Error	Control error for air pressure source condition	Touch [RESTORE] to initialize the drive part of the analyzer. The analyzer restarts. • If the problem is not resolved by restarting, check that the air compressor is working and that there are no leaks in the flow circuit. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00002	Air Opening Error	During air opening operation, pressure is outside the range of +/–8.0 kPa	Touch [RESTORE] to initialize the drive part of the analyzer. In the electromagnetic valve tab, open 15A and 15B, and check the pressure in the AD sensor tab. • If pressure is outside the range indicated to the left, collapse or clog in the delivery tube, clog in the electromagnetic valve, or pressure sensor malfunction is suspected. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

Code	Error	Cause	Countermeasures or Recovery Operation
00003	ISO Chamber Positive Pressure Error	During ISO chamber pressurization, pressure is outside the range of 57.96 to 80.04 kPa	Touch [RESTORE] to initialize the drive part of the analyzer. In the electromagnetic valve tab, operate the compressor, open 13A, and check the ISO chamber pressure in the AD sensor tab. • If pressure is more than 80.04 kPa, sticking in the positive pressure relief valve or collapse or clog in the fluid path is suspected. • If pressure is less than 57.96 kPa, fluid path leak is suspected. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00004	ISO Chamber Negative Pressure Error	During ISO chamber pressurization, pressure is outside the range of −25.0 to −35 kPa	Touch [RESTORE] to initialize the drive part of the analyzer. In the electromagnetic valve tab, operate the compressor, open 13 B, and check the ISO chamber pressure in the AD sensor tab. • If pressure is more than −25.0 kPa, fluid path leak is suspected. • If pressure is less than −35.0 kPa, sticking in the positive pressure relief valve or collapse or clog in the fluid path is suspected. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00005	WC1 Positive Pressure Error	During WC1 pressurization, pressure is outside the range of 57.96 to 80.04 kPa	Touch [RESTORE] to initialize the drive part of the analyzer. In the electromagnetic valve tab, operate the compressor, open 14A, and check the waste chamber pressure in the AD sensor tab. • If pressure is more than 80.04 kPa, sticking in the positive pressure relief valve or collapse or clog in the fluid path is suspected. • If pressure is less than 57.96 kPa, fluid path leak is suspected. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00006	WC1 Negative Pressure Error	During WC1 pressurization, pressure is outside the range of −25.0 to −35 kPa	Touch [RESTORE] to initialize the drive part of the analyzer. In the electromagnetic valve tab, operate the compressor, open 14B, and check the waste chamber pressure in the AD sensor tab. • If pressure is more than −25.0 kPa, fluid path leak is suspected. • If pressure is less than −35.0 kPa, sticking in the positive pressure relief valve or collapse or clog in the fluid path is suspected. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

MP-911W ISO Pump Unit Related

Up and down movement of the MP-911W ISO pump unit is detected by the following 3 sensors.

The sensor plate that moves with the motor reaches the sensor slit part and interception of sensor light is detected.

- Start point sensor
- Bottom dead point sensor
- Motor rotation detection sensor

<table>
<tr><th>Code</th><th>Error</th><th>Cause</th><th>Countermeasures or Recovery Operation</th></tr>
<tr><td>00010</td><td>Diluter Initialize Error</td><td>Initialization movement did not reach the start point sensor (sensor timeout)</td><td>Touch [RESTORE] to initialize the drive part of the analyzer.
• If the motor does not move, check the motor cable.
• If the motor moves, check the photo sensor.
If there is no short from crossover or fluid drops, replace the sensor, replace the MP-911W, and replace the Driver BD in that order until the problem is solved.
Touch [RESTORE] to do the following operation.
• Initialize the analyzer actuator and eject the rack which is being measured.</td></tr>
<tr><td>00011</td><td>Diluter Operation Error</td><td>Pump full stroke did not reach the bottom dead point sensor (sensor timeout)</td><td rowspan="3">Touch [RESTORE] to initialize the drive part of the analyzer.
Check the photo sensor.
If there is no short from crossover or fluid drops, replace the sensor, replace the MP-911W, and replace the Driver BD in that order until the problem is solved.
Touch [RESTORE] to do the following operation.
• Initialize the analyzer actuator and eject the rack which is being measured.</td></tr>
<tr><td>00012</td><td>Diluter Base Position Error</td><td>At the start of pump operation, the sensor which should be ON is OFF
Sensor did not detect it or pump position is incorrect</td></tr>
<tr><td>00013</td><td>Diluter End Position Error</td><td>At the start of pump operation, the sensor which should be ON is OFF
Sensor did not detect it or pump position is incorrect</td></tr>
</table>

MP-912W SAM/RBC Pump Unit Related

Up and down movement of the MP-911W SAM/RBC pump unit is detected by the following 3 sensors.

The sensor plate that moves with the motor reaches the sensor slit part and interception of sensor light is detected.

- Start point position sensor
- Motor rotation detection sensor

Code	Error	Cause	Countermeasures or Recovery Operation
00020	Sample Pump Initialize Error	Initialization movement did not reach the start point sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. • If the motor does not move, check the motor cable. • If the motor moves, check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MP-912W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00022	Sample Pump Base Position Error	At the start of pump operation, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MP-912W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00030	RBC Pump Initialize Error	Initialization movement did not reach the start point sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. • If the motor does not move, check the motor cable. • If the motor moves, check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MP-912W (inner side), and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00032	RBC Pump Base Position Error	At the start of pump operation, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MP-912W (inner side), and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

MP-913W IWBC/OWBC Pump Unit Related

Up and down movement of the MP-913W IWBC/OWBC pump unit is detected by the following 2 sensors.

The sensor plate that moves with the motor reaches the sensor slit part and interception of sensor light is detected.

- Start point position sensor
- Motor rotation detection sensor

Code	Error	Cause	Countermeasures or Recovery Operation
00040	WBC Pump Initialize Error	Initialization movement did not reach the start point sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. • If the motor does not move, check the motor cable. • If the motor moves, check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MP-913W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00042	WBC Pump Base Position Error	At the start of pump operation, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MP-913W (front/near side), and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

MS-910W Sampler Unit Related

Left-right movement of the MP-910W sampler unit is detected by the following 5 sensors.

The sensor plate that moves with the motor reaches the sensor slit part and interception of sensor light is detected.

- Start point position sensor
- OWBC cup position sensor
- RBC cup position sensor
- IWBC cup position sensor
- OP aspiration position sensor

Up and down movement is detected by the following 3 sensors.

The sensor plate that moves with the motor reaches the sensor slit part and interception of sensor light is detected.

- Start point position sensor
- OP aspiration position sensor
- AL aspiration position sensor

Code	Error	Cause	Countermeasures or Recovery Operation
00050	X Sampler Initialize Error	Initialization movement did not reach the start point sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. • If the motor does not move, check the motor cable. • If the motor moves and there is no short from crossover or fluid drops, check the distribution wires of the UT-7294 SAMPLER SENSOR BD, replace the MP-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00051	X Sampler Operation Error	Movement of the sensor to the OP position did not reach the OP sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. Check the distribution wires of the UT-7294 SAMPLER SENSOR BD, replace the MS-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00052	X Sampler Base Position Error	At the start of sampler movement, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	Touch [RESTORE] to initialize the drive part of the analyzer. Check the distribution wires of the UT-7294 SAMPLER SENSOR BD, replace the MS-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00053	X Sampler End Position Error	At the end of sampler movement, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	Touch [RESTORE] to initialize the drive part of the analyzer. Check the distribution wires of the UT-7294 SAMPLER SENSOR BD, replace the MS-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00060	Y Sampler Initialize Error	Initialization movement did not reach the start point sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. • If the motor does not move, check the motor cable. • If the motor moves, check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MS-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

Code	Error	Cause	Countermeasures or Recovery Operation
00061	Y Sampler Operation Error	Movement of the sensor to the full stroke position did not reach the sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MS-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00062	Y Sampler Base Position Error	At the start of sampler movement, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	
00063	Y Sampler End Position Error	At the start of sampler movement, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	

MS-911W Open Air Unit Related

Up and down movement of the MS-911W open air unit is detected by the following 2 sensors.

The sensor plate that moves with the motor reaches the sensor slit part and interception of sensor light is detected.

- Start point position sensor
- Bottom dead point position sensor

Code	Error	Cause	Countermeasures or Recovery Operation
00070	Venting Needle Initialize Error	Initialization movement did not reach the start point sensor (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. • If the motor does not move, check the motor cable. • If the motor moves, check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MS-911W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00071	Venting Needle Operation Error	Full stroke did not reach the bottom dead point sensor (sensor timeout)	Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MS-911W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00072	Venting Needle Base Position Error	At the start of venting needle operation, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the MS-911W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

Code	Error	Cause	Countermeasures or Recovery Operation
00073	Venting Needle End Position Error	At the end of venting needle operation, the sensor which should be ON is OFF Sensor did not detect it or pump position is incorrect	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the MS-911W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

Pinch Bulb Related

The pinch bulb is composed of the following.

The sensor plate that moves with the motor reaches the sensor slit part and interception of sensor light is detected.

- Moving part to clamp the phamed tube
- Motor
- Motor position sensor

Code	Error	Cause	Countermeasures or Recovery Operation
00090	PV1 Initialize Error	Error in bulb closing operation (initialization operation) Sensor did not detect it or bulb position is incorrect (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. • If the motor does not move, check the motor cable. • If the motor moves, check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the XP-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00100	PV2 Initialize Error		
00110	PV3 Initialize Error		
00120	PV4 Initialize Error		
00130	PV5 Initialize Error		
00091	PV1 Close Operation Error	Error in bulb closing operation Sensor did not detect it or bulb position is incorrect (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the XP-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00101	PV2 Close Operation Error		
00111	PV3 Close Operation Error		
00121	PV4 Close Operation Error		
00131	PV5 Close Operation Error		
00092	PV1 Open Operation Error	Error in bulb opening operation Sensor did not detect it or bulb position is incorrect (sensor timeout)	Touch [RESTORE] to initialize the drive part of the analyzer. Check the photo sensor. If there is no short from crossover or fluid drops, replace the sensor, replace the XP-910W, and replace the Driver BD in that order until the problem is solved. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00102	PV2 Open Operation Error		
00112	PV3 Open Operation Error		
00122	PV4 Open Operation Error		
00132	PV5 Open Operation Error		

Thermistor Related

Code	Error	Cause	Countermeasures or Recovery Operation
00140	Thermistor Abnormality (Cup)	Thermistor failure, distribution wire problem, or problem in IC (AD converter) on board: AD VALUE OVER	Touch [RESTORE] to initialize the drive part of the analyzer. Check the connector of the corresponding thermistor. Check the connector of the UT-7287 PRESSURE SENSOR BD. Check the connector of the UT-7282 MAIN BD. If these actions do not solve the problem, replace the thermistor, replace the PRESSURE SENSOR BD, and replace the MAIN BD in that order. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00141	Thermistor Abnormality (Cup Heater)		
00142	Thermistor Abnormality (Tank)		
00143	Thermistor Abnormality (Tank Heater)		
00144	Thermistor Abnormality (HGB temperature sensor)		
00145	Thermistor Abnormality (SS temperature sensor)		
00146	Thermistor Abnormality (chassis internal temperature sensor)		
00156	Thermistor Abnormality (diluent temperature sensor)		

Circuit Related

Code	Error	Cause	Countermeasures or Recovery Operation
00160	CBC Circuit Abnormality	Circuit inspection result out of range (WBC, RBC, MCV, W-ELE, R-ELE)	Touch [RESTORE] to initialize the drive part of the analyzer. In System Settings, check the measurement conditions (sensitivity, threshold). Check the MC-910W CBC MEASURING UNIT wires. Check the ANALOG BD wires. If these actions do not solve the problem, replace the UT-7286 MEASURING BD and UT-7283 ANALOG BD in that order. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00161	DIFF Circuit Abnormality	Circuit inspection result out of range (TOC)	Touch [RESTORE] to initialize the drive part of the analyzer. In System Settings, check the measurement conditions (FS, FL, SD sensitivity, and FS threshold). Check the ANALOG BD wires. If there is a problem, replace the UT-7283 ANALOG BD. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00162	HGB Circuit Abnormality	HGB LED OFF voltage is outside the range of 0.05 to 0.15 V AD circuit abnormality, LED circuit abnormality, AMP circuit abnormality	Touch [RESTORE] to initialize the drive part of the analyzer. Check the MH-910W HGB measuring unit wires. Check the ANALOG BD wires. If there is a problem, replace the MH-910W. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

Code	Error	Cause	Countermeasures or Recovery Operation
00163	SS Circuit Abnormality	SS LED OFF voltage outside the range of 0.05 to 0.15 V AD circuit abnormality, LED circuit abnormality, AMP circuit abnormality	Touch [RESTORE] to initialize the drive part of the analyzer. Check the ZY-911W2 cup heater unit wires. Check the ANALOG BD wires. If there is a problem, replace the ZY-911W2. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

Leak Check Related

Code	Error	Cause	Countermeasures or Recovery Operation
00200	Leak detected	Abnormality detected during leak check	Touch [RESTORE] to initialize the drive part of the analyzer. For details, refer to the Technical Reference Manual. Check the fluid path that was judged abnormal. NOTE: Run [Maintenance] > [Service] > [Main] > [Leak Check] and if there is a problem with the fluid path, an error between 00200 and 00355 will occur. Responses to each error are described in the Technical Reference Manual. After the problem is solved, do the leak check. **Touch [RESTORE] to do the following operation.** • Put the analyzer actuator on standby.
00201	Leak detected		
00202	Electromagnetic valve operation error		
00203	Electromagnetic valve operation error		
00210	Kink detected		
00211	Leak detected		
00212	Leak detected		
00213	Electromagnetic valve operation error		
00220	Kink detected		
00221	Leak detected		
00225	Kink detected		
00226	Leak detected		
00227	Electromagnetic valve operation error		
00230	Leak detected		
00240	Kink detected		
00241	Leak detected		
00242	Kink detected		
00243	Kink detected		
00244	Kink detected		
00245	Kink detected		
00246	Kink detected		
00247	Kink detected		
00251	Kink detected		
00252	Leak detected		
00261	Kink detected		
00262	Leak detected		
00271	Kink detected		
00272	Leak detected		
00273	Leak detected		
00281	Kink detected		
00282	Leak detected		
00291	Kink detected		
00292	Leak detected		
00293	Leak detected		
00294	Leak detected		
00295	Kink detected		
00300	Kink detected		
00301	Kink detected		
00302	Kink detected		
00310	Kink detected		
00311	Kink detected		
00312	Kink detected		
00313	Kink detected 6		
00314	Kink detected		
00350	Press source unit: (−) press sensor: atmospheric pressure		
00351	Press source unit: (+) press sensor: atmospheric press		
00352	Press source unit: (−) press sensor: (−) press applied		
00353	Press source unit: (+) press sensor: (−) press applied		
00354	Press source unit: (−) press sensor: (+) press applied		
00355	Press source unit: (+) press sensor: (+) press applied		

Needle Position Adjustment Related

<table>
<tr><th>Code</th><th>Error</th><th>Cause</th><th>Countermeasures or Recovery Operation</th></tr>
<tr><td>00400</td><td>Sampler start point adjustment position error</td><td rowspan="2">[Pierced] key was touched when the sampler was not in unpierced position</td><td rowspan="2">Touch [RESTORE] to initialize the drive part of the analyzer.
“Adjusting the Measurement Position” (p. 6-59)
Touch the [Not Pierced] key. When the sampler moves to the not pierced position, touch the [Pierced] key.
Touch [RESTORE] to do the following operation.
• Put the analyzer actuator on standby.</td></tr>
<tr><td>00401</td><td>Sampler open adjustment position error</td></tr>
<tr><td>00402</td><td>X-direction open adjustment value out of range</td><td>Outside the setting range (95 to 105) for manual measurement position (lateral)</td><td rowspan="2">Touch [RESTORE] to return the analyzer to standby.
Enter a value within the setting range of 95 to 105.
Touch [RESTORE] to do the following operation.
• The indicator lamp lights green.</td></tr>
<tr><td>00403</td><td>Y-direction open adjustment value out of range</td><td>Outside the setting range (95 to 105) for manual measurement position (toward the inside)</td></tr>
<tr><td>00404</td><td>AL start point adjustment position error</td><td>[Pierced] key was touched when the sampler was not in unpierced position</td><td rowspan="2">Touch [RESTORE] to initialize the drive part of the analyzer.
Touch the [Not Pierced] key. When the sampler moves to the not pierced position, touch the [Pierced] key.
Touch [RESTORE] to do the following operation.
• Put the analyzer actuator on standby.</td></tr>
<tr><td>00405</td><td>Pressure release needle position error</td><td>[Pierced] key was touched when the venting needle was not in pierced position</td></tr>
</table>

Other

Code	Error	Cause	Countermeasures or Recovery Operation
00500	Internal communication loss	Communication with measuring part lost and number of retries exceeded	Touch [RESTORE] to initialize the drive part of the analyzer. Check LAN wiring between PC-910W/PC-911W DATA PROCESSING UNIT and UT-7282 MAIN BD. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00600	WBC MCB Error	MCB error status Processing completion 500 ms timeout after auto reset	Touch [RESTORE] to initialize the drive part of the analyzer. Restart the analyzer. If this does not solve the problem, replace the UT-7283 ANALOG BD. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.
00601	RBC MCB Error	MCB error status Processing completion 500 ms timeout after auto reset	Restart the analyzer. If this does not solve the problem, replace the UT-7283 ANALOG BD. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and eject the rack which is being measured.

Code	Error	Cause	Countermeasures or Recovery Operation
01000 01001	System error	System error	Touch [RESTORE] to return the analyzer to standby. Restart the analyzer. **Touch [RESTORE] to do the following operation.** • The indicator lamp lights green.
08000	Autoloader Continuous Operation Detected	Autoloader power interruption detected	Touch [RESTORE] to initialize the drive part of the analyzer. Turn the analyzer power off, check the autoloader connection wires, and restart the analyzer. If this does not solve the problem, replace the cable, autoloader, and MAIN BD. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator

1xxxx: Emergency Stop and Recoverable Errors

Code	Error	Cause	Countermeasures or Recovery Operation
10000	IWBC Cup Draining Error	IWBC cup draining complete was not detected During cup draining, the WC1 pressure was not greater than −25 kPa	Touch [RESTORE] to drain the cup again. Check the overflow tray. Wipe it if there is fluid. Check for clog in the IWBC cup drain outlet and filter. Check for clog or break in the drain fluid path. Check for clog in electromagnetic valve 28. After removing clog, do cleaning. **Touch [RESTORE] to do the following operation.** • Drain the cup. Eject the rack which is being measured.
10001	RBC Cup Draining Error	RBC cup draining completion was not detected During cup draining, the WC1 pressure was not greater than −25 kPa	Touch [RESTORE] to drain the cup again. Check the overflow tray. Wipe it if there is fluid. Check for clog in the RBC cup drain outlet. Check for clog or break in the drain fluid path. Check for clog in electromagnetic valve 28. After removing clog, do cleaning. **Touch [RESTORE] to do the following operation.** • Drain the cup. Eject the rack which is being measured.
10002	OWBC Cup Draining Error	OWBC cup draining completion was not detected During cup draining, the WC1 pressure was not greater than −25 kPa	Touch [RESTORE] to drain the cup again. Check the overflow tray. Wipe it if there is fluid. Check for clog in the OWBC cup drain outlet. Check for clog or break in the drain fluid path. Check for clog in electromagnetic valve 29. After removing clog, do cleaning. **Touch [RESTORE] to do the following operation.** • Drain the cup. Eject the rack which is being measured.

Code	Error	Cause	Countermeasures or Recovery Operation
10100	Analyzer emergency stop	RESET key was touched during operation and the analyzer stopped	Touch [RESTORE] to return the analyzer to measurement condition. **Touch [RESTORE] to do the following operation.** • When measuring or cleaning: Do cleaning, initialize the analyzer actuator, and eject the rack which is being measured. • When not measuring or cleaning: Initialize the analyzer actuator.
10150	Temperature Upper Limit Error (Cup)	Temperature sensor on the cup is outside the range 37.0 to 43.0°C (98.6 to 109.4°F)	Touch [RESTORE] to return the analyzer to standby. If there is a temperature sensor abnormality, replace the board. If there is a temperature sensor cable wire break, replace the cable. **Touch [RESTORE] to do the following operation.** • When measuring or cleaning: Eject the rack which is being measured, drain the waste chambers and clean. • When not measuring or cleaning: Eject the rack which is being measured and drain the waste chambers.
10151	Temperature increase error (cup heater)	Temperature sensor on the cup heater is outside the range 35.0 to 45.0°C (95 to 113°F)	
10152	Temperature Upper Limit Error (Tank)	Temperature sensor on the tank is outside the range 37.0 to 43.0°C (98.6 to 109.4°F)	
10153	Temperature increase error (tank heater)	Temperature sensor on the tank heater is outside the range 35.0 to 45.0°C (95 to 113°F)	
11000	Waste Chamber 1 Full	WC1 full condition detected	Touch [RESTORE] to drain the waste chamber again. Check for clog or break in the drain fluid path.
11001	Waste Chamber 2 Full	WC2 full condition detected	After removing the clog, do cleaning. **Touch [RESTORE] to do the following operation.** • Eject the rack which is being measured, drain the waste chambers and clean.
18000	Mixing cover off	Mixing cover detached	Attach the mixing cover. Touch [RESTORE] to return the analyzer to measurement condition. **Touch [RESTORE] to do the following operation.** • When measuring or cleaning: Do cleaning, initialize the analyzer actuator, and eject the rack which is being measured. • When not measuring or cleaning: Initialize the analyzer actuator.

2xxxx: Operation Stop and Recoverable Errors

Code	Error	Cause	Countermeasures or Recovery Operation
21000	Unexpected shutdown occurred	Without touching the power switch, the analyzer shut down due to power interruption or other reason, usually power switch off operation or power outage	Touch [RESTORE] to initialize the drive part of the analyzer. Do cleaning if power interruption during measurement or cleaning is suspected. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator, and eject the rack.
21050	WBC Detection Hole Clog	WBC aperture cap clog detected	Touch [RESTORE] to do cleaning. If this does not solve the problem, do protein cleaning and the clean the aperture cap according to Section 6 and follow the procedure to clean the aperture cap. **Touch [RESTORE] to do the following operation.** • Do cleaning and initialize the analyzer actuator.
21051	RBC Detection Hole Clog	RBC aperture cap clog detected	
21052	WBC noise	WBC measurement noise detected	
21053	RBC noise	RBC measurement noise detected	
21054	Short Sample	Insufficient blood volume	Touch [RESTORE] to initialize the drive part of the analyzer. Measure the sample in whole blood mode. If the problem is not solved, measure the sample in pre-dilution mode.
		Extremely low dilution blood was measured.	Touch [RESTORE] to initialize the drive part of the analyzer. Measure the sample again and check the measurement data.
		Coagulated blood was measured.	Touch [RESTORE] to initialize the drive part of the analyzer. Do protein cleaning. Clean the sampling needle. If the problem is not solved, replace the sampling needle.
		The sampling needle is clogged.	
		The tube is removed from the upper sampling needle.	Touch [RESTORE] to initialize the drive part of the analyzer. Reconnect the tube and measure again.
		There are bubbles in the fluid path between the sample pump and sampling needle.	Touch [RESTORE] to initialize the drive part of the analyzer. Do cleaning and measure again. If the message frequently appears, the fluid may be leaking from the tube. Replace the tube.
21055	Multiple samples without work orders were detected	[Action if order failure] is set to [Cancel] and multiple samples without the work orders were detected.	Touch [RESTORE] to initialize the drive part of the analyzer. Check whether there are work orders on the Order window. To measure samples without work orders, set [Action if order failure] to [Default order] on the System window.
21056	Measurement has been stopped	Measurement has been stopped because sample information cannot be obtained.	Measurement has not been performed for some of the samples. Check the data and orders, and remeasure any unmeasured samples. If the error occurs frequently, contact your Nihon Kohden representative.
21057	Measurement has been stopped	The measurement has been stopped because the order information cannot be obtained.	Measurement has not been performed for some of the samples. Check the data and orders, and remeasure any unmeasured samples. If the error occurs frequently, contact your Nihon Kohden representative.

Code	Error	Cause	Countermeasures or Recovery Operation
21110	Analyzer internal draining status	Analyzer internal draining operation was done and the analyzer fluid path was drained	After moving or storing the analyzer, touch [RESTORE] to do initial priming. **Touch [RESTORE] to do the following operation.** • Initial priming
21200	Maintenance part replacement status	The fluid path of the affected part was drained during sampling needle replacement, venting needle replacement, filter replacement, or maintenance parts replacement	Follow the procedure in Section 6 to complete replacement of the parts, then touch [RESTORE]. **Touch [RESTORE] to do the following operation.** • Prime the fluid path of the related maintenance parts.
21800	No autoloader reaction (ACK)	An error occurs in communicating with the autoloader.	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Confirm that the autoloader operates normally. “Checking the Analyzer Operations” (p. 6-45) **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator. • Stop measurement operation.
21801	No autoloader reaction (request response)		
23000	3-part diff lysing reagent priming error	Out of HEMOLYNAC•310 detected	Touch [RESTORE] to return the analyzer to standby. Replace the reagent according to Section 8 “Reagent Management” of the operator’s manual. **Touch [RESTORE] to do the following operation.** • The indicator lamp lights green.
23001	5-part diff lysing reagent priming error	Out of HEMOLYNAC•510 detected	Touch [RESTORE] to return the analyzer to standby. Replace the reagent according to Section 8 “Reagent Management” of the operator’s manual. **Touch [RESTORE] to do the following operation.** • The indicator lamp lights green.
23002	Detergent priming error	Out of CLEANAC•710 detected	
23003	Diluent priming error	Out of ISOTONAC•3/4 detected	
23030	Waste Container Full	JW-910W waste sensor (option) detected waste container full	Touch [RESTORE] to return the analyzer to standby. Replace the waste container according to Section 8 “Reagent Management” of the operator’s manual. **Touch [RESTORE] to do the following operation.** • The indicator lamp lights green.
23031	Waste container replacement period	Waste fluid amount exceeded warning value	
26100	Self check not done	After login, measurement was started without self check More than 24 hours between self check and measurement start	Touch [RESTORE] to return the analyzer to standby. Do self check. **Touch [RESTORE] to do the following operation.** • The indicator lamp lights green.
27000	Consumable Parts (Sample Tube)	Sampling needle was used more than 18,000 times	Touch [RESTORE] to return the analyzer to standby. Follow the procedure in Section 6 to replace the part. **Touch [RESTORE] to do the following operation.** • The indicator lamp lights green.
27001	Consumable Parts (Venting Needle)	Venting needle was used more than 18,000 times	
27002	Consumable Parts (Filter)	Filter was used more than 18,000 times	

Code	Error	Cause	Countermeasures or Recovery Operation
28001	AL Detection Sensor Error (BU)	The following sensors in the barcode scanner unit detected abnormalities at the same time: • No sampling tube detected sensor, sampling tube release sensor	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Check the detection status of the related sensor. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28002	AL Detection Sensor Error (AU)	The following sensors in the agitator unit detected abnormalities at the same time: • Agitator rotate down, agitator rotate up • Agitator arm up, agitator arm down	
28003	AL Detection Sensor Error (FU)	The following sensors in the feed unit detected abnormalities at the same time: • Feed axle tab eject/tab return • Feed conveyor position 1, 2, 3, 4, 5, 6, end point	
28004	AL Detection Sensor Error (GU)	The following sensors in the pierce guide unit detected abnormalities at the same time: • Pierce guide fixed/release	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Check the detection status of the related sensor. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28005	AL Detection Sensor Error (TU)	The following sensors in the terminal unit detected abnormalities at the same time: • Rack eject tab eject/tab return	

Code	Error	Cause	Countermeasures or Recovery Operation
28010	Tube check arm ascend failure	The following sensor did not detect the operation • Sampling tube release	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Check the detection status of the related sensor. Check the operation of the related mechanism. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28011	Agitator grip open failure	The following sensor did not detect the operation • Agitator grip release	
28012	Agitator arm descent failure	The following sensor did not detect the operation • Agitator arm lowering	
28013	Agitator grip down failure	The following sensor did not detect the operation • Agitator rotating down	
28014	Blood sample tube failed to release from pierce guide	The following sensor did not detect the operation • Pierce guide release	
28015	Discharge tab return failure	The following sensor did not detect the operation • Rack eject tab return	
28016	Feed conveyor tab return failure	The following sensor did not detect the operation • Feed axle tab return operation	
28017	Feed conveyor failed to go to start position	The following sensor did not detect the operation • Feed conveyor position 1	
28021	Agitator arm ascend failure	The following sensor did not detect the operation • Agitator raising	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Check the detection status of the related sensor. Check the operation of the related mechanism. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28022	Agitator grip up failure	The following sensor did not detect the operation • Agitator raising	
28023	Failure of pierce guide to hold sample tube	The following sensor did not detect the operation • Pierce guide fixed	
28025	Feed tab eject failure	The following sensor did not detect the operation • FEED axle tab out	
28026	Feed conveyor failed to move to start position	The following sensor did not detect the operation • Feed conveyor position 2, 3, 4, 5, 6, end point	
28027	Agitator grip grip failure	The following sensor did not detect the operation • Agitator grip release	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Check the detection status of the related sensor. Check the operation of the related mechanism. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.

Code	Error	Cause	Countermeasures or Recovery Operation
28040	Feed conveyor error (measurement/handling divergence)	The following transport position information did not match in the check before transport operation • Sensor detection position (measurement) • Control recognition position (management)	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Check the feed conveyor position 1, 2, 3, 4, 5, 6, end point sensor detection status. Check the operation of the feed unit. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28041	Feed conveyor error (measurement/target divergence)	The following conveyor position information did not match in the check after conveyor operation • Sensor detection position (measurement) • Conveyor target position (target)	
28042	Feed conveyor abnormality (target out of control)	A conveyor target position outside the conveyor range was set	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Restart the analyzer. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28050	Bar code reader of the autoloader abnormality (device)	Bar code reader of the autoloader error	Touch [RESTORE] to initialize the drive part of the analyzer. Manually remove any rack from inside the autoloader. Confirm that the autoloader operates normally. "Checking the Analyzer Operations" (p. 6-45) **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28051	Bar code reader of the autoloader abnormality (no response)		
28100	Autoloader abnormality (WDT)	Autoloader error	
28101	Autoloader abnormality (device)		

Code	Error	Cause	Countermeasures or Recovery Operation
28900	AL unexpected catch	System error	Touch [RESTORE] to return the analyzer to standby. Restart the analyzer. **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator and release the rack.
28901			
28902			
28903			
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28911			
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28918			

3xxxx: Temporary Operation Stop and Recoverable Errors

Code	Error	Cause	Countermeasures or Recovery Operation
31001	Self check stopped	The self check was stopped.	Touch [RESTORE] to initialize the drive part of the analyzer. Run the self check again. “Running Self Check” (p. 6-12) **Touch [RESTORE] to do the following operation.** • Initialize the analyzer actuator.
38010	Feed conveyor entrance full	Rack on the conveyor line does not return to the autoloader entrance	Remove the rack from the autoloader entrance. Touch [RESTORE] to restart measurement. **Touch [RESTORE] to do the following operation.** • For the full rack, retry operation to return a suspended rack, then restart measurement operation.
38011	Feed conveyor exit full	Rack on the conveyor line does not exit from the autoloader exit	Remove the rack from the autoloader exit. Touch [RESTORE] to restart measurement. **Touch [RESTORE] to do the following operation.** • For the full rack, retry operation to eject a suspended rack, then restart measurement operation.
38012	Check feed conveyor exit	Possible foreign object except the rack is in the autoloader exit	Check that there is no foreign object in the autoloader exit. Touch [RESTORE] to restart measurement. **Touch [RESTORE] to do the following operation.** • Stop measurement operation.
38020	Check feed conveyor entrance	Possibility that a rack or other object was manually inserted into the conveyor line from the autoloader entrance side	Check there is no rack or foreign object in the conveyor line. If there is a rack or foreign object in the conveyor line, remove it. Touch [RESTORE] to restart measurement. **Touch [RESTORE] to do the following operation.** • Restart measurement operation.
38021	Check feed conveyor exit	Possibility that a rack or other object was manually inserted into the conveyor line from the autoloader exit side.	Check there is no rack or foreign object in the conveyor line. If there is a rack or foreign object in the conveyor line, remove it. Touch [RESTORE] to restart measurement. **Touch [RESTORE] to do the following operation.** • Restart measurement operation.
38022	Rack could not be conveyed	Feed conveyor operated but the rack was not held. Feed conveyor (conveyor first time) was done but the incoming sensor continually detected it.	Put the remaining rack in the autoloader entrance again. Touch [RESTORE] to restart measurement. **Touch [RESTORE] to do the following operation.** • If there is a rack which is being auto measured, restart measurement.

4xxxx: Error Notifications during Operation

These errors are only intended to be notification to the user. There is not a recovery operation together with the analyzer operation. The only action is that the error changes to read.

Code	Error	Cause	Countermeasures or Recovery Operation
40390	3-part diff reagent remaining	At the start of leak check, the fluid sensor detected fluid	• When the analyzer has not been drained: Use the RESET key to stop the leak check. Drain the analyzer then restart the leak check. • When the analyzer has been drained: The fluid sensor incorrectly recognized fluid drops as remaining fluid. The leak check can continue.
40391	5-part diff reagent remaining		
40392	Detergent remaining		
43010	Reagent Expiration (Diluent)	Attempted to register expired reagent Registered reagent exceeded the expiration period	Replace with reagent which is within the expiration period and register it.
43011	Reagent Expiration (CBC Lysing Reagent)		
43012	Reagent Expiration (DIFF Lysing Reagent)		
43013	Reagent Expiration (Detergent)		
43020	Diluent remaining amount warning	Remaining reagent dropped below the warning level	Check the remaining reagent level. If necessary, replace it with new reagent and register it.
43021	3-part diff lysing reagent remaining amount warning		
43022	5-part diff lysing reagent remaining amount warning		
43023	Detergent remaining amount warning		
44000	Diluent temperature low	Diluent temperature low Temperature sensor on the MH-910W tubes is less than 10°C (50°F)	Keep the room temperature at 15 to 30°C (59 to 86°F). If there is a temperature sensor abnormality, replace the board. If there is a temperature sensor cable wire break, replace the cable.
44001	Diluent temperature high	Diluent temperature high Temperature sensor on the MH-910W tubes is 50°C (122°F) or more	

Code	Error	Cause	Countermeasures or Recovery Operation
44002	HGB LED temperature low	Room temperature low Temperature sensor on the HGB LED BD is less than 10°C (50°F)	Keep the room temperature at 15 to 30°C (59 to 86°F). If there is a temperature sensor abnormality, replace the board. If there is a temperature sensor cable wire break, replace the cable.
44003	HGB LED temperature high	Room temperature high Temperature sensor on the HGB LED BD is 50°C (122°F) or more	
44004	SS LED temperature low	Room temperature low Temperature sensor on the SS LED BD is less than 10°C (50°F)	
44005	SS LED temperature high	Room temperature high Temperature sensor on the SS LED BD is 50°C (122°F) or more	
44006	Chassis internal temperature low	Chassis temperature low Temperature sensor around the ZY-910W is less than 10°C (50°F)	
44007	Chassis internal temperature high	Chassis temperature high Temperature sensor around the ZY-910W is 50°C (122°F) or more	
46300	Protein cleaning period	More than 25 days since the last protein cleaning (Cleaning must be done within 35 days after the last protein cleaning.)	Do protein cleaning. "Cleaning Protein" (p. 6-6) "Advanced Settings" (p. 7-16)
46802	Order request failure	Connection process timed out	Check the settings of the IP address and the ports, and the network environment. "Checking the Network Condition" (p. 6-43)
46803	Order request failure	Acceptance process timed out	
46805	Order request failure	Connection process failed	Try to communicate with the inspection system again. If an error occurs frequently, check the network environment.
46806	Order request failure	Acceptance process failed	
46832	Order reception failure	Connection process timed out	Check the settings of the IP address and the ports, and the network environment. "Checking the Network Condition" (p. 6-43)
46835	Order reception failure	Connection process failed	Try to communicate with the inspection system again. If an error occurs frequently, check the network environment.
46836	Order reception failure	Acceptance process failed	
46837	Order reception failure	Received message has an error	Recived message from the inspection system has an error. Try to communicate with the inspection system again.
46862	Failure to send the measurement result	Connection process timed out	Check the settings of the IP address and the ports, and the network environment. "Checking the Network Condition" (p. 6-43)
46863	Failure to send the measurement result	Acceptance process timed out	
46865	Failure to send the measurement result	Connection process failed	Try to communicate with the inspection system again. If an error occurs frequently, check the network environment.
46866	Failure to send the measurement result	Acceptance process failed	

Code	Error	Cause	Countermeasures or Recovery Operation
47000	Part Replacement Period (Sampling Needle)	The frequency of the part use reaches the 70 to 90 % of the operation limit. (When the operation limit is 18000, 70 % of the operation limit is 12600, 80 % is 14400, and 90 % is 16200.)	Replace the sampling needle and reset the operation history. "Replacing the Sampling Needle" (p. 6-92) "Checking the Operating State of the Consumables" (p. 6-111)
47001	Part Replacement Period (Venting Needle)		Replace the venting needle and reset the operation history. "Replacing the Venting Needle" (p. 6-100) "Checking the Operating State of the Consumables" (p. 6-111)
47002	Part Replacement Period (Filter)		Replace the filter and reset the operation history. "Replacing the Filter" (p. 6-104) "Checking the Operating State of the Consumables" (p. 6-111)
47003	HGB Voltage Drop	Blank time LED ON voltage is less than 3.5 V	Readjust the HGB voltage sensitivity.
47004	HGB Voltage Increase	Blank time LED ON voltage is more than 4.5 V	
47005	SS Voltage Drop	Blank time LED ON voltage is less than 3.5 V	Readjust the SS voltage sensitivity.
47006	SS Voltage Increase	Blank time LED ON voltage is more than 4.5 V	
47007	Background increase	Background measurement value exceeds specifications of the analyzer	Redo background measurement. If this error occurs frequently, do cleaning. "Cleaning" (p. 6-5)
47610	Check the measurement data	The measurement message [WBC Noise] is displayed	Check the measurement message and take the countermeasure. "Measurement Message List" (p. 3-5)
47611	Check the measurement data	The measurement message [WBC Aperture Clog] is displayed	
47612	Check the measurement data	The measurement message [WBC Time-Series Message] is displayed	
47620	Check the measurement data	The measurement message [RBC Noise] is displayed	
47621	Check the measurement data	The measurement message [RBC Aperture Clog] is displayed	
47622	Check the measurement data	The measurement message [RBC Time-Series Message] is displayed	
47623	Check the measurement data	The measurement message [PLT Time-Series Message] is displayed	
47624	Check the measurement data	The measurement message [Detected small particles] is displayed	
47630	Check the measurement data	The measurement message [Short Sample] is displayed	
47640	Check the measurement data	The measurement message [OpticalCount Message] is displayed	
47641	Check the measurement data	The measurement message [OpticalCount Low] is displayed	
47642	Check the measurement data	The measurement message [SD sensitivity drop] is displayed	

Code	Error	Cause	Countermeasures or Recovery Operation
48000	No rack	Rack could not be detected when auto measurement started	Position the rack and restart auto measurement.
48030	Check sampling tube	A sampling tube may be remaining inside the analyzer because it was agitating during auto measurement before an analyzer power interruption	Check if there is a sample tube remaining in the agitator unit. If there is a sample tube in the agitator unit, shut down the analyzer, remove the mixing cover, and manually remove the tube. 1) Turn off the analyzer. 2) Remove the mixing cover. 3) Manually remove the tube and restore the mixing cover.
48100	Sample tube barcode scanning abnormality	The barcode on the sample tube cannot be read (except the barcode undetected)	If the barcode on the sample tube cannot be read, the measurement cannot be performed following the system setting. If the sample tube is not measured, check the barcode and remeasure the sample. When this occurs frequently check the following points. • Barcode specification is supported by the analyzer. • Barcode sample ID is 20 digits.
48101	Sample tube barcode multiple readings	Several barcode are decteced when the barcode on the sample tube is read	If the several barcode are read from the sample tube, the measurement cannot be performed following the system setting. If the sample tube is not measured, check the barcode and remeasure the sample.
48110	Rack barcode scanning abnormality	The barcode on the rack cannot be read (except the barcode undetected)	If the barcode on the rack is not read, the sample tubes in the rack cannot be measured. Check if the barcode on the rack is not diry or peeled off and remeasure the sample. When this occurs frequently check the following points. • There are scratches or dirt on the rack bar code label. • Rack bar code label is peeling off.

Troubleshooting

The following tables list troubles and their causes and countermeasures.

After doing the countermeasure and after the trouble disappears, confirm that the analyzer operates normally then restart the instrument.

No	Trouble	Cause	Action
1	• Power does not turn on • Power was lost during operation (Main power lamp does not light)	Main power is turned off on the rear panel of the analyzer	Turn on the main power on the rear panel of the analyzer. After the main power lamp lights, press the power switch on the front panel of the analyzer. If the power shuts off during operation, a blood sample may remain in the analyzer. Therefore, clean the inside of the analyzer after the power is restored. “Cleaning” (p. 6-5)
		Power cord disconnected	Check that the power cord is securely connected and turn on the power. If the power shuts off during operation, a blood sample may remain in the analyzer. Therefore, clean the inside of the analyzer after the power is restored. “Cleaning” (p. 6-5)
2	• Noise during measurement • High background noise	Grounding bad	Check that the ground wire is securely connected.
		Nearby device is generating noise	Connect the noise generating device to a separate power outlet.
		Noise from the AC power line	Connect the analyzer to a different power outlet.
		The front cover is open and noise is affecting the measuring unit	Close the front cover.
		Diluent is dirty	Replace the diluent.
		Filter is dirty	Replace the filter. “Replacing the Filter” (p. 6-104)
		Sample cup is dirty	Do protein cleaning. “Cleaning Protein” (p. 6-6)
		Aperture cap is dirty	Remove clogs in the fluid path. “Removing Clogs” (p. 6-10) Do protein cleaning. “Cleaning Protein” (p. 6-6) If protein cleaning does not improve the problem, clean the aperture cap. “Cleaning the Aperture Caps” (p. 6-126)
		Poor contact of external electrode	Securely connect the external electrode.

No	Trouble	Cause	Action
2	• Noise during measurement • High background noise	Dirty inside fluid path	Clean the fluid path. “Cleaning” (p. 6-5)
			Do protein cleaning. “Cleaning Protein” (p. 6-6)
3	Bad reproducibility of cell count values	Insufficient sample stirring	Carefully agitate the sample tube, being careful to preventing bubbles.
		Sample cup is dirty	Do protein cleaning. “Cleaning Protein” (p. 6-6)
		Aperture cap is dirty	Remove clogs in the fluid path. “Removing Clogs” (p. 6-10) Do protein cleaning. “Cleaning Protein” (p. 6-6) If protein cleaning does not improve the problem, clean the aperture cap. “Cleaning the Aperture Caps” (p. 6-126)
		High background noise	See the second countermeasure above on this page.
4	Fluid leak	Clogged electromagnetic valve	Check the electromagnetic valve. “Checking the Operation of Electromagnetic Valves” (p. 6-135)
		Clogged filter	Replace the filter. “Removing Clogs” (p. 6-10)
5	HGB reproducibility is bad	Dirty HGB cell	Do protein cleaning. “Cleaning Protein” (p. 6-6)
6	Cannot print from printer	No recording paper	Load recording paper.
		Paper jam	Remove the jammed paper.
		Abnormality in electrical circuit	Press the RESET key (⊘). If it does not return to the correct operation, turn off the power, wait 10 seconds, and turn the power on again.
7	Actual touched position on touch screen does not match displayed touch position Screen does not change when pressing a touch key	Touch screen needs adjustment	Adjust the touch screen. “Calibrating the Touch Panel” (p. 6-38)
8	Date and time incorrect	Setting error	Correctly set the date and time. Data Management and Setting Guide: Section 5 “System Settings”

No	Trouble	Cause	Action
9	The following message is displayed and the analyzer cannot be operated 00C08270: Real Time Clock Error -Check Date and Time settings Press F1 Continue or F2 to Enter Setup	PC-910W: Internal backup battery exceeded lifetime (about 5 years) PC-911W: Internal battery backup exceeded lifetime (about 10 years)	PC-910W: Replace the internal battery. "Replacing Maintenance Parts in Batches" (p. 6-108) PC-911W: Replace the PC-911W. The internal battery cannot be replaced.
10	WBC distributions extend outside their areas on the scattergram Frequent WBC flags • Frequent WBC flags	Bubbles in flow cell Clog in flow cell	Do cleaning of the flow cell. "Cleaning the Flowcell" (p. 6-8)
		5-part diff sensitivity error deviation	On the calibration screen, adjust the sensitivity according to "Performing Calibration" (p. 5-3). "Adjusting Gain" (p. 6-63)

4 Disassembly and Assembly

Disassembly Preparation

Perform the following before disassembling the analyzer.

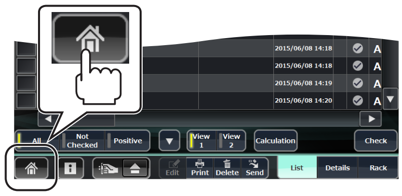
1 Clean protein

For details, refer to “Cleaning Protein” in Section 6 Maintenance (p. 6-6).

2 Drain analyzer

For details, refer to “Draining All Fluid” in Section 6 Maintenance (p. 6-11).

3 Turn power off

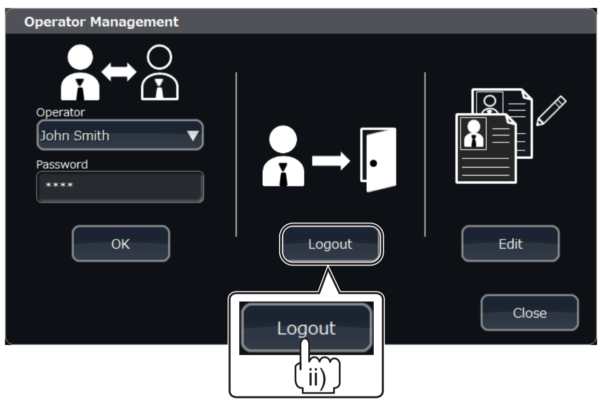


1) Open the Home screen.
   If you are in another window, touch [ ] at the lower left.

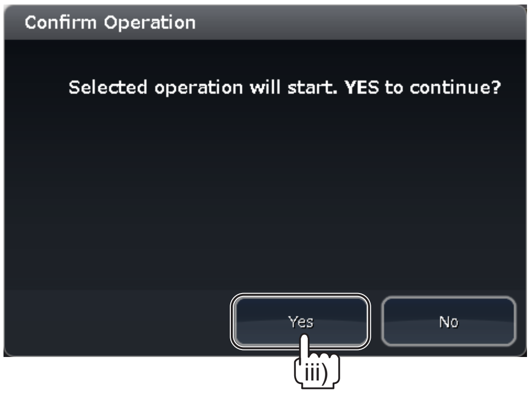
2) Log out.

   i) Touch [ ] on the Home screen. The Operator Management window appears.

   ii) Touch [Logout].

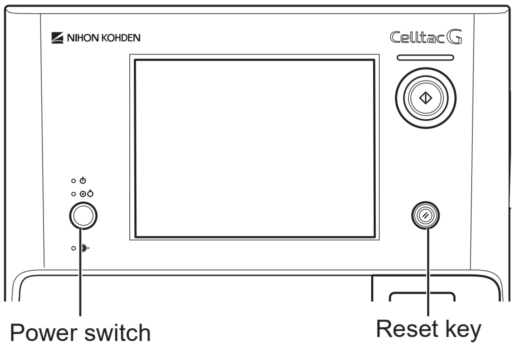


iii)Touch [Yes] on the Confirm Operation window.

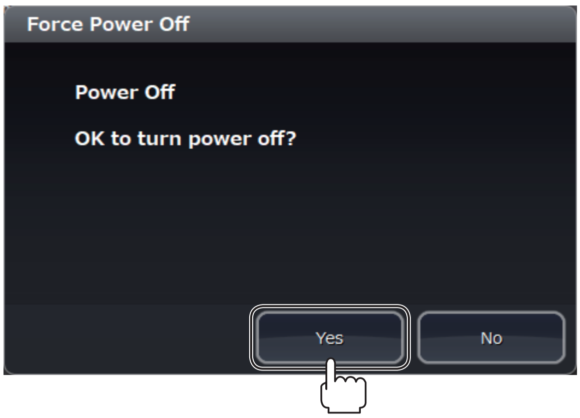


3) Turn the power off.

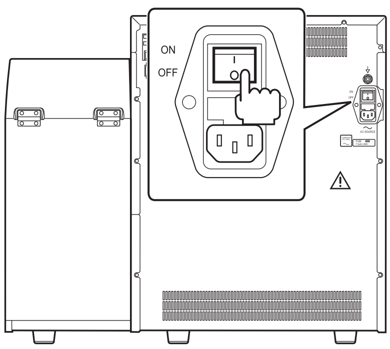
i) While pressing the Reset key on the front panel of the analyzer, push the power switch.



ii) Touch [Yes] on the Confirmation window.

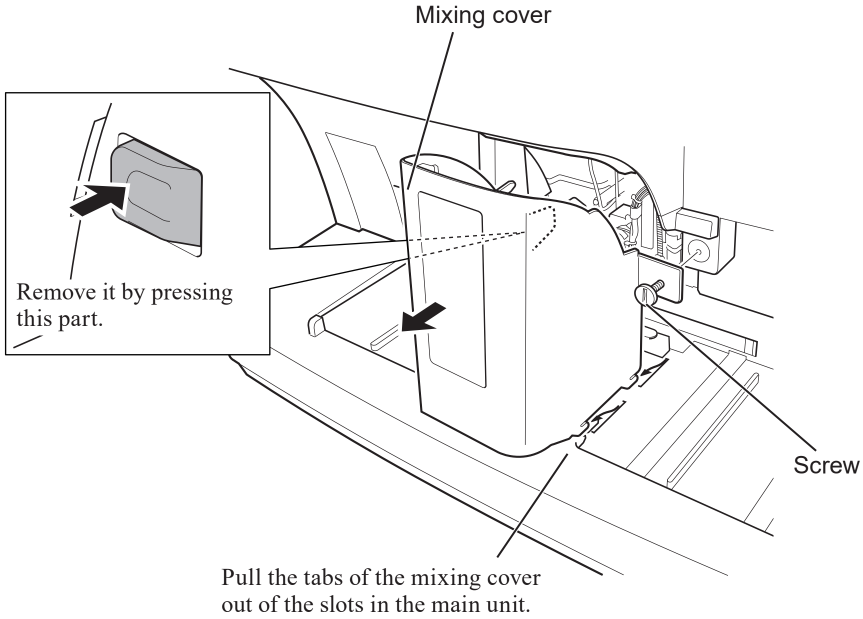


iii)Turn off the Main power switch on the rear panel of the analyzer (to ○) and disconnect the power cord from the wall AC outlet.



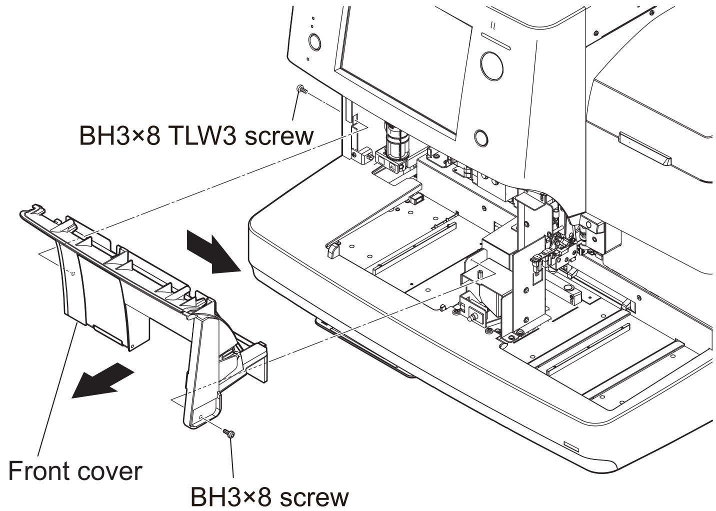
Removing the Mixing Cover

Loosen the screw on the front panel of the main unit and remove the mixing cover.



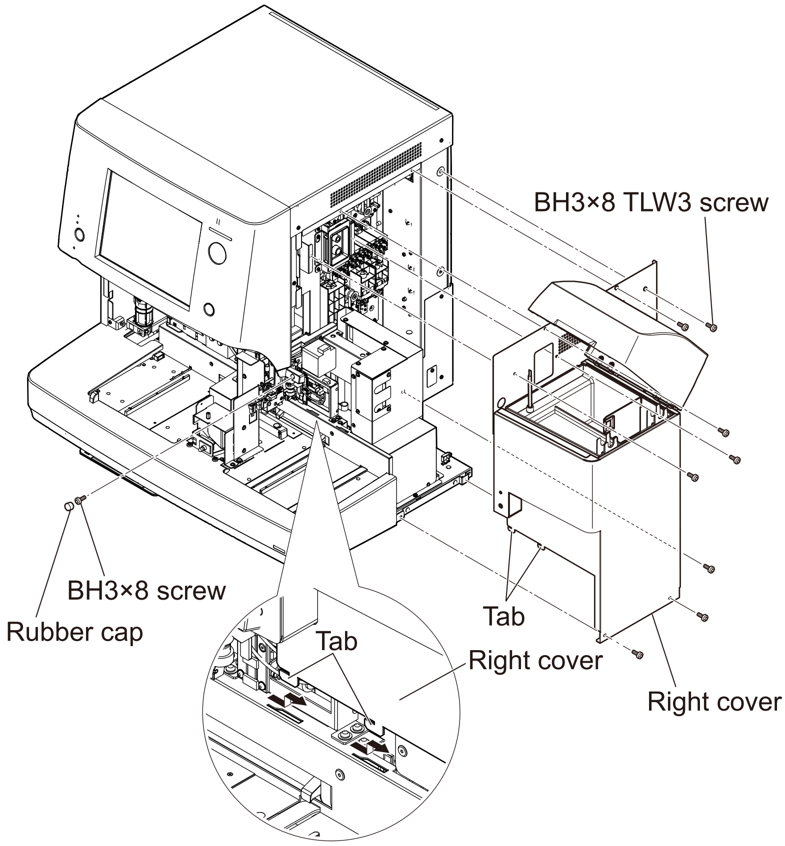
Removing the Front Cover

Remove the BH3×8 TLW3 screw and the BH3×8 screw. Move the front cover slightly to the right and slide the left side of the front cover toward you.



Removing the Right Cover

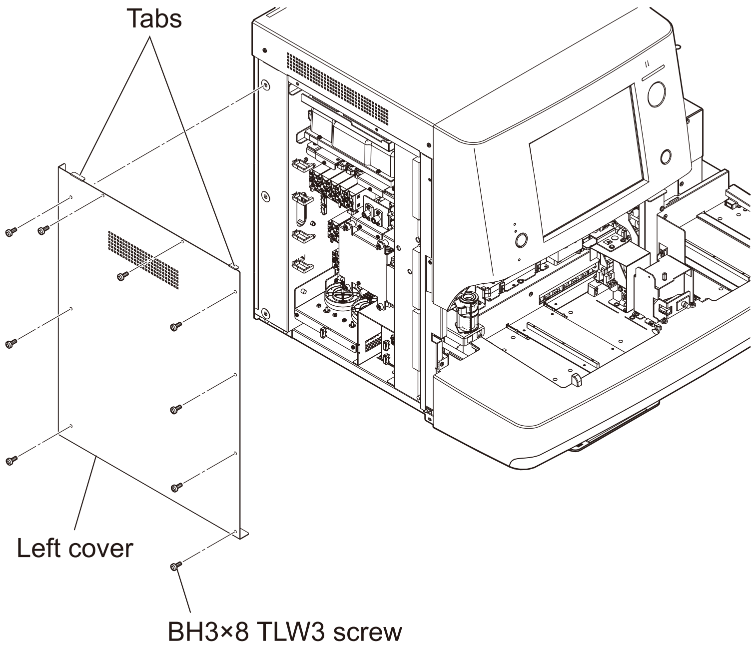
Insert the flat-blade screwdriver into the groove under the rubber cap and remove the rubber cap, then remove the BH3×8 screw. Remove the eight BH3×8 TLW3 screws. Move the right cover slightly inward to the right and pull it up to remove it.



NOTE: Remove the accessories and bottles in the main unit beforehand.
Do not let the right cover fall over.

Removing the Left Cover

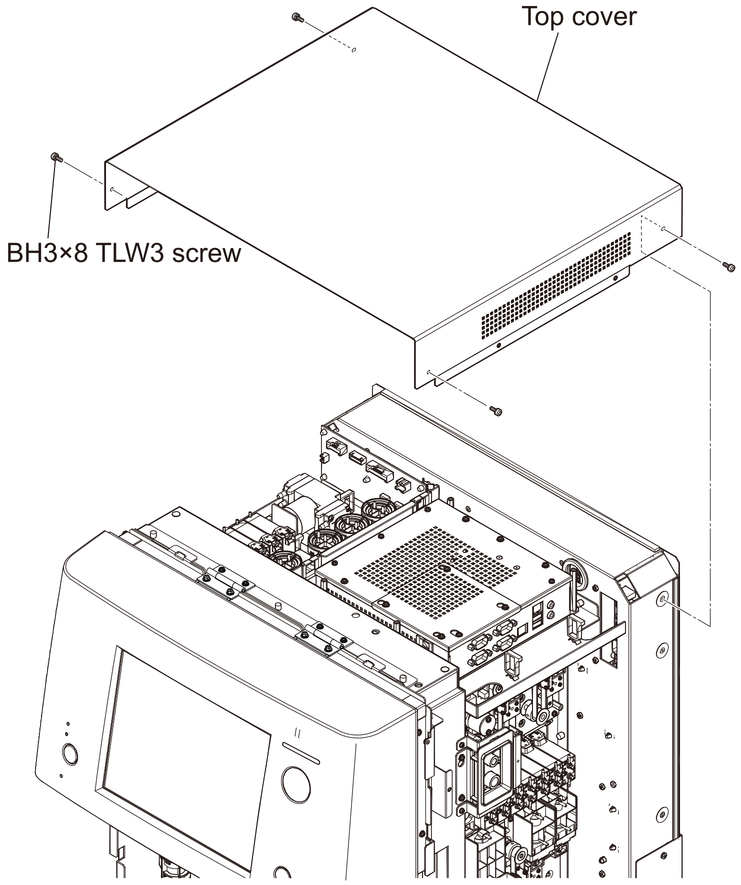
Remove the nine BH3×8 TLW3 screws and remove the left cover.



NOTE: Do not drop the left cover while removing the screws.

Removing the Top Cover

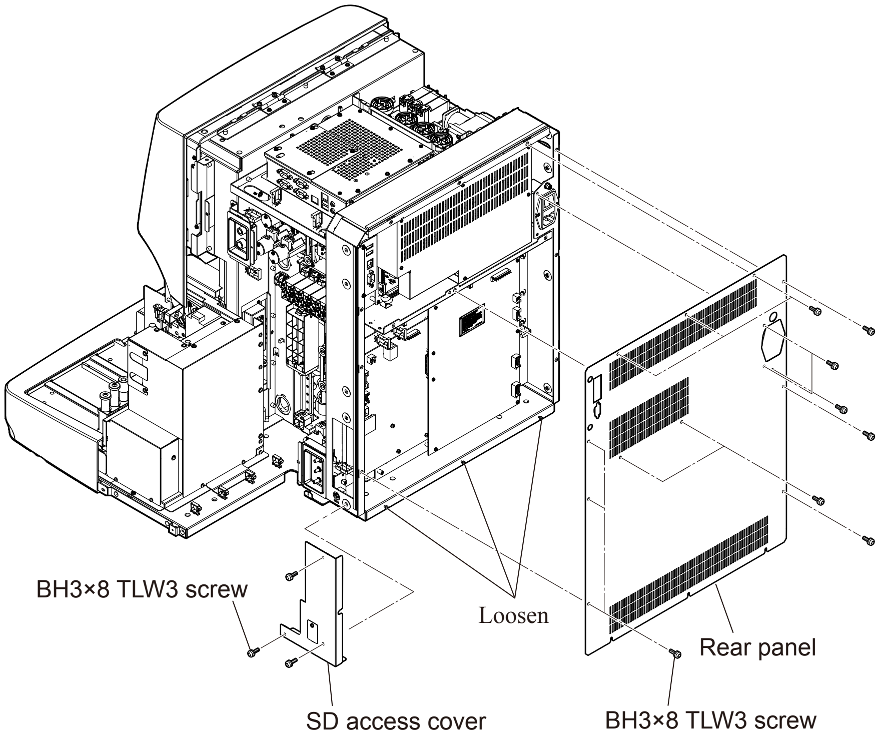
Remove the left and right covers, then remove the four BH3×8 TLW3 screws and remove the top cover.



Removing the Rear Panel

1 Remove the three BH3×8 TLW3 screws and remove the SD access cover.

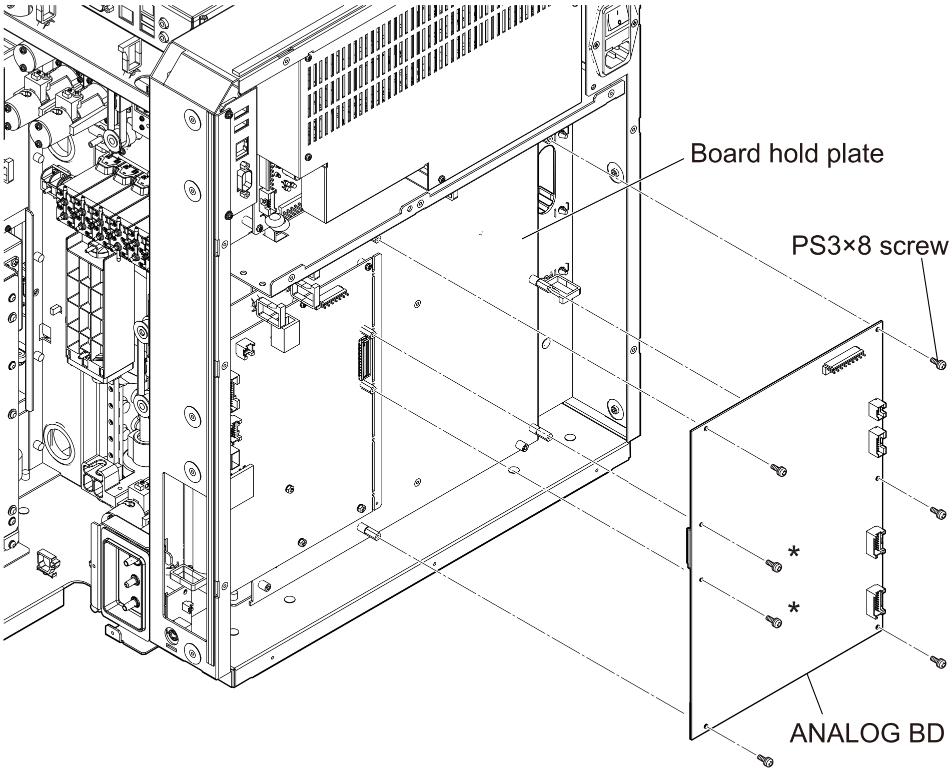
2 Loosen the three BH3×8 TLW3 screws at the lower side of the rear panel and remove the fourteen BH3×8 TLW3 screws. Remove the rear panel by pulling it slightly upward and sliding it toward you.



Removing the UT-7283 ANALOG BD

Repair part number: RP-UT7283

1. Remove the right cover, left cover, top cover and rear panel.
2. Disconnect all cable connectors from the UT-7283 ANALOG BD. Remove the six PS3×8 screws and remove the UT-7283 ANALOG BD from the board hold plate.



Assembly

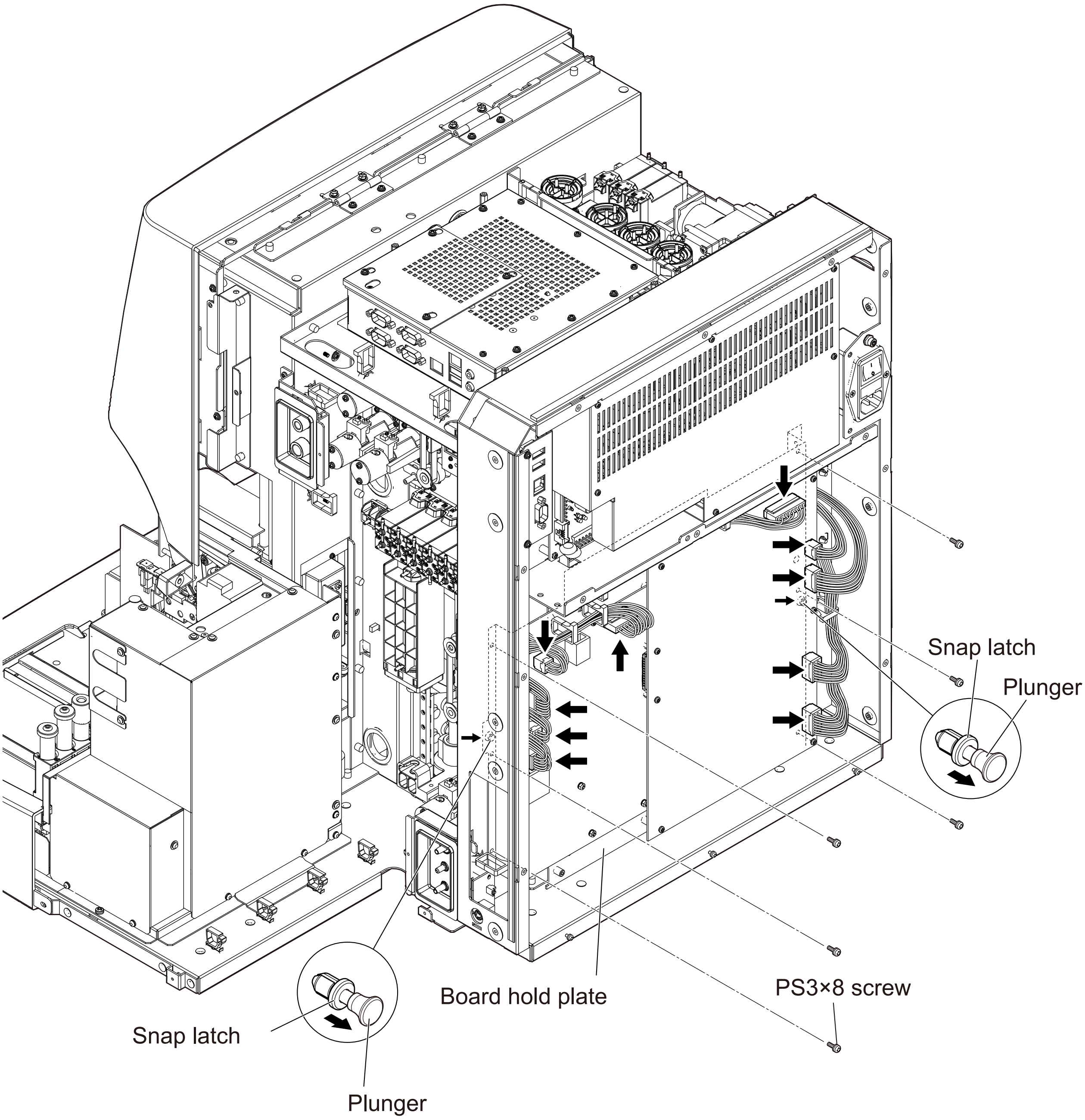
Assemble the UT-7283 ANALOG BD by following the disassembly procedure in reverse.

NOTE: Fix the two screws shown with the * symbol first.

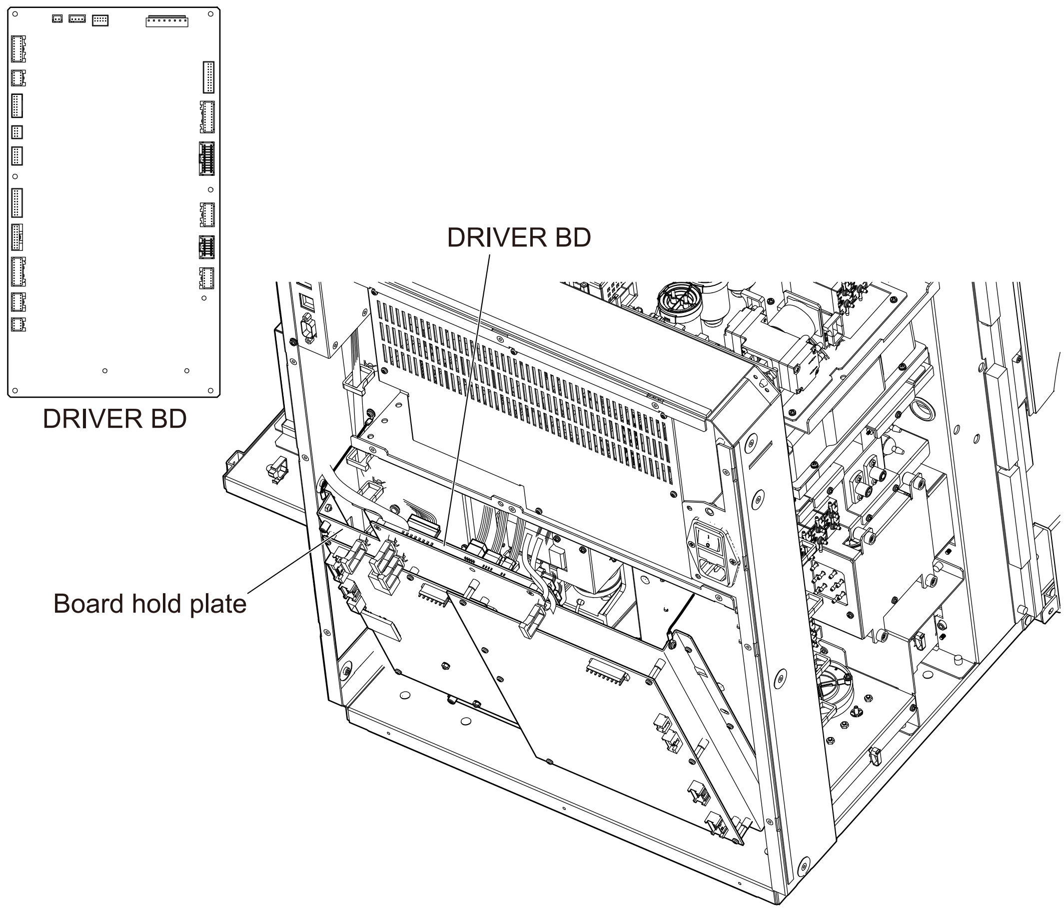
Removing the Board Hold Plate

1 Remove the right cover, left cover, top cover and rear panel.

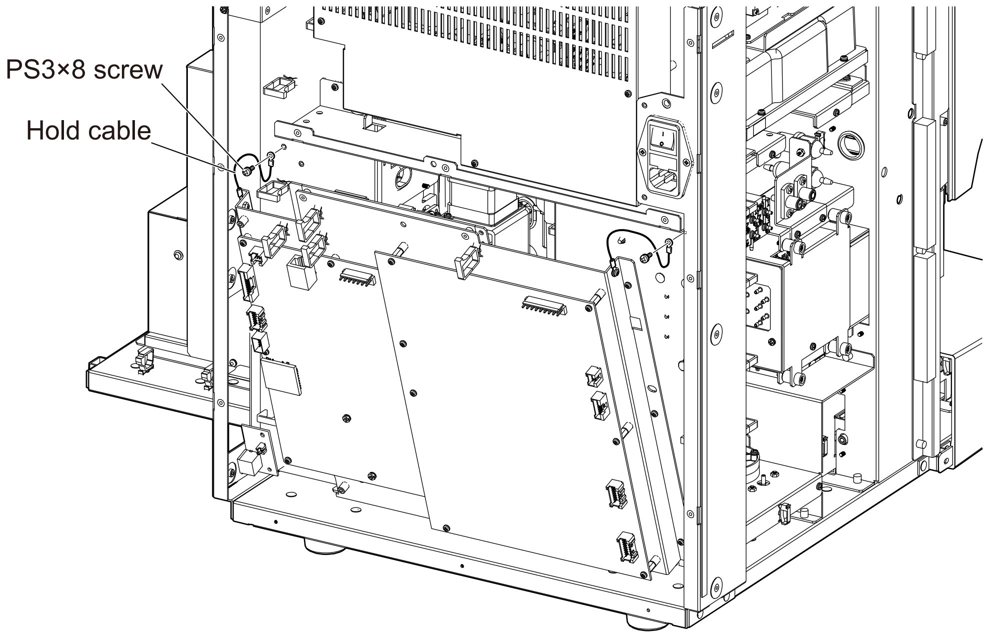
2 Disconnect the ten cable connectors from the board (indicated by the arrows). Remove the six PS3×8 screws from the board hold plate. Pull out the plunger of each of the two snap latches and disconnect the board hold plate.



3 Pull down the upper part of the board hold plate toward you.
Disconnect all cable connectors from the DRIVER BD.



4 Remove the PS3×8 screw which secures the hold cable connecting the board hold plate and the chassis, and remove the board hold plate.



Assembly

Assemble the board hold plate by following the disassembly procedure in reverse.

NOTE
- Do not connect the connectors incorrectly.
- Do not trap the cables.

Removing the UT-7284 DRIVER BD

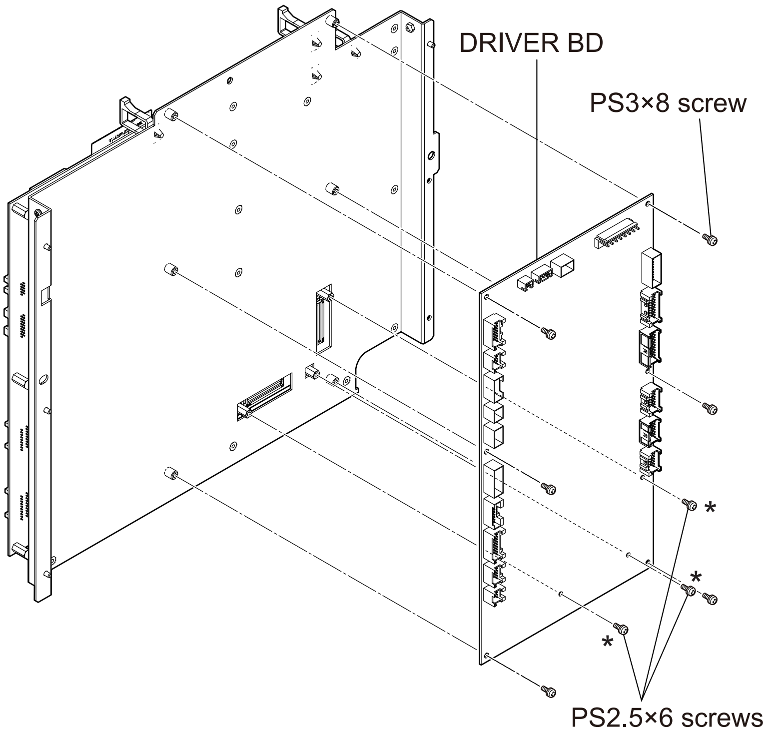
4

Repair part number: RP-UT7284

1 Remove the right cover, left cover, top cover and rear panel.

2 Remove the board hold plate.

3 Remove the six PS3×8 screws and three PS2.5×6 screws from the removed board hold plate, and remove the UT-7284 DRIVER BD.



Assembly

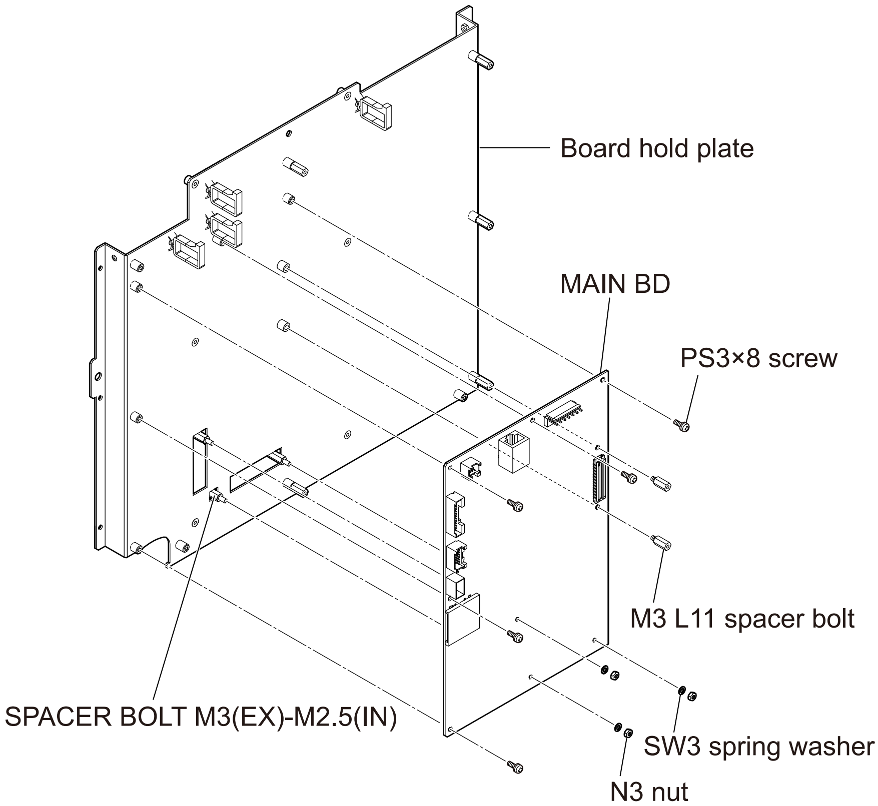
Assemble the UT-7284 DRIVER BD by following the disassembly procedure in reverse.

NOTE: Fix the three PS2.5×6 screws shown with the * symbol first.

Removing the UT-7282 MAIN BD

Repair part number: RP-UT7282

1. Remove the right cover, left cover, top cover and rear panel.
2. Remove the board hold plate.
3. Remove the UT-7283 ANALOG BD and UT-7284 DRIVER BD from the removed board hold plate.
4. Remove the five PS3×8 screws and two M3 L11 spacer bolts, then remove the UT-7282 MAIN BD from the board hold plate.
5. Remove the three N3 nuts and three SW3 spring washers, then remove the three M3 (EX) - M2.5 (IN) SPACER BOLTS from the UT-7282 MAIN BD.



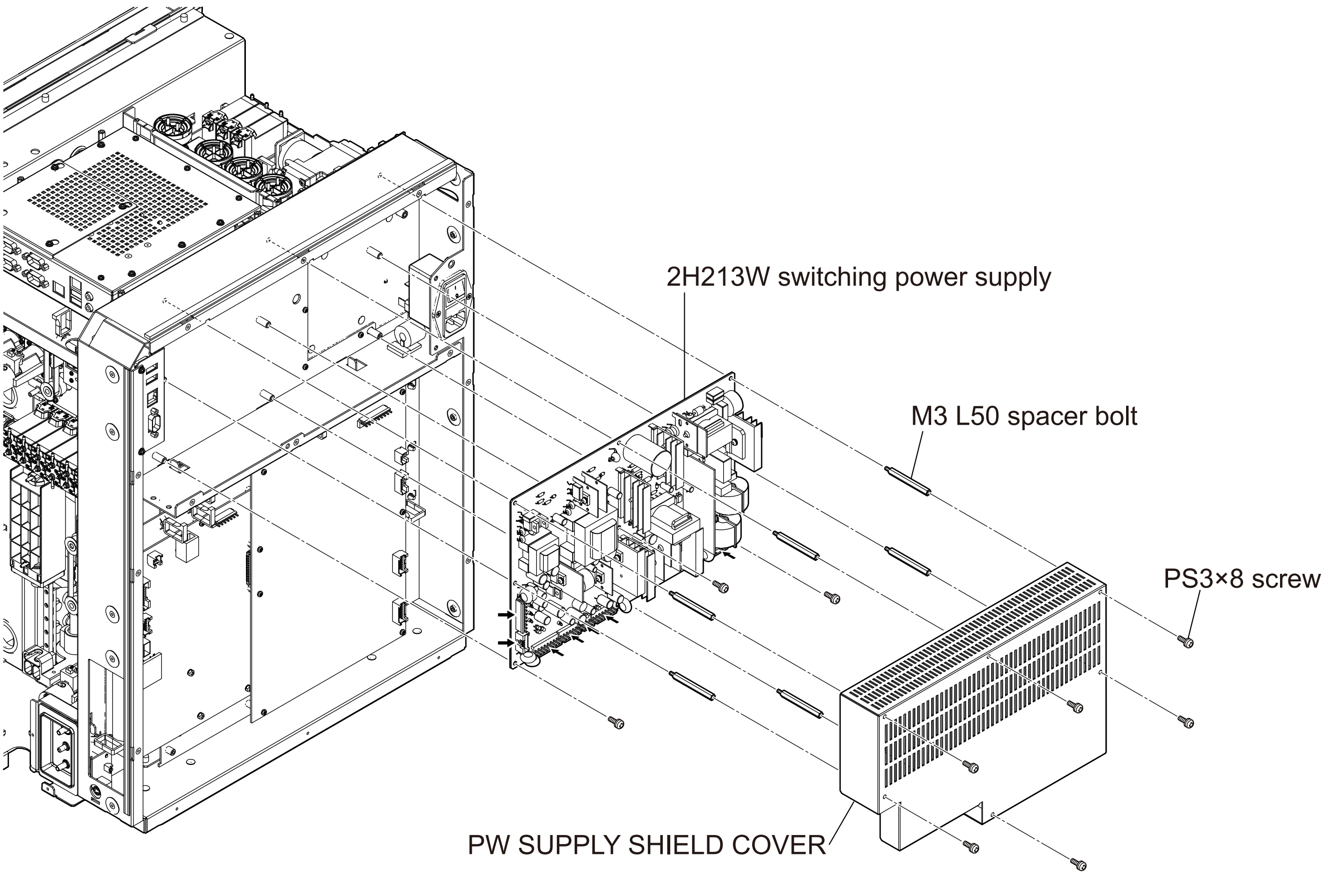
Assembly

Assemble the UT-7282 MAIN BD by following the disassembly procedure in reverse.

Removing the 2H213W Switching Power Supply

Repair part number: RP-9000059693

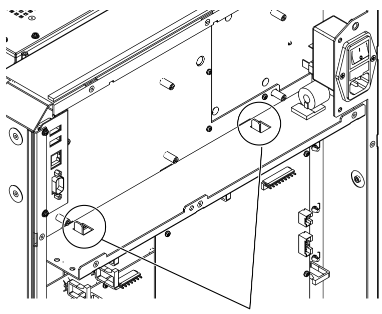
1. Remove the right cover, left cover, top cover and rear panel.
2. Remove the six PS3×8 screws and remove the PW SUPPLY SHIELD COVER.
3. Remove the six M3 L50 spacer bolts and three PS3×8 screws. Disconnect the seven cable connectors and remove the 2H213W switching power supply.



Assembly

Assemble the 2H213W switching power supply by following the disassembly procedure in reverse.

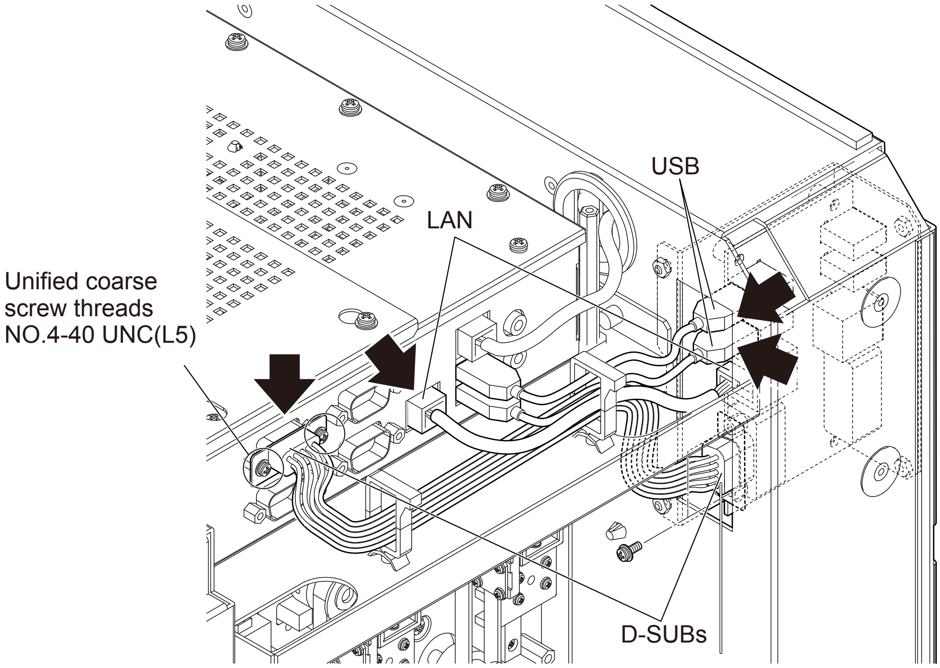
NOTE: Install the switching power supply by placing it on the following supports.



Removing the UT-7288 BACK PANEL BD

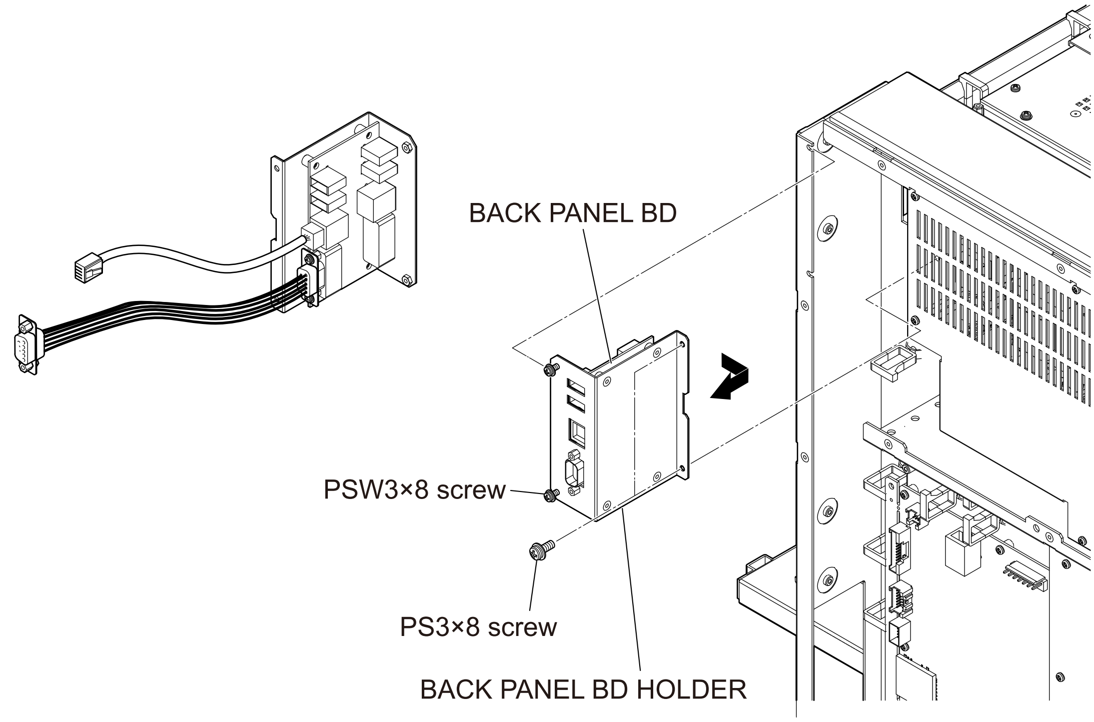
Repair part number: RP-UT7288

1. Remove the right cover, left cover, top cover and rear panel.
2. Disconnect the two USB cable connectors from the UT-7288 BACK PANEL BD.
3. Disconnect the LAN cable connector, remove the two screws (unified coarse screw thread NO. 4-40 UNC(L5)) which secure the D-SUB and remove each cable from the PC-910W or PC-911W.



4 Remove the two PS3×8 screws, loosen the two PSW3×8 screws and remove the BACK PANEL BD HOLDER.

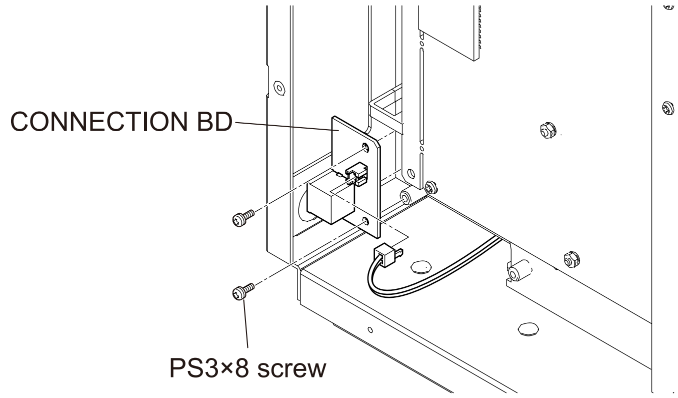
5 Disconnect the LAN cable connector, remove the two screws (unified coarse screw thread NO. 4-40 UNC(L5)) which secure the D-SUB and remove each cable from the UT-7288 BACK PANEL BD.



Removing the UT-7292 CONNECTION BD

Repair part number: RP-UT7292

1. Remove the right cover, left cover, top cover and rear panel.
2. Disconnect the cable connector, remove the two PS3×8 screws and remove the UT-7292 CONNECTION BD.

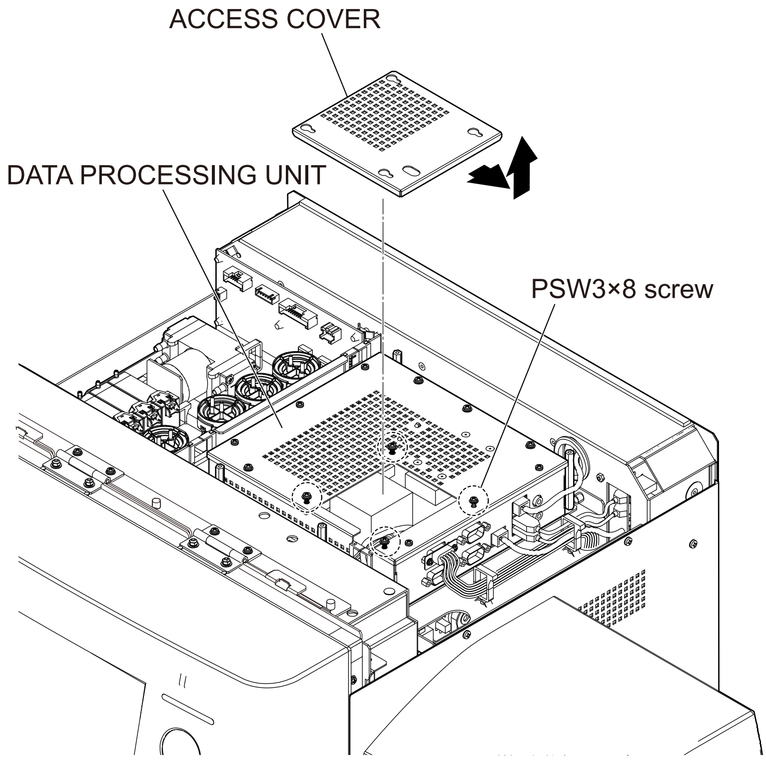


Removing the PC-910W DATA PROCESSING UNIT

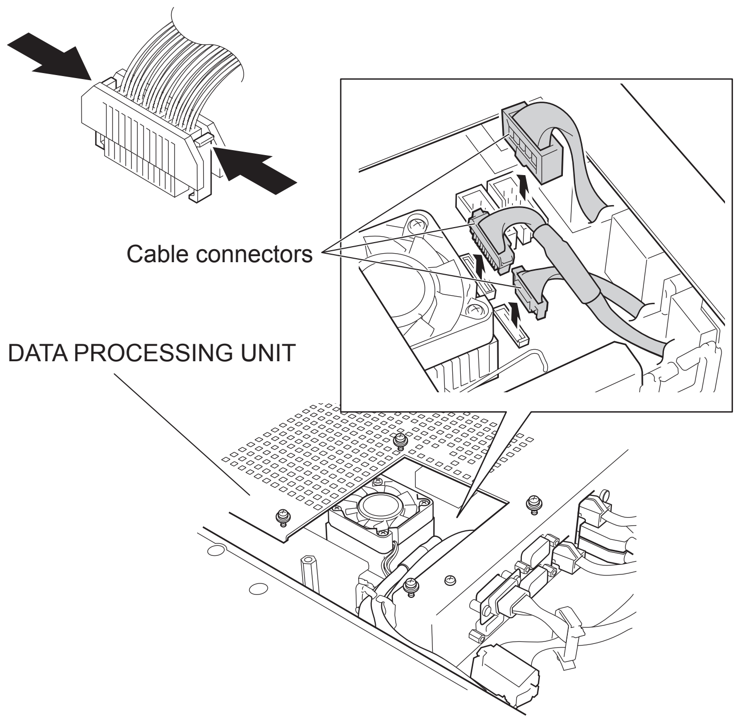
4

Repair part number: RP-PC910W

1. Remove the top cover.
2. Loosen the four screws (indicated by circles) which secure the ACCESS COVER to the DATA PROCESSING UNIT and remove the ACCESS COVER.

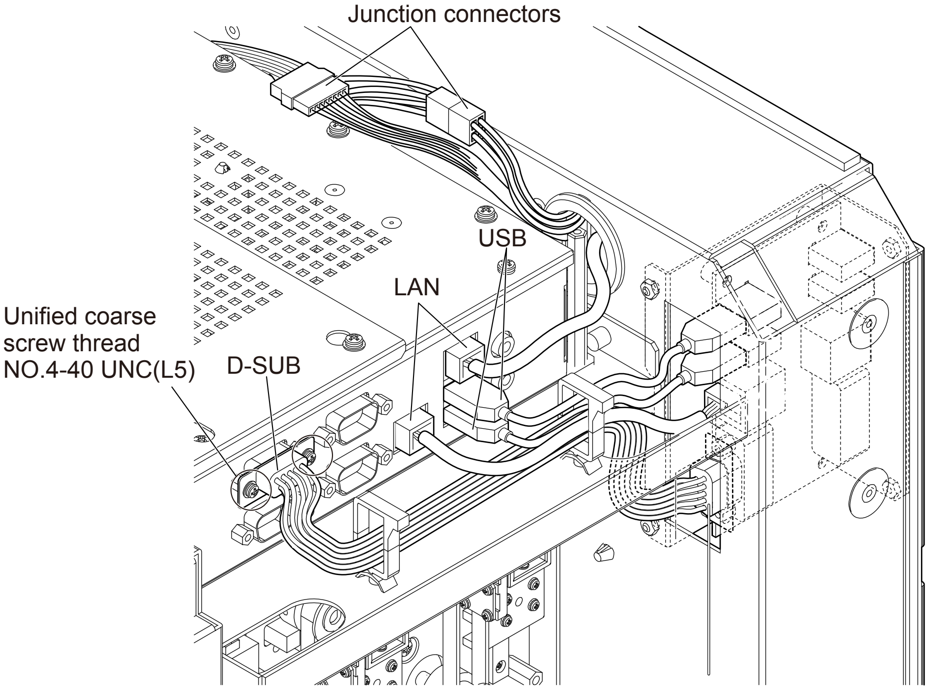


3. Disconnect the three cable connectors which connect the DATA PROCESSING UNIT to the FRONT PANEL UNIT.

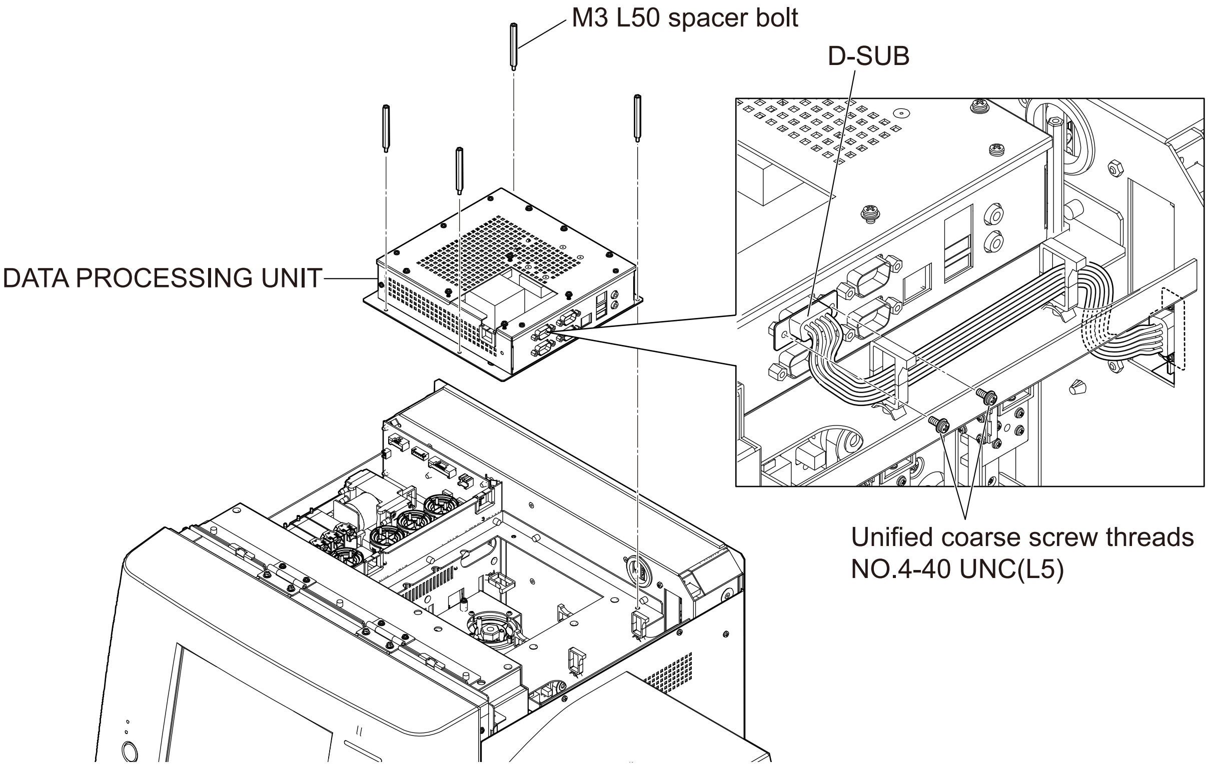


4 Disconnect the two junction connectors which are connected to the analyzer.

5 Disconnect all the D-SUB, LAN and USB connectors.



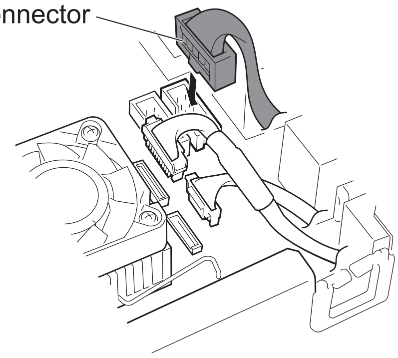
6 Remove the four spacer bolts and remove the DATA PROCESSING UNIT.



Assembly

Assemble the PC-910W DATA PROCESSING UNIT by following the disassembly procedure in reverse.

NOTE
- When assembling, connect the black cable connector to the right side.
- Do not trap the cables.
- PC-910W can only be used in combination with the PV-910W.

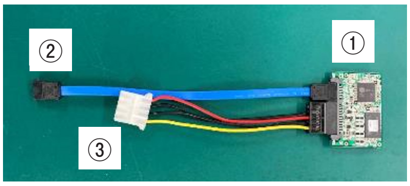


Notes on replacing the SSD and SATA cables

NOTE: Be sure to use the correct combination for the SATA cable connected to the SSD. It cannot be used in combination with other units.

PC-910W (SSD and SATA cable combination)

No.	Component	Part Code	Part Name
①	SSD	RPA-9000059895	Assy, SSD MFDHSS-008GV-MEK91
②	SATA cable	RP-9000059730	Cable, sata-20cm(20cm)
③	SATA-PW cable	RP-9000059731	Cable, sata-pw12(12cm)

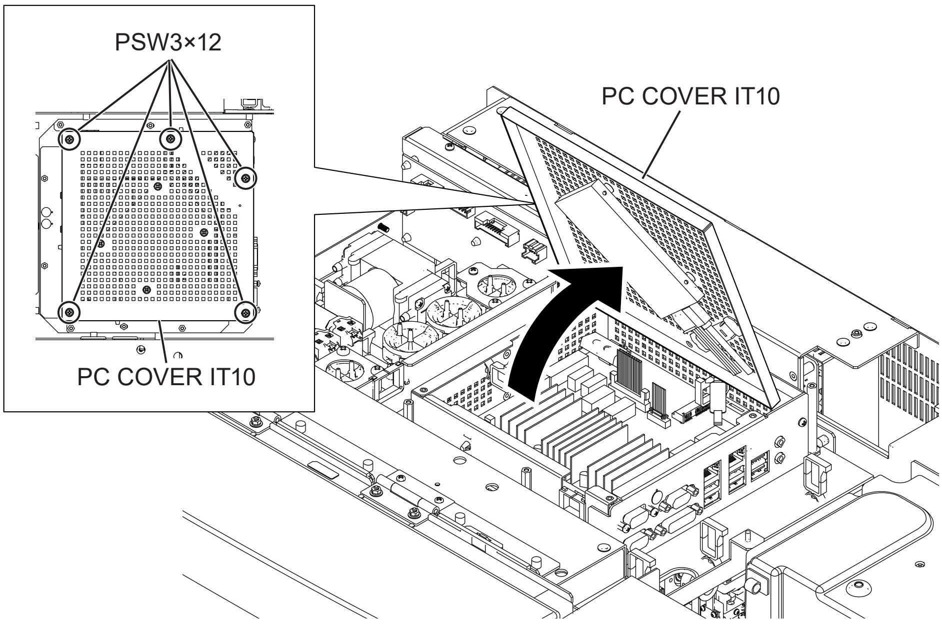


Removing the PC-911W DATA PROCESSING UNIT

Repair part number: RP-PC911W

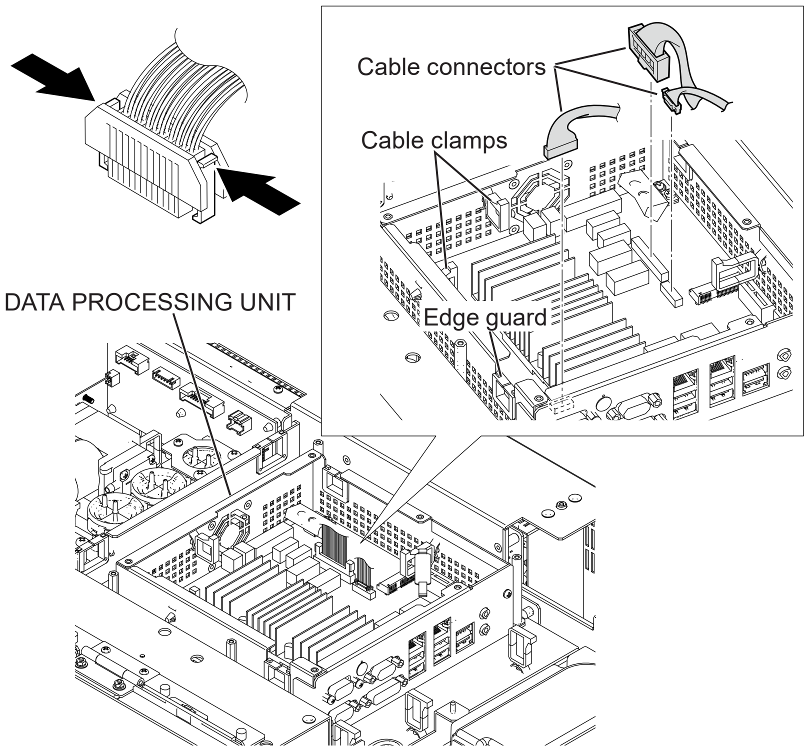
1 Remove the top cover.

2 Remove the five screws (PSW3×12), and open the PC COVER IT10 in the direction of the arrow, and remove it.



3 Disconnect the three cable connectors connected from the FRONT PANEL UNIT to the DATA PROCESSING UNIT.

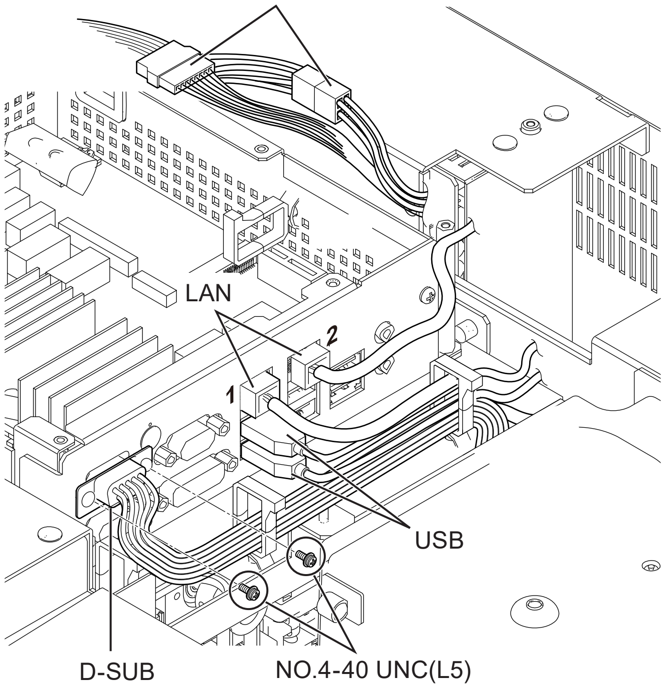
4 Disconnect the cables from the two cable clamps and the edge guard.



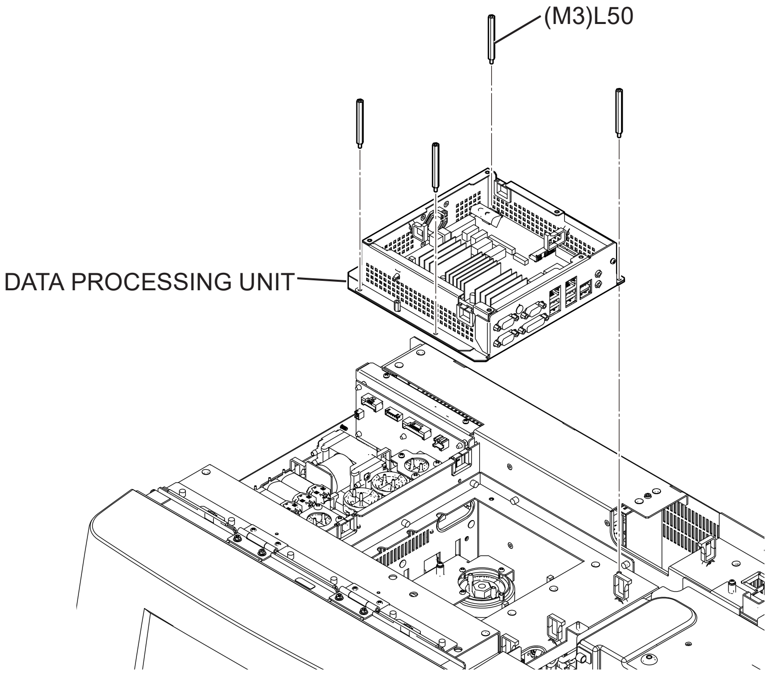
5 Remove the two junction connectors that are connected to the analyzer.

6 Remove the two screws (NO.4-40 UNC (L5)), and disconnect all cables from the D-SUB, LAN, and USB connectors.

NOTE: Check the connection position of each cable before disconnecting it to prevent mistaken reconnection of cables during reassembly.



7 Remove the four spacing bolts ((M3)L50), and remove the DATA PROCESSING UNIT.



Assembly

Assemble the PC-911W DATA PROCESSING UNIT by following the disassembly procedure in reverse.

NOTE
- When assembling, connect the black cable connector to the right side.
- Do not trap the cables.
- PC-911W can only be used in combination with the PV-920W.
- If the DATA PROCESSING UNIT (PC-911W) has been replaced, check and correct the interface numbers for ROUTE setting and ROUTE setting #2.

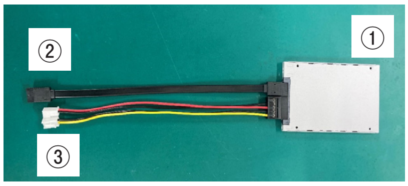
For details on the procedure for setting the interface numbers for ROUTE setting/ROUTE setting #2, refer to “Checking the Interface Numbers” (p. 6-44).

Notes on replacing the SSD and SATA cables

NOTE
- Be sure to use the correct combination for the SATA cable connected to the SSD. It cannot be used in combination with other units.

PC-911W (SSD and SATA cable combination)

No.	Component	Part Code	Part Name
①	SSD	RPA-6104901229	RN2S-040GP02JI-NK1-MEK91 01-01
②	SATA cable	6104-901054	SATA CABLE(BLACK) 200MM
③	SATA-PW cable	6104-900497	CABLE SATA POWER(200MM)



Removing the PV-910W FRONT PANEL UNIT

4

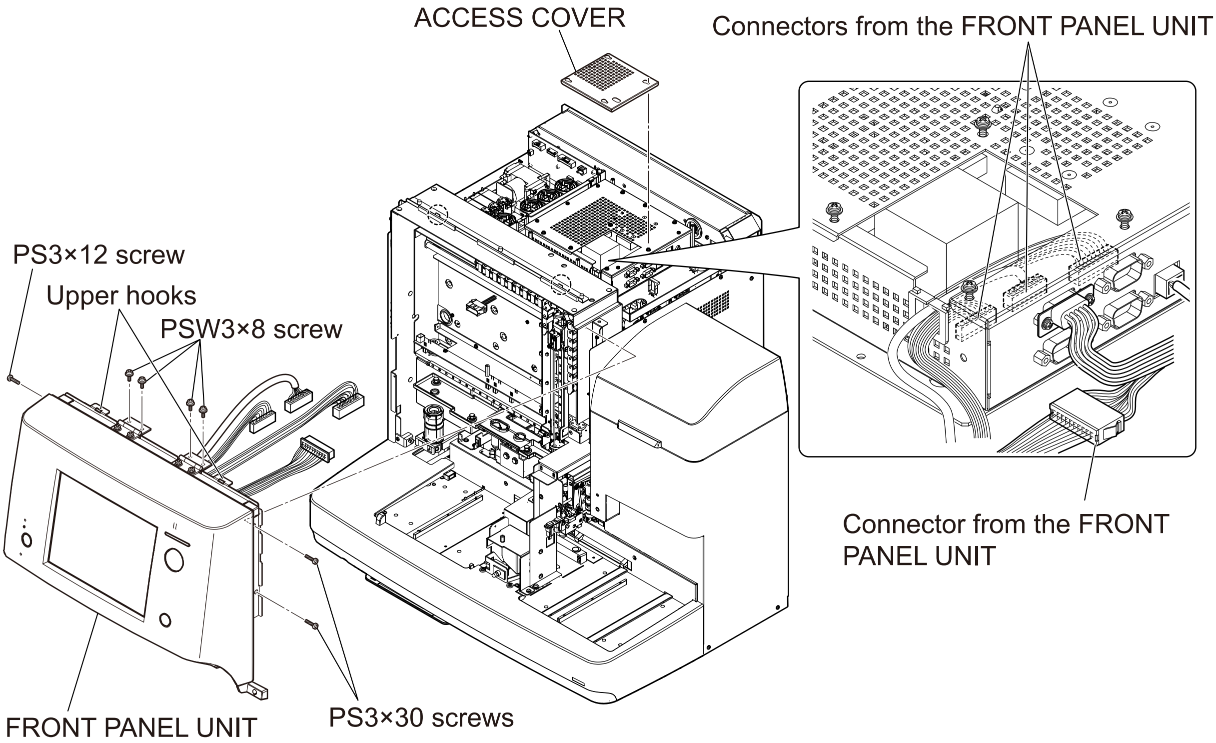
Repair part number: RP-PV910W

1. Remove the mixing cover, front cover and top cover.

2. Remove the ACCESS COVER from the DATA PROCESSING UNIT. Disconnect all cable connectors from the FRONT PANEL UNIT.

   NOTE • Note: Check the connection position of each cable before disconnecting it to prevent mistaken reconnection of cables during reassembly.

   Remove the two PS3×30 screws, one PS3×12 screw and four PSW3×8 screws which secure the FRONT PANEL UNIT and remove the FRONT PANEL UNIT.

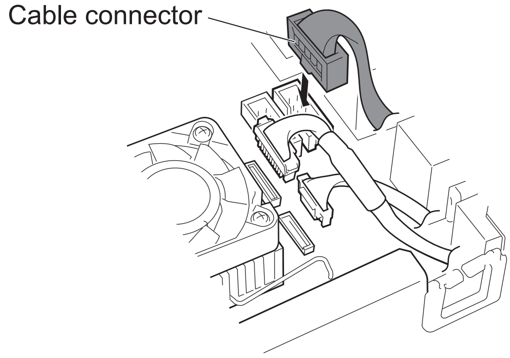


NOTE: Slide the lower part of the front panel unit toward you, pull it slightly upward, remove the two upper hooks, and slide it toward you.

Assembly

Assemble the PV-910W FRONT PANEL UNIT by following the disassembly procedure in reverse.

NOTE
- When assembling, connect the black cable connector to the right side.
- Do not trap the cables.
- PV-910W can only be used in combination with the PC-910W.



Notes on replacing the various cables

When replacing the cables used for the PV-910W, be sure to replace them in the correct combination.

NOTE: These cables are not compatible with the cables used for the PV-920W. It cannot be used in combination with other units.

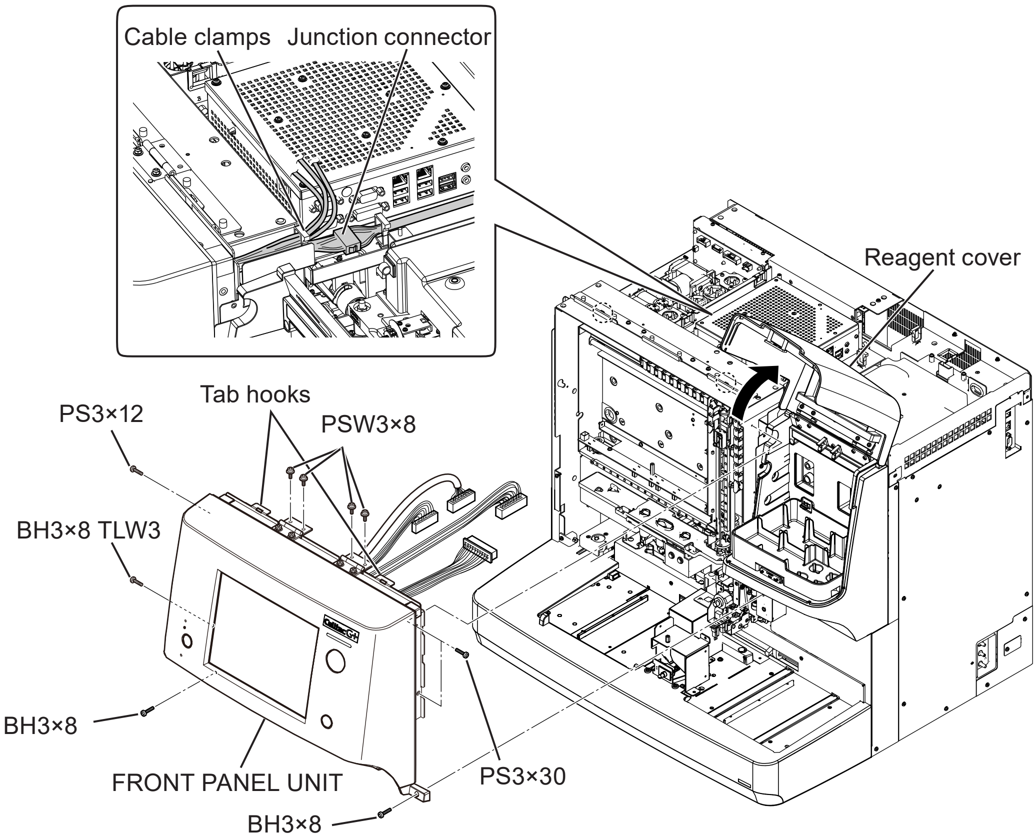
PV-910W cables

Part Code	Part Name
RP-9000059783	Cable, 51021-1000/ghr-10v-s(w620)
RP-9000059781	Cable, pudp-10v-s/ra-1011(w670)
RP-9000059782	Cable, shldp-20v-s(w610)shield

Removing the PV-920W FRONT PANEL UNIT

Repair part number: RP-PV920W

1. Remove the mixing cover, front cover, and top cover.
2. From the DATA PROCESSING UNIT, disconnect the three cables connected from the FRONT PANEL UNIT to the DATA PROCESSING UNIT.
3. Remove the junction connector connected to the analyzer, and remove the four cables from the cable clamp.
4. Open the reagent cover, and remove the two screws (PS3×30) on the side of the reagent compartment.
5. Remove the two screws (BH3×8), one screw (BH3×8 TLW3), one screw (PS3×12), and four screws (PSW3×8) securing the FRONT PANEL UNIT.
6. Pull the lower part of the FRONT PANEL UNIT toward you, and then lift it up slightly, and remove the FRONT PANEL UNIT from the two tab hooks.



Assembly

Assemble the PV-920W FRONT PANEL UNIT by following the disassembly procedure in reverse.

NOTE
- Do not trap the cables.
- PV-920W can only be used in combination with the PC-911W.

Notes on replacing the various cables

When replacing the cables used for the PV-920W, be sure to replace them in the correct combination. It cannot be used in combination with other units.

NOTE: These cables are not compatible with the cables used for the PV-910W.

PV-920W cables

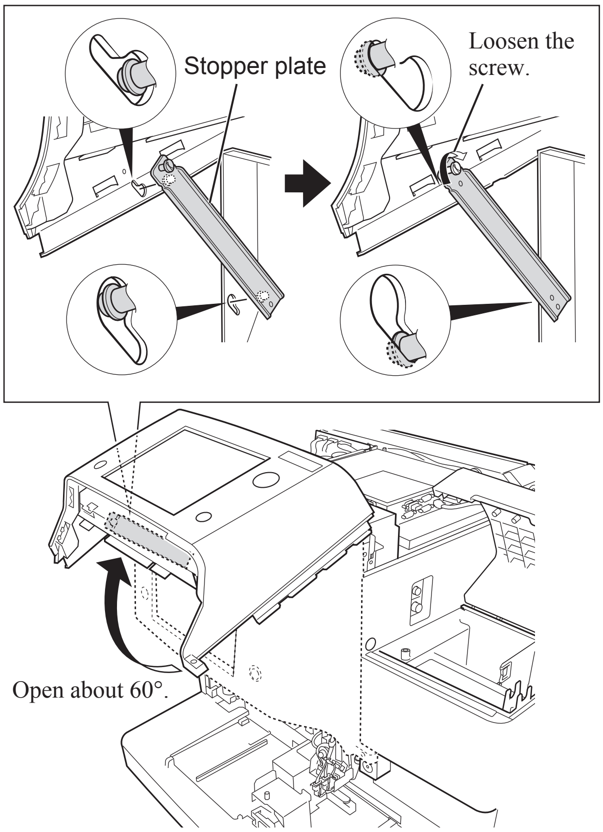
Part Code	Part Name
6104-900988	CABLE PV-PC LCD PWR(MEK-91/92) 840mm
6104-900989	CABLE PV-PC SERIAL(MEK-91/92) 640mm
6104-900494	CABLE PV-PC LVDS(MEK-91/92) 830mm

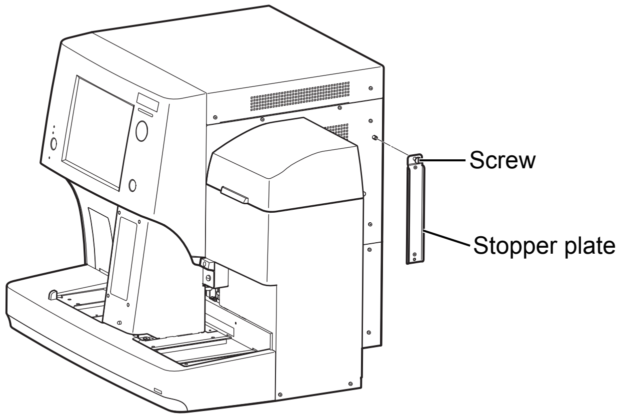
Removing the RP-6114937826 AUTOLOADER

Repair part number: RP-6114937826

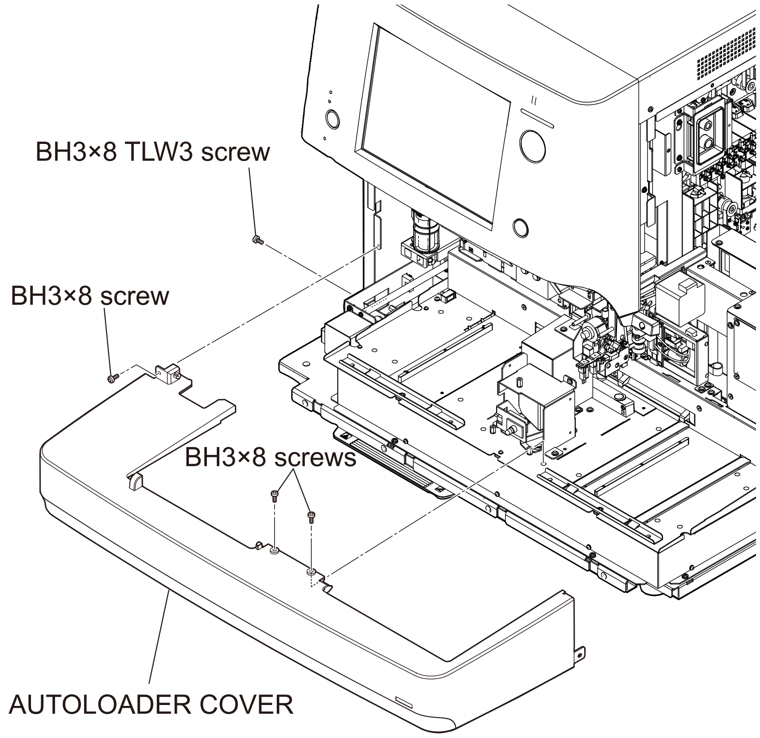
1 Remove the mixing cover, front cover, right cover and top cover.

2 Open the front panel unit upward and secure it with the stopper plate.

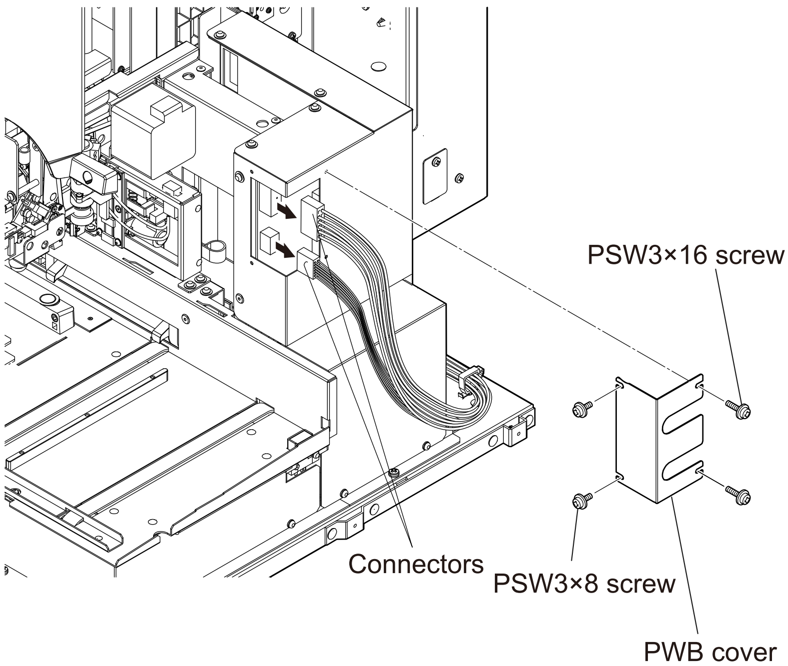




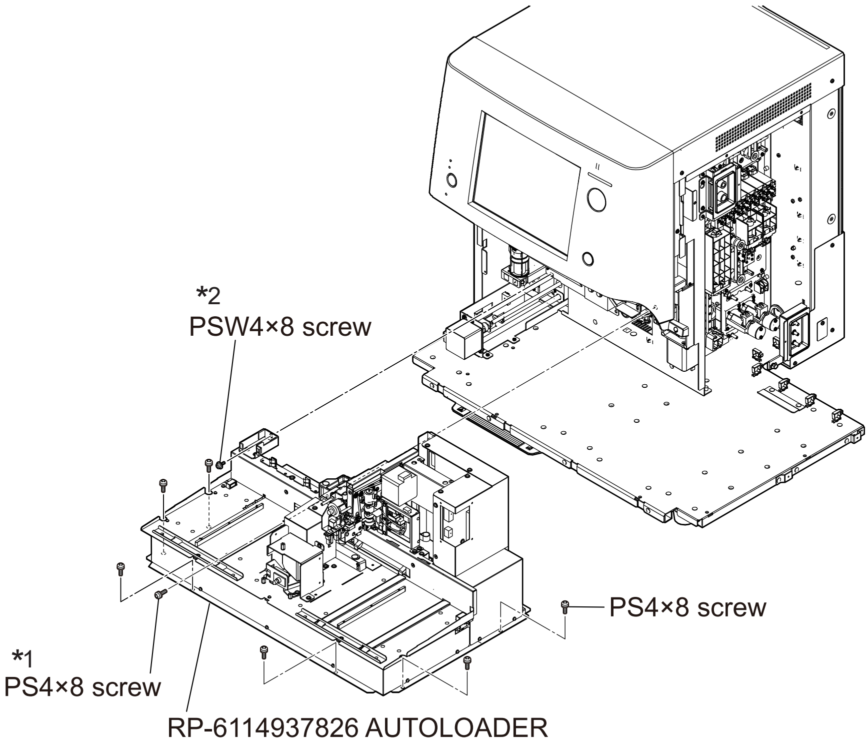
3 Remove the BH3×8 TLW3 screw which secures the left cover to the AUTOLOADER COVER. Remove the three BH3×8 screws which secure the AUTOLOADER COVER, and remove the AUTOLOADER COVER by sliding it toward you.



4 Remove the two PSW3×8 screws and two PSW3×16 screws, and remove the PWB cover. Disconnect the two cable connectors from the MOTHER BD.



5 Remove the PSW4×8 screw and seven PS4×8 screws, and remove the AUTOLOADER.



Assembly

Assemble the RP-6114937826 AUTOLOADER by following the disassembly procedure in reverse.

NOTE
- Fix the *1 and *2 screws first, in this order.
- Check that the sampling needle is not descended.
- When replacing the AUTO LOADER, upgrade the AL software using a QS-023W software kit.

Checking the Sampling Needle Position

Use one of the jigs specified below to check the position of sampling needle.

AUTOLOADER S/N xxxxxxxxK: RPK-6113924534 (MEK-9100 S/N 00110 or later)

AUTOLOADER S/N xxxxxxxx_: RPK-6114935815 (MEK-9100 S/N 00109 or earlier)

For the checking method, refer to p. 4-82.

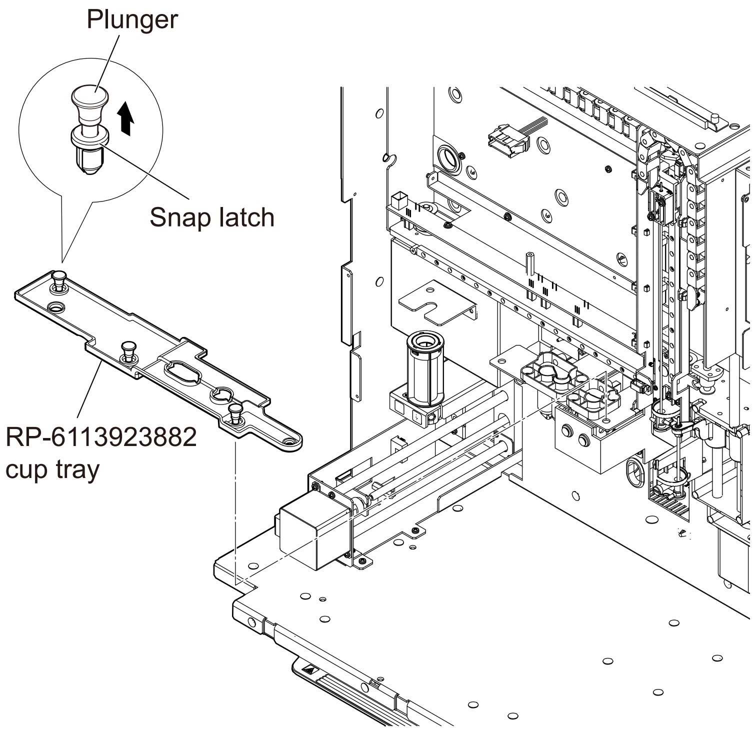
NOTE: Do not use unspecified jigs. They may damage the analyzer.

Removing the MS-910W SAMPLER UNIT

Repair part number: RP-MS910W

1 Remove the mixing cover, front cover, right cover, top cover, front panel unit, autoloader cover and autoloader.

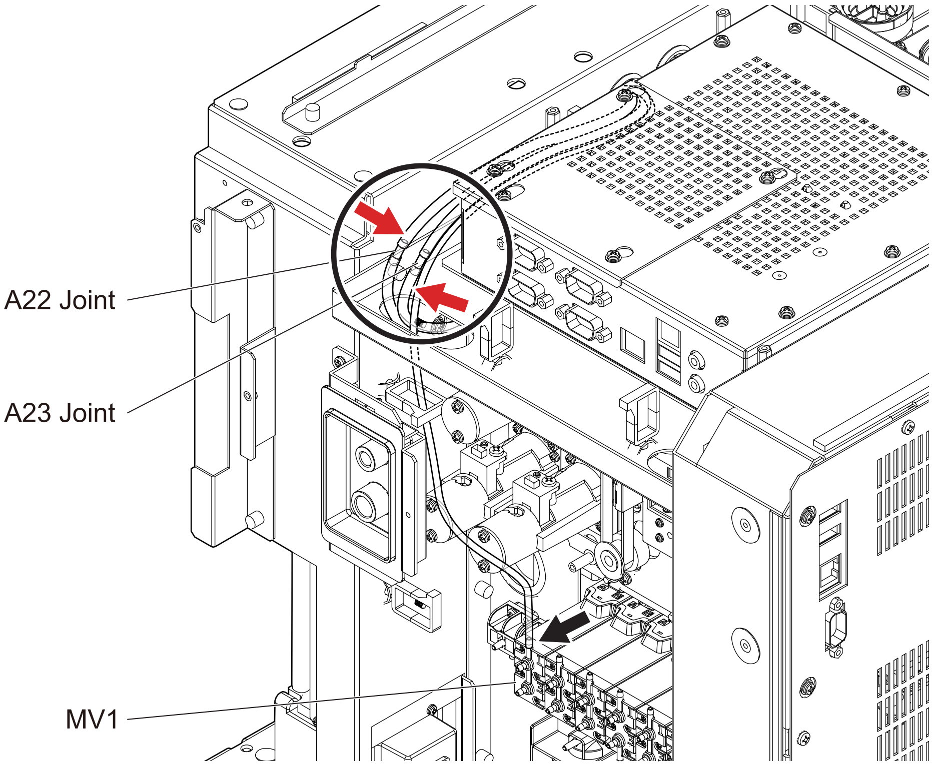
2 Pull out the plunger of each of the three snap latches and remove the cup tray.



4

3 Remove the tube from port 1 of MV1 on the right side panel and remove the tubes from the A22 and A23 tube joints.

NOTE
- When removing the tube from the A22 joint, remove the tube on the MS-910W side.
- When removing the tube from the A23 joint, remove the tube on the main unit side.

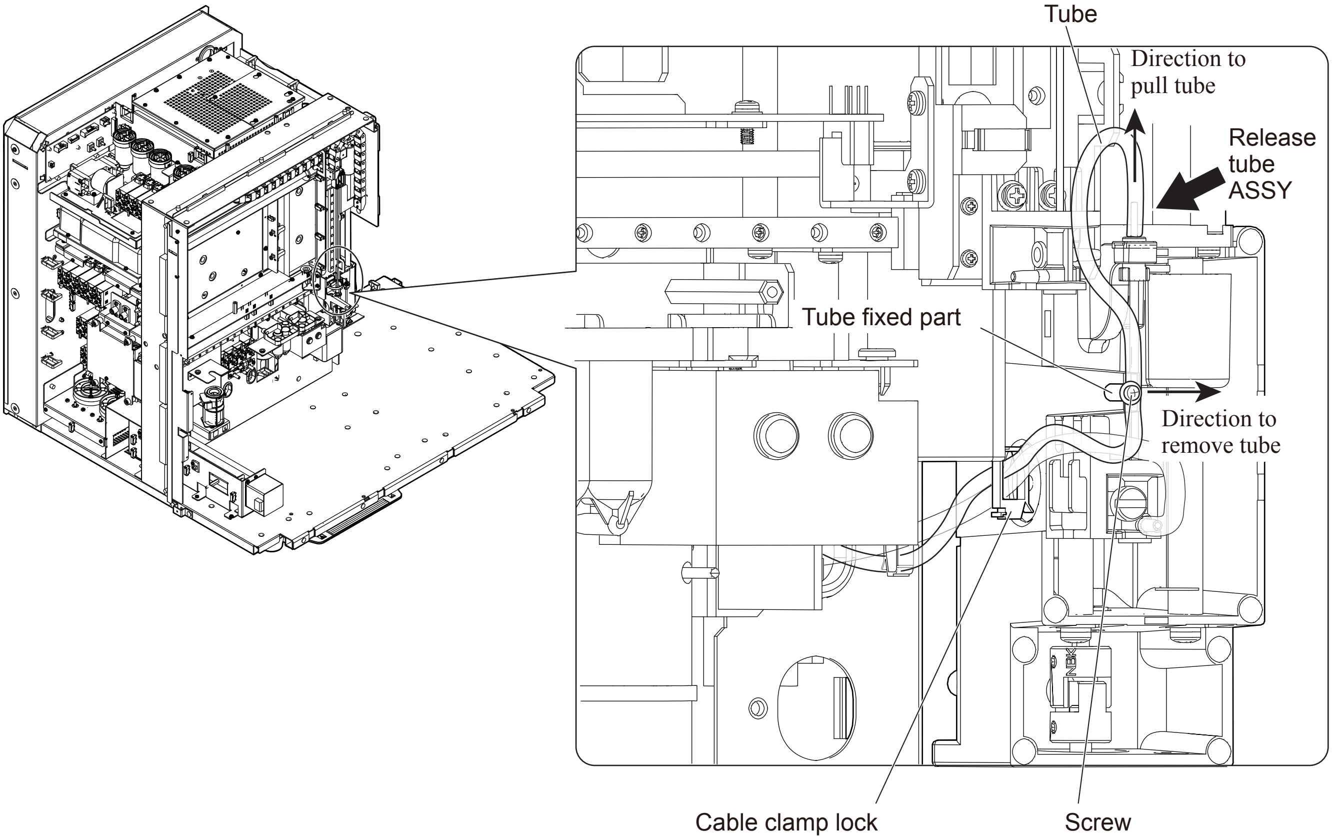


NOTE
- When replacing the unit, disconnect the tube joint on the SAMPLER UNIT side (indicated by the circle). The tube joint is not provided with the unit.
- The analyzer cannot function properly when the tube piping is incorrect. When reconnecting the tube, check that the tube marking matches the piping list.
- When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

4 Remove the tubes.

- Loosen the screw in the figure and remove the tube from the tube fixed part.
- Pull out the tube from the release tube ASSY.
- Unlock the cable clamp and release the tube.

NOTE
- When assembling, secure the tubes so that they will not be deformed or bent. Operate the SAMPLER UNIT and OPEN AIR UNIT to check that there is no interference with them.
- When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

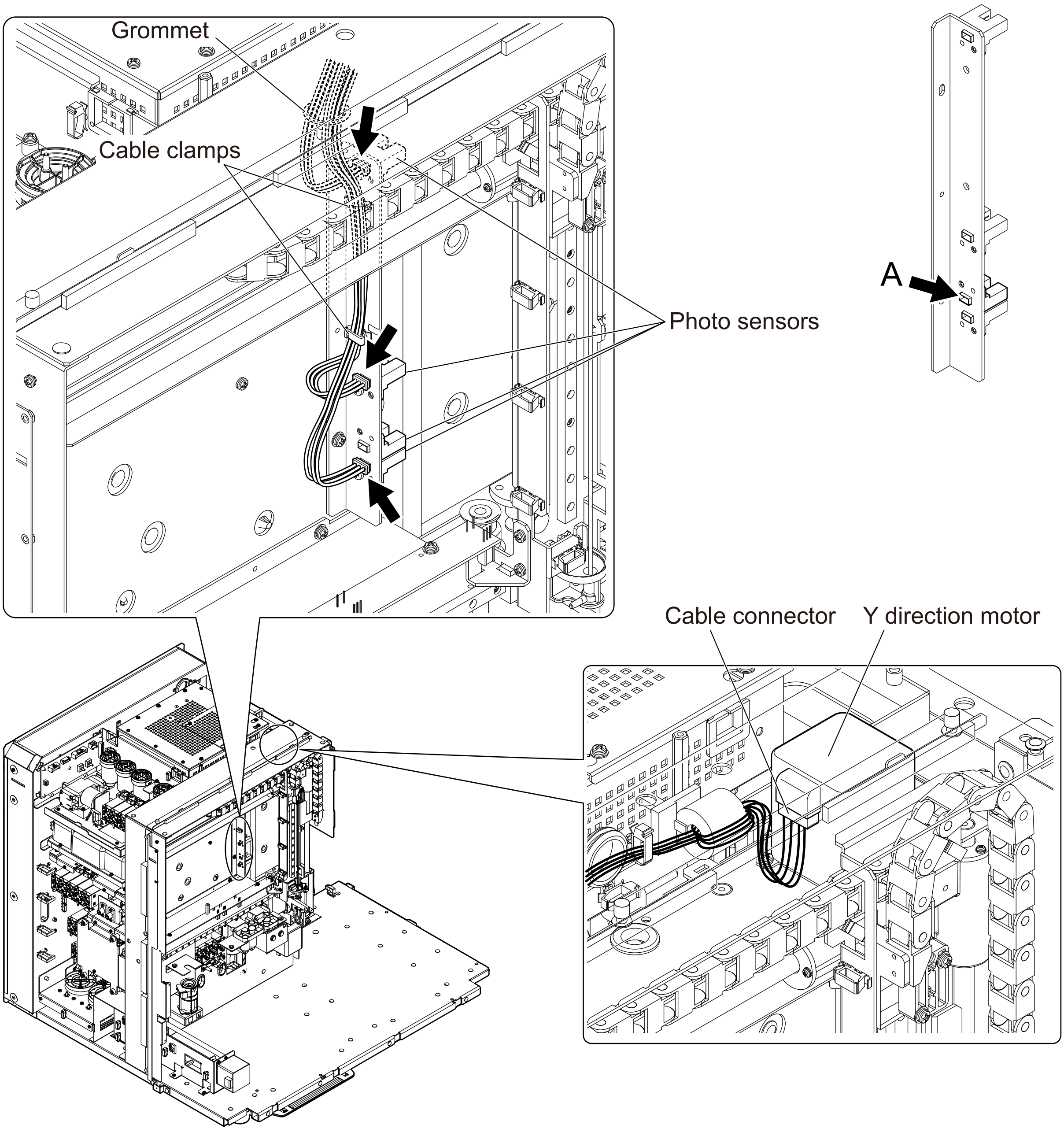


5 Remove the PHOTO SENSOR cables.

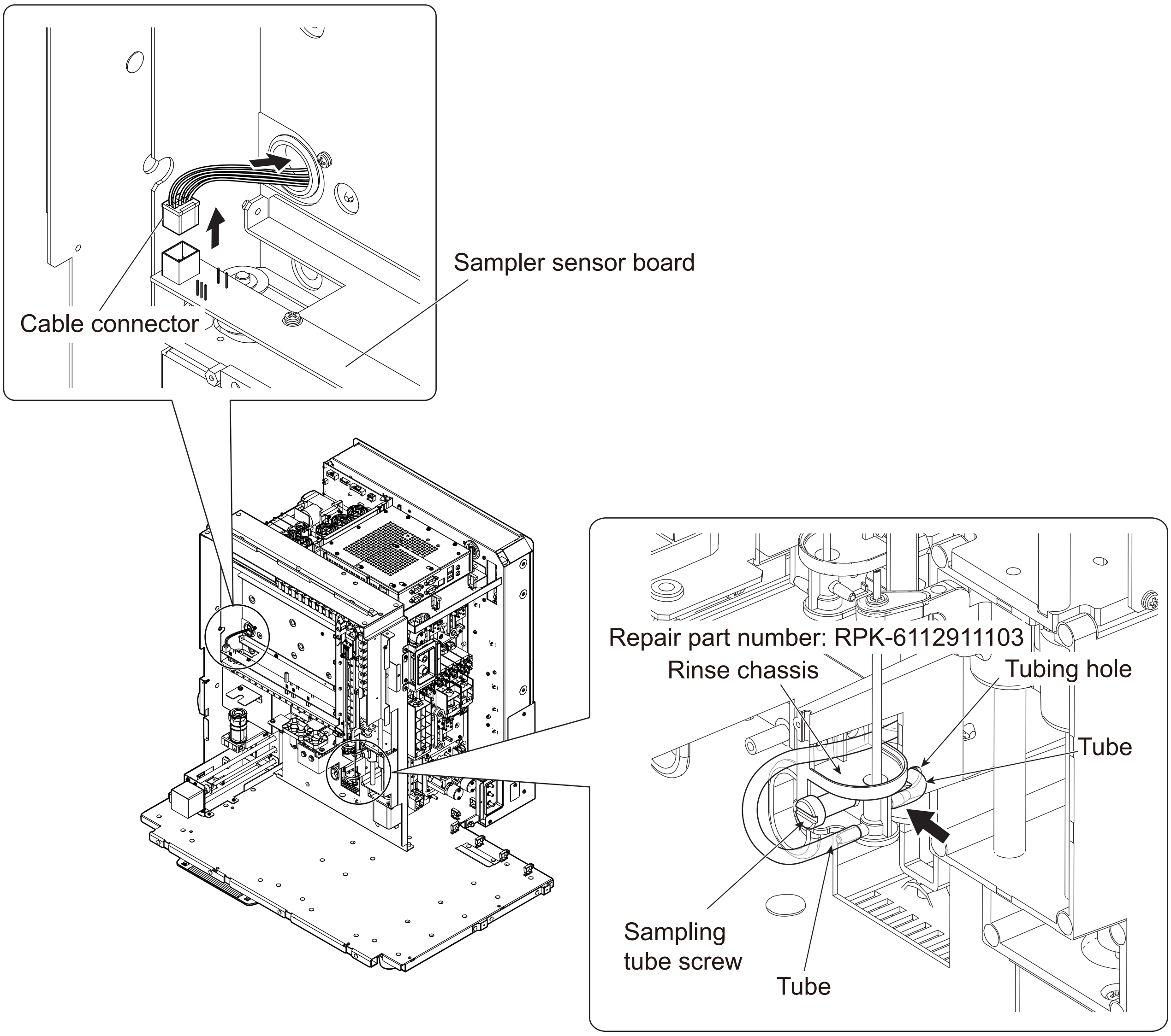
- Unlock the cable clamp and disconnect the three cable connectors (indicated by the arrows).
- Pull up each cable and pull the cables out from the grommet.

6 Disconnect the cable connector of the Y direction motor.

NOTE: When assembling, check that there is no looseness or slack in the cables. Also, operate the SAMPLER UNIT and check that there is space of 10 mm or more between the SAMPLER UNIT and cables.
When assembling, connect the cables correctly. Do not use the sensor indicated by (A).



7 Disconnect the cable connector from the sampler sensor board.
Push the connector into the grommet.



8 Remove the rinse chassis and tubes.

- Remove the sampling tube screw with a coin or flat-blade screwdriver.
- Slide the rinse chassis toward you, remove the tube (indicated by the arrow) and push the tube into the tubing hole.

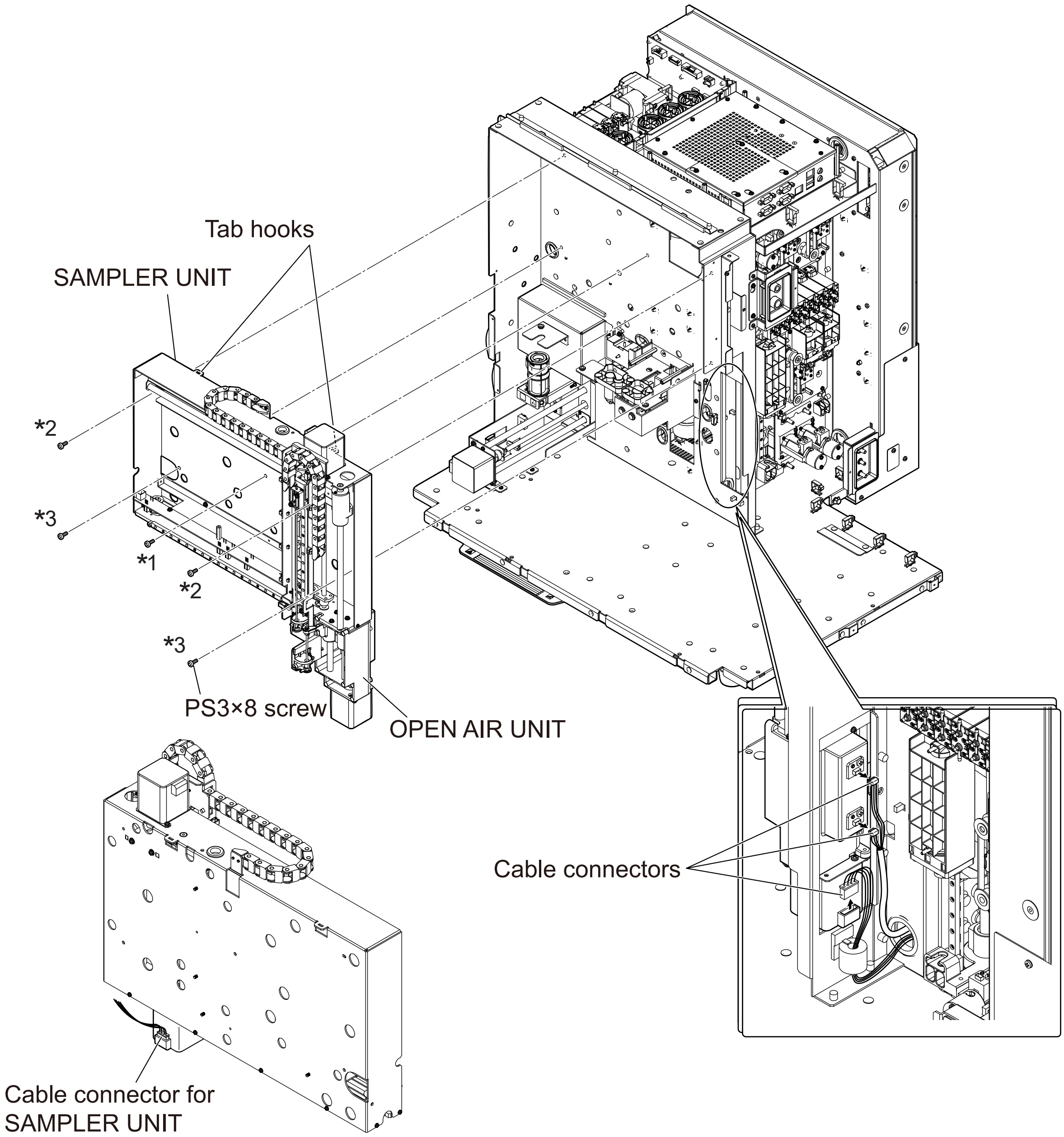
NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

9 Disconnect the OPEN AIR UNIT cable connectors.

- Disconnect the three cable connectors (indicated by the arrows) before removing the SAMPLER UNIT.

10 Remove the SAMPLER UNIT.

- Remove the five PS3×8 screws.
- Lift up the SAMPLER UNIT about 5 mm to clear the two tab hooks at the top then pull it toward you.



NOTE: The SAMPLER UNIT cable connector is inserted into the motor at the rear lower right of the SAMPLER UNIT. Slowly remove the cable and disconnect the cable connector.

Assembly

Assemble the MS-910W SAMPLER UNIT by following the disassembly procedure in reverse.

NOTE
- Do not trap the tubes or cables.
- Fix the *1, *2 and *3 screws in this order.

Checking the Sampling Needle Position

Use one of the jigs specified below to check the position of sampling needle.

AUTOLOADER S/N xxxxxxxxK: RPK-6113924534 (MEK-9100 S/N 00110 or later)

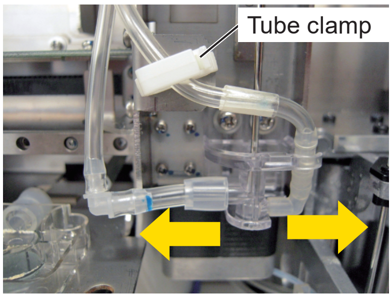
AUTOLOADER S/N xxxxxxxx_: RPK-6114935815 (MEK-9100 S/N 00109 or earlier)

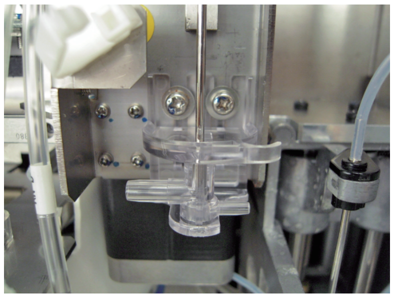
For the checking method, refer to p. 4-82.

NOTE: Do not use unspecified jigs. They may damage the analyzer.

Replacement of the Rinse Chassis

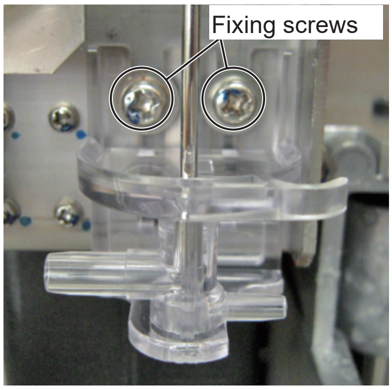
1 Remove the tube from the tube clamp and remove the two tubes connected to the rinse chassis.

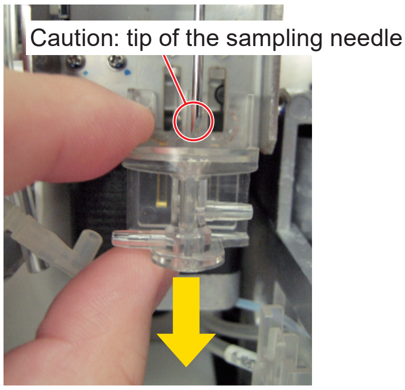




2 Remove the two fixing screws and remove the rinse chassis by pulling it down from the sampling needle.

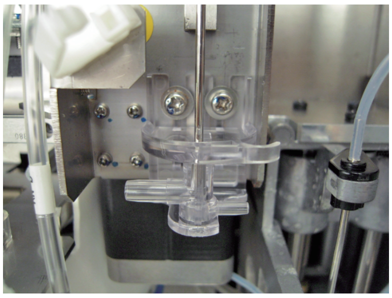
NOTE
- Some Spacers can be used on the back of the rinse chassis. In that case, the spacers are reused, so be careful not to lose the spacers when removing the rinse chassis.
- The tip of the sampling needle is very sharp, so be careful not to get injured.





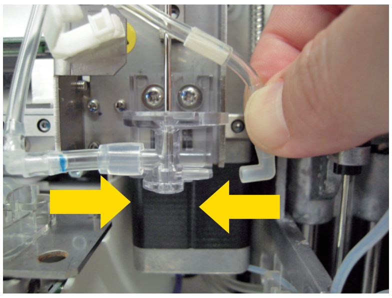
3 Attach the new rinse chassis.

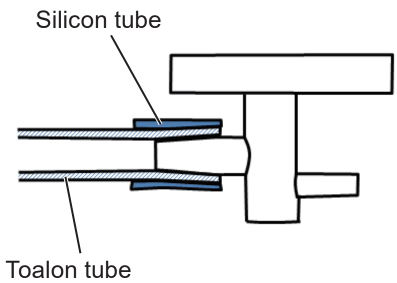
NOTE
- When some spacers are used, use the same spacers with the new rinse chassis.
- Be careful not to damage the rinse chassis by the tip of the sampling needle.



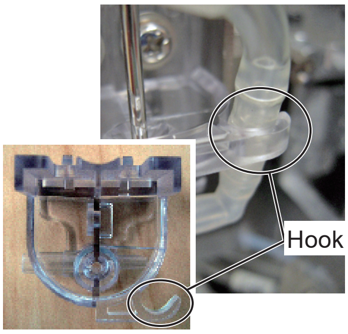
4 Connect the two tubes to the rinse chassis.

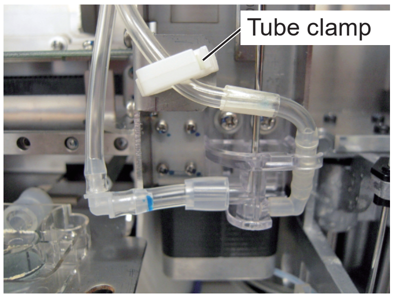
NOTE
- Align the edge of the toalon tube and that of the silicon tube and connect them to the port to the end firmly.
- Make sure that the toalon tube is inserted to the end firmly.
- If the connection is not firm, fluid leakage, contamination or pressure error may occur.





5 Hook the right tube and clamp the tube with the tube clamp.

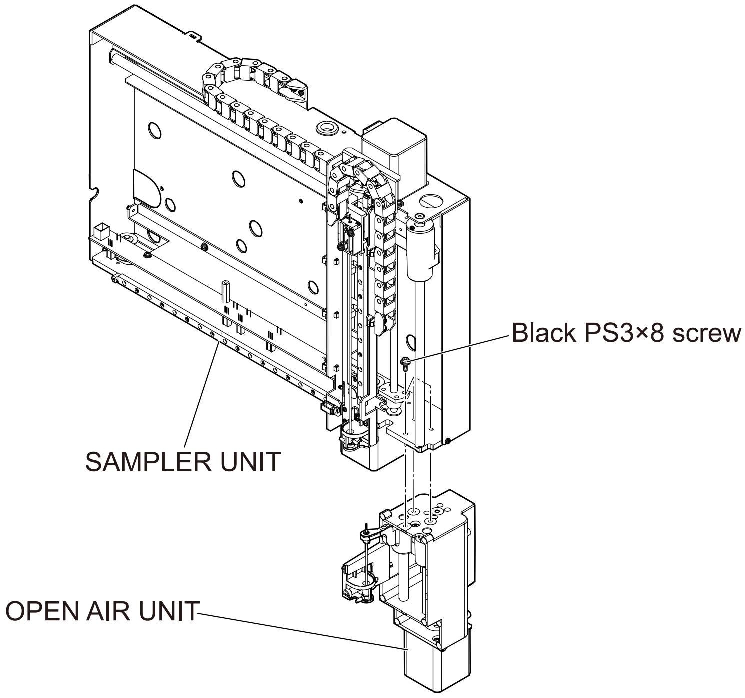




Removing the MS-911W OPEN AIR UNIT

Repair part number: RP-MS911W

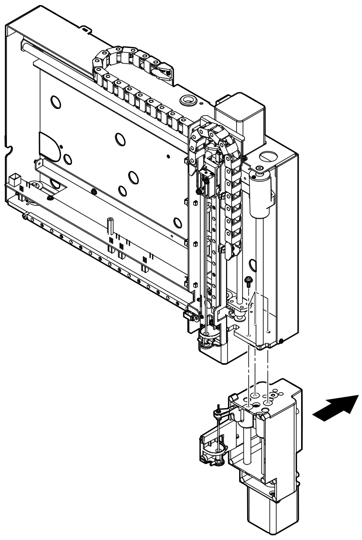
1. Remove the mixing cover, front cover, right cover, left cover, top cover, autoloader cover and autoloader.
2. Remove the three screws which secure the SAMPLER UNIT and remove the OPEN AIR UNIT.



Assembly

Assemble the MS-911W OPEN AIR UNIT by following the disassembly procedure in reverse.

NOTE: Secure the OPEN AIR UNIT by pushing it in to the end.



Checking the Sampling Needle Position

Use one of the jigs specified below to check the position of sampling needle.

AUTOLOADER S/N xxxxxxxxK: RPK-6113924534 (MEK-9100 S/N 00110 or later)

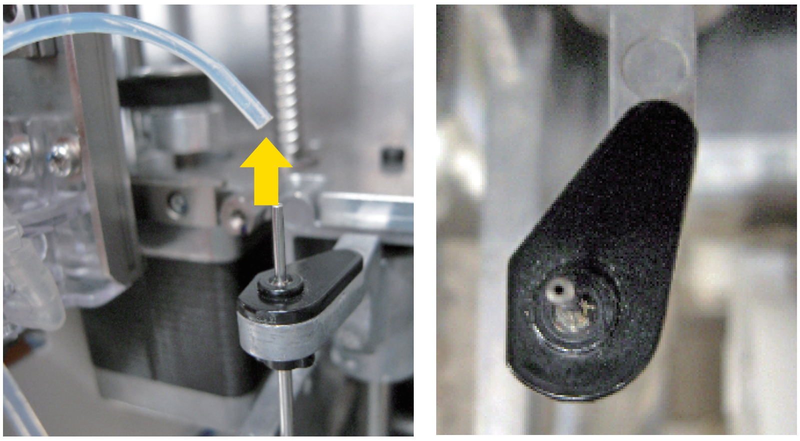
AUTOLOADER S/N xxxxxxxx_: RPK-6114935815 (MEK-9100 S/N 00109 or earlier)

For the checking method, refer to p. 4-82.

NOTE: Do not use unspecified jigs. They may damage the analyzer.

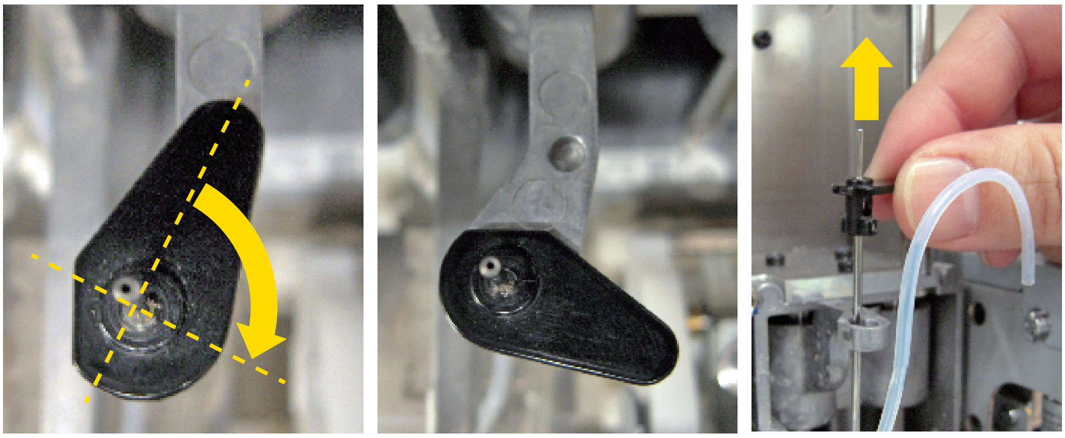
Replacement of the Venting Needle

1 Remove the tube from the top of the venting needle.

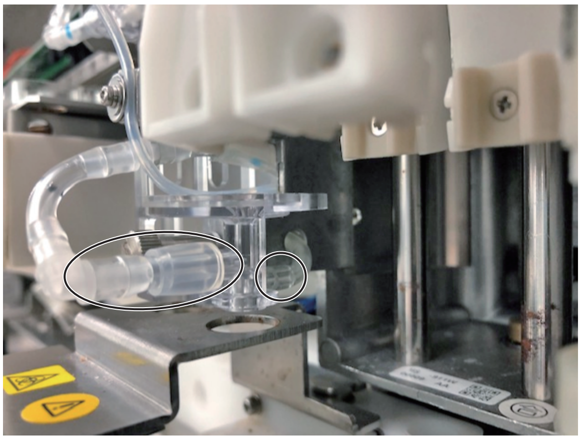


2 Rotate the venting needle by 90 degrees clockwise and remove the venting needle by pulling it up.

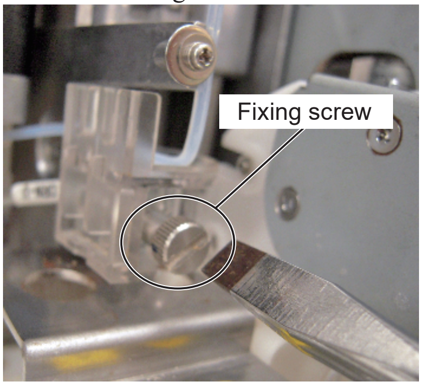
NOTE: The tip of the venting needle is very sharp, so be careful not to get injured.

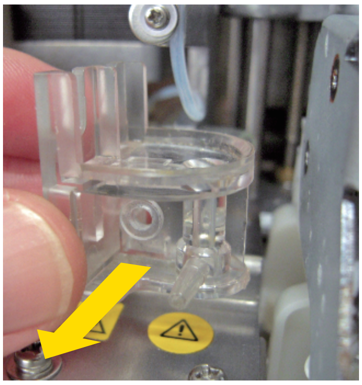


3 Remove the two tubes connected to the rinse chassis.



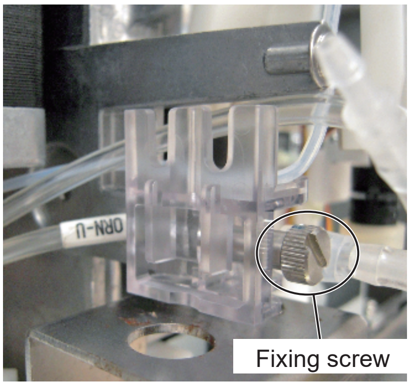
4 Remove the fixing screw and rinse chassis.

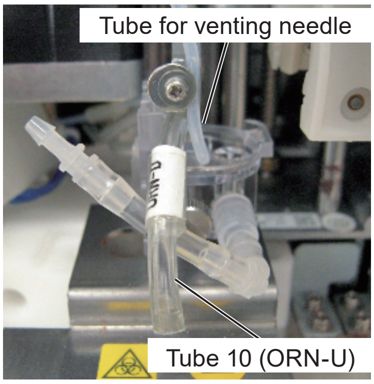


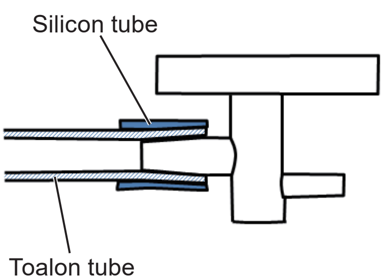


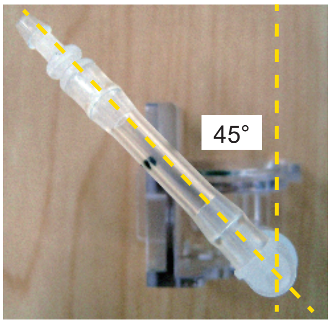
5 Attach the new rinse chassis and secure it with the fixing screw, and then connect the tube to the rinse chassis.

NOTE
- Be sure to place the tube 10 (ORN-U) as shown below not to contact with the venting needle.
- Align the edge of the toalon tube and that of the silicon tube and connect them to the port to the end firmly.
- Make sure that the toalon tube is inserted to the end firmly.
- If the connection is not firm, fluid leakage, contamination or pressure error may occur.

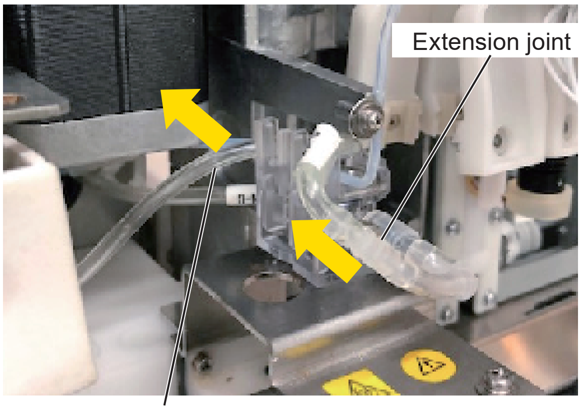






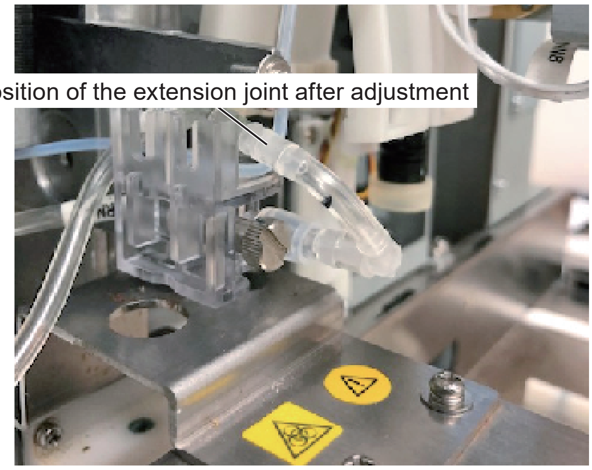


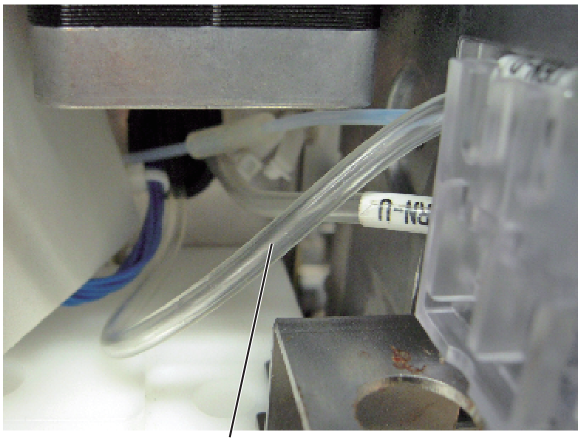
6 Adjust the position of the extension joint as shown below by pulling the tube back.



Pull the tube back and move the extension joint.

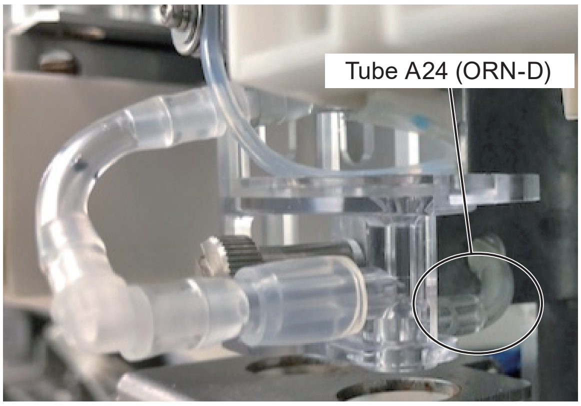
Position of the extension joint after adjustment





Tube 10 (ORN-U) at the back of the rinse chassis

7 Connect the tube A24 (ORN-D) to the rinse chassis.



8 Attach the venting needle and tube for venting needle.

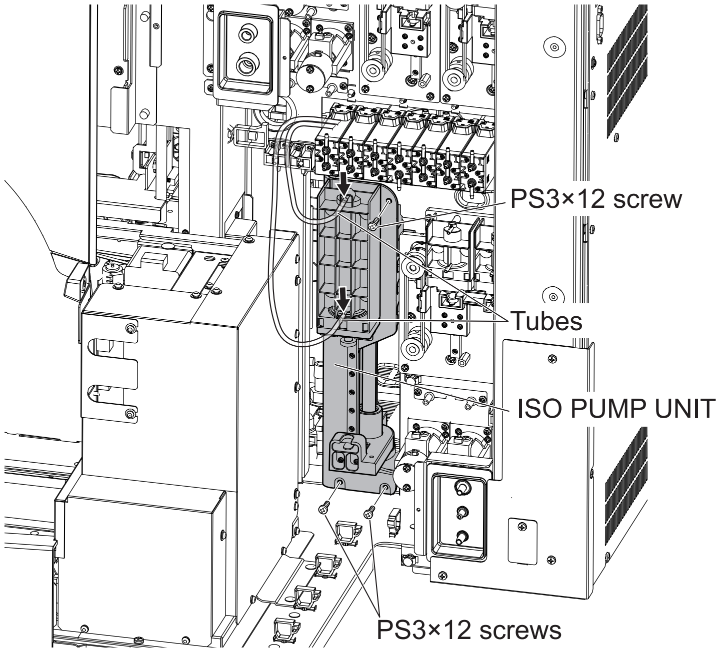
NOTE: Be careful not to damage the rinse chassis by the tip of the sampling needle.

Removing the MP-911W ISO PUMP UNIT

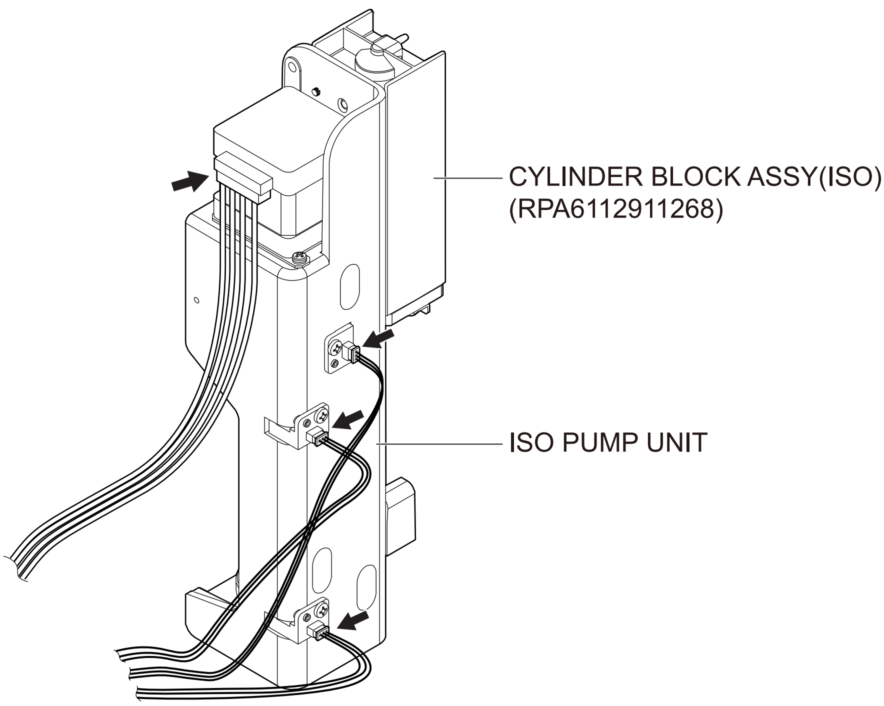
Repair part number: RP-MP911W

1. Remove the right cover.
2. Remove the two tubes (indicated by the arrows) from the ISO PUMP UNIT, remove the three PS3×12 screws and slide the ISO PUMP UNIT toward you.

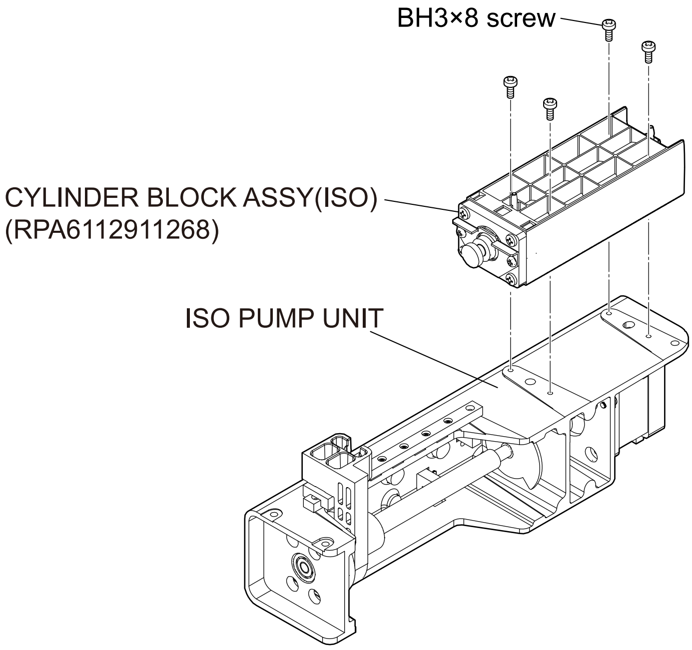
   NOTE: Do not break the tube connection part when removing the tube.



3. Disconnect the three PHOTO SENSOR cable connectors and the motor cable connector, and remove the ISO PUMP UNIT.



4 Remove the four BH3×8 screws from the ISO PUMP UNIT and remove the CYLINDER BLOCK ASSY.



Assembly

Assemble the MP-911W ISO PUMP UNIT by following the disassembly procedure in reverse.

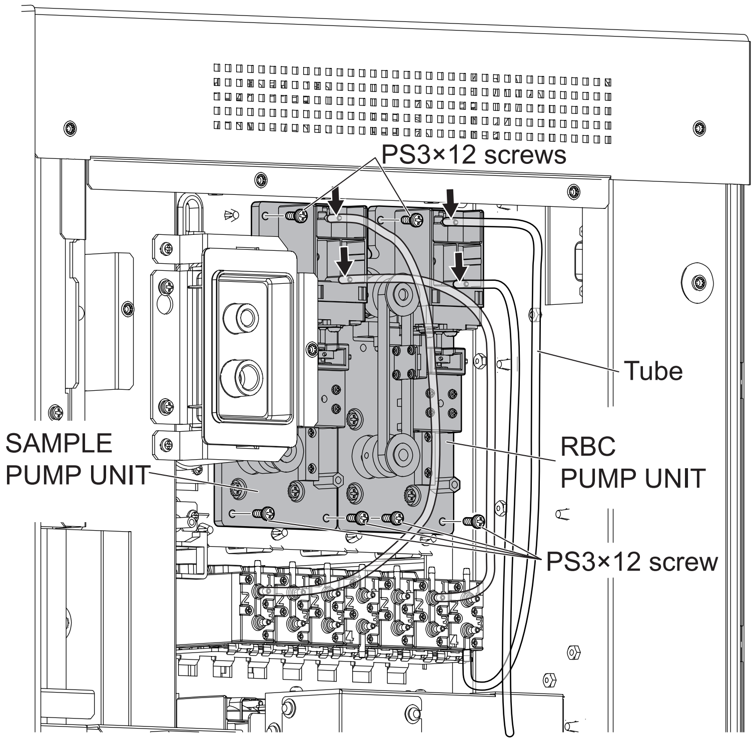
NOTE
- Store the ISO PUMP UNIT by placing with the CYLINDER BLOCK facing upward. The unit falling over may cause damage.
- When assembling, match the cable color and cable connector marking label color. The marking label is attached near the cable connector as a guide.
- When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Removing the MP-912W SAM/RBC PUMP UNIT

Repair part number: RP-MP912W

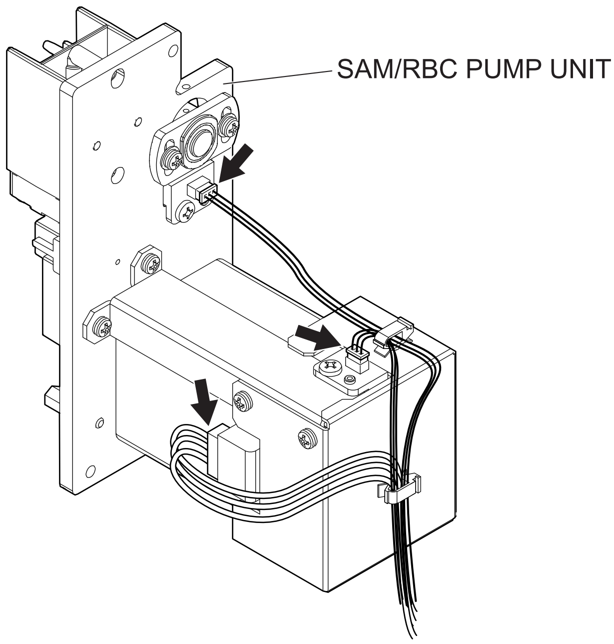
1 Remove the right cover.

2 Remove the four tubes (indicated by the arrows) and three PS3×12 screws, and slide the SAM/RBC PUMP UNIT toward you.

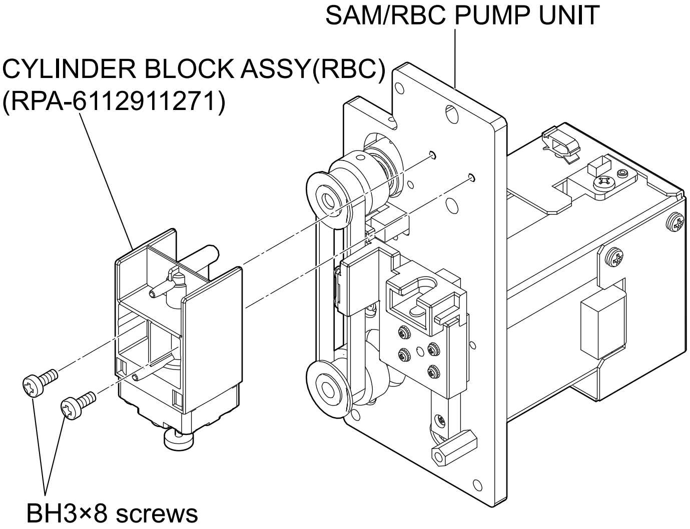


NOTE: Do not break the tube connection part when removing the tube.

3 Disconnect the two sensor cable connectors and the motor cable connector, and remove the SAM/RBC PUMP UNIT.



4 Remove the two BH3×8 screws from the SAM/RBC PUMP UNIT and remove the CYLINDER BLOCK ASSY.



Assembly

Assemble the MP-912W SAM/RBC PUMP UNIT by following the disassembly procedure in reverse.

NOTE
- When assembling, match the cable color and cable connector marking label color. The marking label is attached near the cable connector as a guide.
- When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

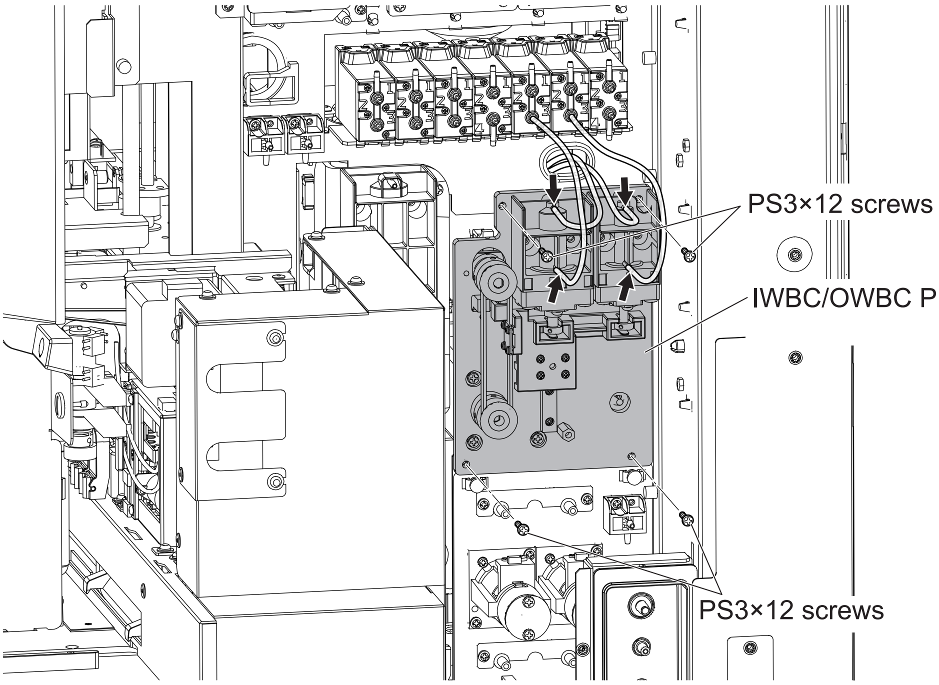
Removing the MP-913W IWBC/OWBC PUMP UNIT

Repair part number: RP-MP913W

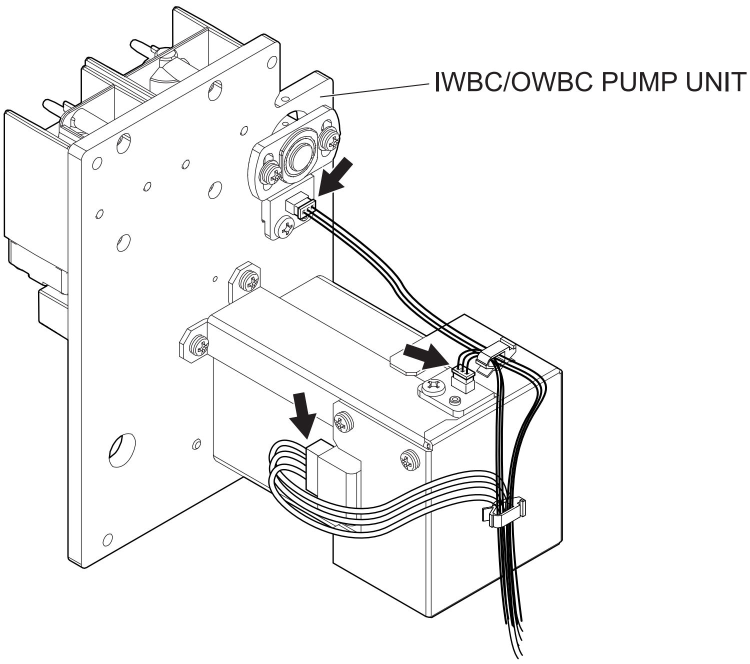
1 Remove the right cover.

2 Remove the four tubes (indicated by the arrows) and four PS3×12 screws, and slide the IWBC/OWBC PUMP UNIT toward you.

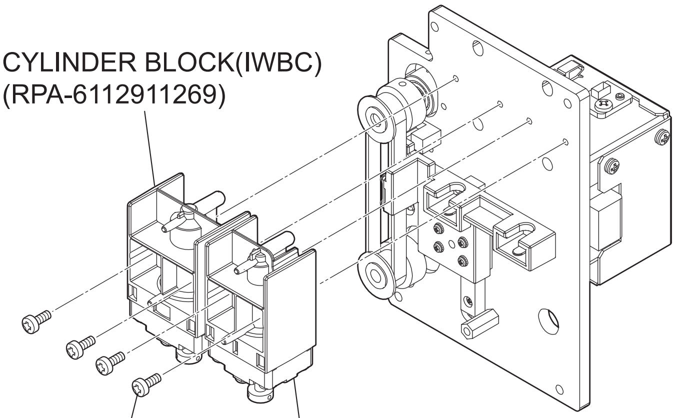
NOTE: Do not break the tube connection part when removing the tube.



3 Disconnect the two sensor cable connectors and the motor cable connector, and remove the IWBC/OWBC PUMP UNIT.



4 Remove the four BH3×8 screws from the IWBC/OWBC PUMP UNIT, and remove the CYLINDER BLOCK (OWBC) and CYLINDER BLOCK (IWBC).



Assembly

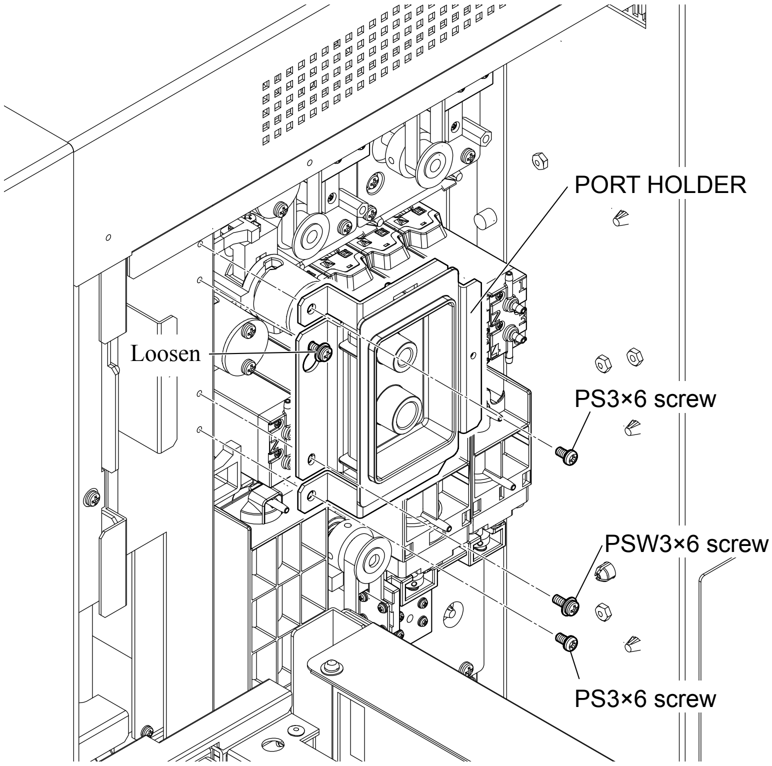
Assemble the MP-913W IWBC/OWBC PUMP UNIT by following the disassembly procedure in reverse.

NOTE
- When assembling, match the cable color and cable connector marking label color. The marking label is attached near the cable connector as a guide.
- When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Removing the XP-910W PINCH VALVE UNIT

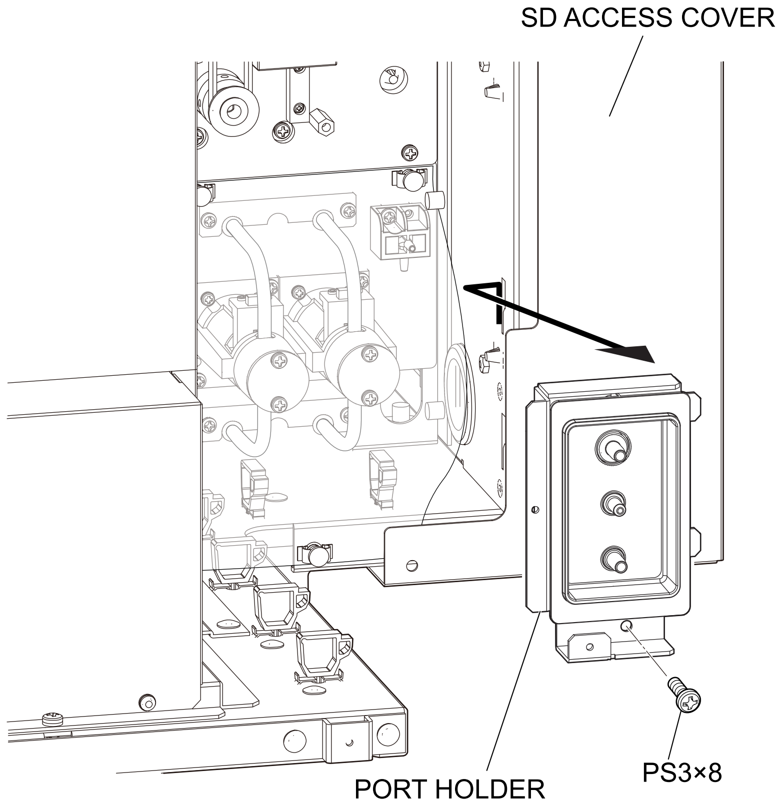
Repair part number: RP-XP910W

1 Remove the right cover. Remove the two PS3×6 screws and the PSW3×6 screw from the PORT HOLDER at the upper left, loosen the PSW3×6 screw and remove the PORT HOLDER.

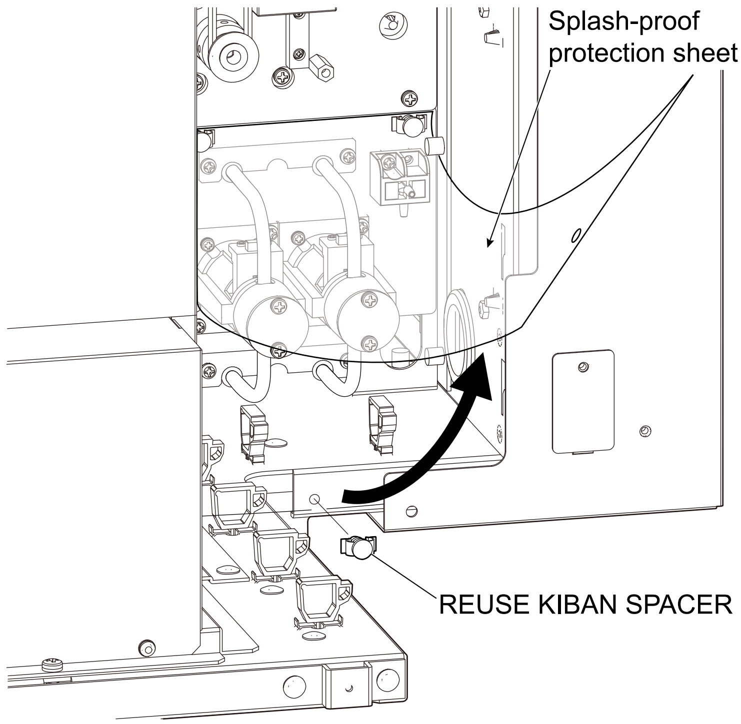


2 Remove the three BH3×8 TLW3 screws and remove the SD ACCESS COVER.

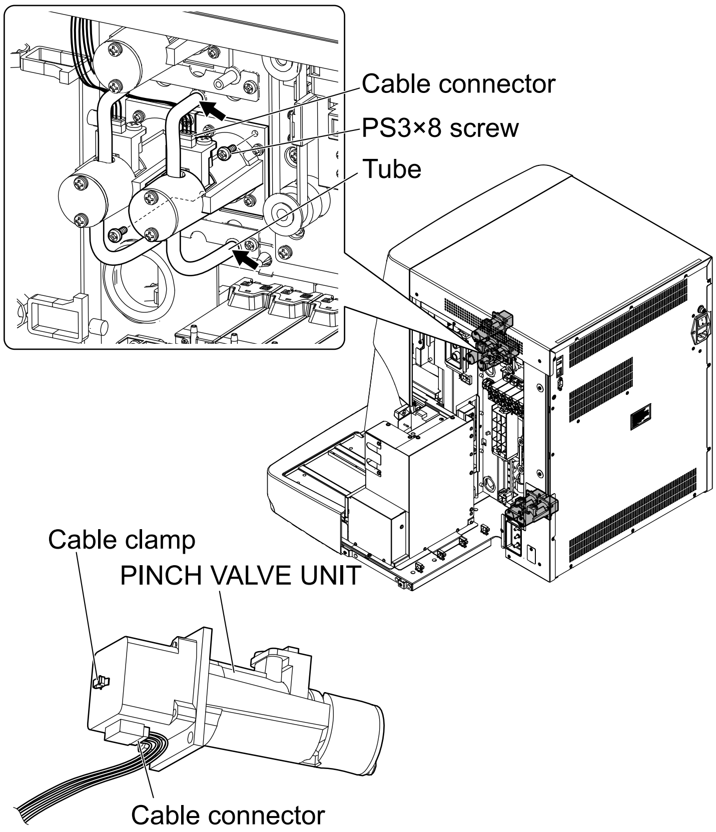
3 Remove the PS3×8 screw, and remove the PORT HOLDER by moving it slightly upward and sliding it toward you.



4 Remove the two REUSE KIBAN SPACERS from the lower side of the splash-proof protection sheet and pull up the sheet.



5 Remove the two tubes (indicated by the arrows) and the two PS3×8 screws which secure the PINCH VALVE UNIT. Disconnect the cable connector, slide the PINCH VALVE UNIT slowly toward you, disconnect the bottom cable connector and remove the PINCH VALVE UNIT.

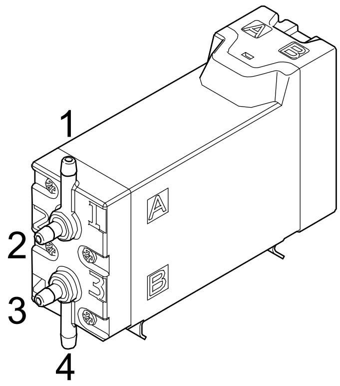


Assembly

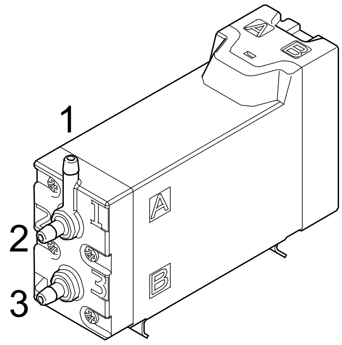
Assemble the XP-910W PINCH VALVE UNIT by following the disassembly procedure in reverse.

NOTE
- When assembling, match the cable color and cable connector marking label color. The marking label is attached near the cable connector as a guide.
- When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Removing the Electromagnetic Valves

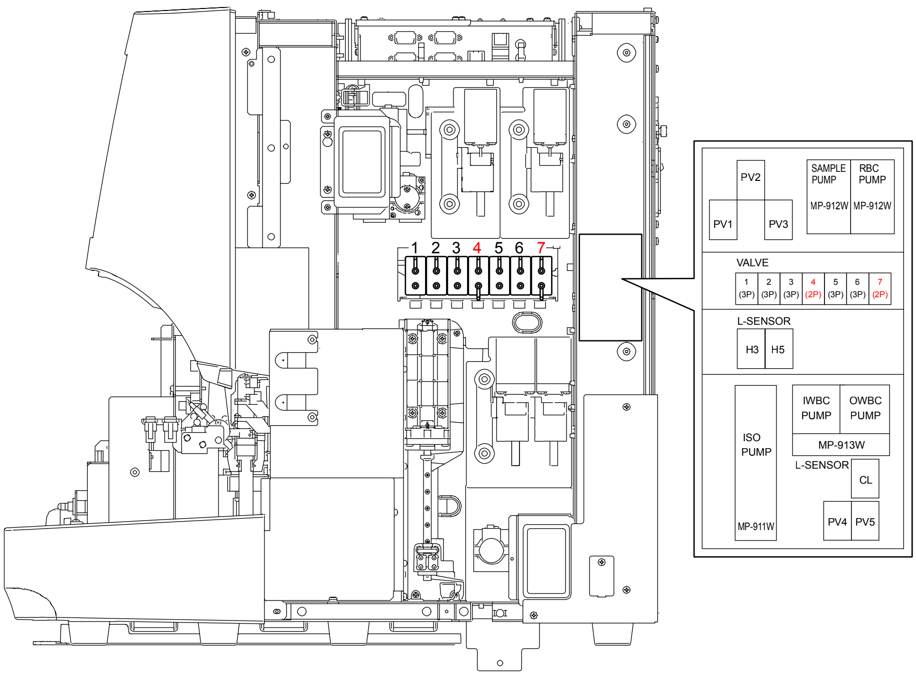


RP-9000057721
two-way valve (2P)

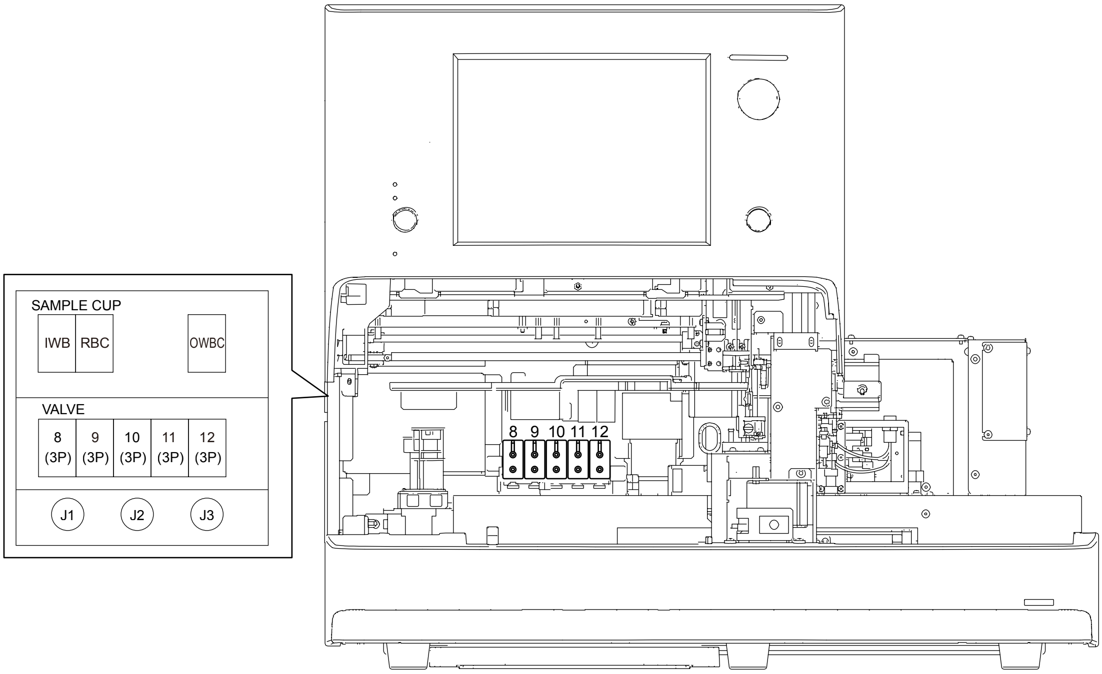


RP-9000057722
three-way valve (3P)

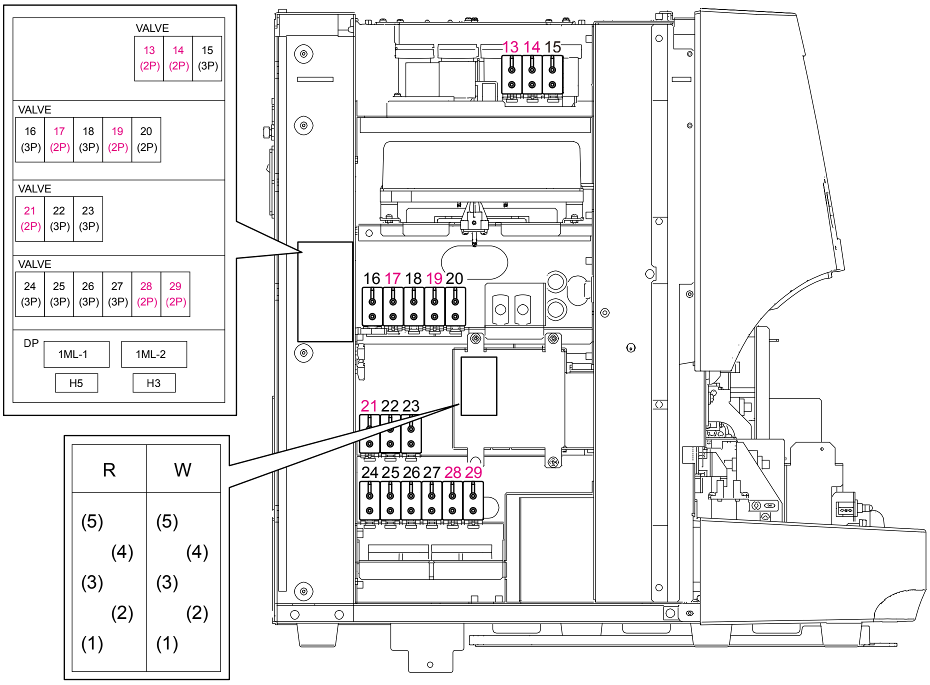
Right Side Panel



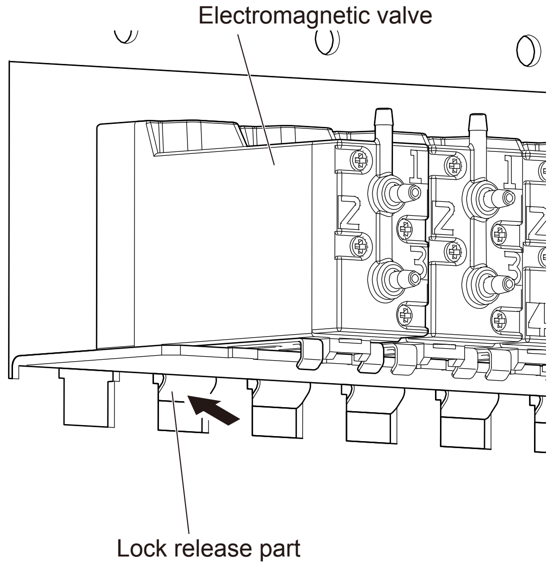
Front Panel



Left Side Panel

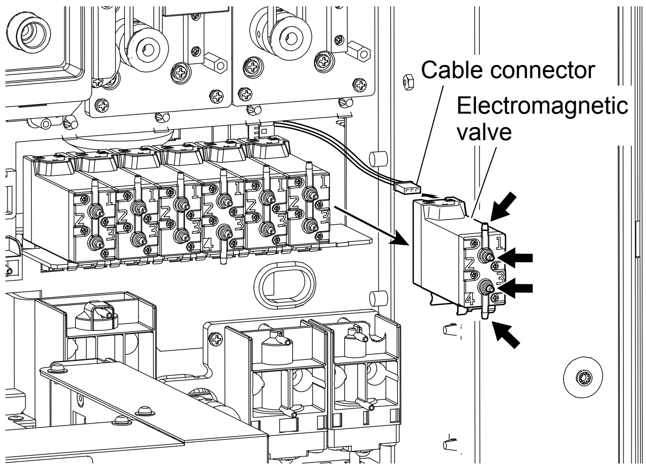


Press the lock release part with the flat-blade screwdriver to unlock and remove the electromagnetic valve.



Removing the MV1 to 7 Electromagnetic Valves

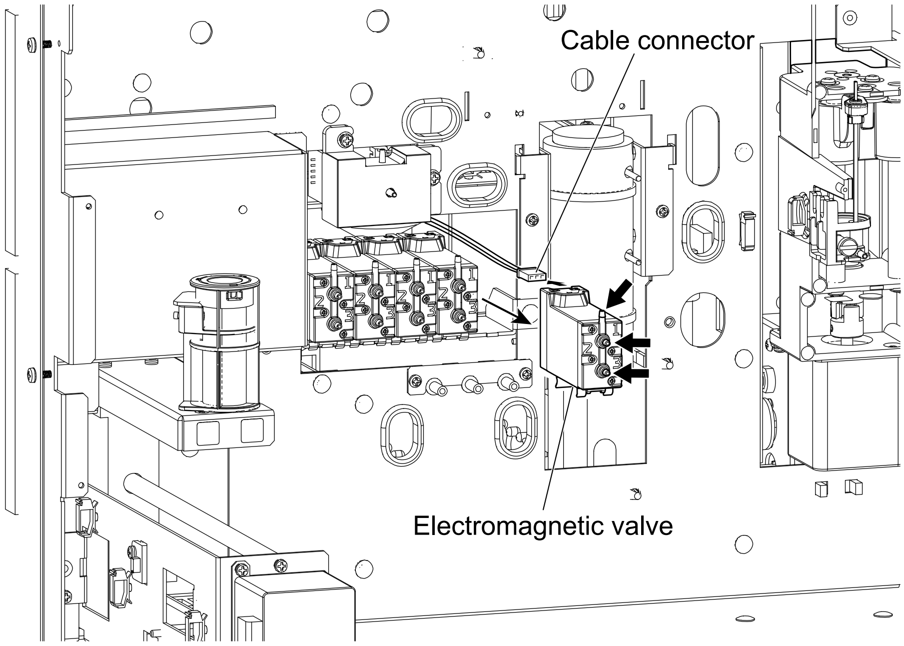
1. Remove the right cover.
2. Remove all tubes from the electromagnetic valve and unlock the lock. Slide the electromagnetic valve toward you and disconnect the cable connector from the electromagnetic valve.



Removing the MV8 to 12 Electromagnetic Valves

1 Remove the mixing cover, front cover, right cover, top cover, autoloader cover, autoloader, front panel unit, sampler unit with open air unit and heater unit.

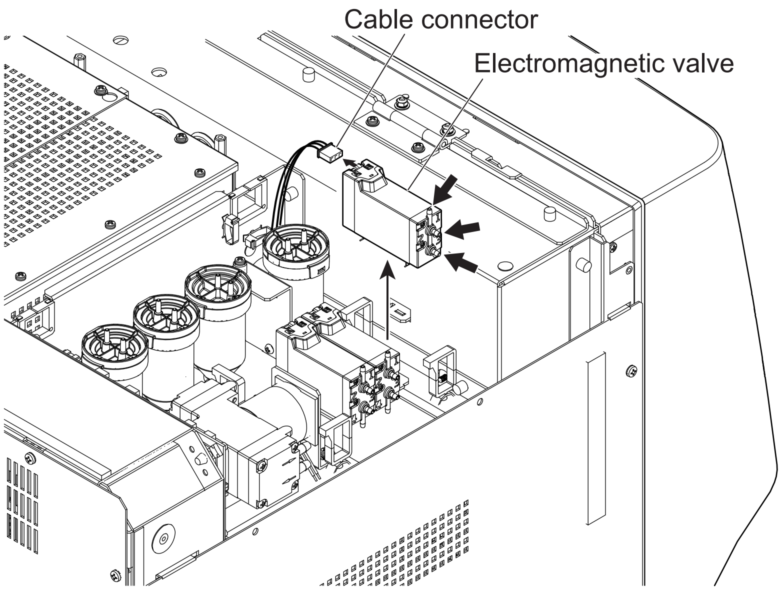
2 Remove all tubes from the electromagnetic valve and unlock the lock. Slide the electromagnetic valve toward you and disconnect the cable connector from the electromagnetic valve.



Removing the MV13 to 15 Electromagnetic Valves

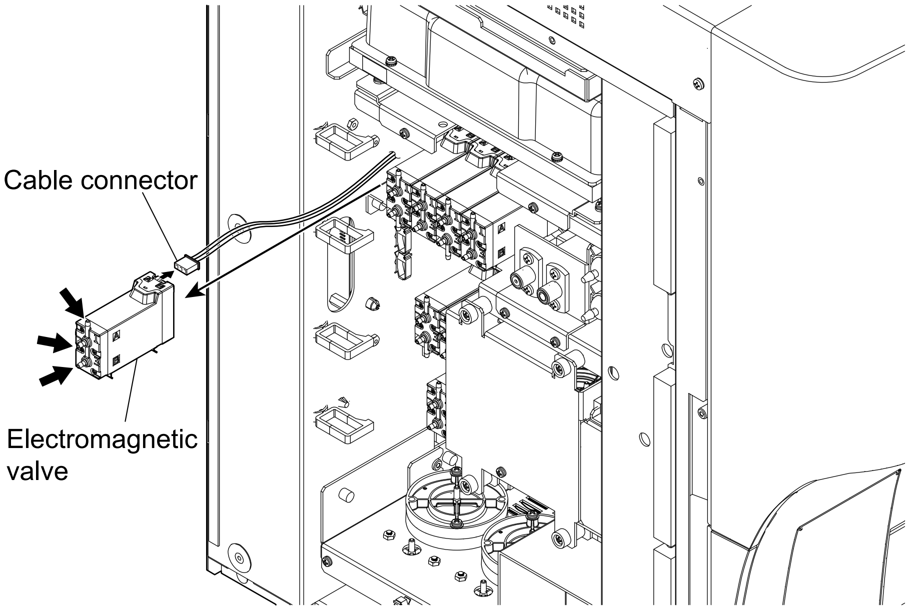
1 Remove the top cover.

2 Remove all tubes from the electromagnetic valve and unlock the lock. Slide the electromagnetic valve toward you and disconnect the cable connector from the electromagnetic valve.



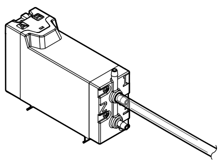
Removing the MV16 to 29 Electromagnetic Valves

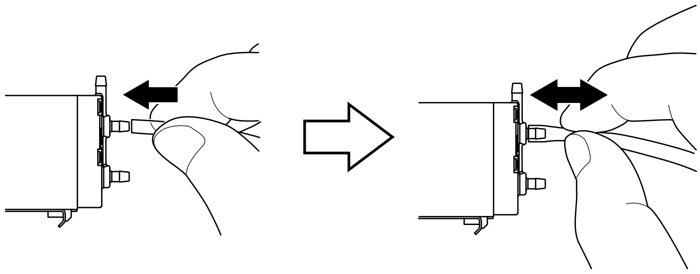
1. Remove the left cover.
2. Remove all tubes from the electromagnetic valve and unlock the lock. Slide the electromagnetic valve toward you and disconnect the cable connector from the electromagnetic valve.



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Reconnecting the Electromagnetic Valve and Tube

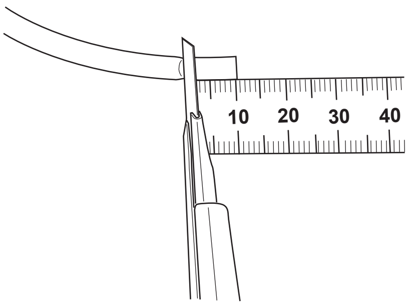




NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

After reconnecting the tube, pull it several times.

If the tube comes off easily, it may be deteriorated. In this case, cut off about 1 cm from the end to remove the deteriorated part.



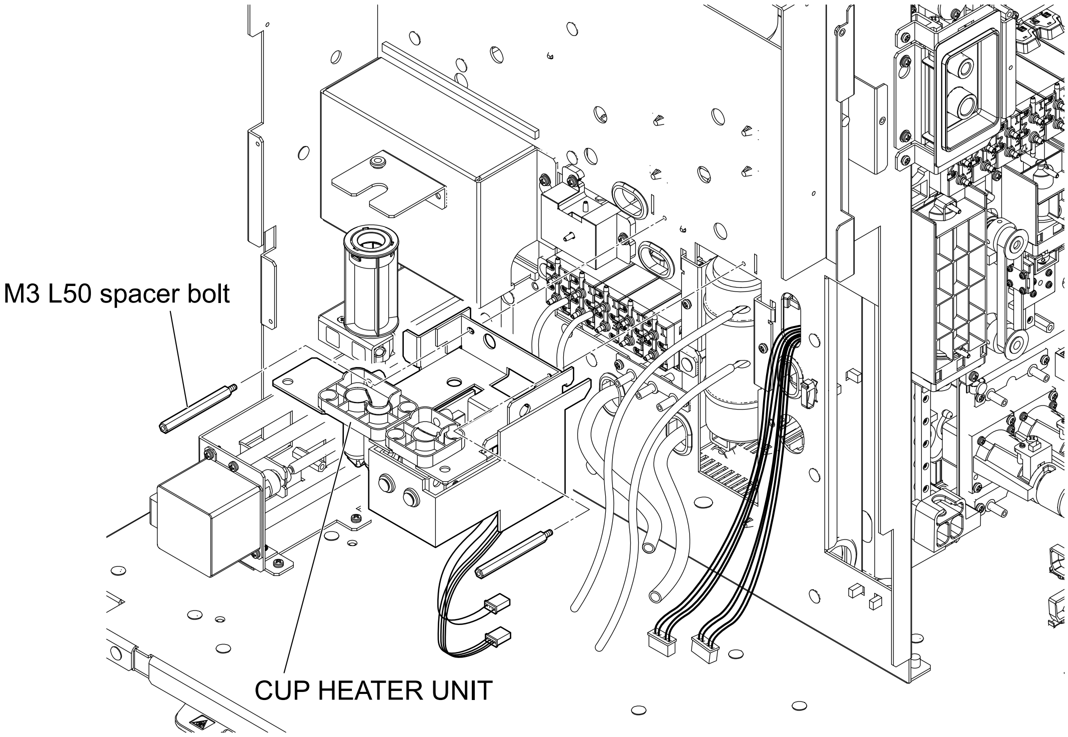
Then, reconnect the tube.

Removing the ZY-911W2 CUP HEATER UNIT

Repair part number: RP-ZY911W

1. Remove the mixing cover, front cover, right cover, top cover, autoloader cover, autoloader, front panel unit and sampler unit with open air unit.

2. Remove the two M3 L50 spacer bolts and disconnect the two cable connectors. Slide the CUP HEATER UNIT toward you, remove all tubes (refer below), and remove the CUP HEATER UNIT.



Removing the Tubes

1 Remove the two tubes connected to the TANK HEATER UNIT.

Tubes: “TH-O-U” “TH-O-D” (remove from the TANK HEATER side)

2 Remove the tube connected to the IWBC CUP and MV27-3.

Tube: “I-CP-L” (remove from the CUP side)

Remove the CUP overflow tube (remove from the CUP side).

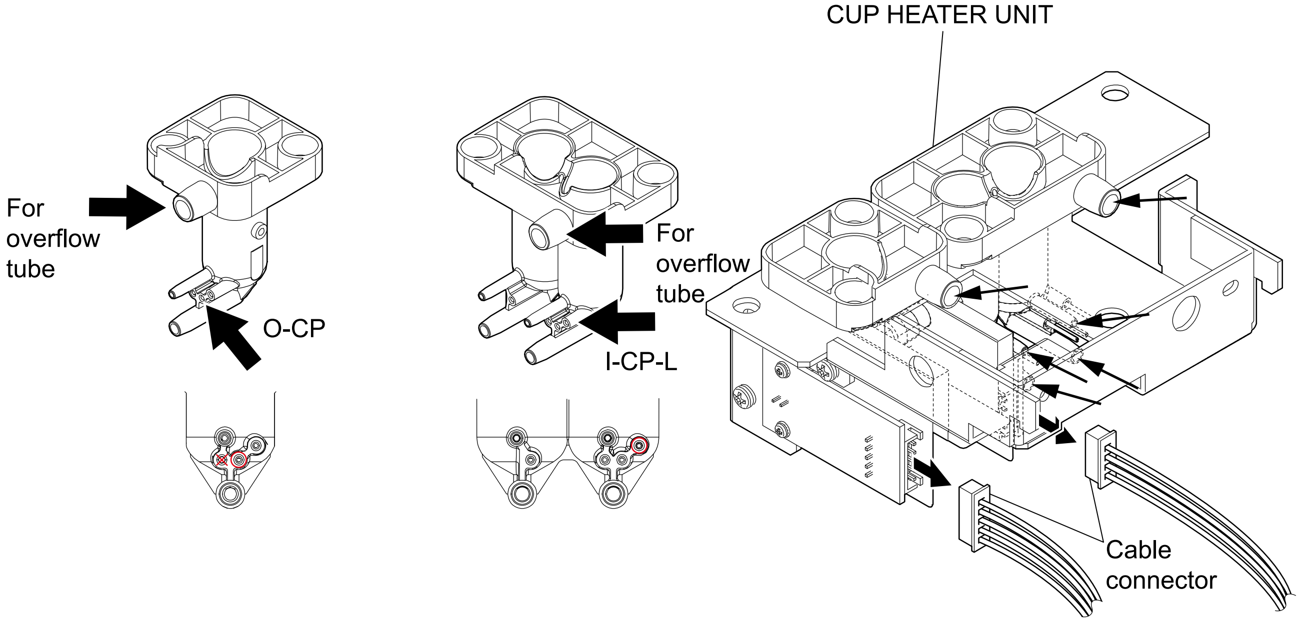
3 Remove the tube connected to the OWBC CUP and MV20-2.

Tube: “O-CP” (remove from the CUP side)

Remove the CUP overflow tube (remove from the CUP side).

4 Remove the following tubes from the analyzer.

“FILTER” “J2” “J3” “9-2” “3-2” “3-3”

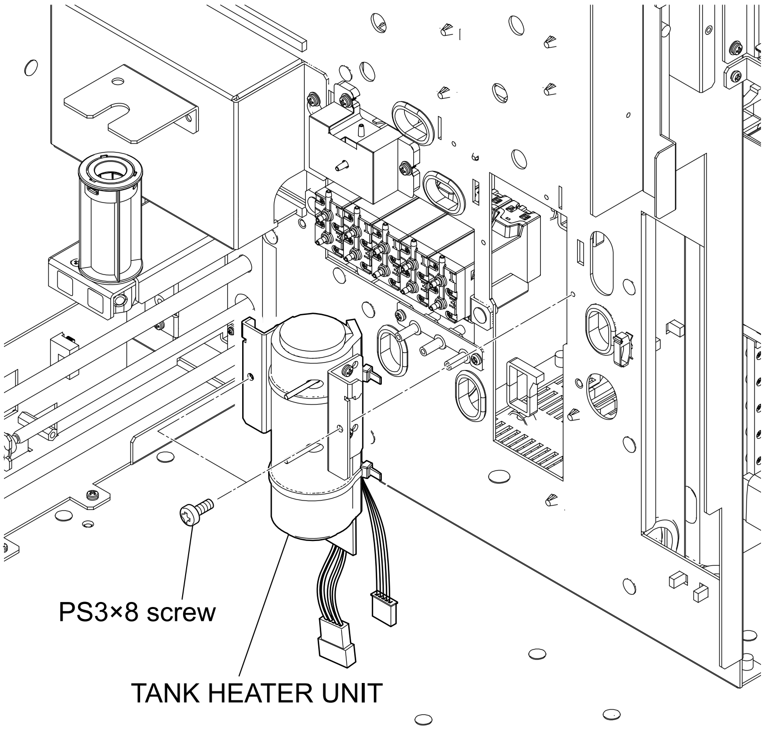


NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Removing the ZY-910W TANK HEATER UNIT

Repair part number: RP-ZY910W

1. Remove the mixing cover, front cover, right cover, top cover, autoloader cover, autoloader, front panel unit, sampler unit with open air unit and cup heater unit.



2. Remove the two PS3×8 screws. Slide the TANK HEATER UNIT toward you, remove the four tubes, disconnect the two cable connectors, and remove the TANK HEATER UNIT.

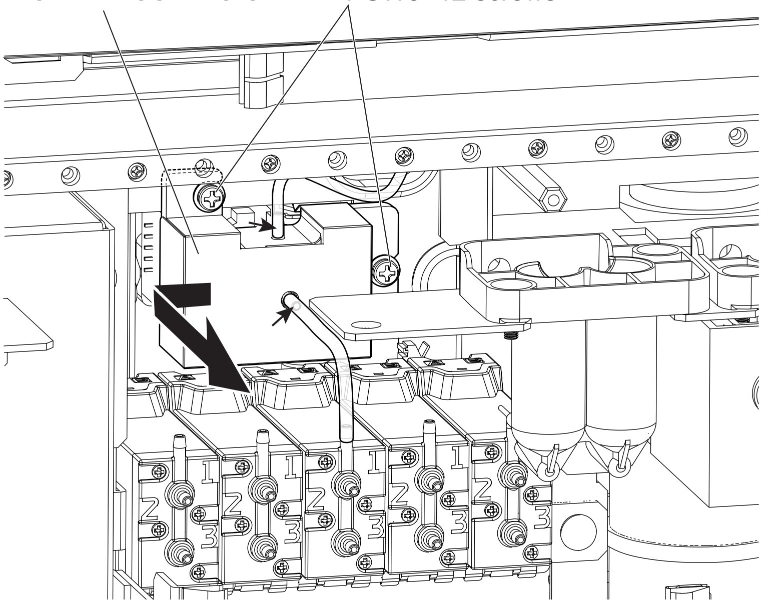
NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

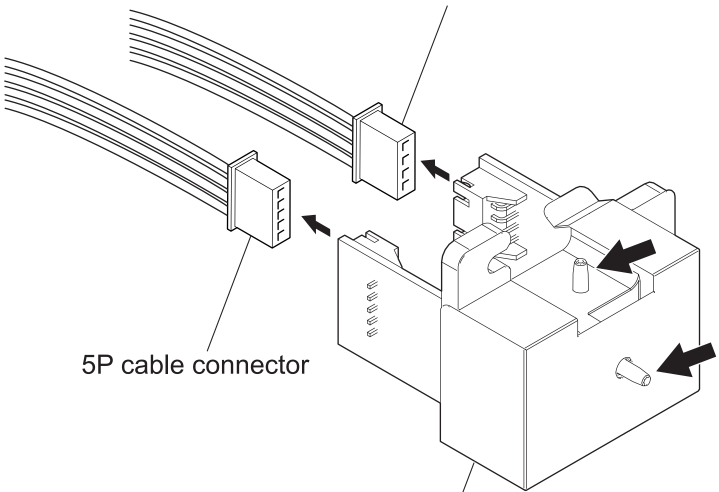
Removing the MH-910W HGB MEASURING UNIT

Repair part number: RP-MH910W

1 Remove the mixing cover, front cover and cup tray.

2 Remove the two tubes (indicated by the arrows) and loosen the PSW3×12 screw. Move the HGB MEASURING UNIT to the left and slide it toward you, disconnect the two cable connectors and remove the HGB MEASURING UNIT.





NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Removing the MP-910W PNEUMATIC UNIT

Repair part number: RP-MP910W

1 Remove the left cover and top cover.

2 Remove the two tubes from port 2 and port 3 of MV22. Remove the two PRESSURE SENSOR BD tubes from P1 and P2 ports. Remove the four (1) PS3×8 screws of the PNEUMATIC UNIT and disconnect the four cable connectors. Remove the two (2) PS3×8 screws which secure the FILTER HOLDER and remove the FILTER HOLDER.

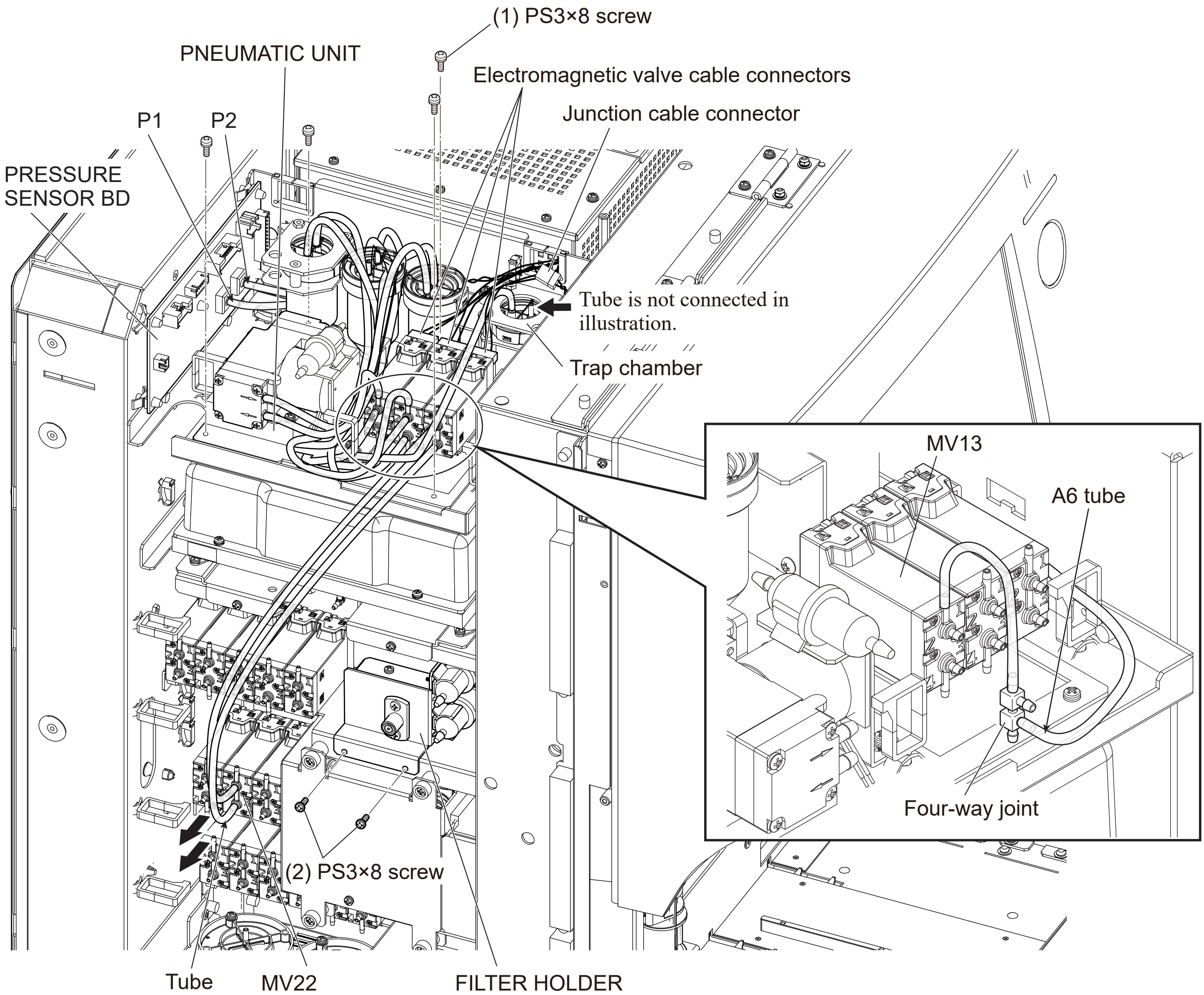
3 Remove the two tubes from port 2 and port 3 of MV22. (Labels “22-2” and “22-3”)

4 Remove the two PRESSURE SENSOR BD tubes from P1 and P2 ports. (Labels “P1” and “P2”)

5 Remove the tube from the upper part of the Trap chamber. (Label “TRC”)

6 Remove the A6 tube from the four-way joint. (Label “A6”)

7 Disconnect the four cable connectors. (Three electromagnetic valves, one junction cable)



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Assembly

Assemble the MP-910W PNEUMATIC UNIT by following the disassembly procedure in reverse.

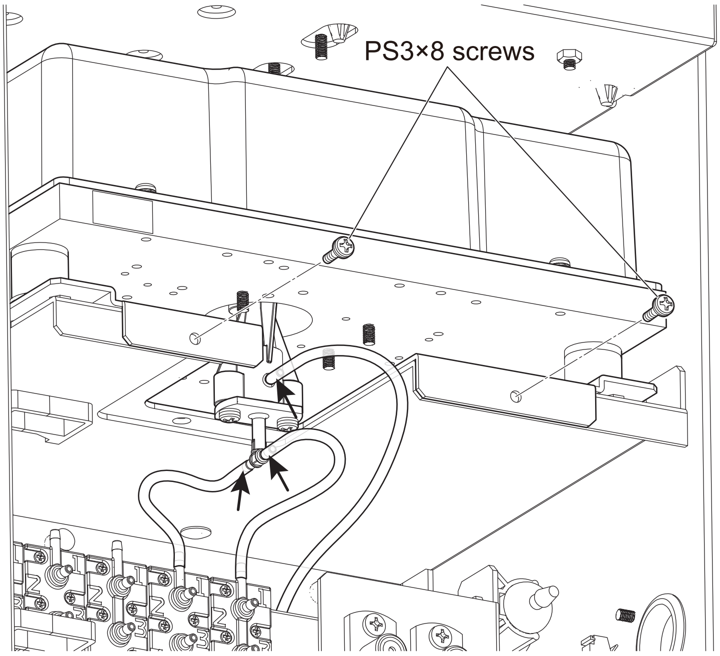
NOTE: Do not fold the tubes.

Removing the MO-910W LASER OPTICAL UNIT

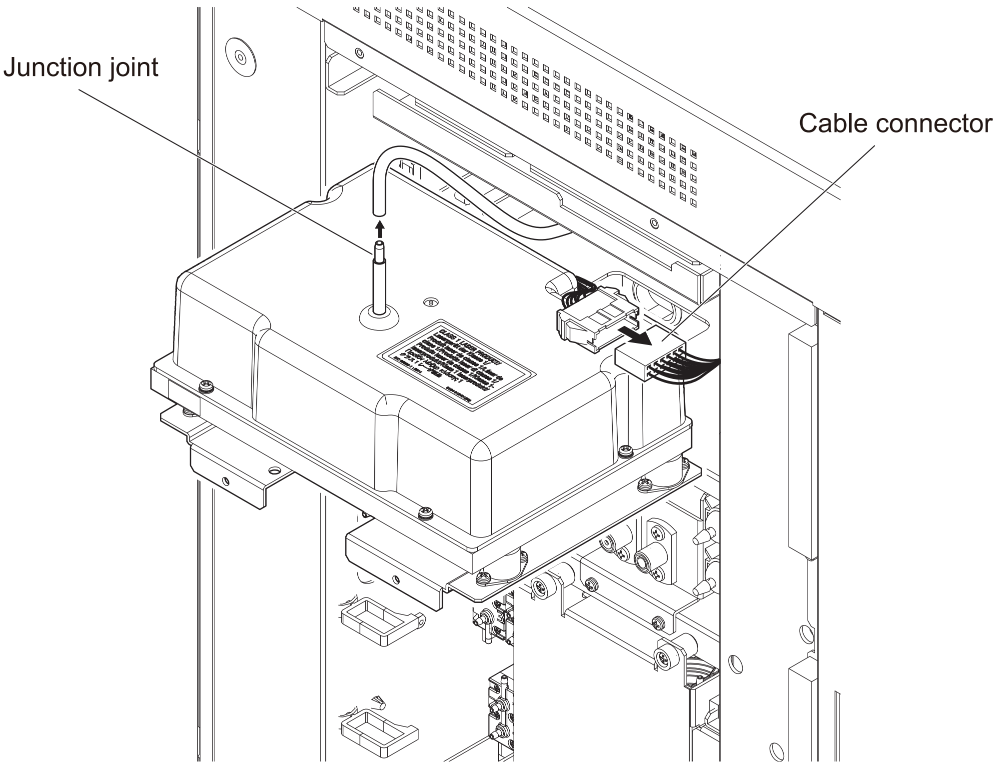
Repair part number: RP-MO910W

1 Remove the left cover.

2 Remove the three tubes (indicated by the arrows), remove the two PS3×8 screws and slide the LASER OPTICAL UNIT toward you.



3 Remove the tube from the junction joint on the upper part of the LASER OPTICAL UNIT, disconnect the cable connector and remove the LASER OPTICAL UNIT.



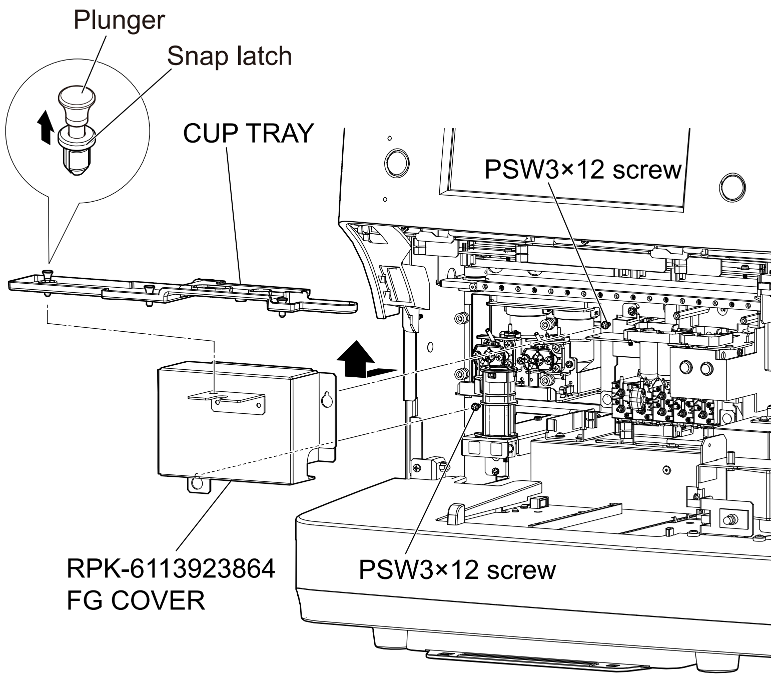
NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Removing the MC-910W CBC MEASURING UNIT

Repair part number: RP-MC910W

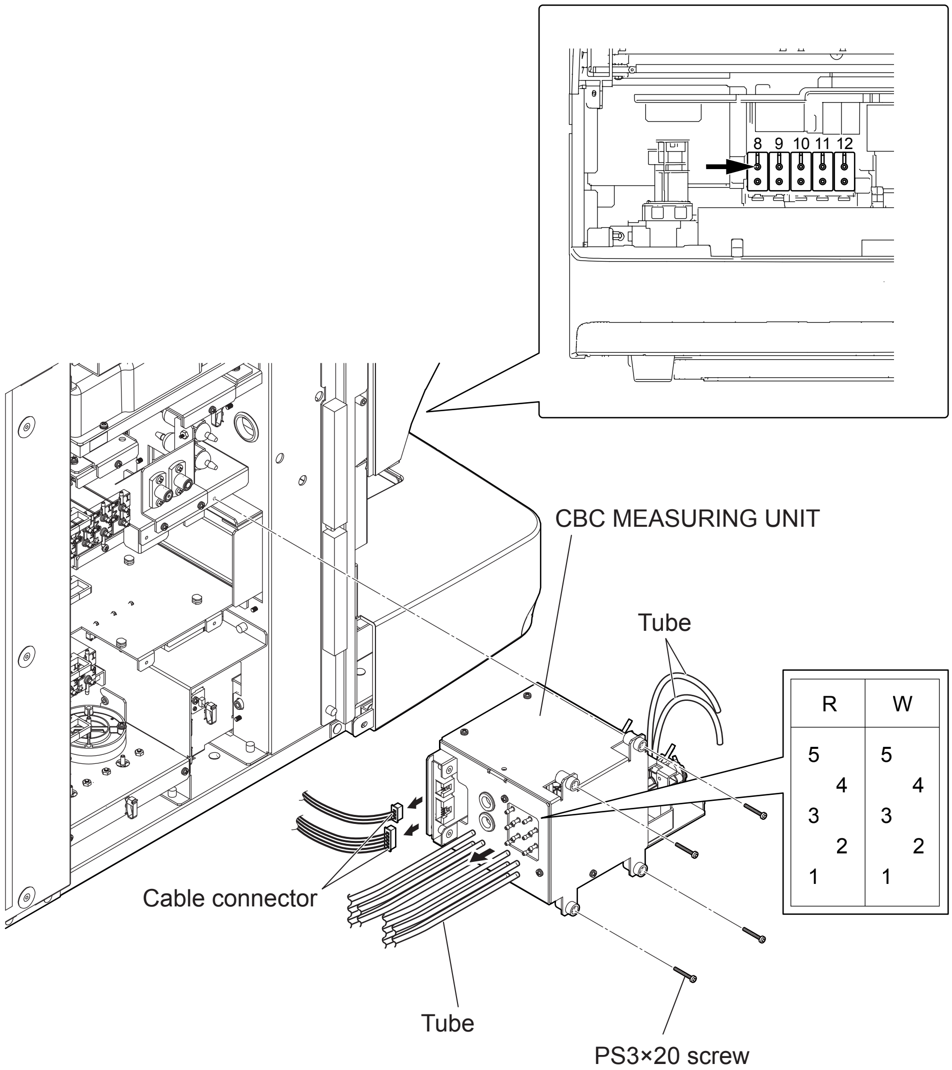
1. Remove the mixing cover, front cover, left cover and cup tray.
2. Loosen the two PSW3×12 screws, and remove the FG COVER by moving it upward and sliding it toward you.

   These screws can be loosened by turning them with a tool about ten times. When removal is difficult, loosen the screws more.



3. Remove the W-1 to W-5 and R-1 to R-5 tubes from the CBC MEASURING UNIT.
4. On the left side panel, remove port 2 and port 3 of MV21.

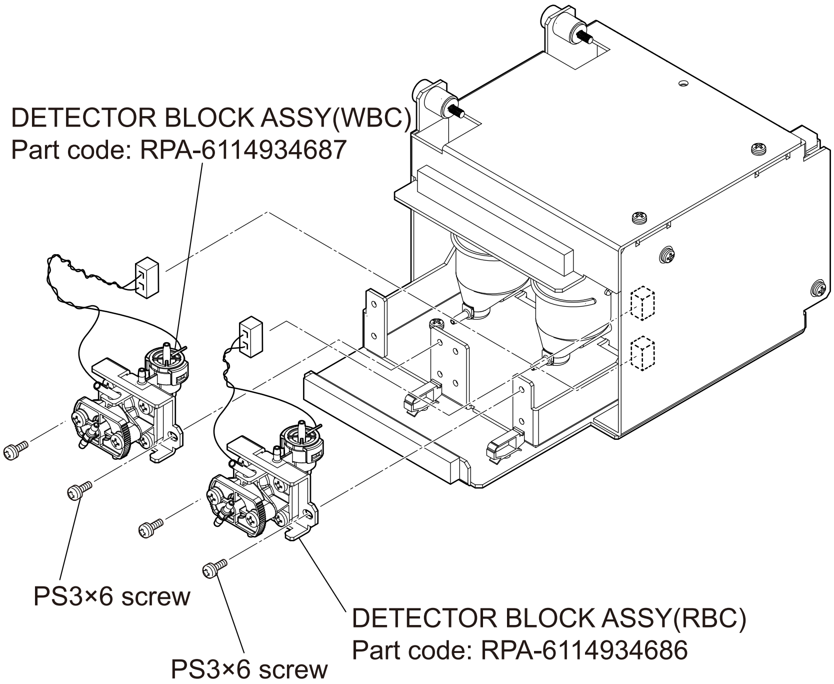
5 On the front panel, remove port 1 of MV8 and port 1 of MV9. Remove the four PS3×20 screws evenly, disconnect the four cable connectors and remove the CBC MEASURING UNIT.



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Removing the DETECTOR BLOCK ASSY (WBC) and (RBC)

1. Remove the mixing cover, front cover and left cover.
2. Disconnect the cable connector of the DETECTOR BLOCK ASSY (RBC).
3. Remove the tube and two PS3×6 screws and remove the DETECTOR BLOCK ASSY (RBC).
4. Disconnect the cable connector of the DETECTOR BLOCK ASSY (WBC).
5. Remove the tube and two PS3×6 screws and remove the DETECTOR BLOCK ASSY (WBC).



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Assembly

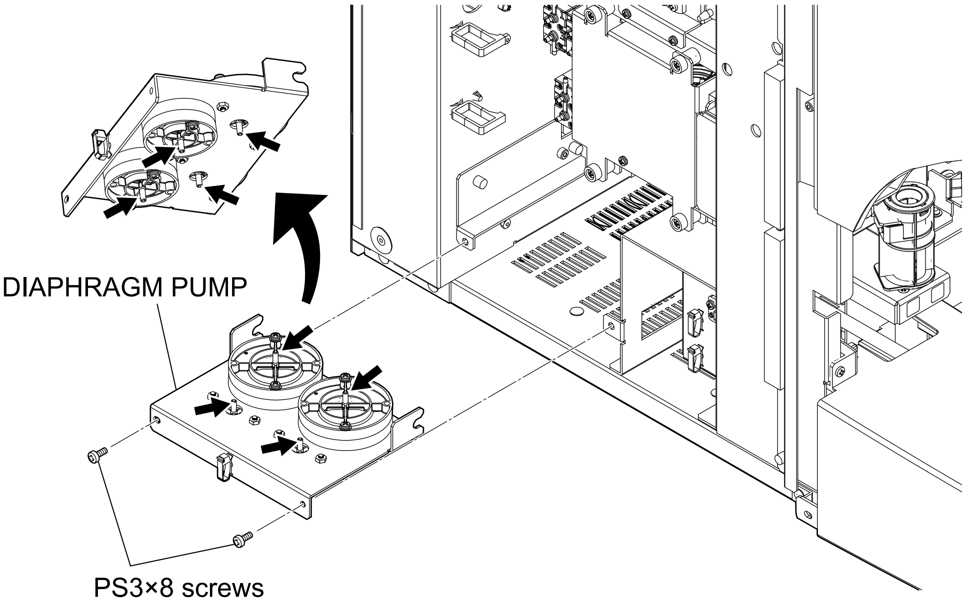
Assemble the DETECTOR BLOCK ASSY (WBC) and (RBC) by following the disassembly procedure in reverse.

NOTE
- Do not fold or trap the tubes.
- Evenly tighten the four PS3×20 screws which secure the CBC MEASURING UNIT. Keep even tension on all the screws by tightening each screw a little bit then moving to the next screw.

Removing the DIAPHRAGM PUMP ASSY

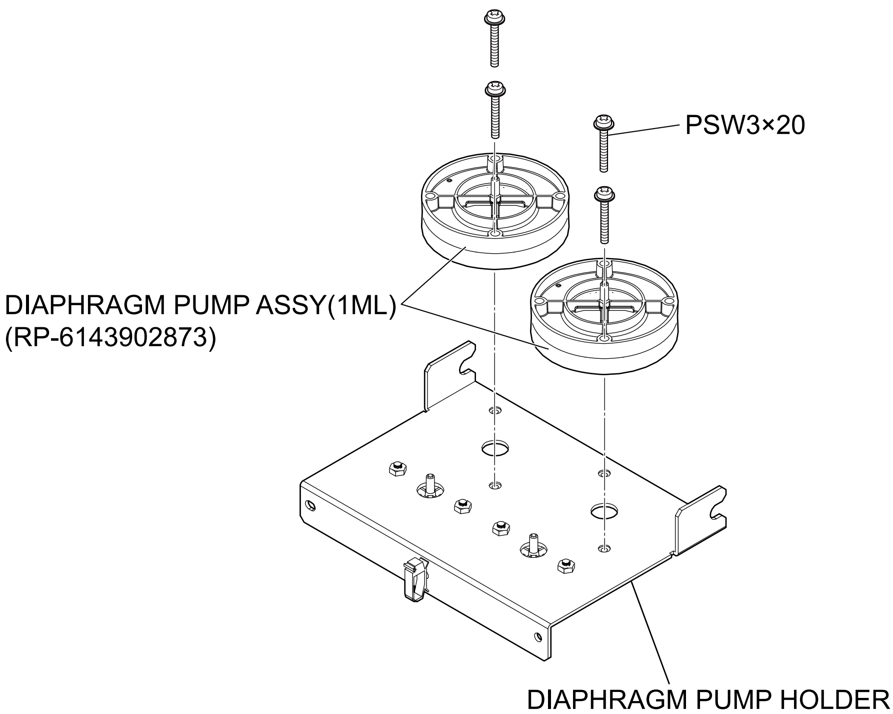
1 Remove the left cover.

2 Remove the four tubes on the upper side. Remove the two PSW3×8 screws. Slide the DIAPHRAGM PUMP ASSY toward you and remove the four tubes from the lower side of the DIAPHRAGM PUMP ASSY.

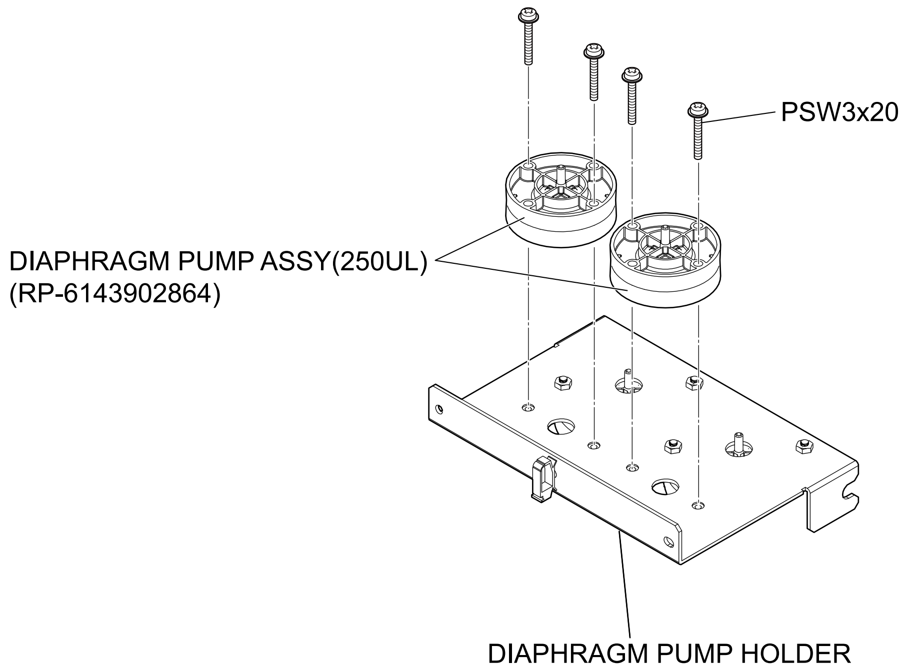


NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

3 Remove the four PSW3×20 screws from the DIAPHRAGM PUMP HOLDER and remove the DIAPHRAGM PUMP ASSY (1ML).



4 Remove the four PSW3×20 screws from the DIAPHRAGM PUMP HOLDER and remove the DIAPHRAGM PUMP ASSY (250UL).



Assembly

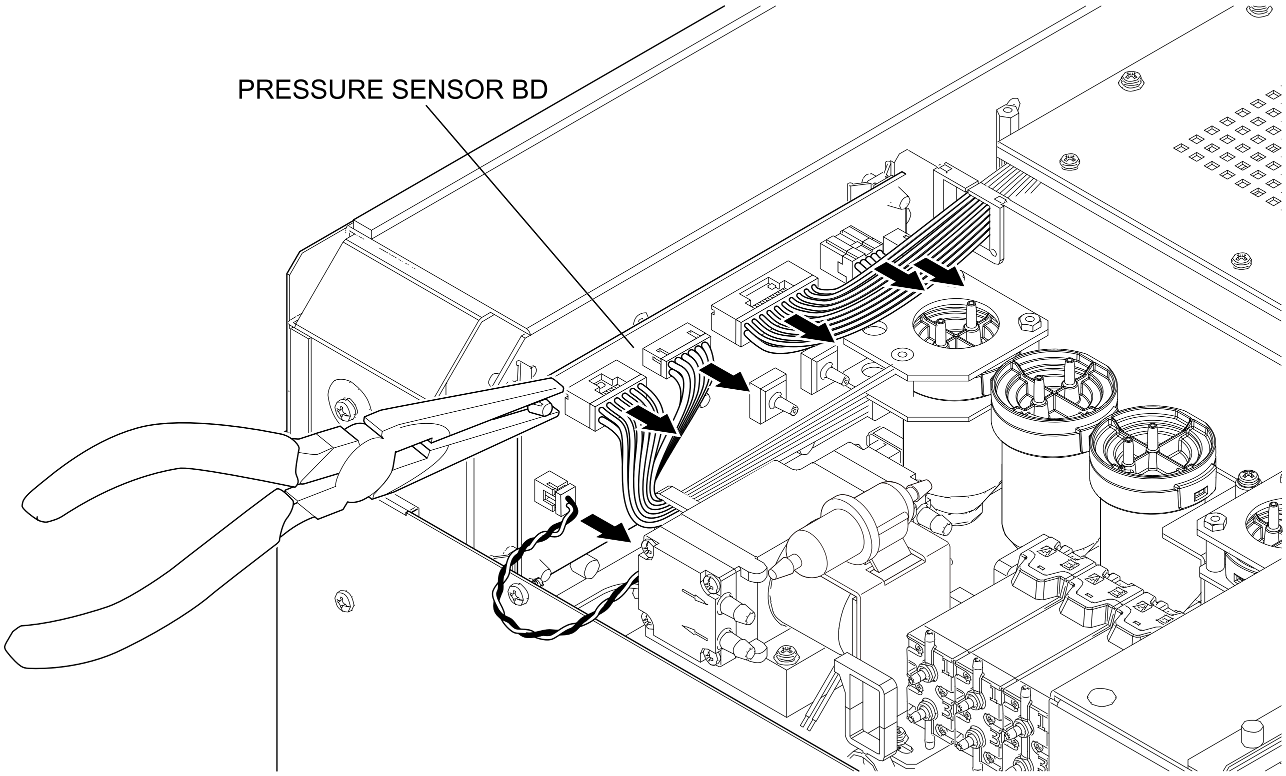
Assemble the DIAPHRAGM PUMP ASSY by following the disassembly procedure in reverse.

NOTE: Do not fold or trap the tubes.

Removing the UT-7287 PRESSURE SENSOR BD

Repair part number: RP-UT7287

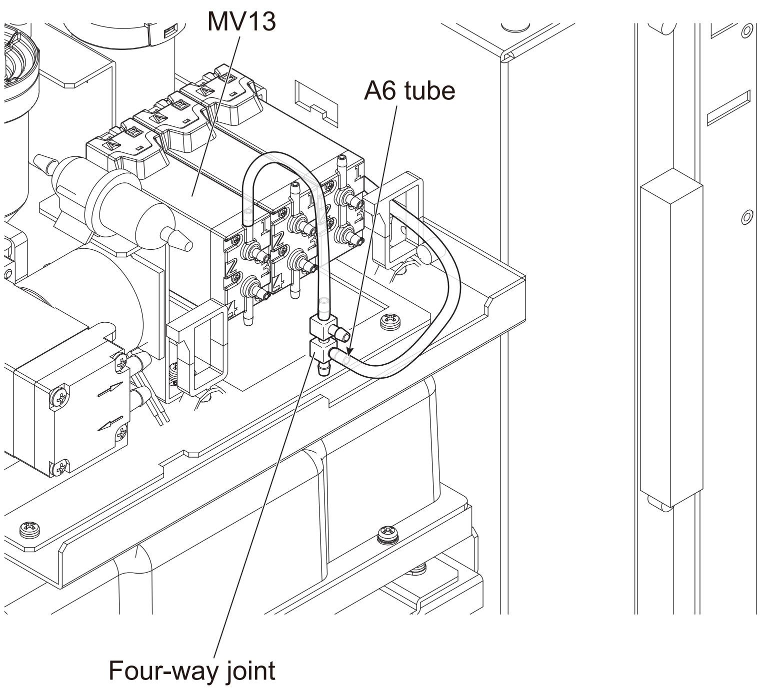
1. Remove the top cover.
2. Disconnect the five cable connectors (all except the innermost cable connector) from the PRESSURE SENSOR BD. Use needle nose pliers to grip the LOCKING CARD SPACER, slide the PRESSURE SENSOR BD slightly toward you, disconnect the innermost cable connector and remove the PRESSURE SENSOR BD.



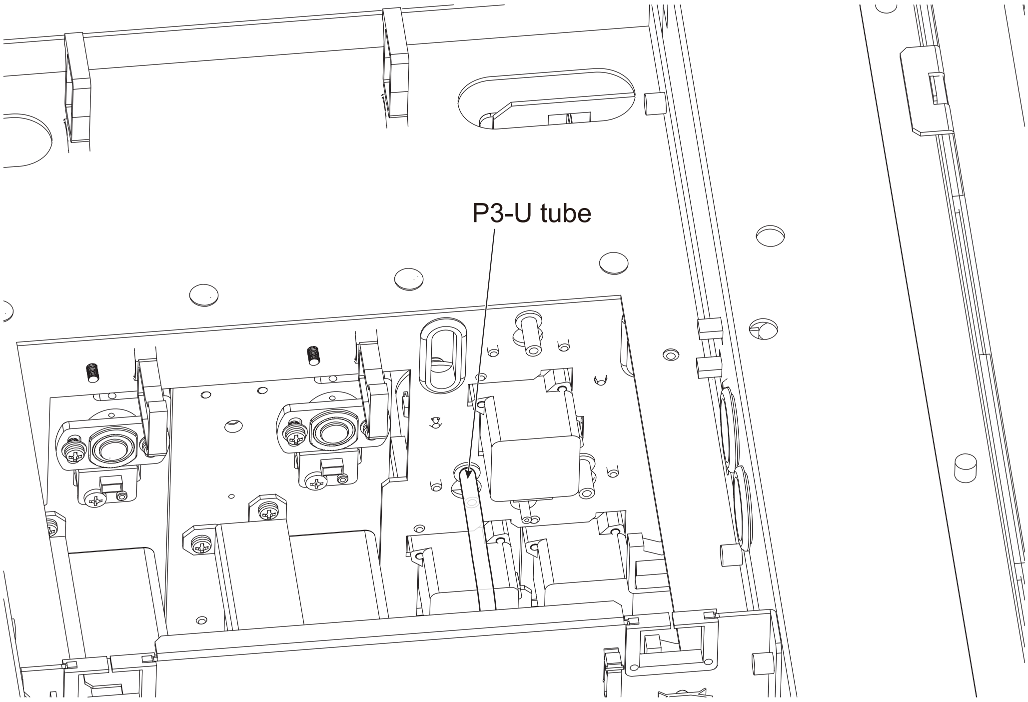
Removing the JQ-910W ISO CHAMBER UNIT

Repair part number: RP-JQ910W

1. Remove the mixing cover, front cover, right cover, left cover, top cover and rear panel.
2. Remove the DATA PROCESSING UNIT.
3. On the left side panel, remove the tubes from port 2 and port 3 of MV16, port 1 of MV17, port 1 of MV18 and port 2 of MV19.
4. On the front panel, remove the tubes from port 3 of MV10 and port 3 of MV12.
5. On the right side panel, remove the tubes from port 4 of MV4, port 1 of MV5, port 1 of MV6 and port 2 of MV7.
6. Remove the A6 tube from the four-way joint.

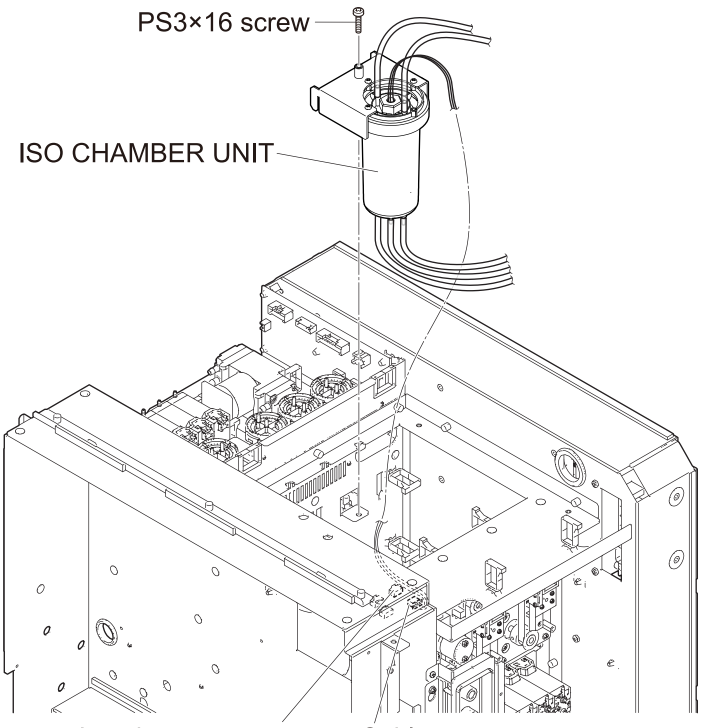


7 Remove the P3-U tube.



8 Disconnect the cable connector from the junction cable connector.

9 Loosen the PS3×16 screw and pull up the ISO CHAMBER UNIT carefully to prevent the screw from falling.



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Assembly

Assemble the JQ-910W ISO CHAMBER UNIT by following the disassembly procedure in reverse.

NOTE: Do not fold or trap the tubes.

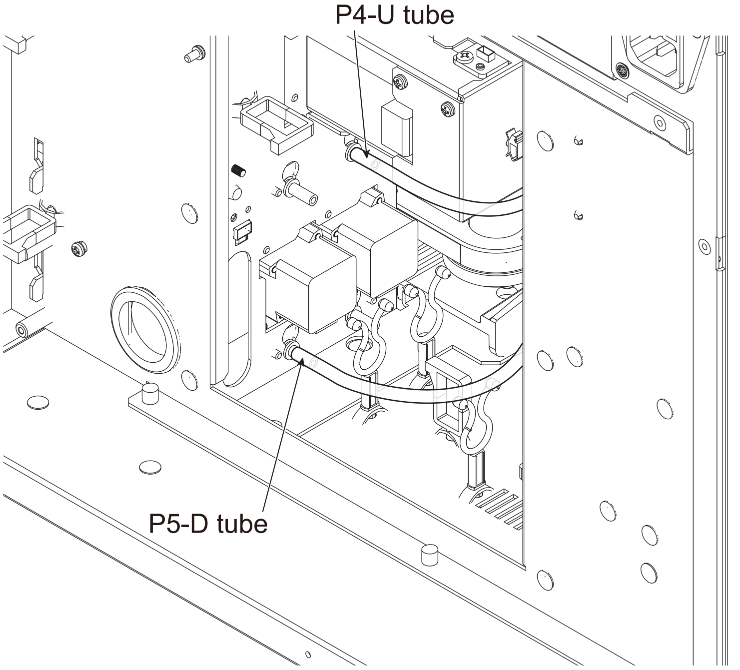
Removing the JQ-911W WASTE CHAMBER 1 UNIT

Repair part number: RP-JQ911W

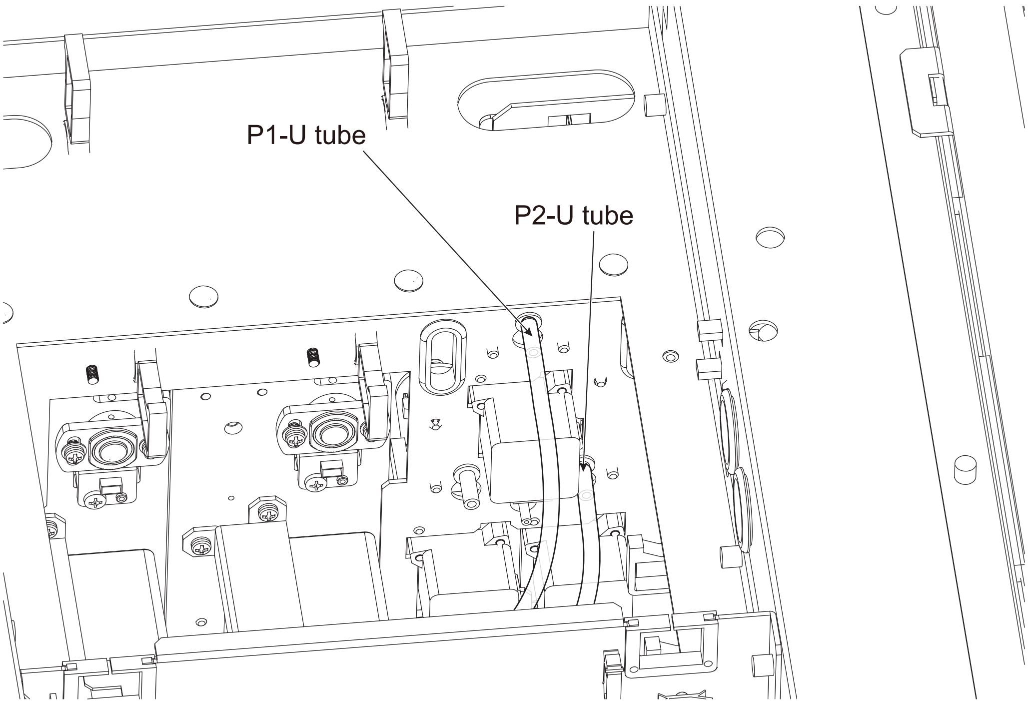
1 Remove the mixing cover, front cover, right cover, left cover, top cover and rear panel.

2 Remove the DATA PROCESSING UNIT.

3 Remove the P4-U and P5-D tubes from the rear panel.

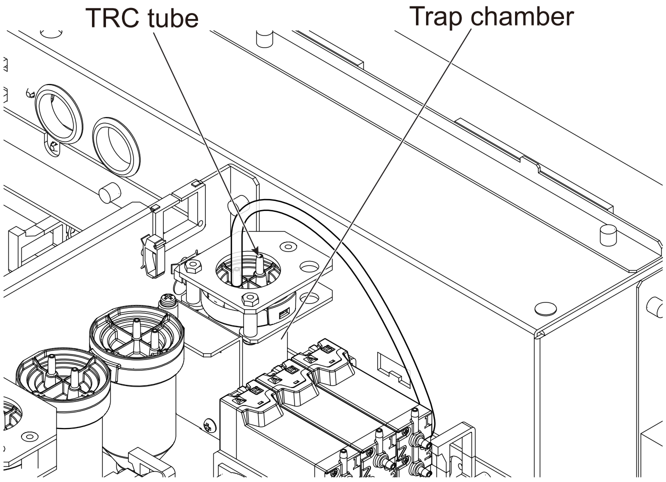


4 Remove the P1-U and P2-U tubes.

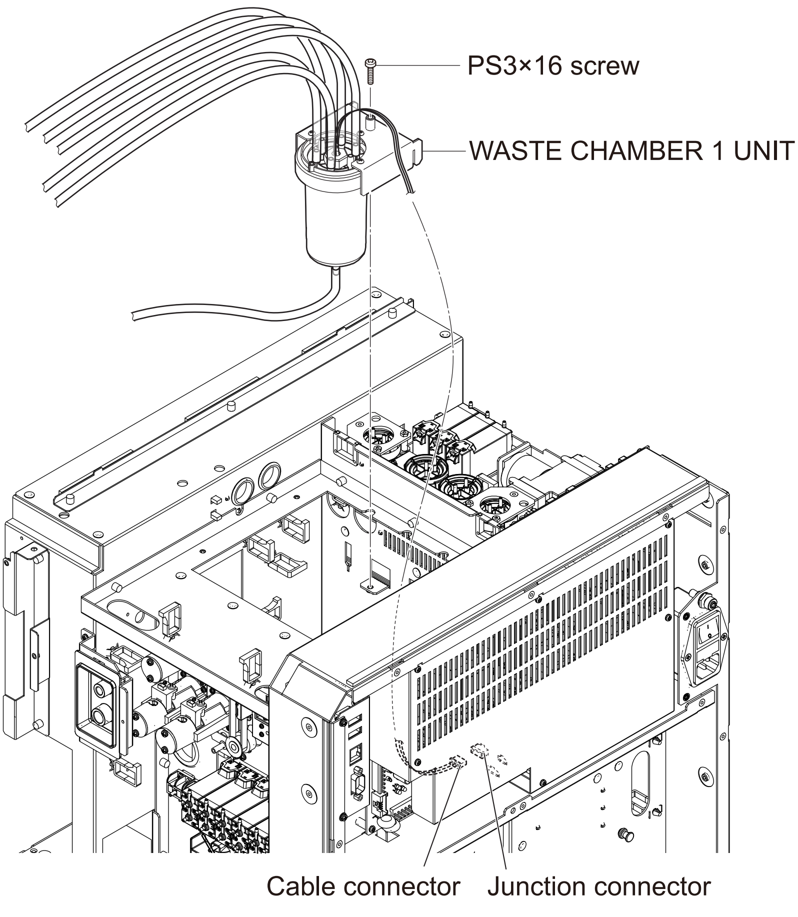


5 On the left side panel, remove the tubes from port 1 and port 4 of MV28 and port 1 of MV29.

6 On the front panel, remove the tube from port 2 of MV12 and the TRC tube from the Trap chamber.



7 Disconnect the cable connector from the junction cable connector, loosen the PS3×16 screw and pull up the WASTE CHAMBER 1 UNIT carefully to prevent the screw from falling.



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Assembly

Assemble the JQ-911W WASTE CHAMBER 1 UNIT by following the disassembly procedure in reverse.

NOTE: Do not fold or trap the tubes.

Removing the JQ-912W WASTE CHAMBER 2 UNIT

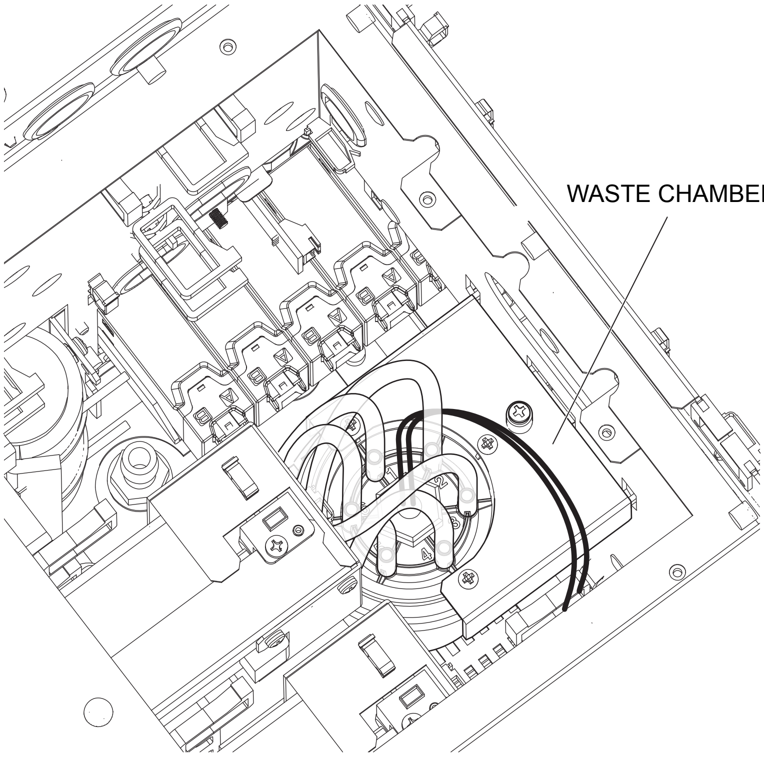
Repair part number: RP-JQ912W

1 Remove the right cover, left cover, top cover and rear panel.

2 Remove the DATA PROCESSING UNIT.

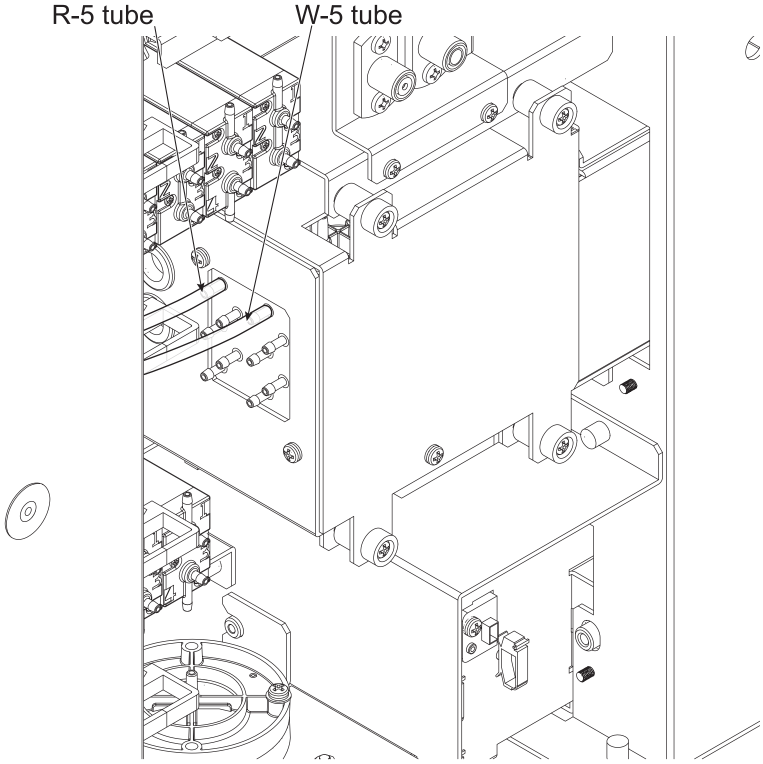
3 Remove the ISO CHAMBER UNIT.

4 Remove the WASTE CHAMBER 2 UNIT.

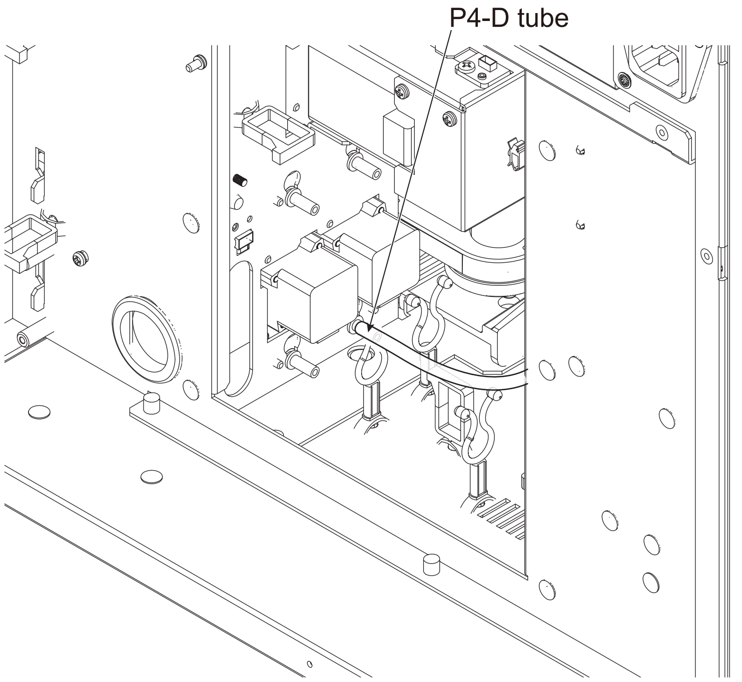


5 On the left side panel, remove the tubes from port 4 of MV17, port 4 of MV19, port 1 of MV23 and port 4 of MV29.

6 Remove the R-5 labeled tube for RBC and the W-5 labeled tube for IWBC.

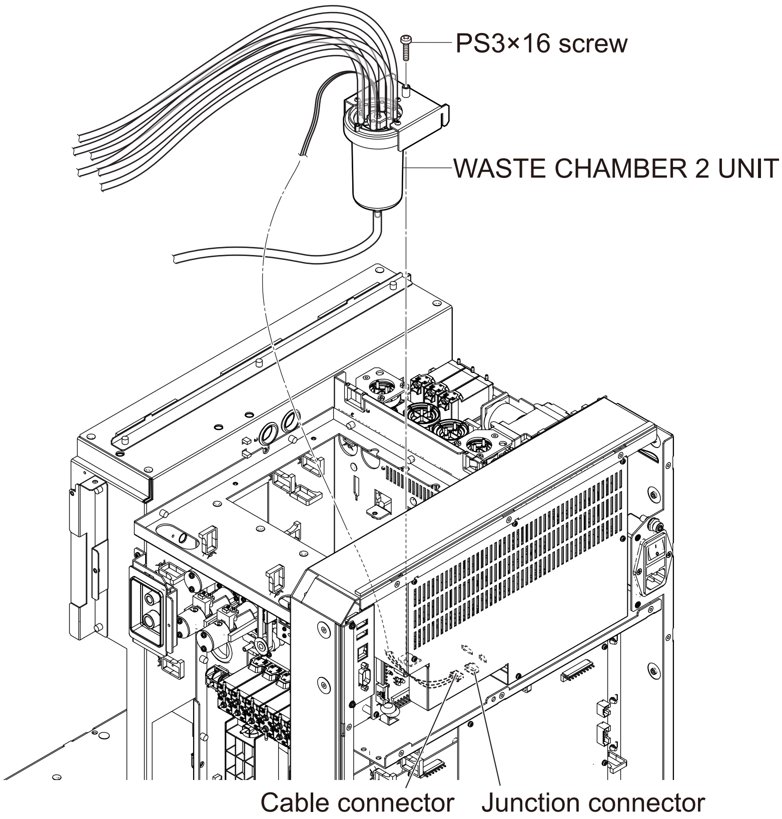


7 Remove the P4-D tube from the rear panel.



8 Disconnect the cable connector from the junction cable connector.

9 Loosen the PS3×16 screw and pull up the WASTE CHAMBER 2 UNIT carefully to prevent the screw from falling.



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

Assembly

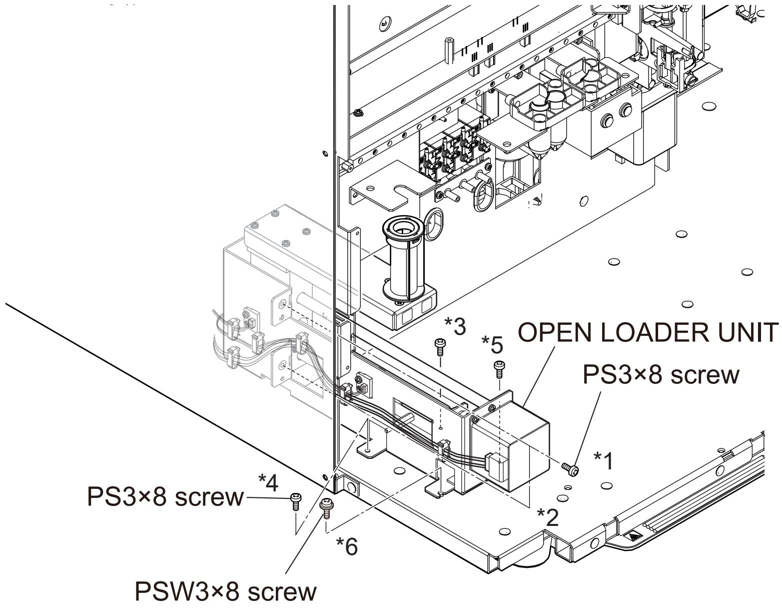
Assemble the JQ-912W WASTE CHAMBER 2 UNIT by following the disassembly procedure in reverse.

NOTE: Do not fold or trap the tubes.

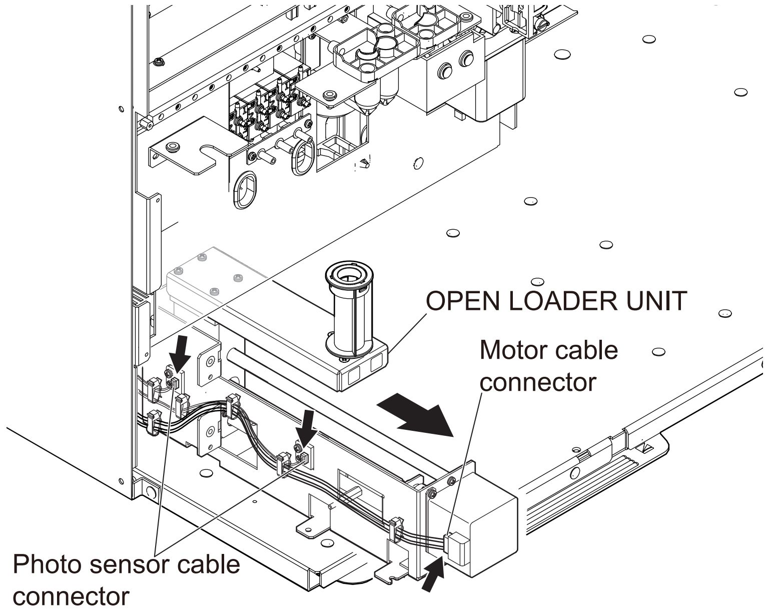
Removing the MS-912W OPEN LOADER UNIT

Repair part number: RP-MS912W

1 Remove the four PS3×8 screws and the PSW3×8 screw, and slide the OPEN LOADER UNIT toward you.



2 Disconnect the two photo sensor cable connectors and the motor cable connector, and remove the OPEN LOADER UNIT.



Assembly

Assemble the MS-912W OPEN LOADER UNIT by following the disassembly procedure in reverse.

NOTE
- Fix the *1, *2, *3, *4, *5 and *6 screws in this order.
- Do not trap the cables.

Checking the Sampling Needle Position

Use the RPK-6113924534 specified jig or RPK-6114935815 OPEN LOADER jig to check the position of the sampling needle.

For the checking method, refer to p. 4-90.

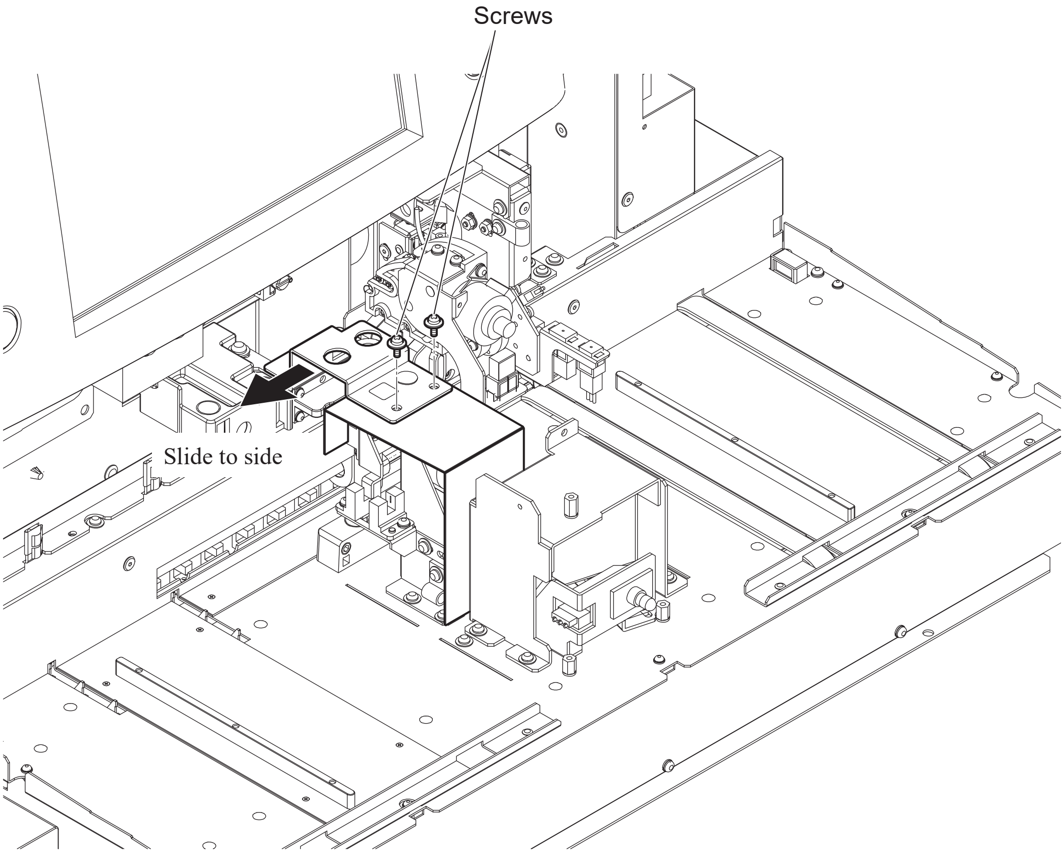
NOTE: The RPK-6113924534 and RPK-6114935815 OPEN LOADER jig are the same.

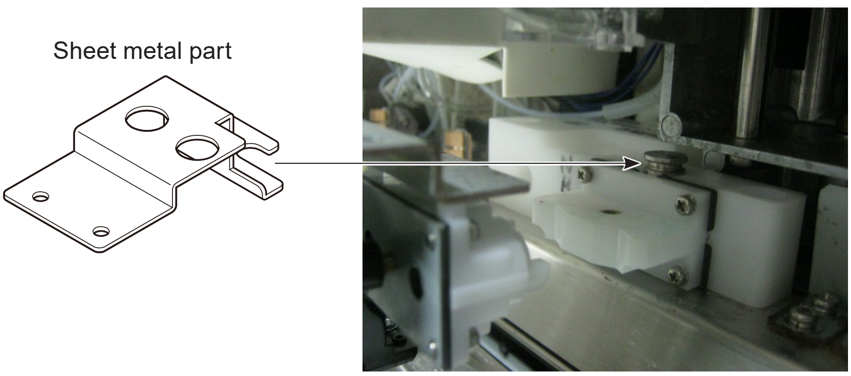
Checking and Adjusting the Sampling Needle Position (MS-910W, MS-911W, Autoloader)

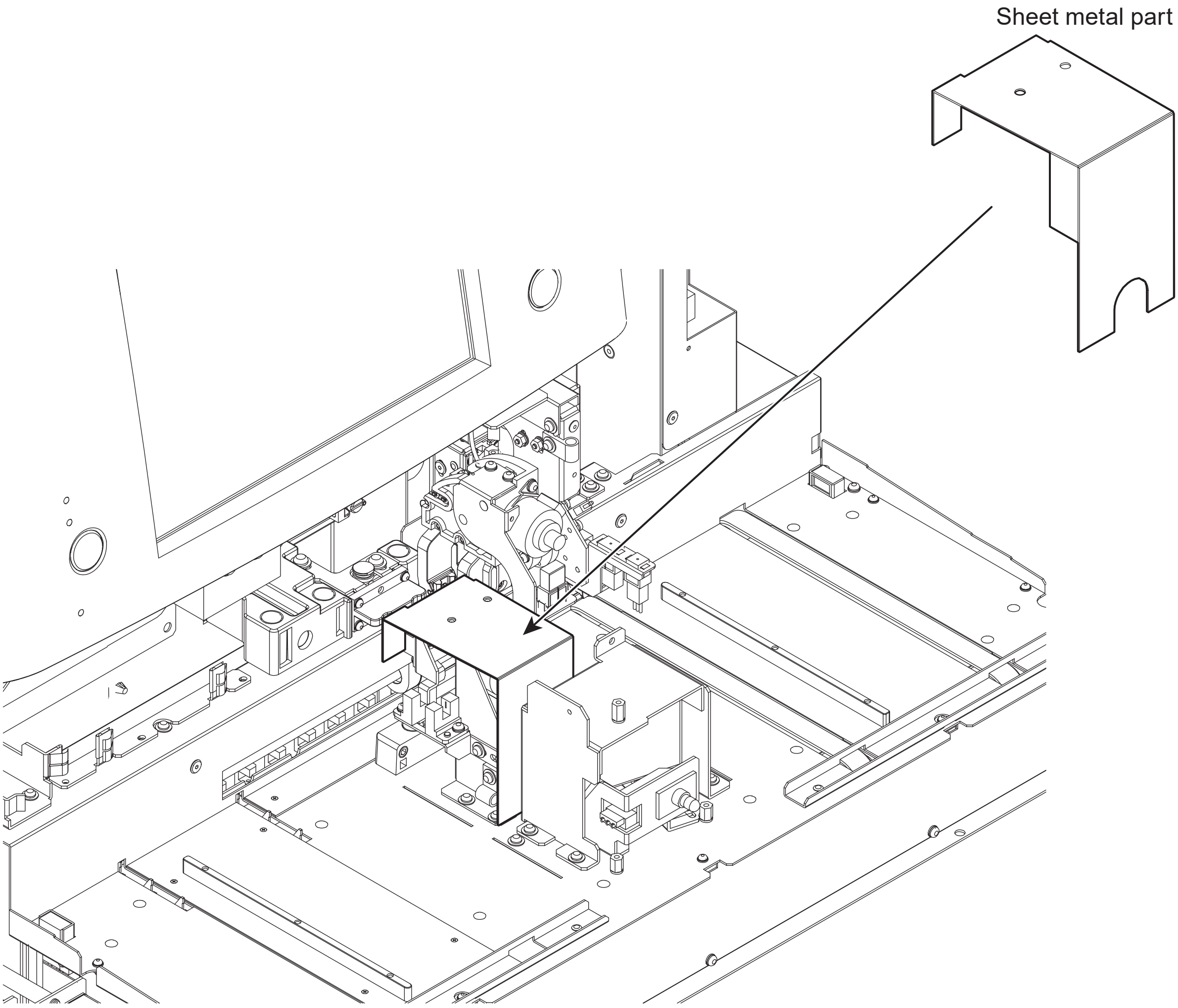
Removing the Autoloader Sheet Metal Parts

Remove the two screws and two sheet metal parts in order to install the specified jig.

Slide the sheet metal to the side and remove it.

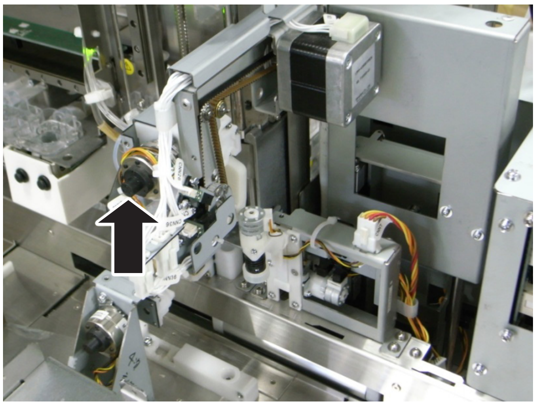


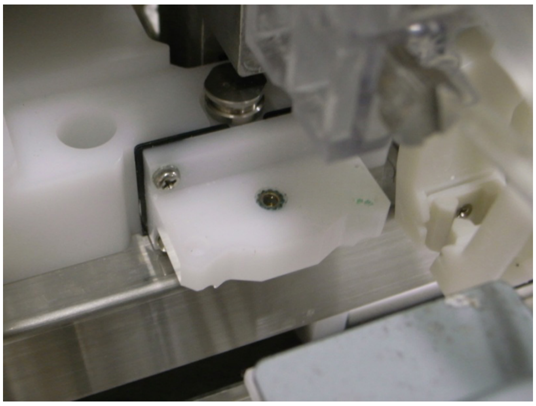


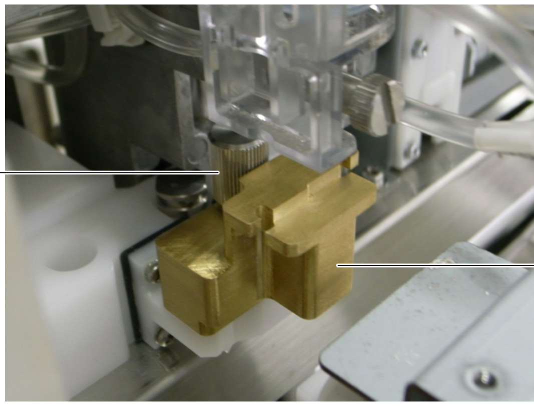

Sheet metal part

Installing the Jig

Raise the agitator arm and install the jig using a screw.



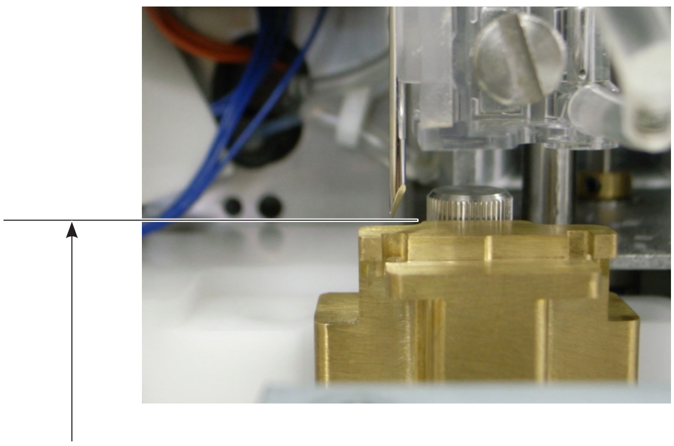




Auto Measurement Position Adjustment

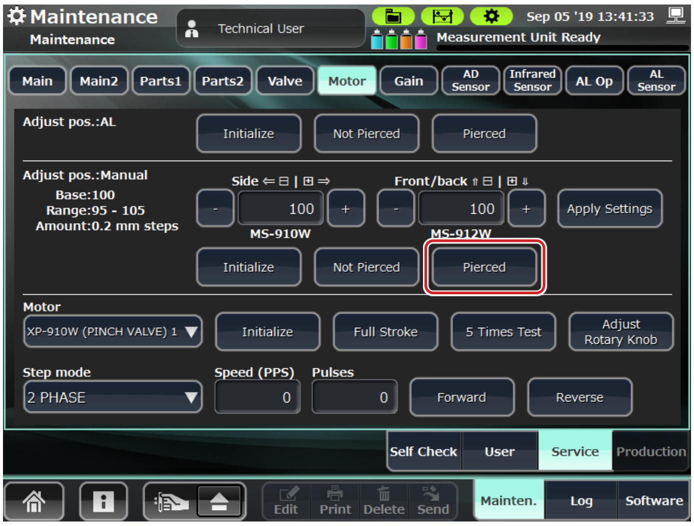
1 Initialize the X and Y directions of the sampler unit with the [Initialize] key.

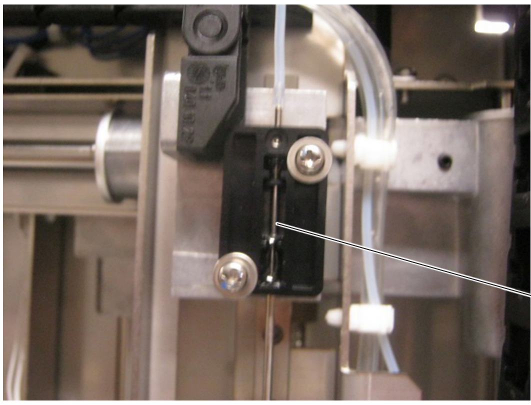
2 Touch the [Not Pierced] key to move the sampling nozzle to the non-pierced position.

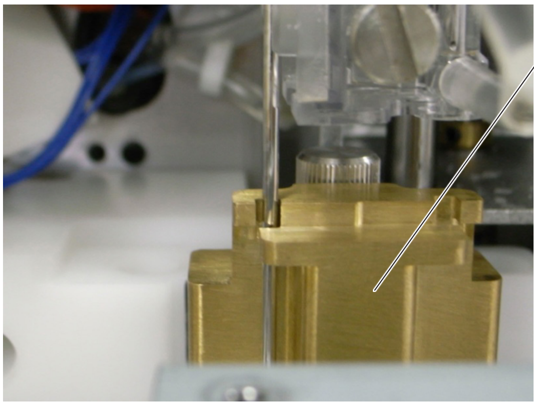


Lower the sampling needle from this position.
Check visually that the jig is not hit.

3 Touch the [Pierced] key to lower the sampling needle.





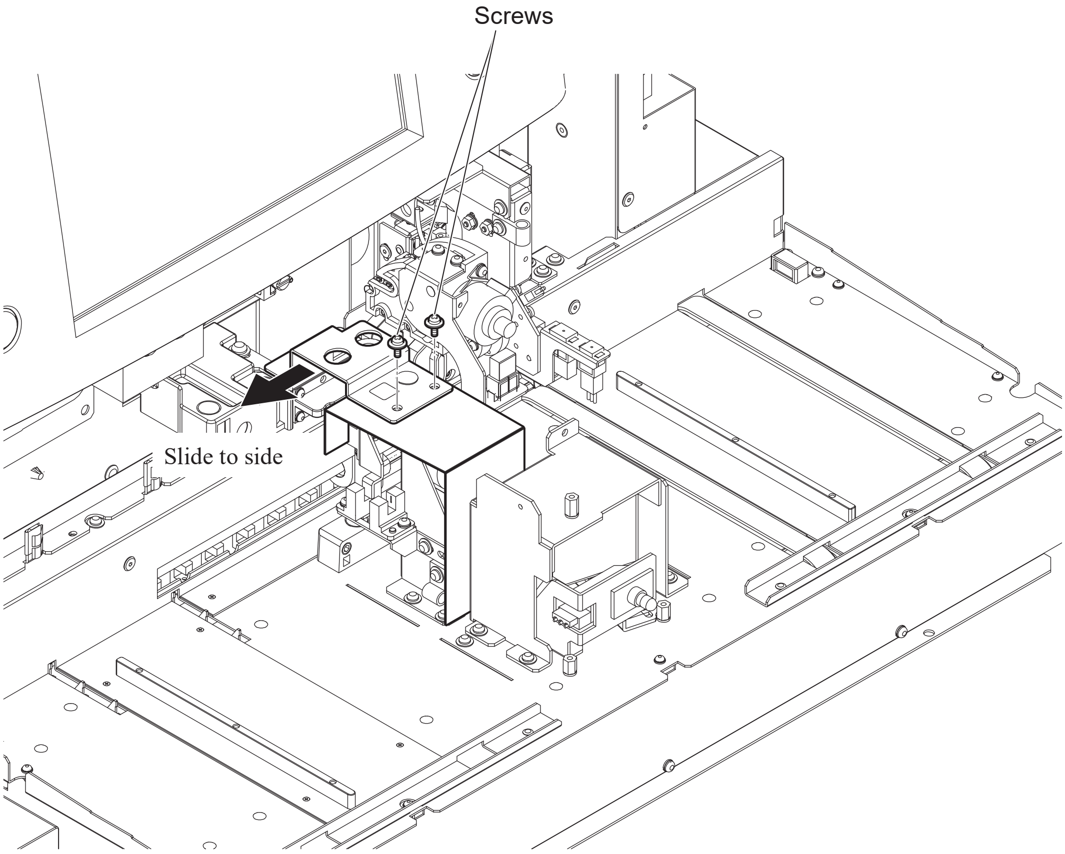


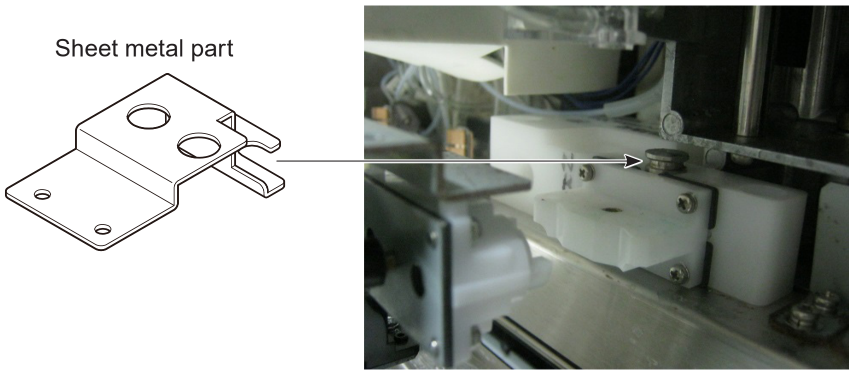
In this condition, check that there is no continuity between the sampling needle and jig.

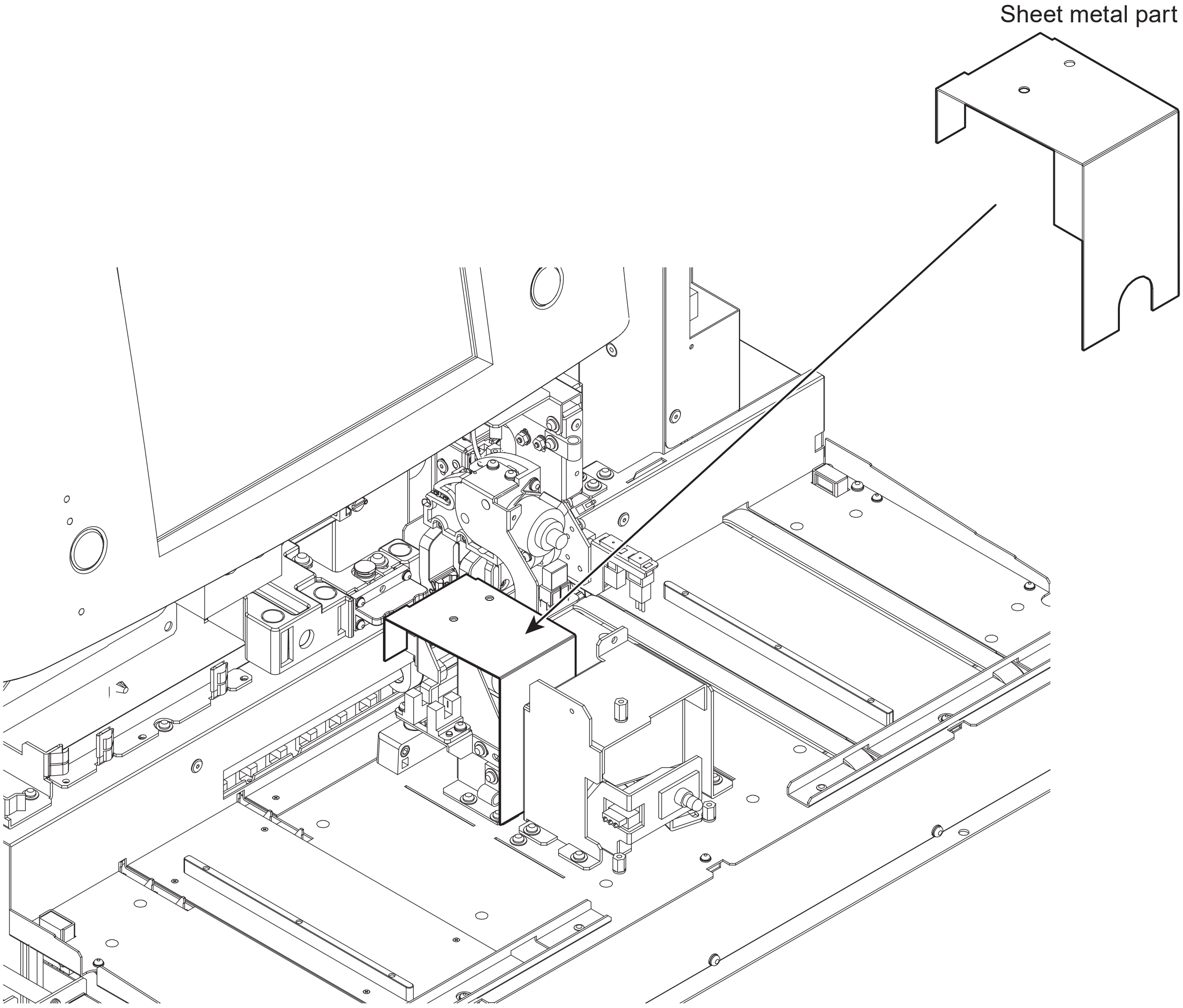
Checking and Adjusting the Sampling Needle Position (MS-910W, MS-911W, Autoloader)

Removing the Autoloader Sheet Metal Parts

Remove the two screws and two sheet metal parts.



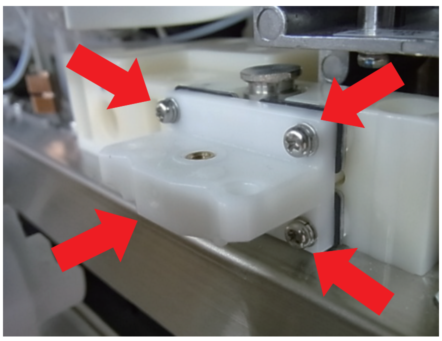


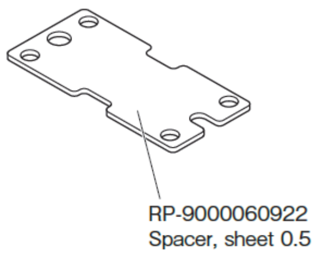


Adjusting the Autoloader Position Back and Forth

1 Remove the four screws and sampling tube stopper assy.

NOTE: There are some spacers between the sampling tube stopper assy and the autoloader. Be careful not to lose them.

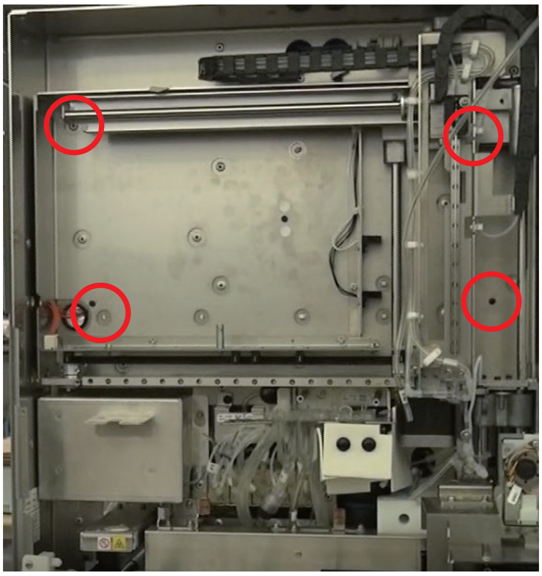




2 Adjust the sampling tube stopper assy by adding or removing the spacer.

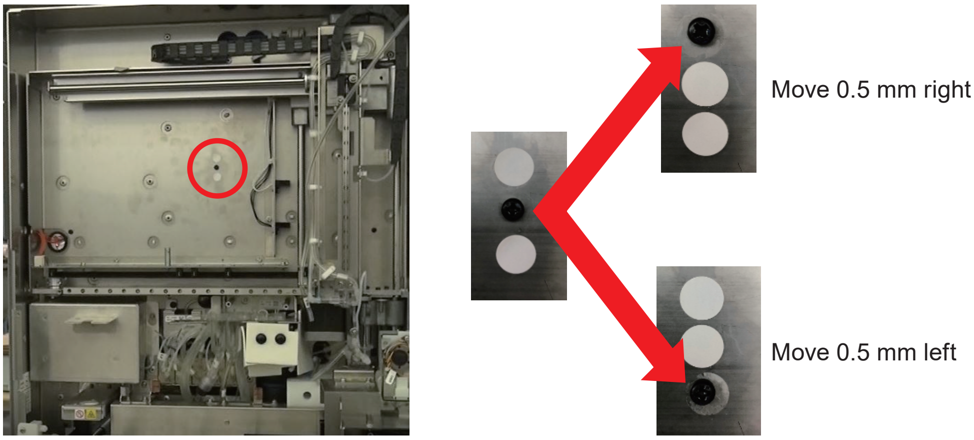
Adjusting the Autoloader Position Left and Right

1 Loosen the four positioning screws of the sampler unit



2 Remove the positioning screw and adjust the autoloader by moving the sampler unit left and right.

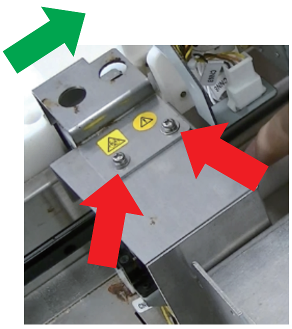
NOTE: When moving the sampler unit 0.5 mm left / right, peel off the lower / upper white label and tighten the screw.



3 Tighten the rest of the four screws.

After the adjustment is complete, return the two sheet metal parts to their original position.

NOTE: Reattach the two sheet metal parts with two screws while pushing the two parts to the right.



Checking and Adjusting the Sampling Needle Position (MS-912W)

Manual Measurement Position Adjustment

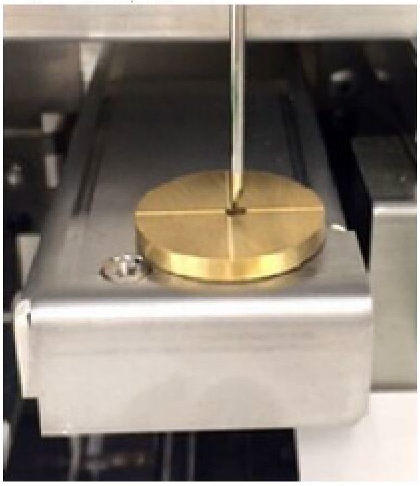
Perform auto measurement position adjustment before performing manual measurement position adjustment.

1. Set the jig on the open loader.

2. Initialize the X and Y directions of the sampler unit with the [Initialize] key.

3. Move the sampling needle to the not pierced position with the [Not Pierced] key and perform a visual check.

4 Press the [Pierced] key to move the sampling nozzle to the pierced position.



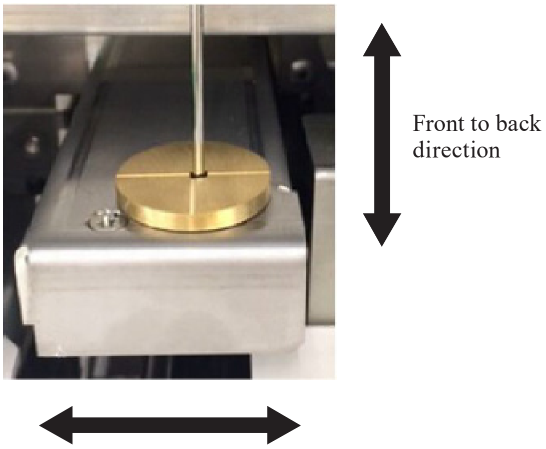
5 The same as in auto measurement, use a tester to check that there is no continuity between the jig and sampling needle.

When the Sampling Needle Center and Jig Hole Center are Not Aligned

1 Check with [Not Pierced].

2 To adjust in the side to side direction — Adjust with [+] and [–] of [Side]

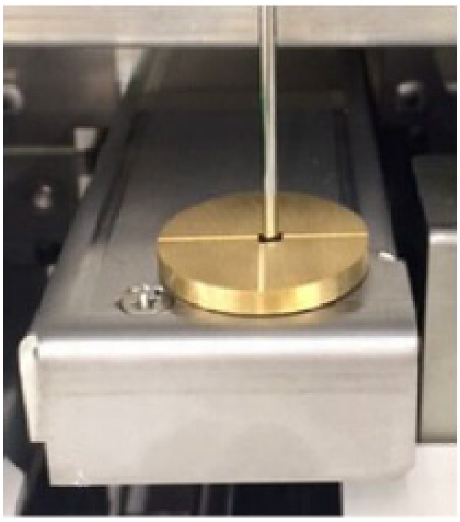
To adjust in the front to back direction — Adjust with [+] and [–] of [Front/back]



3 Enable the setting with [Apply Settings].

Initialization is performed when touched.

4 Repeat 1 to 3 until the sampling needle center and jig hole center are aligned.



5 Touch [Pierced] and check that there is no continuity between the sampling needle and jig.

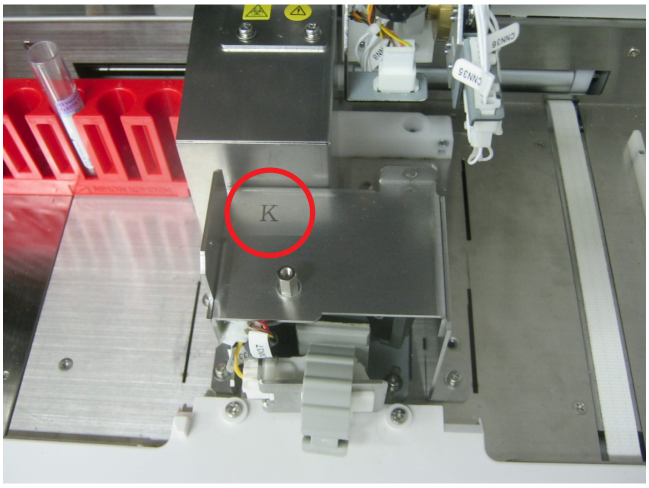
Adapting to the SARSTEDT / KABE SAMPLING Tubes

Changing the autoloader measurement section

When you use the SARSTEDT / KABE sampling tube, the following kit is required.

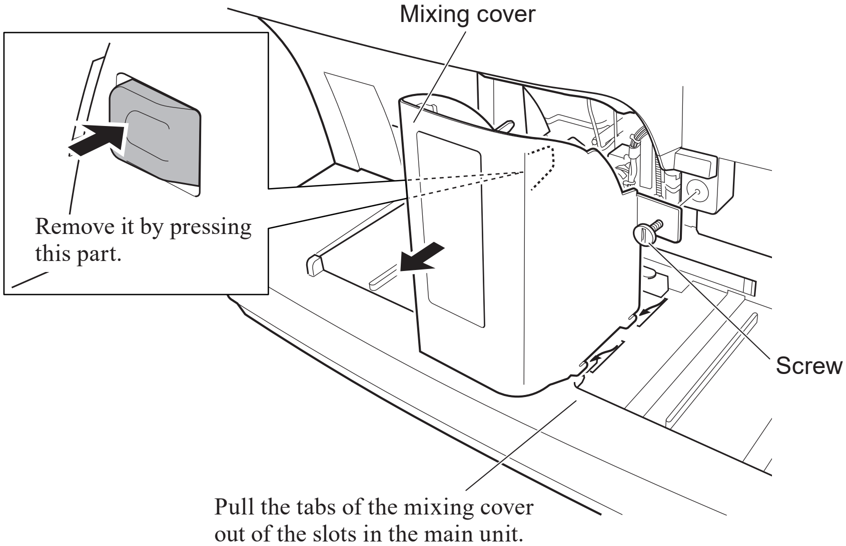
- SARSTEDT: YZ-008B1 (SARSTEDT KIT)
- KABE: YZ-008B2 (KABEVETTE G KIT)

The autoloader compatible with SARSTEDT has the stopper marked with “K”.

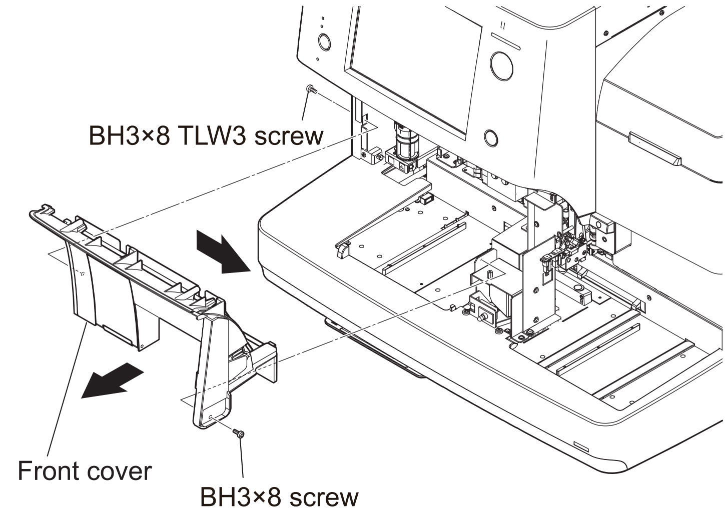


NOTE: The procedure of adapting the autoloader to the SARSTEDT / KABE sampling tube is almost the same. If you want to adapt the autoloader to the KABE sampling tube, skip the [only SARSTEDT] steps.

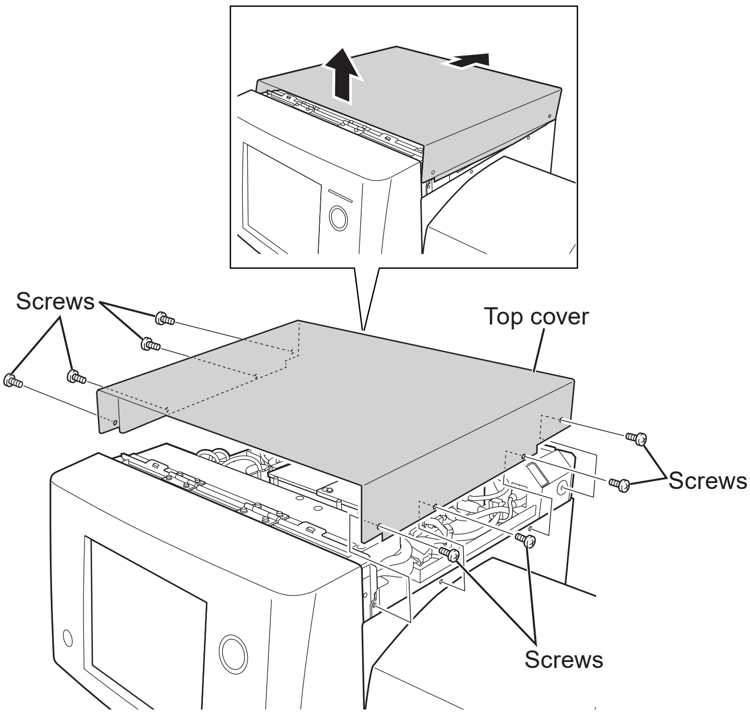
1 Loosen the screw on the front panel of the main unit and remove the mixing cover.



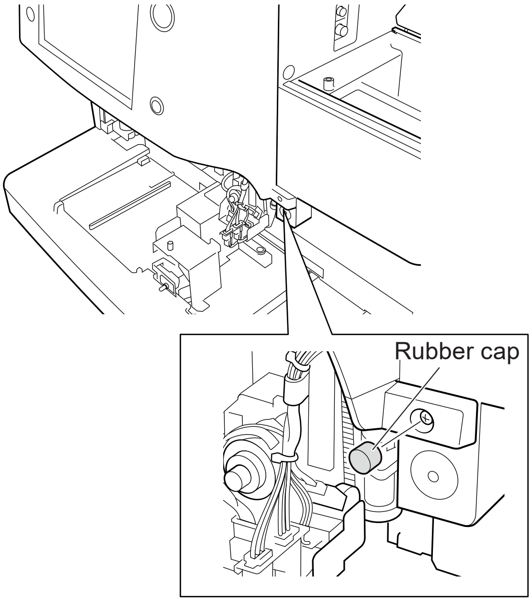
2 Remove the BH3×8 TLW3 screw and the BH3×8 screw. Move the front cover slightly to the right and slide the left side of the front cover toward you.



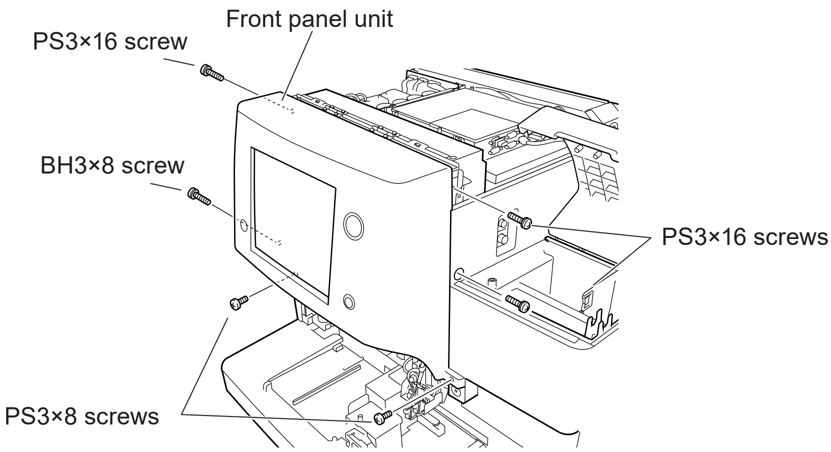
3 Remove the eight screws to remove the top cover.



4 Remove the rubber cap.

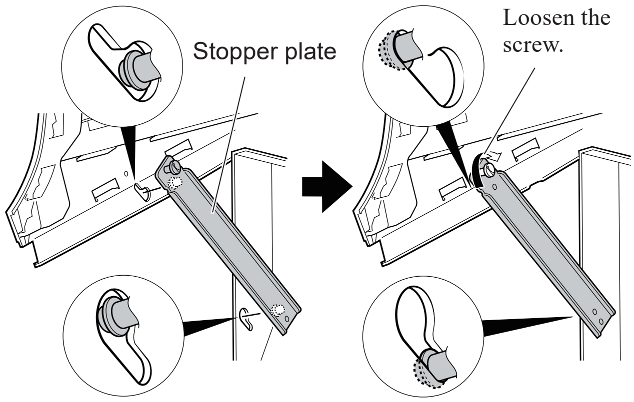


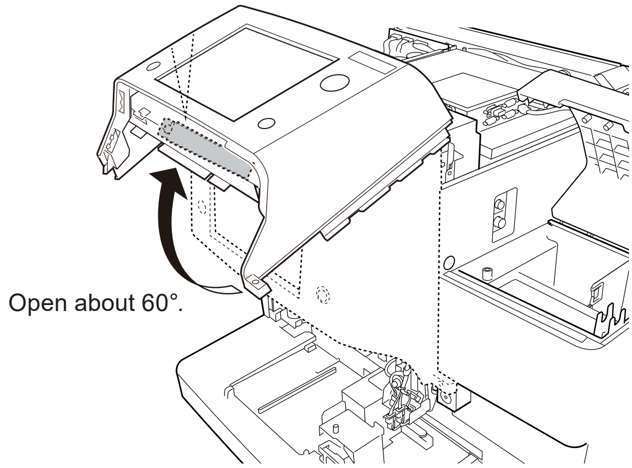
5 Remove the six screws which secure the front panel unit.



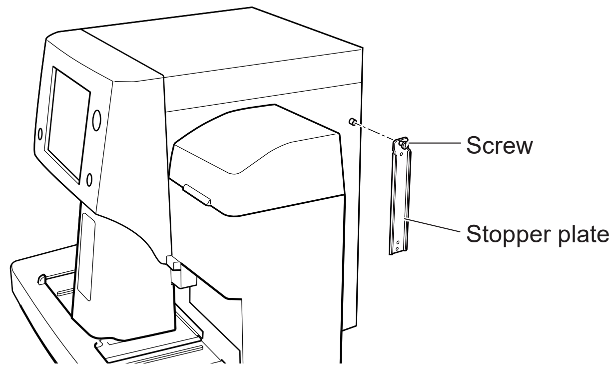
6 Open the front panel unit about 60° and fix it with the provided stopper plate as shown in the figure.

NOTE: Do not open the front panel unit 90° or more. This may damage the analyzer.



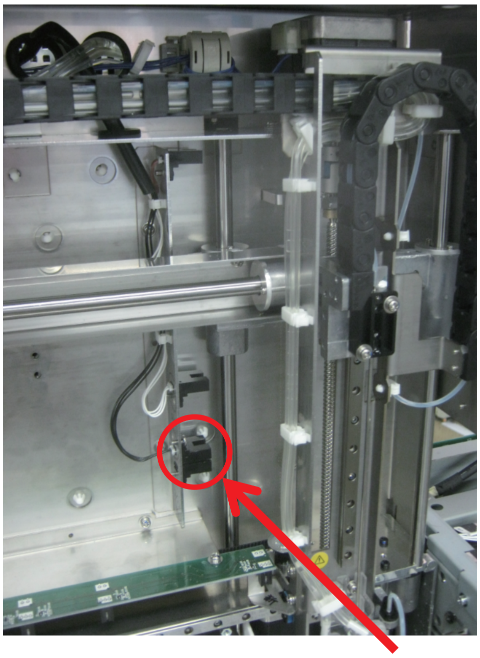


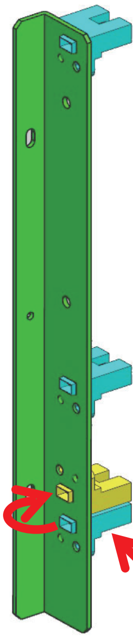
The provided stopper plate is fixed with a screw at the position in the figure.



7 Disconnect the connector from the default sensor and connect the connector to the sensor for SARSTEDT.

NOTE
- Before the operation, turn off the analyzer main power.
- Be careful of the sampling needle during the operation.
- This step is not applied to the sampler unit which does not have the sensors.
- After disconnecting the connector, vertically invert the connector and connect it to the sensor for SARSTEDT.





Sampler aspiration CL

[only SARSTEDT]

8 Replace the rotate head.

NOTE: Do not remove the other parts in the autoloader. Some of the parts need adjustment if they are removed.

1) Turn on the analyzer.

Operator's Manual:
"Turning On the Analyzer" in Section 5

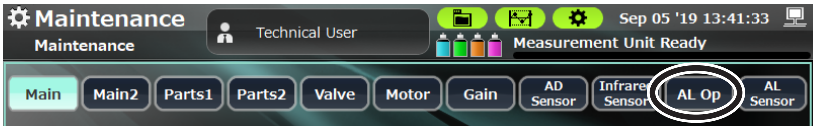
2) Log in as a [Technical User].

"Changing the Operator to a Technical User" (p. 6-25)

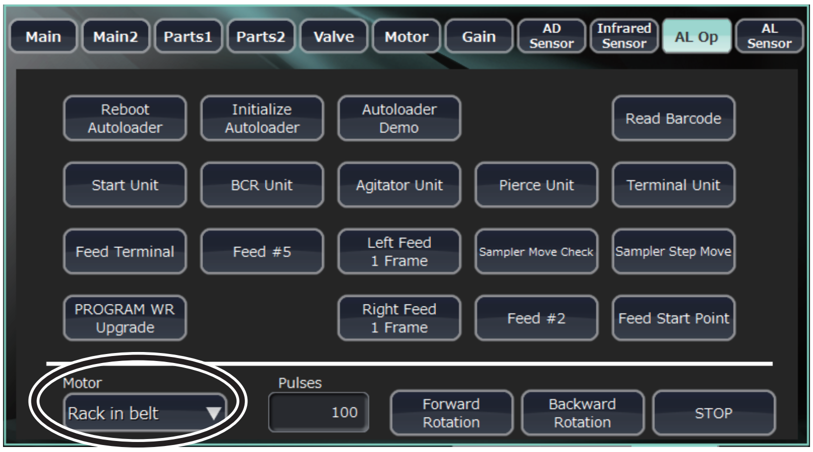
3) Open the Service Maintenance window.

"Opening the Service Maintenance Window" (p. 6-27)

4) Touch [AL OP] to open the Autoloader Operation window.

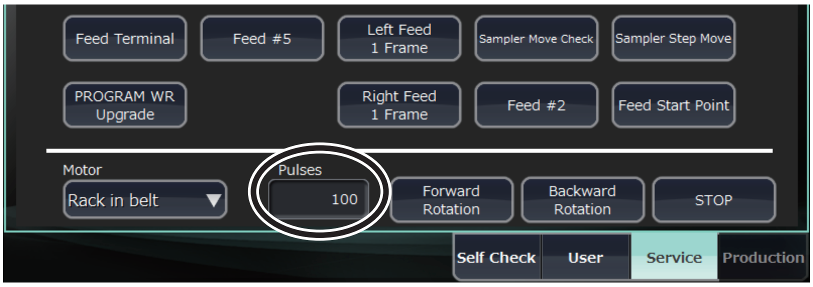


5) Touch [Motor] and select [Rotate sampling tube] from the drop-down menu.

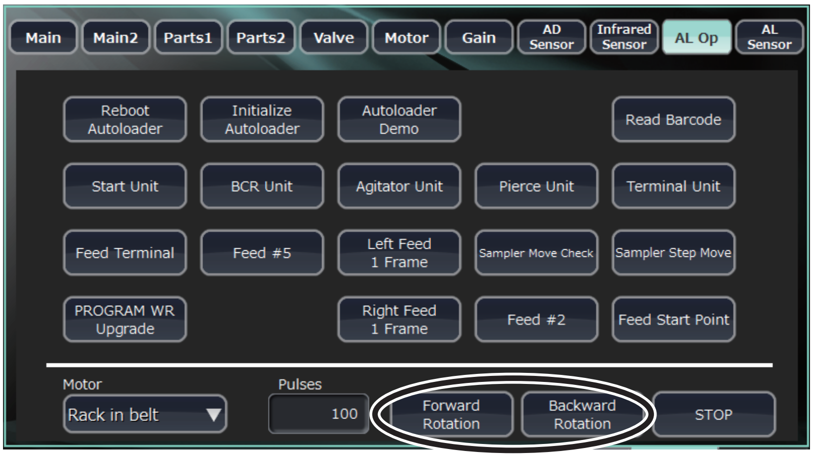


6) Enter the number of operation pulses for the controlled motor.

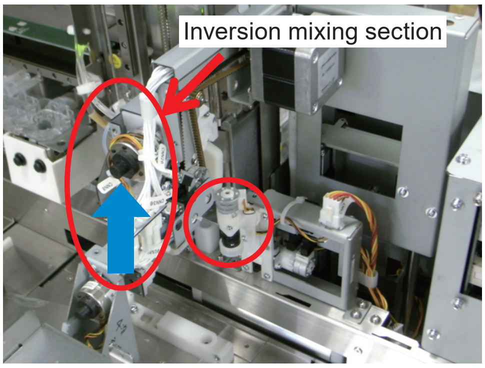
NOTE: If you enter “500” in the input box, rotate the rotate head by approximately 90 degrees.

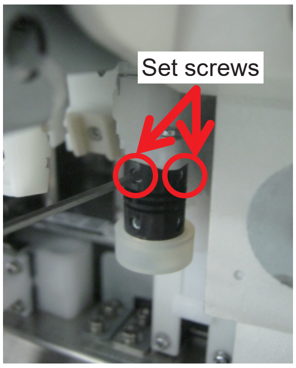


7) Touch [Forward Rotation] or [Backward Rotation] to rotate the rotate head so that you can easily access the set screws of the rotate head.



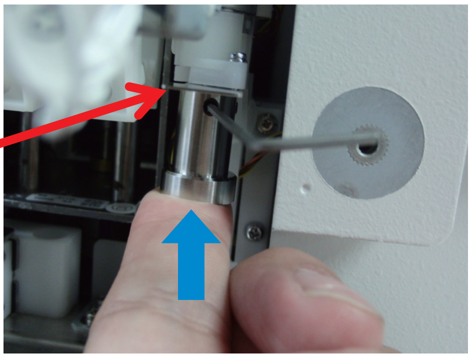
8) While lifting up the inversion mixing section, loosen the two set screws with a 1.5 mm hex wrench, and remove the rotate head.



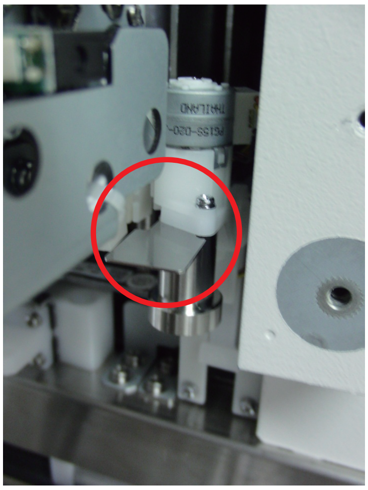


9) Insert the spacer, and then attach the rotate head for SARSTEDT by pressing it from the bottom.

Spacer



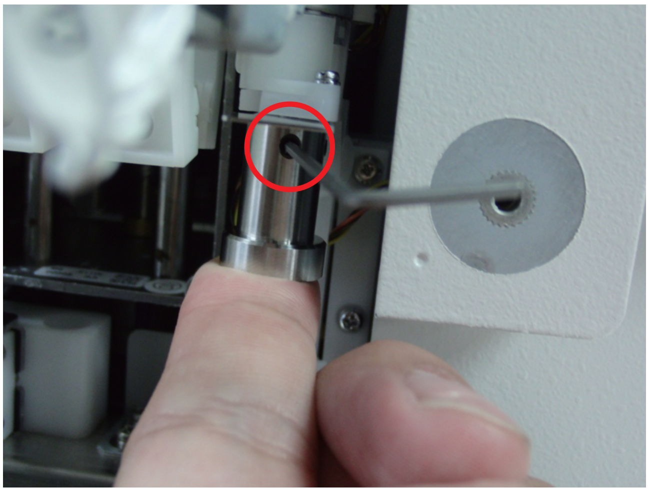
NOTE: Insert the spacer vertically toward the front side of the unit. When the spacer is not correctly inserted, the unit does not work properly.



Correct position

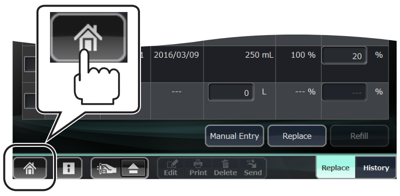
Wrong position

10) Temporarily fix the rotate head with the provided set screw, and then tighten the two set screws to secure the rotate head.

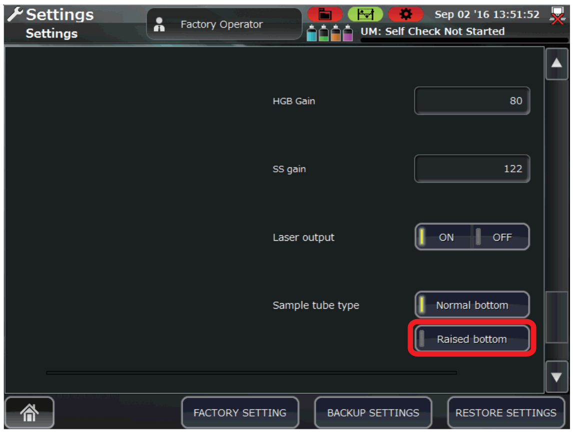


9 Change the settings.

1) Open the Home screen. If you are in another window, touch [ ] at the lower left.



2) Touch [Settings] > [Measurement Conditions] > [Sample tube type] > [Raised bottom].



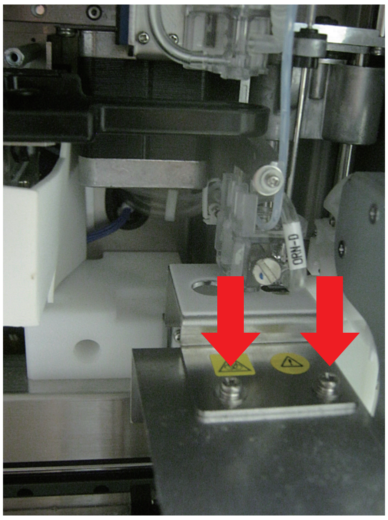
3) Return to the Home screen.

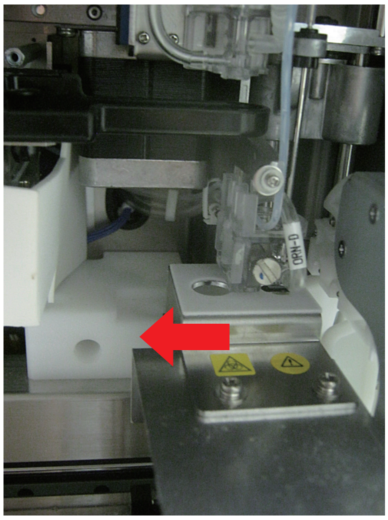
NOTE
- This setting does not change if the system settings is initialized to the factory default settings.
- To change the setting, the following software is required:
  Main: ver. 01-06 or later
  GUI: ver. 01-05 or later
  Autoloader: ver. 01-04 or later

[only SARSTEDT]

10 Check the piercing position.

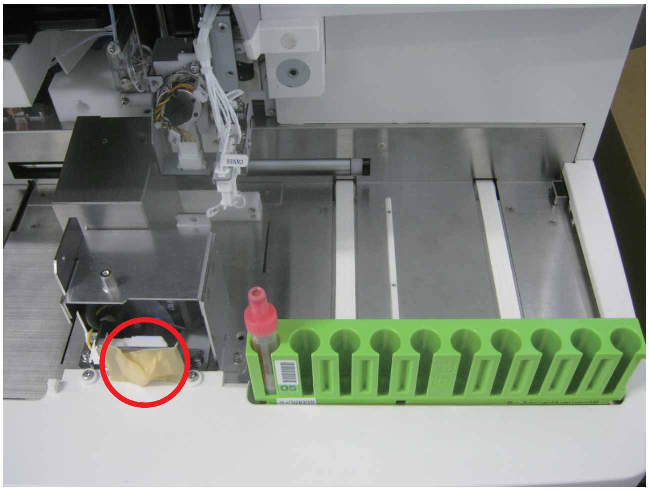
1) Remove the two screws and the stopper (AL) SARSTEDT.





2) Set the SARSTEDT to the left-most of the rack.

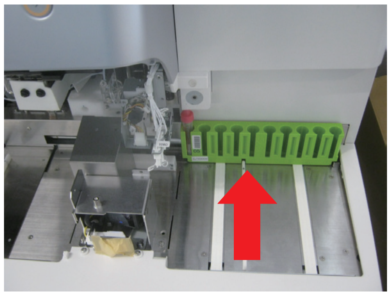
NOTE: Be sure to keep pushing the mixing cover removal sensor not to cause an emergency stop.



3) To initialize the autoloader, touch [Maintenance] > [Service] > [AL Op] > [Initialize Autoloader], and then touch [Yes].

NOTE: All the moving parts in the autoloader are initialized.

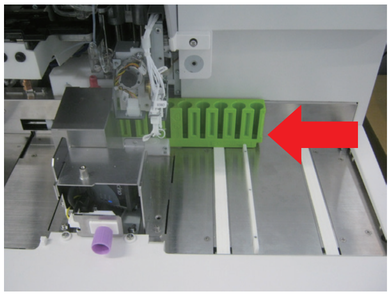
4) Touch [Start Unit] > [Yes] and move the rack by the conveyor belt.



5) Select “Hold/release feed tab” from the drop-down menu, enter “1000” in the pulses parameter box, and then touch [Forward Rotation] > [Yes].

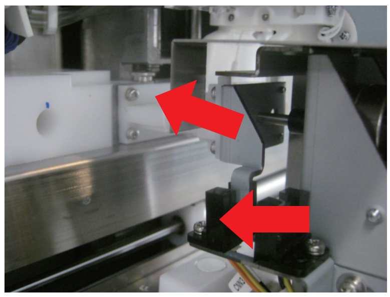
The feed tabs come down and hold the rack.

6) Touch [Feed #5] > [Yes] to move the rack to the aspiration and discharge position.



7) Select “Grip/Ungrip tube gui” from the drop-down menu, enter “1000” in the pulses parameter box, and then touch [Backward Rotation] > [Yes].

The sampling tube is fixed by the guide.



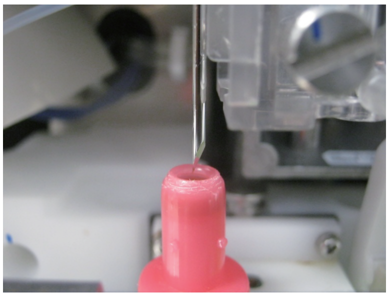
8) On the Service Maintenance window, select [Motor], and touch the following buttons:

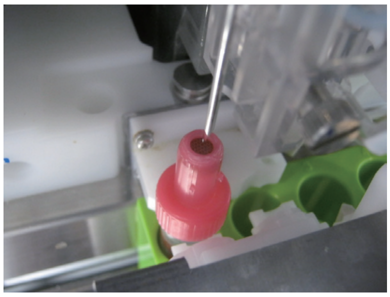
- Touch [Initialize], and then touch [Yes] in the popup window.
- Touch [Not Pierced], and then touch [Yes] in the popup window.

The sampling needle moves to the position of the sampling tube.

NOTE
- The sampling needle stops just before piercing the sampling tube.
- Be careful not to touch the needle coming down. This may cause damage.

9) Check that the sampling needle is located in the center of the sampling tube.





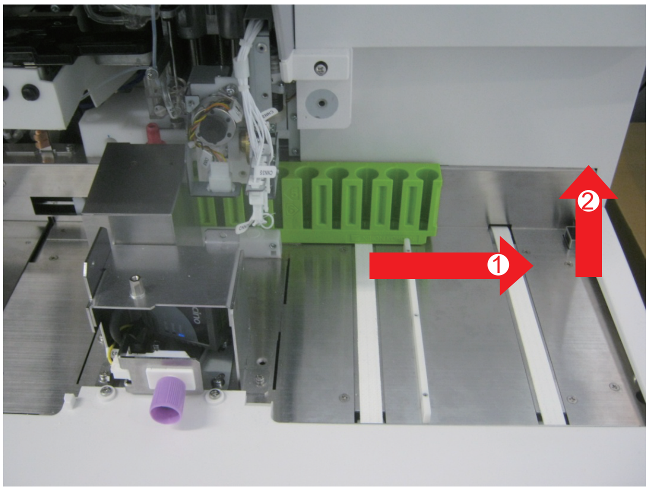
10) Touch [Initialize] > [Yes] to move the sampling needle to the default position.

11) Touch [AL Op] > [Initialize Autoloader] > [Yes] to move each actuator of the autoloader to the default position.

NOTE: Perform this operation with the rack left.

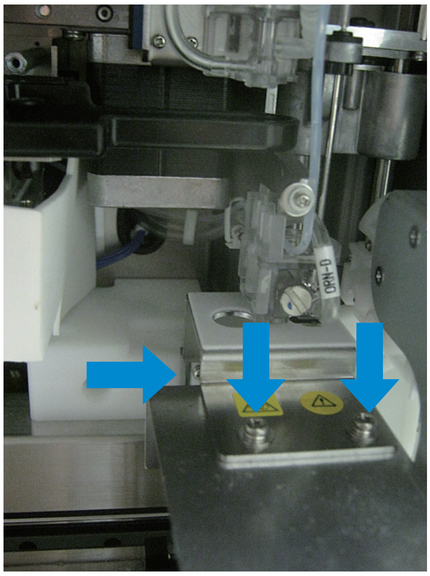
12) Manually remove the rack as shown below.

NOTE: Do not remove the rack diagonally.



[only SARSTEDT]

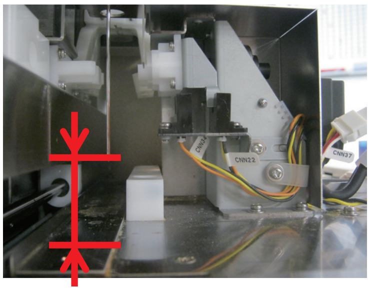
11 Attach the stopper (AL) SARSTEDT while pushing the stopper to the right and fix it with the two screws.



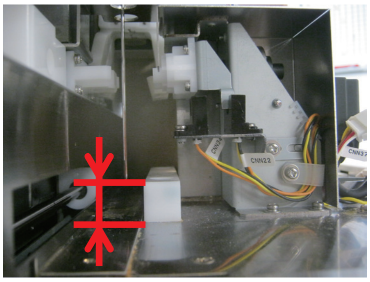
12 Visually confirm the height of the aspiration and discharge position in the following procedure.

- Touch [Maintenance] > [Service] > [AL Op] > [Samler Step Move] > [Yes].

[Samler Step Move] is a function that performs a series of autoloader measurement of the sampler unit step by step.



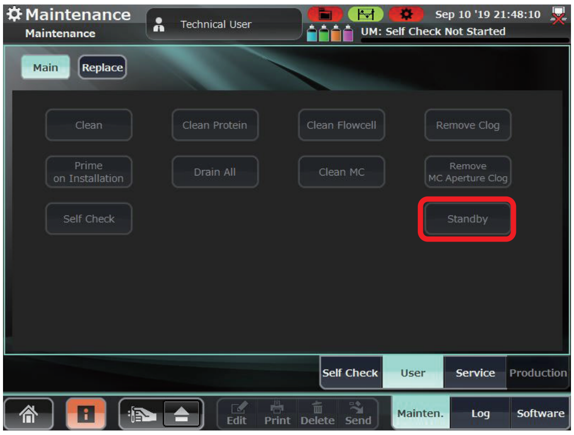
Setting position of [Raised bottom]



Setting position of [Normal bottom]

13 Touch [Standby] to initialize the sampler unit.

[Standby] is a function that initialize all the actuators when turning on the analyzer.



14 Reattach the PV-910W, the top cover, the front panel and the mixing cover.

15 Confirm that the autoloader works normally by performing the rack measurement with SARSTEDT. Check items are as follows:

- An error does not occur.
- The sampling tube can be rotated and the bar code can be read (only SARSTEDT).
- The sampling needle enters the sampling tube normally.
- The sampling needle do not hit the bottom of the sampling tube.

5

Adjustment

Calibration

When an unacceptable error is found in a measurement value as a result of quality control, the analyzer needs to be calibrated so that measurements are closer to the true values.

Operator's Manual:
Section 6 "Quality Control"

The analyzer is calibrated with MEK-CAL hematology calibrator.

"HGB, HCT and PLT Calibration with Human Blood" (p. 5-7)

NOTE
- WBC, RBC, HGB, HCT, RDW-CV, PLT and MPV and sensitivity adjustment (FS, FL, SD) of the WBC 5 part differential scattergram can be calibrated with MEK-CAL calibrator.
- The WBC 5-part differential is calibrated by checking that the calibration coefficient of NE%, LY%, MO%, EO% and BA% is 1000. Only check the calibration coefficient here because the sensitivity adjustment of the scattergram allows for precise calibration of the WBC 5-part differential.
- When calibrating with a reference method that uses a calibrator other than the one recommended by Nihon Kohden, measure more than 10 samples collected within the past 8 hours (past 4 hours for WBC differential) and which were stored at room temperature after collection, then adjust the calibration coefficient according to the comparison between the measurement values and the reference method values. Do not use a sample which is suspected to be abnormal as the calibrator.
- The MEK-5DN hematology control cannot be used as a calibrator. MEK-5DN is for quality control.
- Do not use a calibrator past its expiration date.

  Unopened: expiration date on the label or package

  Opened: 7 days after opening
- Store the control between 2 and 8°C (36 and 46°F). Do not freeze the calibrator.
- Use the calibrator once it has returned to room temperature.
- Mix the hematology control by gently turning it upside down several times before measurement.
- Read the calibrator manual thoroughly and follow its precautions.
- Re-calibrate when there is difference with the reference method. Decide the calibration coefficient from the average of the measured data then enter the coefficient.

Performing Calibration

1 Touch [CAL] on the QC window. The Calibration window opens.

2 Select a measurement mode (Normal or Pre-dilution) and touch [Calibration Measurement].

Check the measurement method to use and select the calibration mode.

Calibration Mode	Auto Measurement	Manual Measurement		
		Whole Blood	Pre-dilution	WBC High
Normal	✓	✓	–	✓ [1]
Pre-dilution	–	–	✓	–

[1] The calibration coefficients for the measurement of high WBC concentrations can be edited manually only by users with Technical User privileges. For the use of this function, contact your Nihon Kohden representative.

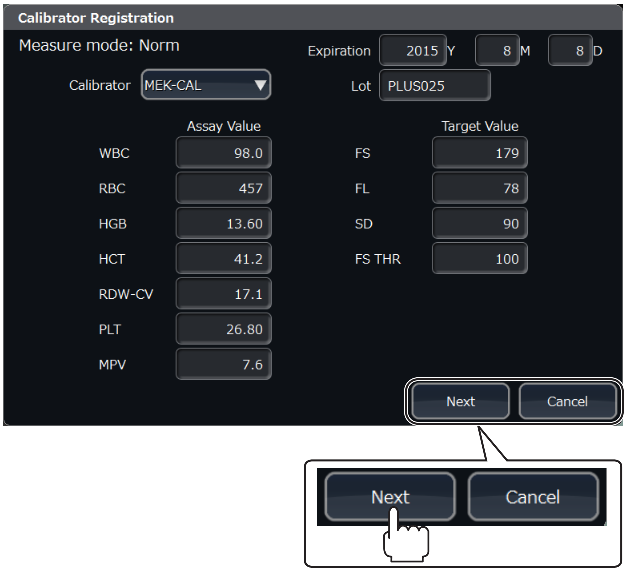
The aspirating position is different for auto and manual measurement (except pre-dilution) but it uses the same nozzle. Use normal mode for calibration.
The reagent needs to be prepared in Pre-dilution measurement. Use pre-dilution mode for calibration.

3 After the Calibrator Registration window appears, scan the QR code on the assay sheet of the calibrator with the barcode reader.

The information of the read calibrator is set and displayed on the window.

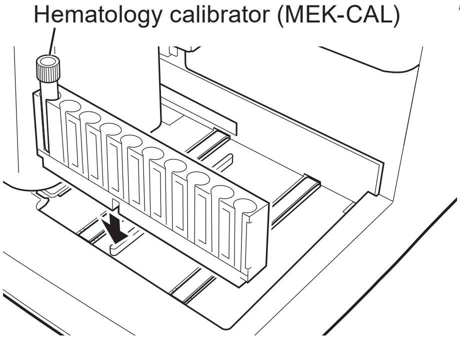
> The information can also be entered directly by touching the setting parameter.

4 After checking the information on the window, touch [Next] to open the Auto CAL Mode window.



Normal mode

Hematology calibrator (MEK-CAL)



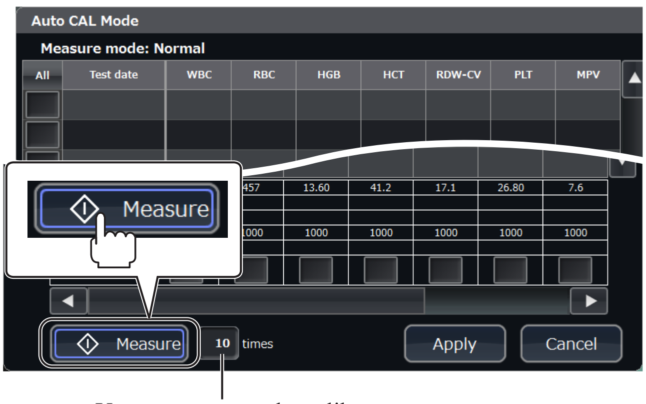
5 Measure the calibrator.

Normal mode:

1) Insert the calibrator into the left end (first position) of the rack.
2) Place the rack with the calibrator in the analyzer, and touch [Measure]. Measure the calibrator 10 times.

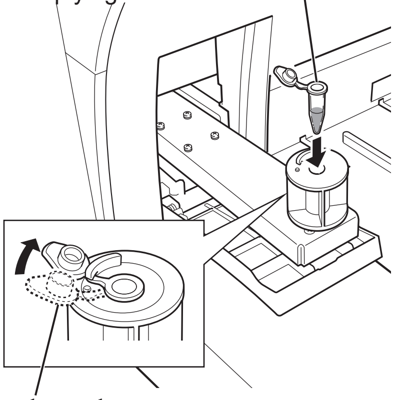
> Operator's Manual:
> "Performing Auto Measurement" in Section 5

> You can measure the calibrator from 1 to 20 times. Enter the number of times to automatically measure the calibrator.



You can measure the calibrator from 1 to 20 times.

Pre-dilution mode
20 µL of the hematology calibrator (MEK-CAL) which were diluted with the same multiplying factor



Secure the cap by inserting the cap under the tab of the adapter.

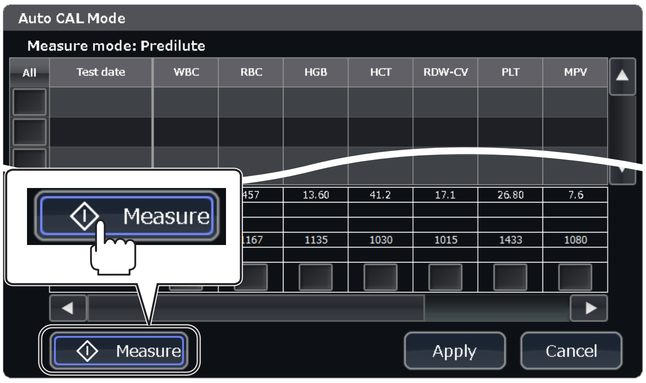
Pre-dilution mode:

1) Refer to steps **4** to **7** in “Performing Pre-dilution Measurement” in Section 5 and prepare 10 samples of 20 µL of MEK-CAL hematology calibrator which were diluted with 120 µL of diluent (ISOTONAC•3).

   Operator’s Manual:
   “Performing Pre-dilution Measurement” in Section 5

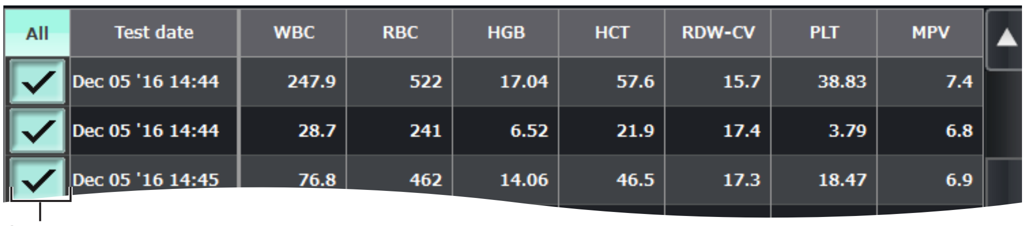
2) Uncap the micro tube, insert it into the adapter of the sample tube holder, and touch [Measure]. Perform manual measurement 10 times.

   Operator’s Manual:
   “Performing Manual Measurement” in Section 5



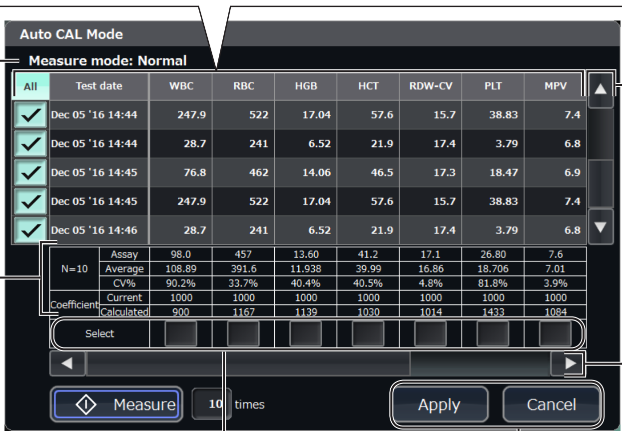
When measurement is complete, the measurement results appear on the screen.

NOTE: When the number of measurement data exceeds 20, the oldest data is overwritten in order to keep the latest 20 data.



Check box
• Touch to select the measurement data to perform statistical calculation. The check icon appears in the box.
• To unselect, touch the selected data again.
• Touch [All] to select or unselect all items.

Measurement mode



Touch [▲], [▼], [◀] or [▶] to scroll the list vertically or horizontally.

Statistical data
Displays the results of the statistical calculation.

Select
Touch to select the parameter to change the calibration coefficient.
The check icon appears in the box.

[Apply]: Applies the revised calibration coefficient to the selected parameters.

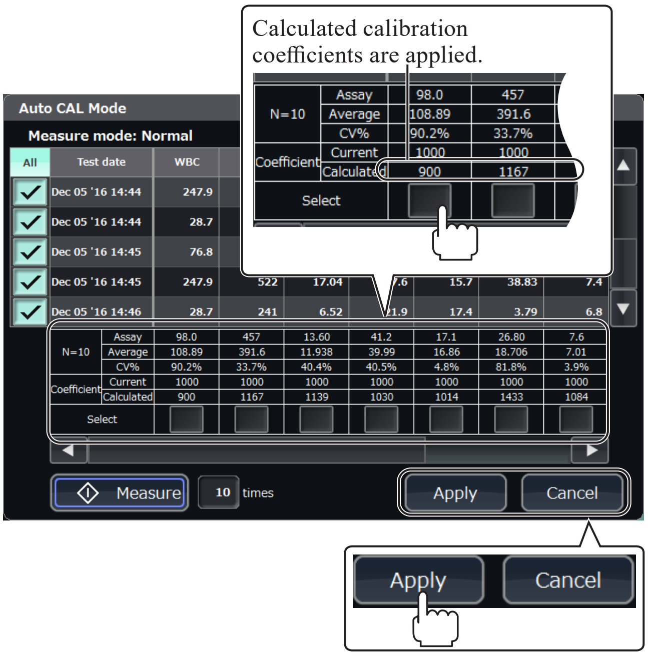
[Cancel]: Discards all data including the measurement data and returns to the Calibration window.

6 Select 10 or more sets of measurement data to do a statistical calculation.

NOTE: If the number of measurement data is less than 10, repeat measurement.

- To unselect, touch the selected data again.
- Touch [All] to select or unselect all items.

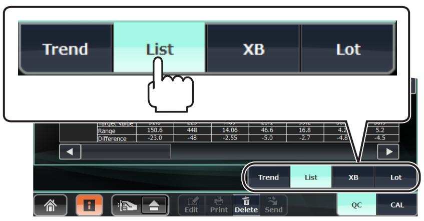
7 Check the data, select the parameter column to change the calibration coefficient, and touch [Apply].



8 Check that the calibration coefficient is correctly applied on the Calibration window.

9 Perform a quality control measurement using a hematology control and check that the result is within the control range.

Operator's Manual:
"Measuring the Hematology Control" in Section 6



On the QC window, touch [List] to open the List window.

The List window displays the measurement data of the hematology control in the list.

The data on the Trend window is linked to that on the List window.

Checking Calibration Result

The calibration history can be displayed on the Calibration window.

HGB, HCT and PLT Calibration with Human Blood

Measure 10 human blood samples of healthy persons using the analyzer as well as a spectrophotometer and microhematocrit centrifuge. Calculate the calibration coefficient using the HGB, HCT and PLT values obtained from a spectrophotometer and microhematocrit centrifuge.

1. Prepare 10 human blood samples collected from the veins of 10 different healthy persons.
2. Measure each sample twice with the analyzer.
3. Measure with a spectrophotometer and microhematocrit centrifuge.

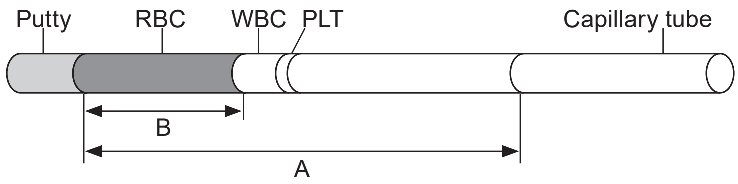
   NOTE: Measurement accuracy with the spectrophotometer and microhematocrit centrifuge depends on the processes. Perform the processes carefully.

HCT Measurement

1) Aspirate the whole blood sample into 2/3 of the pre-dilution tube, wipe away any blood from the outside of the tube, and seal the ends of the tubes with putty.

2) Set the microhematocrit centrifuge for 11,000 rpm for 5 minutes and rotate the tube in the centrifuge.

3) Immediately after rotation stops, remove the tube and measure the length of Layers A and B with a microscope. Then calculate each HCT.



$$HCT = \frac{B\ (\text{Red blood cell volume})}{A\ (\text{Blood volume})} 100\ (\%)$$

4) Measure 2 tubes for each sample and treat the mean of the measurements as the HCT values with the spectrophotometer and microhematocrit centrifuge method.

HGB Measurement

1) Prepare a lysing reagent in accordance with the International Committee for Standardization in Hematology (ICSH) and use it as a diluent.

2) Make a pair of two 200:1 diluted samples from each sample.

3) Set up the spectrophotometer as follows to measure the 200:1 diluted samples, and calculate HGB values.

• Wavelength: approx. 540 nm

• Mode: ABS (absorbance) mode

Multiply each measured absorbance by 29.3 to obtain the HGB value.

$$HGB = \text{Measured absorbance} \times \underbrace{29.3}\ (\text{g/dL})$$

$$29.3 = \frac{64458 \times 200}{44 \times 1000 \times 1 \times 10}$$

64458 : Molecular weight of HGB
200 : Dilution ratio
44 : Optical density coefficient in mm mol
1000 : from mg to g
1 : Cell thickness (cm)
10 : from g/L to g/dL

4) Measure the two 200:1 diluted samples and treat the average of the measurements as the HGB values with the spectrophotometer and microhematocrit centrifuge method.

PLT Measurement

Measure the platelet count in accordance with the following international standard.

ICSH/ISLH 2001:

International Council for Standardization in Hematology Expert Panel on Cytometry and International Society of Laboratory Hematology Task Force on Platelet Counting. Platelet counting by RBC/platelet ratio method. A reference method. Am Journal of Clinical Pathology 115:460-464 2001

4 Calculate the HGB, HCT and PLT calibration coefficients.

1) By filling the following table with the HGB, HCT and PLT values, calculate the mean (A) among the 8 data, excluding the highest one data and the lowest one data.

2) By applying the calculated mean (A) and calibration coefficient (B) to the following formula, calculate the revised calibration coefficient (C).

Sample No.	Measurement Value		Data
	Spectrophotometer and Microhematocrit Centrifuge	Analyzer	$\dfrac{\text{Analyzer measurement data} - \text{Spectrophotometer and microhematocrit centrifuge measurement data}}{\text{Spectrophotometer and microhematocrit centrifuge measurement data}}$ 100 (%)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Mean among the 8 data excluding the highest one data and lowest one data (A)			(%)
Current calibration coefficient (B)			
Revised calibration coefficient (C) $(C) = (B) \times \left(1 - \dfrac{(A)}{100}\right)$			

5 Open the Calibration window and set the revised calibration coefficient.

Forced Calibration

Forced calibration is a method for manually editing the calibration coefficient. This is different from the normal calibration method in which the calibrator (MEK-CAL) is measured and the calibration coefficient is calculated automatically.

Calibration Window

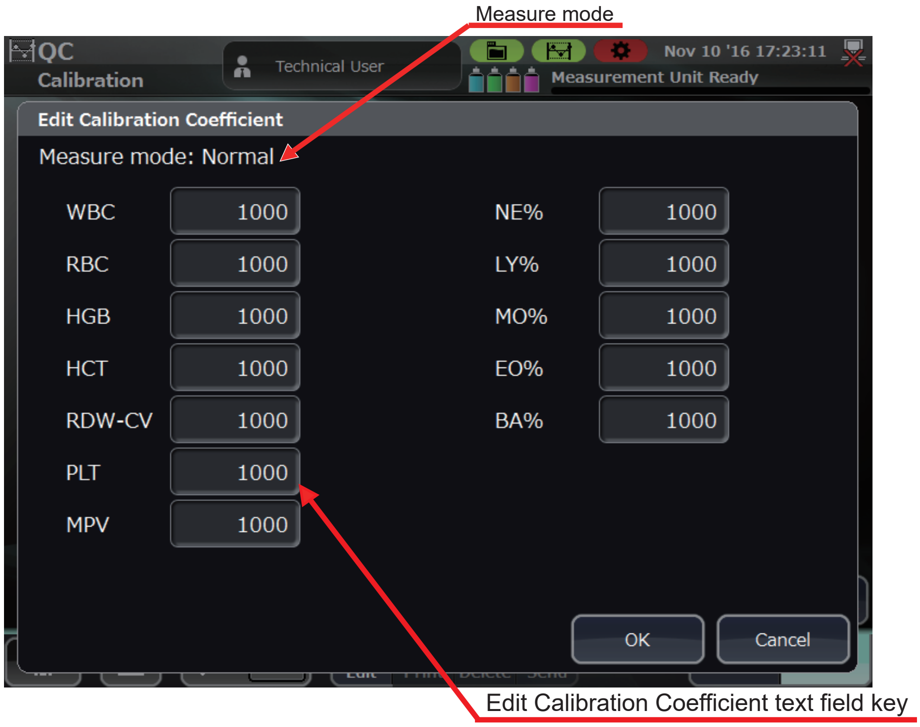
Opens the Edit Calibration Coefficient popup for directly editing the calibration coefficient.

1 Select a calibration mode (Normal or Pre-dilution, WBC High [1]) from the measurement mode drop-down list.

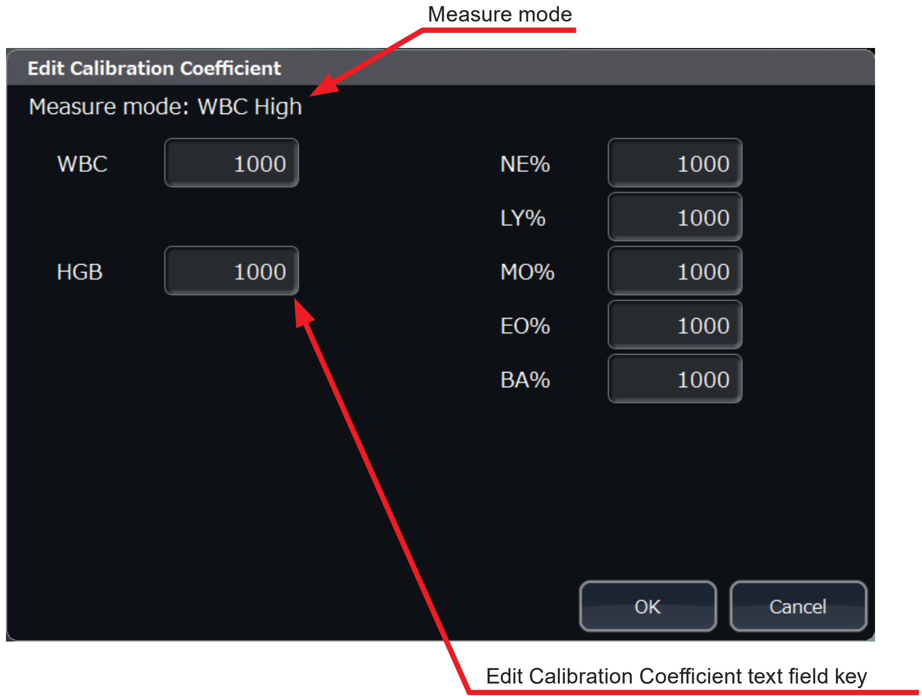
[1] The calibration coefficients for the measurement of high WBC concentrations can be edited manually only by users with Technical User privileges. For the use of this function, contact your Nihon Kohden representative.

2 Touch [Edit] key. The Edit Calibration Coefficient window appears.

Edit Calibration Coefficient Window (Normal or Pre-dilution)



Edit Calibration Coefficient Window (WBC High)



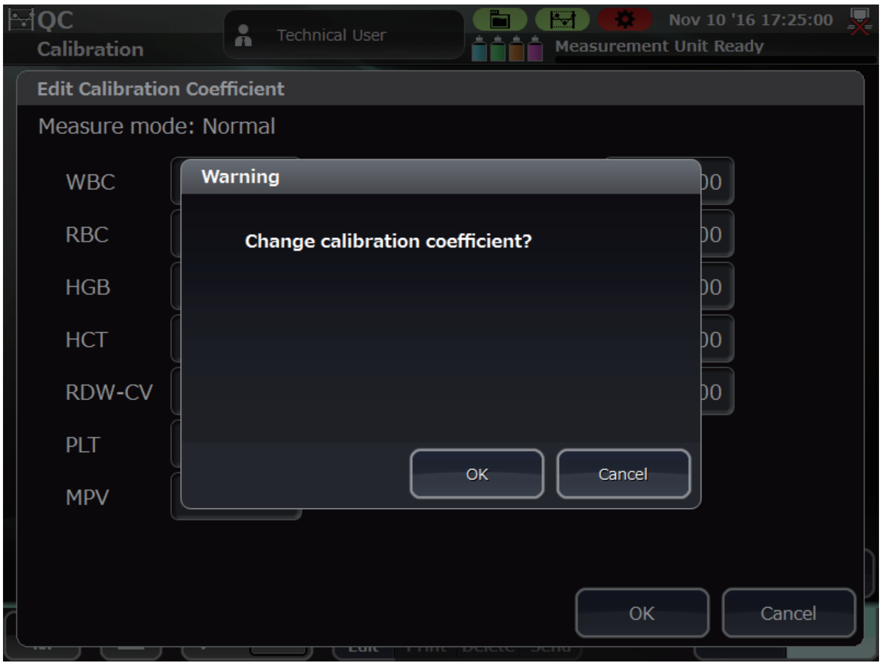
3 Enter the desired calibration coefficient in the Edit Calibration Coefficient text field.

The entry range is 500 to 2000 and within ±20% of the current value.

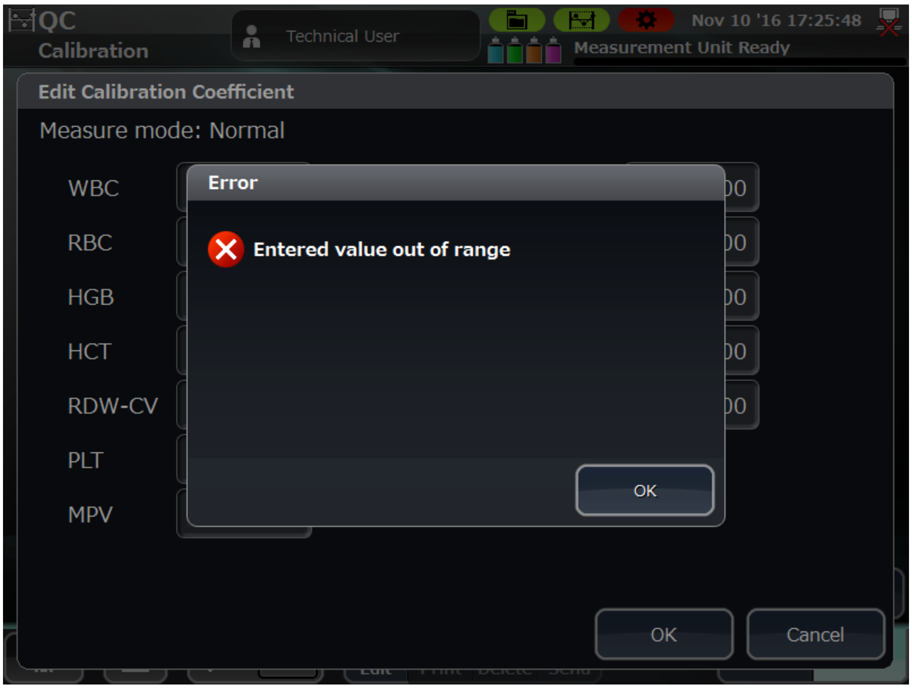
4 Touch [OK] key. When the change is allowed in a before and after comparison, the confirmation window appears.

5 Touch [OK].

Example of Warning when Change Allowed

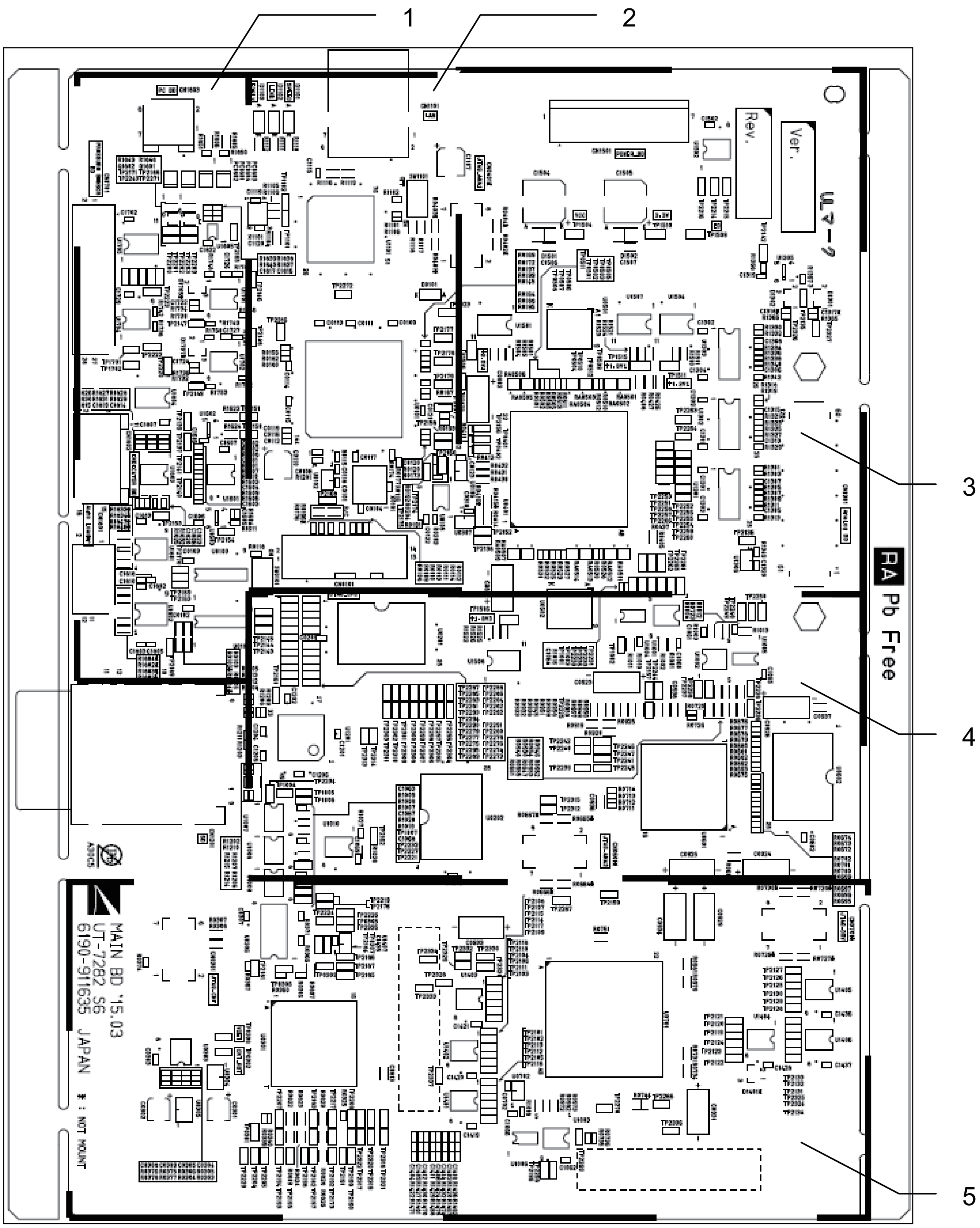


When the Entry Range is Exceeded



Board Inside Description

UT-7282 MAIN BD



Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0301	XIRQ_PC_IN is not used.	ED (TP1509)	—	—	5
TP0302	CPLD reset [CNT_RST]		When normal: High During reset: Low	The analyzer does not operate normally.	5
TP0303	LED_YOBI1 is not used.		—	—	5
TP0305	HEAT1_STATUS is not used.		—	—	5
TP0306	HEAT2_STATUS is not used.		—	—	5
TP0307	SRAM chip selection [XCS_SYS_SRAM]		During access: Low Not during access: High	The analyzer does not operate normally.	5
TP0308	3.3 V power loss detection [VDET]		When normal: High 3.3 V power loss: Low	The analyzer does not operate normally.	5
TP0401	N.C(3.3V PU) is not used.		—	—	3
TP0402	N.C(3.3V PU) is not used.		—	—	3
TP1001	FPGA configuration memory clock [ANA1_SCK]		When normal: High During configuration: Clock output	Cannot perform FPGA configuration normally	3
TP1002	FPGA configuration memory chip selection [ANA1_CS]		When normal: High During configuration: Low	Cannot perform FPGA configuration normally	3
TP1003	FPGA configuration memory data input [ANA1_SI]		When normal: High During configuration: Data	Cannot perform FPGA configuration normally	3
TP1004	U1007_4Y is not used.		—	—	4
TP1005	U1007_5Y is not used.		—	—	4
TP1006	U1007_6Y is not used.		—	—	4
TP1007	U1008_4Y is not used.		—	—	4
TP1101	LANC clock 1 [XTAL1]		25MHz	Cannot communicate with PC-910W/PC-911W	2
TP1102	LANC clock 2 [XTAL2]		25MHz	Cannot communicate with PC-910W/PC-911W	2
TP1504	Main power [VCC]		3.135 to 3.465 V	The main power does not turn on.	3
TP1506	FPGA core power [+2.5V1]		2.450 to 2.550 V	The analyzer does not operate normally.	3
TP1509	Digital GND [ED]		—	—	3
TP1510	Secondary power [3.3V]		3.135 to 3.465 V	The analyzer does not operate normally.	3
TP1511	FPGA core power [+1.2V1]		1.176 to 1.224 V	The analyzer does not operate normally.	3
TP1515	FPGA power [+1.8V1]		1.764 to 1.836 V	CBC measurement does not operate normally.	3
TP1516	FPGA power [+1.8V1]		1.764 to 1.836 V	CBC measurement does not operate normally.	3
TP1701	Cup heater clock [HEAT1_CLK]		During heater operation: Clock output	The cup heater does not operate normally.	1
TP1702	Tank heater clock [HEAT2_CLK]		During heater operation: Clock output	The tank heater does not operate normally.	1
TP2101	IRBC syringe upper sensor [SENS1]		Sensor shielded: Low Sensor open: High	RBC and PLT measurement do not operate normally.	5
TP2102	IRBC syringe encoder sensor [SENS2]		Sensor shielded: Low Sensor open: High	RBC and PLT measurement do not operate normally.	5

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2103	Pinch valve 4 initial position sensor [SENS3]	ED (TP1509)	Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2104	Diluter syringe upper sensor [SENS4]		Sensor shielded: Low Sensor open: High	The dilution operation does not operate normally.	5
TP2105	Pinch valve 5 initial position sensor [SENS5]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2106	Sampler Y lower sensor [SENS6]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2107	[SENS7] is not used.		—	—	5
TP2108	WBC syringe upper sensor [SENS8]		Sensor shielded: Low Sensor open: High	WBC measurement does not operate normally.	5
TP2109	WBC syringe encoder sensor [SENS9]		Sensor shielded: Low Sensor open: High	WBC measurement does not operate normally.	5
TP2110	Sample pump syringe upper sensor [SENS10]		Sensor shielded: Low Sensor open: High	The sample pump does not operate normally.	5
TP2111	Sample pump syringe encoder [SENS11]		Sensor shielded: Low Sensor open: High	The sample pump does not operate normally.	5
TP2112	Pressure release upper sensor [SENS12]		Sensor shielded: Low Sensor open: High	The pressure release operation does not operate normally.	5
TP2113	[SENS13] is not used.		—	—	5
TP2114	Pinch valve 1 initial position sensor [SENS14]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2115	Pinch valve 2 initial position sensor [SENS15]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2116	Diluter syringe lower sensor [SENS16]		Sensor shielded: Low Sensor open: High	The dilution operation does not operate normally.	5
TP2117	Diluter encoder sensor [SENS17]		Sensor shielded: Low Sensor open: High	The dilution operation does not operate normally.	5
TP2118	Pinch valve 3 initial position [SENS18]		Sensor shielded: Low Sensor open: High	Priming does not operate normally.	5
TP2119	Float sensor 1 sensor [SENS19]		Sensor shielded: Low Sensor open: High	ISO chamber full detection does not operate.	5
TP2120	Float sensor 2 sensor [SENS20]		Sensor shielded: Low Sensor open: High	WC1 chamber full detection does not operate.	5
TP2121	Float sensor 3 sensor [SENS21]		Sensor shielded: Low Sensor open: High	WC2 chamber full detection does not operate.	5
TP2122	Float sensor 4 sensor [SENS22]		Sensor shielded: Low Sensor open: High	Waste container full detection does not operate.	5
TP2123	[SENS23] is not used.		—	—	5
TP2124	Sampler X: Initial position sensor [SENS24]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2125	Sampler X: 5 Diff cup position sensor [SENS25]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2126	Sampler X: RBC cup position sensor [SENS26]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2127	Sampler X: WBC cup position sensor [SENS27]	ED (TP1509)	Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2128	Sampler X: End position sensor [SENS28]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2129	Pressure release lower sensor [SENS29]		Sensor shielded: Low Sensor open: High	The pressure release operation does not operate normally.	5
TP2130	Sampler Y middle sensor [SENS30]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2131	Sampler Y upper sensor [SENS31]		Sensor shielded: Low Sensor open: High	The analyzer does not operate normally.	5
TP2132	[SENS32] is not used.		—	—	5
TP2133	[SENS33] is not used.		—	—	5
TP2134	Open loader: Front sensor [SENS34]		Sensor shielded: Low Sensor open: High	Manual measurement does not operate normally.	5
TP2135	Short sample LED temperature [SS_LED]		Analog voltage: 0 to 3.3 V	Short sample measurement does not operate normally.	3
TP2136	HGB LED temperature [HGB_AD_DIN]		Analog voltage: 0 to 3.3 V	HGB measurement does not operate normally.	3
TP2137	Cup heater temperature [SMPLCP_HEATER]		Analog voltage: 0 to 3.3 V	Cannot detect the cup heater temperature alarm	1
TP2138	System control [XRD]		During access: Low Not during access: High	The analyzer does not operate normally.	3
TP2139	Tank heater temperature [TANK_HEATER]		Analog voltage: 0 to 3.3 V	Cannot detect the tank heater temperature alarm	1
TP2140	[DIL] is not used.		—	—	1
TP2141	HGB diluent temperature [HGB_DIL]		Analog voltage: 0 to 3.3 V	HGB measurement does not operate normally.	1
TP2142	HGB LED temperature [HGB_LED]		Analog voltage: 0 to 3.3 V	HGB measurement does not operate normally.	3
TP2143	CPU_AD selection signal 0 [CPU_AD_SEL0]		When selected: High When not selected: Low	The AD conversion target selection does not operate normally.	4
TP2144	CPU_AD selection signal 1 [CPU_AD_SEL1]		When selected: High When not selected: Low	The AD conversion target selection does not operate normally.	4
TP2145	CPU_AD selection signal 2 [CPU_AD_SEL2]		When selected: High When not selected: Low	The AD conversion target selection does not operate normally.	4
TP2146	[LIQ_ISO] is not used.		—	—	2
TP2147	CLEANAC•710 fluid sensor [LIQ_CLEAN]		No fluid: 1.9 V or higher Fluid present: 0.8 V or less	Detergent detection does not operate normally.	1
TP2148	HEMOLYNAC•310 fluid sensor [LIQ_HEMO3]		No fluid: 1.9 V or higher Fluid present: 0.8 V or less	HEMO3 fluid detection does not operate normally.	2
TP2149	HEMOLYNAC•510 fluid sensor [LIQ_HEMO5]		No fluid: 1.9 V or higher Fluid present: 0.8 V or less	HEMO5 fluid detection does not operate normally.	1
TP2150	Pressure sensor 1 [PRESSURE1]		Analog voltage: 0 to 3.3 V	Pressure sensing does not operate normally.	1, 2

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2151	Pressure sensor 2 [PRESSURE2]	ED (TP1509)	Analog voltage: 0 to 3.3 V	Pressure sensing does not operate normally.	1, 2
TP2152	System control [XWR2]		During access: Low Not during access: High	The analyzer does not operate normally.	3
TP2153	AUTOLOADER connection [AL_CONNECT]		Connected: High Not connected: Low	The AUTOLOADER does not operate normally.	1
TP2154	Internal chassis temperature [CASEIN]		When normal: High Interruption request: Low	The analyzer does not operate normally.	1
TP2156	CBC interruption request [XIRQ_CBC_AD]		When normal: High Interruption request: Low	CBC measurement does not operate normally.	3
TP2157	5 Diff interruption request [XIRQ_5DIFF]		When normal: High Interruption request: Low	5 Diff measurement does not operate normally.	4
TP2158	LANC interruption request [XIRQ_LAN]		When normal: High Interruption request: Low	The analyzer does not operate normally.	2
TP2159	Sensor interruption request [XIRQ_SENS]		When normal: High Interruption request: Low	The analyzer does not operate normally.	5
TP2160	Motor, switch, etc. interruption request [XIRQ_MT_SW_SPI]		When normal: High Interruption request: Low	The analyzer does not operate normally.	2
TP2161	SDC interruption request [XIRQ_SD]		When normal: High Interruption request: Low	Accessing SD card does not operate normally.	4
TP2162	Alarm interruption request [XIRQ_ALM]		When normal: High Interruption request: Low	Cannot detect the 5 V, 24 V power loss etc. alarm	4
TP2163	AUTOLOADER reception [RXD_AL]		When normal: High During access: Data	The AUTOLOADER does not operate normally.	1
TP2165	[PC_GPI2] is not used.		—	—	1
TP2167	[XWAIT] is not used.		—	—	2
TP2168	Non-maskable interrupt [NMI]		When normal: High During NMI: Low	The analyzer does not operate normally.	2
TP2169	AUTOLOADER transmission data [TXD_AL]		When normal: High During access: Low	The AUTOLOADER does not operate normally.	1
TP2170	AUTOLOADER power on [XAL_POWON]		During POW ON: Low During POW OFF: High	The AUTOLOADER does not operate normally.	1
TP2171	[PC_GPO] is not used.		—	—	1
TP2172	Bus clock [BCLK]		When normal: 48 MHz	The analyzer does not operate normally.	2
TP2173	Watchdog overflow [XWDTOVF]		When normal: High During WDTOVF: Low	The analyzer does not operate normally.	5
TP2174	EEPROM clock [SCL0]		When normal: High During access: Clock output	The analyzer does not operate normally.	2

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2175	EEPROM data [SDA0]	ED (TP1509)	When normal: High During access: Data	The analyzer does not operate normally.	2
TP2176	System reset instruction [XRESET]		When normal: High During reset: Low	The analyzer does not operate normally.	5
TP2177	Indicator red [INDI_R]		Lit: High Off: Low	The color of the indicator lamp does not become normal.	2
TP2178	Indicator green [INDI_G]		Lit: High Off: Low	The color of the indicator lamp does not become normal.	2
TP2179	Indicator blue [INDI_B]		Lit: High Off: Low	The color of the indicator lamp does not become normal.	2
TP2181	CPLD clock [RTC32K]		When normal: 32.756 kHz	The secondary power does not start up.	5
TP2182	SRAM control [XUBE]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2183	SRAM control [XLBE]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2184	CPU reset [XRESET_CPU]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2185	System reset output [XRESET1]		When normal: High During reset: Low	The analyzer does not operate normally.	5
TP2186	System reset output (motor enable) [XRESET2]		When normal: High During reset: Low	All motors do not operate.	5
TP2187	LANC reset [XRESET_LAN]		When normal: High During reset: Low	The analyzer does not operate normally.	5
TP2188	POWERSW to PC-910W/ PC-911W [PC_POWER_SW]		When normal: Low During reset: High pulse	PC-910W/PC-911W does not operate normally.	1
TP2189	AUTOLOADER reset [AL_RESET]		When normal: Low During reset: High	The AUTOLOADER does not operate normally.	1
TP2190	FPGA (ANA1) chip selection [XCS_ANA1]		When normal: High During access: Low	CBC measurement does not operate normally.	5
TP2191	FPGA (ANA2) chip selection [XCS_ANA2]		When normal: High During access: Low	5 Diff measurement does not operate normally.	5
TP2192	FPGA (DRV) chip selection [XCS_DRV]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2193	FPGA (ANA2) SRAM chip selection [XCS_ANA2_SRAM]		When normal: High During access: Low	5 Diff measurement does not operate normally.	5
TP2194	Chip selection for FPGA (ANA1) configuration memory [XCS_ FLASH_ANA1]		When normal: High During access: Low	FPGA configuration is not performed normally.	5
TP2195	Chip selection for FPGA (ANA2) configuration memory [XCS_FLASH_ANA2]		When normal: High During access: Low	FPGA configuration is not performed normally.	5
TP2196	Chip selection for FPGA (DRV) configuration memory [XCS_ FLASH_DRV]		When normal: High During access: Low	FPGA configuration is not performed normally.	5
TP2197	Flash memory chip selection [XCS_FLASH]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2198	LANC chip selection [XCS_LANC]		When normal: High During access: Low	The analyzer does not operate normally.	5

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2199	SDC chip selection [XSC_SDC]	ED (TP1509)	When normal: High During access: Low	Cannot access the SD card	5
TP2200	Fluid sensor digital potentiometer control [XCS_SIO_VRLIQ]		When normal: High During access: Low	Cannot perform digital potentiometer adjustment of the fluid sensor	1
TP2201	[CS_SIO_RMLIQ] is not used.		—	—	1
TP2202	Fluid sensor digital potentiometer control [SIO_CLK_LIQ]		When normal: High During access: Clock output	Cannot perform fluid sensor digital potentiometer control	1
TP2203	[SIO_DO_LIQ] is not used.		—	—	1
TP2204	HGB digital potentiometer control [HGB_SPI_CS_DPOT]		When normal: High During access: Low	Cannot perform HGB digital potentiometer control	5
TP2205	Short sample (SS) digital potentiometer control [SS_SPI_CS_DPOT]		When normal: High During access: Low	Cannot perform SS digital potentiometer control	5
TP2206	Short sample (SS) emission control [SS_RLY]		When on: High When off: Low	Cannot measure SS normally	5
TP2207	HGB digital potentiometer clock [HGB_SPI_CLK_DPOT]		When normal: High During access: Clock output	Cannot measure HGB normally	5
TP2208	HGB digital potentiometer data [HGB_SPI_DO_DPOT]		When normal: High During access: Data	Cannot measure HGB normally	5
TP2209	[SIO_DI_LIQ] is not used.		—	—	5
TP2214	+3.3 V power on and off [3V_ONOFF]		When on: High When off: Low	The analyzer does not operate normally.	3
TP2215	Other power on and off [ALL_ONOFF]		When on: High When off: Low	The analyzer does not operate normally.	3
TP2216	PC-910W/PC-911W power on and off [P12V_PC_ONOFF]		When on: High When off: Low	The analyzer does not operate normally.	3
TP2217	Power off request [POWER_OFF]		When normal: Low During request: High	The analyzer does not operate normally.	5
TP2219	Secondary power LED [LED_SUBPWR]		Secondary power on: High Secondary power off: Low	The secondary power LED is not lit.	5
TP2220	Buzzer clock [BUZ_CLK]		When normal: Low When sounding: Clock output	The buzzer does not sound.	1
TP2221	Clog removal clock [FLUSH_CLK]		When normal: Low When flushing: Clock output	Clog removal does not operate normally.	4
TP2222	Cup heater clock [HEAT1_CLK]		When normal: Low During heater operation: Clock output	The cup heater does not operate normally.	1
TP2223	Tank heater clock [HEAT2_CLK]		When normal: Low During heater operation: Clock output	The tank heater does not operate normally.	1

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2224	FPGA (ANA1) configuration control [ANA1_DONE]	ED (TP1509)	When normal: High Configuration incomplete: Low	The analyzer does not operate normally.	5
TP2225	FPGA (ANA2) configuration control [ANA2_DONE]		When normal: High Configuration incomplete: Low	The analyzer does not operate normally.	4
TP2226	FPGA (DRV) configuration control [DRV_DONE]		When normal: High Configuration incomplete: Low	The analyzer does not operate normally.	4
TP2227	FPGA configuration control [CNF_SDI]		When normal: High During configuration: Data	The analyzer does not operate normally.	5
TP2228	FPGA configuration control [XFPGA_PROG]		When normal: High During configuration: Low	The analyzer does not operate normally.	4
TP2229	FPGA configuration control [CNF_SDO]		When normal: High During configuration: Data	The analyzer does not operate normally.	5
TP2230	FPGA configuration control [CNF_CLK]		When normal: High During configuration: Clock output	The analyzer does not operate normally.	4
TP2231	FPGA configuration control [PROM_CONT]		When normal: Low During DL: High	The analyzer does not operate normally.	4
TP2232	FPGA (ANA1) configuration control [CNF_ANA1_DI]		When normal: High During configuration: Data	The analyzer does not operate normally.	4
TP2233	FPGA (ANA1) configuration control [CNF_ANA1_DO]		When normal: High During configuration: Data	The analyzer does not operate normally.	4
TP2234	FPGA (ANA1) configuration control [CNF_ANA1_CS]		When normal: High During configuration: Low	The analyzer does not operate normally.	4
TP2235	FPGA (ANA1) configuration control [CNF_ANA1_CLK]		When normal: High During configuration: Clock output	The analyzer does not operate normally.	4
TP2236	FPGA (ANA2) configuration control [CNF_ANA2_CS]		When normal: High During configuration: Low	The analyzer does not operate normally.	4
TP2237	FPGA (ANA2) configuration control [CNF_ANA2_CLK]		When normal: High During configuration: Clock output	The analyzer does not operate normally.	4
TP2238	FPGA (ANA2) configuration control [CNF_ANA2_DO]		When normal: High During configuration: Data	The analyzer does not operate normally.	4
TP2239	5 Diff AD converter clock [DIFF_AD_CLK]		When normal: High During operation: Clock output	5 Diff measurement does not operate normally.	4

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2240	5 Diff AD converter channel selection [DIFF_AD_SEL0]	ED (TP1509)	Selection bit 0 data	5 Diff measurement does not operate normally.	4
TP2241	5 Diff AD converter channel selection [DIFF_AD_SEL1]		Selection bit 1 data	5 Diff measurement does not operate normally.	4
TP2242	[DIFF_AD_SEL2] is not used.		—	—	4
TP2243	Laser on [LASER_POWERON]		When normal: Low When on: High	The laser does not turn on.	1
TP2244	Laser LED [LASER_LED]		Laser off: Low Laser on: High	The laser LED is not lit.	4
TP2245	5 Diff CAL clock [DIFF_CAL_CLK]		When normal: High During CAL: Clock output	Cannot perform 5 Diff calibration	4
TP2246	5 Diff CAL selection [DIFF_CAL_SEL]		When normal: High During CAL: Low	Cannot perform 5 Diff circuit check	4
TP2247	5 Diff peak hold [DIFF_PK_HLD]		During hold: High During reset: Low	Cannot perform 5 Diff measurement	4
TP2248	5 Diff digital potentiometer control [DIFF_SPI_CLK_DPOT]		When normal: High During access: Clock output	Cannot perform 5 Diff sensitivity adjustment	4
TP2249	5 Diff digital potentiometer control [DIFF_SPI_CS_DPOT]		When normal: High During access: Low	Cannot perform 5 Diff sensitivity adjustment	4
TP2250	5 Diff digital potentiometer control [DIFF_SPI_DO_DPOT]		When normal: High During access: Data	Cannot perform 5 Diff sensitivity adjustment	4
TP2251	CBC CAL pulse [CAL_PLS]		When normal: Low During CAL: Clock output	Cannot perform CBC circuit check	3
TP2252	RBC relay control [RBC_AMP_RLY]		When normal: Low During measurement: High	RBC and PLT measurement do not operate normally.	3
TP2253	RBC relay control [RBC_CAL_RLY]		When normal: Low During CAL: High	Cannot perform RBC circuit check	3
TP2254	RBC relay control [RBC_FLUSH_RLY]		When normal: Low When flushing: High	Cannot remove clog	3
TP2255	WBC relay control [WBC_AMP_RLY]		When normal: Low During measurement: High	WBC measurement does not operate normally.	3
TP2256	WBC relay control [WBC_CAL_RLY]		When normal: Low During CAL: High	Cannot perform WBC circuit check	3
TP2257	WBC relay control [WBC_FLUSH_RLY]		When normal: Low When flushing: High	Cannot remove clog	3
TP2258	HGB emission [HGB_RLY]		When normal: Low LED emission: High	Cannot measure HGB	3
TP2259	RBC AD converter channel selection [RBC_SEL]		During blood cell measurement: Low During electrode measurement: High	Cannot measure RBC, PLT and electrode voltage	3

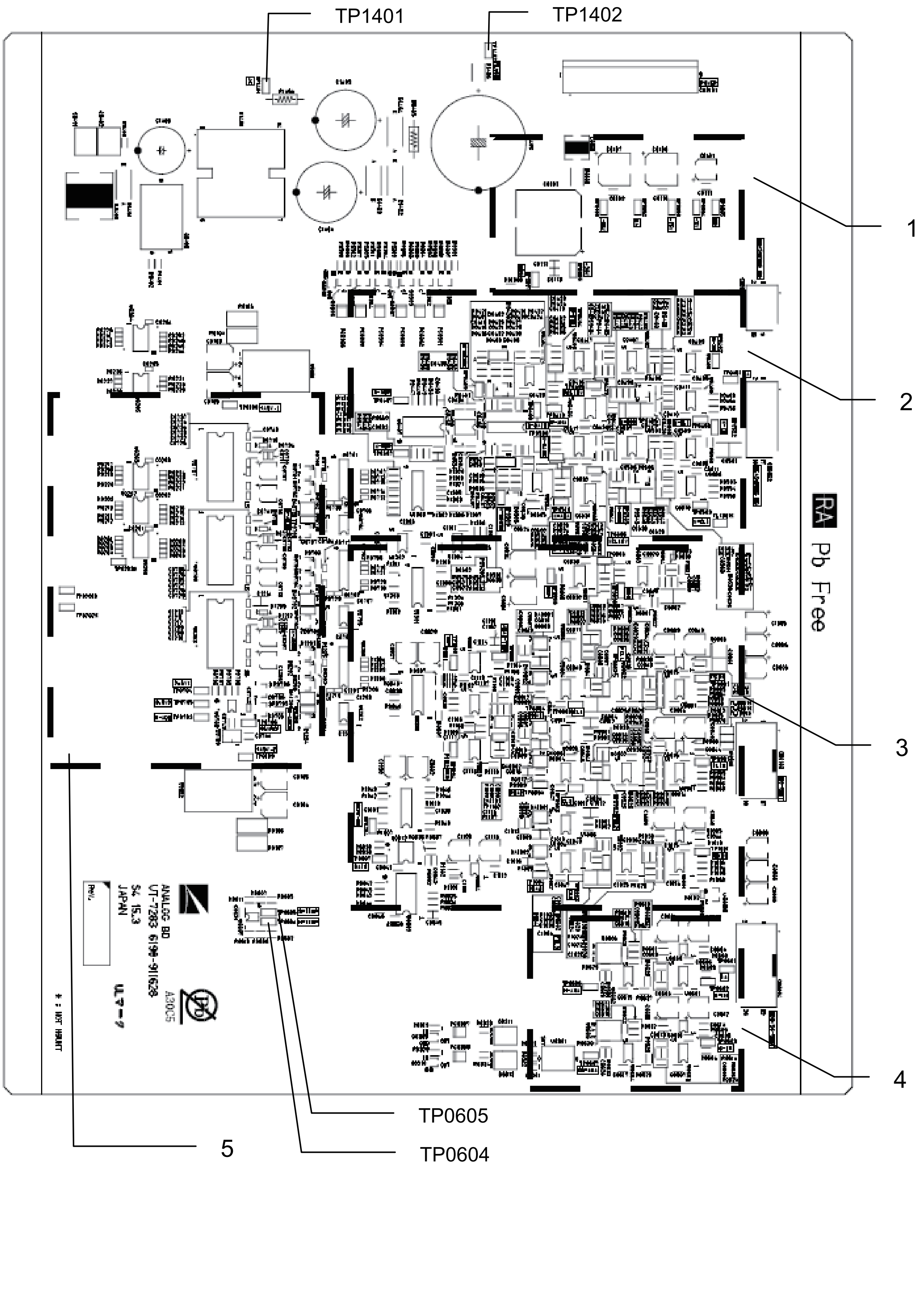
Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2260	RBC AD converter channel selection [RBC_SEL]	ED (TP1509)	During blood cell measurement: Low During electrode measurement: High	Cannot measure WBC or electrode voltage	3
TP2261	HGB AD converter chip selection [XHGB_AD_CS]		When normal: High During access: Low	HGB and SS measurement do not operate normally.	3
TP2262	HGB AD conversion data output [HGB_AD_DOUT]		When normal: High During access: Data	HGB and SS measurement do not operate normally.	3
TP2263	RBC AD converter clock [R_AD_CLK]		When normal: Low During access: Clock output	RBC and PLT measurement do not operate normally.	3
TP2264	WBC AD converter clock [W_AD_CLK]		When normal: Low During access: Clock output	WBC measurement does not operate normally.	3
TP2265	HGB AD converter clock [HGB_AD_CLK]		When normal: Low During access: Clock output	HGB measurement does not operate normally.	3
TP2266	FPGA (DRV) configuration control [CNF_DRV_DI]		When normal: High During configuration: Data	The analyzer does not operate normally.	5
TP2267	Motor interruption request [XIRQ_MT]		When normal: High During interruption: Low	The analyzer does not operate normally.	5
TP2268	FPGA (DRV) configuration control [CNF_DRV_CS]		When normal: High During configuration: Low	The analyzer does not operate normally.	5
TP2269	FPGA (DRV) configuration control [CNF_DRV_CLK]		When normal: High During configuration: Clock output	The analyzer does not operate normally.	5
TP2270	FPGA (DRV) configuration control [CNF_DRV_DO]		When normal: High During configuration: Data	The analyzer does not operate normally.	5
TP2271	Laser permission signal [SW_LASER_KEY]		Permission: High No permission: Low	The laser does not turn on.	1
TP2272	Address bus A[0]		When normal: High During access: Address	The analyzer does not operate normally.	2
TP2273	Address bus A[1]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2274	Address bus A[2]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2275	Address bus A[3]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2276	Address bus A[4]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2277	Address bus A[5]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2278	Address bus A[6]		When normal: High During access: Address	The analyzer does not operate normally.	4

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2279	Address bus A[7]	ED (TP1509)	When normal: High During access: Address	The analyzer does not operate normally.	4
TP2280	Address bus A[8]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2281	Address bus A[9]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2282	Address bus A[10]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2283	Address bus A[11]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2284	Address bus A[12]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2285	Address bus A[13]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2286	Address bus A[14]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2287	Address bus A[15]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2288	Address bus A[16]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2289	Address bus A[17]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2290	Address bus A[18]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2291	Address bus A[19]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2292	Address bus A[20]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2293	Address bus A[21]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2294	Address bus A[22]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2295	Address bus A[23]		When normal: High During access: Address	The analyzer does not operate normally.	4
TP2296	Data bus D[0]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2297	Data bus D[1]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2298	Data bus D[2]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2299	Data bus D[3]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2300	Data bus D[4]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2301	Data bus D[5]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2302	Data bus D[6]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2303	Data bus D[7]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2304	Data bus D[8]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2305	Data bus D[9]		When normal: High During access: Data bus	The analyzer does not operate normally.	4

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2306	Data bus D[10]	ED (TP1509)	When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2307	Data bus D[11]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2308	Data bus D[12]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2309	Data bus D[13]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2310	Data bus D[14]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2311	Data bus D[15]		When normal: High During access: Data bus	The analyzer does not operate normally.	4
TP2312	System control [XRD2]		When normal: High During access: Low	The analyzer does not operate normally.	4
TP2313	System control [XHWR]		When normal: High During access: Low	The analyzer does not operate normally.	4
TP2314	System control [XLWR]		When normal: High During access: Low	The analyzer does not operate normally.	4
TP2315	System control [XWR]		When normal: High During access: Low	The analyzer does not operate normally.	4
TP2316	System control (built-in ROM, boot) [XCS0]		When normal: High During access: Low	The analyzer does not operate normally.	2
TP2317	System control (flash memory) [XCS1]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2318	System control (FPGA ANA2) [XCS2]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2319	System control (FPGA ANA1) [XCS3]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2320	System control (CPLD) [XCS4]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2321	System control (SRAM) [XCS5]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2322	System control (SDC, LANC) [XCS6]		When normal: High During access: Low	The analyzer does not operate normally.	5
TP2323	[XCS7] is not used.		—	—	2
TP2324	Open loader: Back sensor [SENS35]		Sensor shielded: Low Sensor open: High	Manual measurement does not operate normally.	5
TP2325	[SENS36] is not used.		—	—	5
TP2326	HGB LED temperature [HGB_LED_TEMP]		Analog value: 0 to 3.3 V	HGB measurement does not operate normally.	3
TP2327	SS_LED temperature [SS_LED_TEMP]		Analog value: 0 to 3.3 V	SS measurement does not operate normally.	3
TP2328	Diluter motor control [XMD_MT_EN]		Disabled: High Enabled: Low	The diluter motor does not operate normally.	5
TP2329	Diluter motor control [MD_MT_M1]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The diluter motor does not operate normally.	5
TP2330	Diluter motor control [MD_MT_M2]			The diluter motor does not operate normally.	5
TP2331	Diluter motor control [MD_MT_M3]			The diluter motor does not operate normally.	5
TP2332	Diluter motor control [MD_MT_CW]		CW: Low CCW: High	The diluter motor does not operate normally.	5

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2333	Diluter motor current down [MD_MT_CDWN]	ED (TP1509)	Normal: Low Current down: High	The diluter motor does not operate normally.	5
TP2334	Diluter motor control [MD_MT_CLK]		Normal: Low During operation: Clock output	The diluter motor does not operate normally.	5
TP2335	All motor driver reset [DRV_RESET]		Normal: High Reset: Low	All motors do not operate normally.	5
TP2336	MV20_A [MV_01]		ON: High OFF: Low	MV20_A does not operate normally.	5
TP2337	[FAN_SENS1] is not used.		—	—	5

UT-7283 ANALOG BD



Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0101	+15 V line voltage	EA (TP0401)	14.7 to 15.3 V	Cannot measure data normally	1
TP0102	EA (analog GND)		0 V	—	1
TP0103	−15 V line voltage		−14.7 to −15.3 V	Cannot measure data normally	1
TP0104	+5 V line voltage	ED (TP0105)	4.75 to 5.25 V	Cannot measure data normally	1
TP0105	ED (digital GND)		0 V	—	1
TP0106	+36 V line voltage	E36 (TP0107)	35.0 to 36.36 V	Cannot measure data normally	1
TP0107	E36 (analog GND)		0 V	—	1
TP0108	+A5V_1 line voltage	EA (TP0401)	4.9 to 5.1 V	Cannot measure RBC and WBC (CBC) data normally	5
TP0109	+A5V_2 line voltage		4.9 to 5.1 V	Cannot measure 5 Diff data normally	5
TP0201	Reserve (unimplemented)	ED (TP0105)	—	—	5
TP0202	Reserve (unimplemented)		—	—	5
TP0203	Reserve (unimplemented)		—	—	5
TP0204	5 Diff system peak hold control signal [DIFF-PH]		When normal: Low When detected: High	Cannot measure 5 Diff system data normally	3
TP0401	EA	EA (TP0401)	0 V	—	2
TP0402	RBC measurement data [R-IN]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0403	RBC electrode voltage [R-ELE]		When normal: Low During electrode voltage measurement: 34.5 V or less	Cannot measure the electrode voltage of the RBC measurement section	2
TP0404	Acquired data after passing through the RBC Bessel filter [R-FIL]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0405	Baseline correction signal of RBC data acquisition phase control section [R-ROB]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0406	Threshold level of RBC data acquisition phase control section [RCLLEV]		100 mV	Cannot measure RBC, PLT system data normally	2
TP0407	Threshold level detection signal of RBC data acquisition phase control section [R-RBP]		When normal: Low When detected: High	Cannot measure RBC, PLT system data normally	2
TP0408	Baseline release control signal during RBC data acquisition [R-GATE]		When normal: Low When data is detected: High	Cannot measure RBC, PLT system data normally	2
TP0409	RBC hardware noise flag [R-NOISE]		When normal: Low When hardware noise is detected: High	Cannot detect the RBC hardware noise	2

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0410	Acquired data after RBC amplification [R-ANA]	EA (TP0401)	When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0502	WBC measurement data [W-IN]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0503	WBC electrode voltage [W-ELE]		When normal: Low During electrode voltage measurement: 34.5 V or less	Cannot measure the electrode voltage of the WBC measurement section	2
TP0504	Acquired data after passing through the WBC Bessel filter [W-FIL]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0505	Baseline correction signal of WBC data acquisition phase control section [W-ROB]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0506	Threshold level of WBC data acquisition phase control section [WCLLEV]		460 mV	Cannot measure RBC, PLT system data normally	2
TP0507	Threshold level detection signal of WBC data acquisition phase control section [W-RBP]		When normal: Low When detected: High	Cannot measure RBC, PLT system data normally	2
TP0508	Baseline release control signal during WBC data acquisition [W-GATE]		When normal: Low When data is detected: High	Cannot measure RBC, PLT system data normally	2
TP0509	WBC hardware noise flag [W-NOISE]		When normal: Low When hardware noise is detected: High	Cannot detect the WBC hardware noise	2
TP0510	Acquired data after WBC amplification [W-ANA]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally	2
TP0601	EA		0 V	—	4
TP0602	HGB measurement data [H-IN]		When normal: Low When detected: Several V	Cannot measure HGB data normally	4
TP0603	SS measurement data [S-IN]		When normal: Low When detected: Several V	Cannot measure SS data normally	4
TP0604	HGB LED temperature data [H-TEMP]		0 deg: About 3.285 V 22.5 deg: About 2.118 V 50 deg: About 1.073 V	Cannot acquire HGB LED temperature normally	

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0605	SS LED temperature data [S-TEMP]	EA (TP0401)	0 deg: About 3.285 V 22.5 deg: About 2.118 V 50 deg: About 1.073 V	Cannot acquire SS LED temperature normally	
TP0606	Measurement data after HGB setting sensitivity amplification [H-ANA]		When normal: Low When detected: Several V	Cannot measure HGB data normally	4
TP0607	Measurement data after SS setting sensitivity amplification [SS-ANA]		When normal: Low When detected: Several V	Cannot measure SS data normally	4
TP0701	RBC, PLT AD converter acquired data [R-ADIN]		When normal: Low When detected: Several V	Cannot measure RBC, PLT system data normally	5
TP0702	WBC AD converter acquired data [W-ADIN]		When normal: Low When detected: Several V	Cannot measure WBC (CBC) data normally	5
TP0703	AD converter output of HGB, SS measurement data [H-ADO]		When normal: Low When detected: Several V	Cannot measure HGB, SS data normally	5
TP0704	Reserve [2.5V1]		2.5 V	—	5
TP0705	Reserve [2.5V2]		2.5 V	—	5
TP0706	+5VREF line voltage		4.994 to 5.006 V	Cannot measure HGB, SS data accurately	5
TP0801	5 Diff system FS measurement data [FSIN]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0802	Acquired data after passing through the 5 Diff system FS Bessel filter [FIL1]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0803	Acquired data before 5 Diff system FS peak hold [CL1]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0804	5 Diff system FS acquired data peak hold signal [PHA1]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0805	Threshold level of 5 Diff system FS data acquisition phase control section [RBTHR]		460 mV	Cannot measure 5 Diff system data normally	3
TP0806	Threshold level detection signal of 5 Diff system FS data acquisition phase control section [RBP]		When normal: Low When detected: High	Cannot measure 5 Diff system data normally	3

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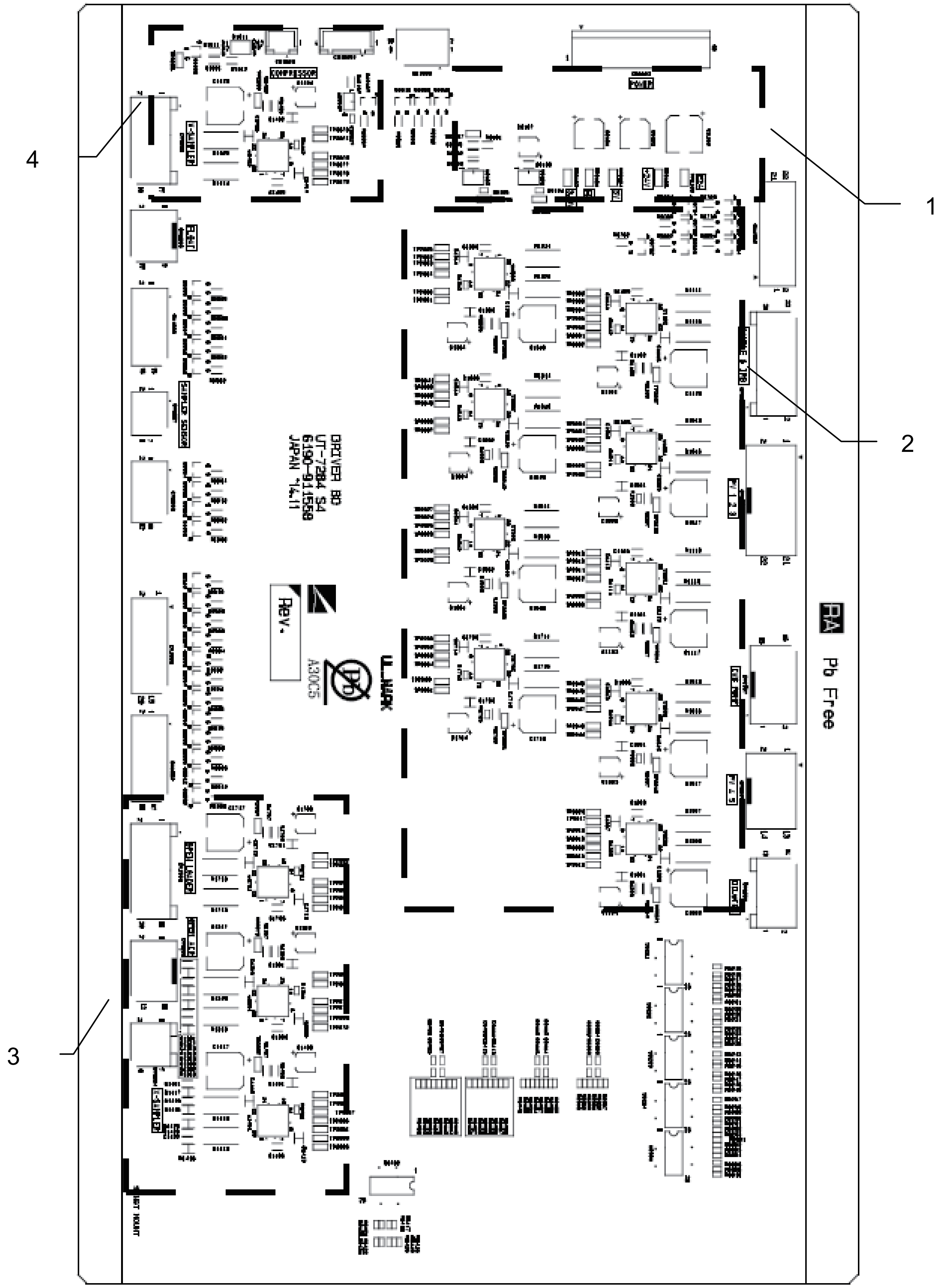
Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0807	Baseline release control signal during 5 Diff system FS data acquisition [GATE]	EA (TP0401)	When normal: Low When detected: High	Cannot measure 5 Diff system data normally	3
TP0808	Baseline correction signal of 5 Diff system FS data acquisition phase control section [RB1]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0901	5 Diff system FL measurement data [FLIN]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0902	Acquired data after passing through the 5 Diff system FL Bessel filter [FIL2]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0903	5 Diff system FL acquired data peak hold signal [CL2]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP0904	5 Diff system FL acquired data peak hold signal [PHA2]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP1001	5 Diff system SD measurement data [SDIN]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP1002	Acquired data after passing through the 5 Diff system SD Bessel filter [FIL3]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP1003	5 Diff system SD acquired data peak hold signal [CL3]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP1004	5 Diff system SD acquired data peak hold signal [PHA3]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure 5 Diff system data normally	3
TP1101	Threshold level of 5 Diff system FS [ANA1-THR]		According to optical threshold level setting	Cannot measure 5 Diff system data normally	3
TP1102	Threshold level for 5 Diff system FS peak detect detection		460 mV	Cannot measure 5 Diff system data normally	3
TP1103	5 Diff system FS threshold detection flag [THP]		When normal: Low When detected: High	Cannot measure 5 Diff system data normally	3
TP1104	5 Diff system FS peak detect detection [PKD]		When normal: Low When detected: High	Cannot measure 5 Diff system data normally	3
TP1201	5 Diff system AD converter acquired data [D-ADIN]		When normal: Low When detected: High	Cannot measure 5 Diff system data normally	5

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP1401	Before clog removal voltage generation amplification [AC]	EA (TP0401)	When normal: Low When voltage detected is: Vp-p about 280 V	Cannot generate clog removal voltage	
TP1402	After clog removal voltage generation amplification [FLUSH]		When normal: Low When voltage detected is: 200 to 280 V	Cannot generate clog removal voltage	

UT-7284 DRIVER BD



Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0101	Acquired data after passing through the 5 Diff system FS Bessel filter [FIL1]	ED (TP0101)	—	—	1
TP0102	Power [3.3 V]		3.135 to 3.465 V	—	1
TP0103	Power [+24 V]	E24 (TP0105)	22.8 to 25.2 V	—	1
TP0104	Power [5 V]		4.75 to 5.25 V	—	1
TP0105	24 V, 5 V system GND [E24]		—	—	1
TP2001	IRBC motor control CLK [IRBC_MT_CLK_BUF]	ED (TP0101)	During motor operation: Clock output	The IRBC motor does not operate normally.	2
TP2002	IRBC motor rotation direction [IRBC_MT_CW_BUF]		During motor CW: High During motor CCW: Low	The IRBC motor does not operate normally.	2
TP2003	IRBC motor excitation mode [IRBC_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The IRBC motor does not operate normally.	2
TP2004	IRBC motor excitation mode [IRBC_MT_M2_BUF]			The IRBC motor does not operate normally.	2
TP2005	IRBC motor excitation mode [IRBC_MT_M3_BUF]			The IRBC motor does not operate normally.	2
TP2006	IRBC motor control enable [XIRBC_MT_EN_BUF]		Disabled: High Enabled: Low	The IRBC motor does not operate normally.	2
TP2007	IRBC motor control current setting [IRBC_REF]		During operation: About 1.317 V During current down: About 0.486 V	The IRBC motor does not operate normally.	2
TP2008	IWBC motor control CLK [IWBC_MT_CLK_BUF]		During motor operation: Clock output	The IWBC motor does not operate normally.	2
TP2009	IWBC motor rotation direction [IWBC_MT_CW_BUF]		During motor CW: High During motor CCW: Low	The IWBC motor does not operate normally.	2
TP2010	IWBC motor excitation mode [IWBC_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The IWBC motor does not operate normally.	2
TP2011	IWBC motor excitation mode [IWBC_MT_M2_BUF]			The IWBC motor does not operate normally.	2
TP2012	IWBC motor excitation mode [IWBC_MT_M3_BUF]			The IWBC motor does not operate normally.	2
TP2013	IWBC motor control enable [XIWBC_MT_EN_BUF]		Disabled: High Enabled: Low	The IWBC motor does not operate normally.	2
TP2014	IWBC motor control current setting [IWBC_REF]		During operation: About 0.886 V During current down: About 0.435 V	The IWBC motor does not operate normally.	2
TP2015	Diluter motor control CLK [MD_MT_CLK_BUF]		During motor operation: Clock output	The diluter motor does not operate normally.	2
TP2016	Diluter motor rotation direction [MD_MT_CW_BUF]		During motor CW: High During motor CCW: Low	The diluter motor does not operate normally.	2
TP2017	Diluter motor excitation mode [MD_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The diluter motor does not operate normally.	2
TP2018	Diluter motor excitation mode [MD_MT_M2_BUF]			The diluter motor does not operate normally.	2
TP2019	Diluter motor excitation mode [MD_MT_M3_BUF]			The diluter motor does not operate normally.	2

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2020	Diluter motor control enable [XMD_MT_EN_BUF]	ED (TP0101)	Disabled: High Enabled: Low	The diluter motor does not operate normally.	2
TP2021	Diluter motor control current setting [MD_REF]		During operation: About 0.947 V During current down: About 0.449 V	The diluter motor does not operate normally.	2
TP2022	Pinch valve 1 control CLK [PINCH1_MT_CLK_BUF]		During motor operation: Clock output	Pinch valve 1 does not operate normally.	2
TP2023	Pinch valve 1 rotation direction [PINCH1_MT_CW_BUF]		During motor CW: High During motor CCW: Low	Pinch valve 1 does not operate normally.	2
TP2024	Pinch valve 1 excitation mode [PINCH1_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	Pinch valve 1 does not operate normally.	2
TP2025	Pinch valve 1 excitation mode [PINCH1_MT_M2_BUF]			Pinch valve 1 does not operate normally.	2
TP2026	Pinch valve 1 excitation mode [PINCH1_MT_M3_BUF]			Pinch valve 1 does not operate normally.	2
TP2027	Pinch valve 1 control enable [XPINCH1_MT_EN_BUF]		Disabled: High Enabled: Low	Pinch valve 1 does not operate normally.	2
TP2028	Pinch valve 1 control current setting [PINCH1_REF]		During operation: About 1.063 V During current down: About 0.422 V	Pinch valve 1 does not operate normally.	2
TP2029	Pinch valve 2 control CLK [PINCH2_MT_CLK_BUF]		During motor operation: Clock output	Pinch valve 2 does not operate normally.	2
TP2030	Pinch valve 2 rotation direction [PINCH2_MT_CW_BUF]		During motor CW: High During motor CCW: Low	Pinch valve 2 does not operate normally.	2
TP2031	Pinch valve 2 excitation mode [PINCH2_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	Pinch valve 2 does not operate normally.	2
TP2032	Pinch valve 2 excitation mode [PINCH2_MT_M2_BUF]			Pinch valve 2 does not operate normally.	2
TP2033	Pinch valve 2 excitation mode [PINCH2_MT_M3_BUF]			Pinch valve 2 does not operate normally.	2
TP2034	Pinch valve 2 control enable [XPINCH2_MT_EN_BUF]		Disabled: High Enabled: Low	Pinch valve 2 does not operate normally.	2
TP2035	Pinch valve 2 control current setting [PINCH2_REF]		During operation: About 1.063 V During current down: About 0.422 V	Pinch valve 3 does not operate normally.	2
TP2036	Pinch valve 3 control CLK [PINCH3_MT_CLK_BUF]		During motor operation: Clock output	Pinch valve 3 does not operate normally.	2
TP2037	Pinch valve 3 rotation direction [PINCH3_MT_CW_BUF]		During motor CW: High During motor CCW: Low	Pinch valve 3 does not operate normally.	2
TP2038	Pinch valve 3 excitation mode [PINCH3_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	Pinch valve 3 does not operate normally.	2
TP2039	Pinch valve 3 excitation mode [PINCH3_MT_M2_BUF]			Pinch valve 3 does not operate normally.	2
TP2040	Pinch valve 3 excitation mode [PINCH3_MT_M3_BUF]			Pinch valve 3 does not operate normally.	2
TP2041	Pinch valve 3 control enable [XPINCH3_MT_EN_BUF]		Disabled: High Enabled: Low	Pinch valve 3 does not operate normally.	2

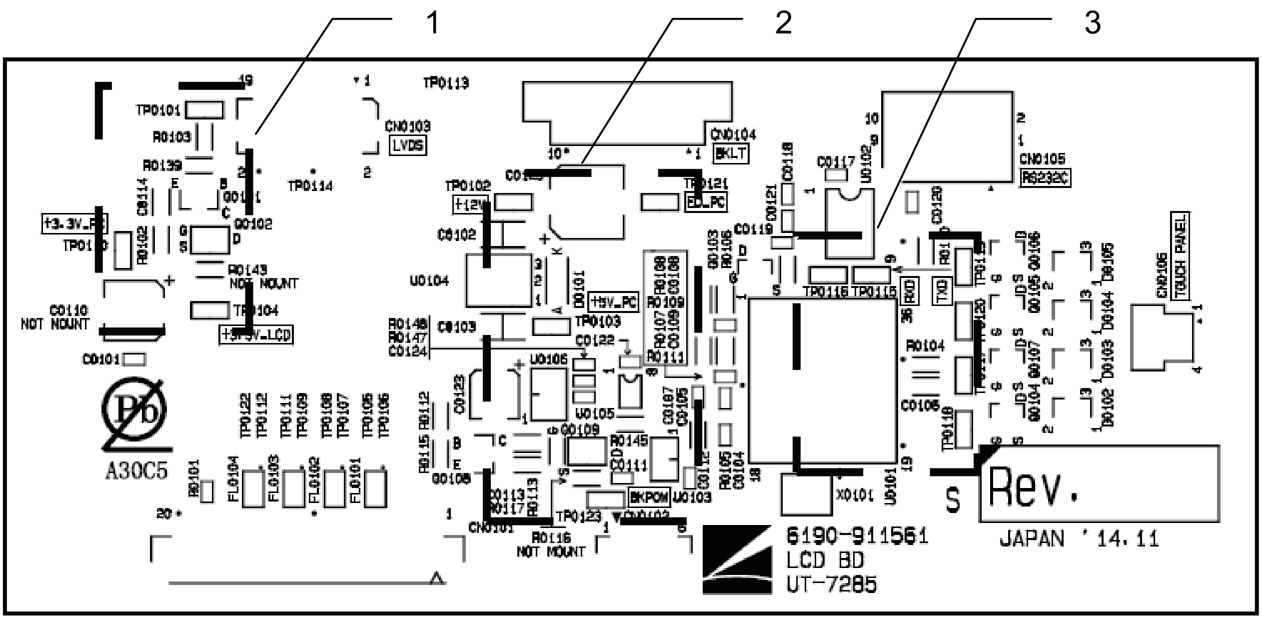
Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2042	Pinch valve 3 control current setting [PINCH3_REF]	ED (TP0101)	During operation: About 1.063 V During current down: About 0.422 V	Pinch valve 4 does not operate normally.	2
TP2043	Pinch valve 4 control CLK [PINCH4_MT_CLK_BUF]		During motor operation: Clock output	Pinch valve 4 does not operate normally.	2
TP2044	Pinch valve 4 rotation direction [PINCH4_MT_CW_BUF]		During motor CW: High During motor CCW: Low	Pinch valve 4 does not operate normally.	2
TP2045	Pinch valve 4 excitation mode [PINCH4_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	Pinch valve 4 does not operate normally.	2
TP2046	Pinch valve 4 excitation mode [PINCH4_MT_M2_BUF]			Pinch valve 4 does not operate normally.	2
TP2047	Pinch valve 4 excitation mode [PINCH4_MT_M3_BUF]			Pinch valve 4 does not operate normally.	2
TP2048	Pinch valve 4 control enable [XPINCH4_MT_EN_BUF]		Disabled: High Enabled: Low	Pinch valve 4 does not operate normally.	2
TP2049	Pinch valve 4 control current setting [PINCH4_REF]		During operation: About 1.063 V During current down: About 0.422 V	Pinch valve 4 does not operate normally.	2
TP2050	Pinch valve 5 control CLK [PINCH5_MT_CLK_BUF]		During motor operation: Clock output	Pinch valve 5 does not operate normally.	2
TP2051	Pinch valve 5 rotation direction [PINCH5_MT_CW_BUF]		During motor CW: High During motor CCW: Low	Pinch valve 5 does not operate normally.	2
TP2052	Pinch valve 5 excitation mode [PINCH5_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	Pinch valve 5 does not operate normally.	2
TP2053	Pinch valve 5 excitation mode [PINCH5_MT_M2_BUF]			Pinch valve 5 does not operate normally.	2
TP2054	Pinch valve 5 excitation mode [PINCH5_MT_M3_BUF]			Pinch valve 5 does not operate normally.	2
TP2055	Pinch valve 5 control enable [XPINCH5_MT_EN_BUF]		Disabled: High Enabled: Low	Pinch valve 5 does not operate normally.	2
TP2056	Pinch valve 5 control current setting [PINCH5_REF]		During operation: About 1.063 V During current down: About 0.422 V	Pinch valve 5 does not operate normally.	2
TP2057	Local reset [XDRV_RESET1]		Normal: High Reset: Low	The sampler vertical or horizontal, pressure release or open loader motor does not operate normally.	3
TP2058	Local reset [XDRV_RESET2]		Normal: High Reset: Low	The IRBC, sample pump or pinch valve 1, 2 or 5 motor does not operate normally.	2
TP2059	Local reset [XDRV_RESET3]		Normal: High Reset: Low	The IWBC, diluter or pinch valve 3 or 4 motor does not operate normally.	2
TP2060	Sample pump motor control CLK [SAM_MT_CLK_BUF]		During motor operation: Clock output	The sample pump motor does not operate normally.	2

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2061	Sample pump motor rotation direction [SAM_MT_CW_BUF]	ED (TP0101)	During motor CW: High During motor CCW: Low	The sample pump motor does not operate normally.	2
TP2062	Sample pump motor excitation mode [SAM_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The sample pump motor does not operate normally.	2
TP2063	Sample pump motor excitation mode [SAM_MT_M2_BUF]			The sample pump motor does not operate normally.	2
TP2064	Sample pump motor excitation mode [SAM_MT_M3_BUF]			The sample pump motor does not operate normally.	2
TP2065	Sample pump motor control enable [XSAM_MT_EN_BUF]		Disabled: High Enabled: Low	The sample pump motor does not operate normally.	2
TP2066	Sample pump motor control current setting [SAM_REF]		During operation: About 1.317 V During current down: About 0.486 V	The sample pump motor does not operate normally.	2
TP2067	Pressure release motor control CLK [OPA_MT_CLK_BUF]		During motor operation: Clock output	The pressure release motor does not operate normally.	3
TP2068	Pressure release motor rotation direction [OPA_MT_CW_BUF]		During motor CW: High During motor CCW: Low	The pressure release motor does not operate normally.	3
TP2069	Pressure release motor excitation mode [OPA_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The pressure release motor does not operate normally.	3
TP2070	Pressure release motor excitation mode [OPA_MT_M2_BUF]			The pressure release motor does not operate normally.	3
TP2071	Pressure release motor excitation mode [OPA_MT_M3_BUF]			The pressure release motor does not operate normally.	3
TP2072	Pressure release motor control enable [XOPA_MT_EN_BUF]		Disabled: High Enabled: Low	The pressure release motor does not operate normally.	3
TP2073	Pressure release motor control current setting [OPA_REF]		During operation: About 1.808 V During current down: About 0.615 V	The pressure release motor does not operate normally.	3
TP2074	Sampler vertical motor control CLK [SMPR1_MT_CLK_BUF]		During motor operation: Clock output	The sampler vertical motor does not operate normally.	3
TP2075	Sampler vertical motor rotation direction [SMPR1_MT_CW_BUF]		During motor CW: High During motor CCW: Low	The sampler vertical motor does not operate normally.	3

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2076	Sampler vertical motor excitation mode [SMPR1_MT_M1_BUF]	ED (TP0101)	M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The sampler vertical motor does not operate normally.	3
TP2077	Sampler vertical motor excitation mode [SMPR1_MT_M2_BUF]			The sampler vertical motor does not operate normally.	3
TP2078	Sampler vertical motor excitation mode [SMPR1_MT_M3_BUF]			The sampler vertical motor does not operate normally.	3
TP2079	Sampler vertical motor control enable [XSMPR1_MT_EN_BUF]		Disabled: High Enabled: Low	The sampler vertical motor does not operate normally.	3
TP2080	Sampler vertical motor control current setting [SMPR1_REF]		During operation: About 1.808 V During current down: About 0.615 V	The sampler vertical motor does not operate normally.	3
TP2081	Sampler horizontal motor control CLK [SMPR2_MT_CLK_BUF]		During motor operation: Clock output	The sampler horizontal motor does not operate normally.	4
TP2082	Sampler horizontal motor rotation direction [SMPR2_MT_CW_BUF]		During motor CW: High During motor CCW: Low	The sampler horizontal motor does not operate normally.	4
TP2083	Sampler horizontal motor excitation mode [SMPR2_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The sampler horizontal motor does not operate normally.	4
TP2084	Sampler horizontal motor excitation mode [SMPR2_MT_M2_BUF]			The sampler horizontal motor does not operate normally.	4
TP2085	Sampler horizontal motor excitation mode [SMPR2_MT_M3_BUF]			The sampler horizontal motor does not operate normally.	4
TP2086	Sampler horizontal motor control enable [XSMPR2_MT_EN_BUF]		Disabled: High Enabled: Low	The sampler horizontal motor does not operate normally.	4
TP2087	Sampler horizontal motor control current setting [SMPR2_REF]		During operation: About 1.808 V During current down: About 0.615 V	The sampler horizontal motor does not operate normally.	4
TP2088	Open loader motor control CLK [OPLD_MT_CLK_BUF]		During motor operation: Clock output	The open loader motor does not operate normally.	3
TP2089	Open loader motor rotation direction [OPLD_MT_CW_BUF]		During motor CW: High During motor CCW: Low	The open loader motor does not operate normally.	3
TP2090	Open loader motor excitation mode [OPLD_MT_M1_BUF]		M3 M2 M1 Excitation 0 0 0 2-phase 0 0 1 1-2-phase 0 1 0 W1-2-phase 0 1 1 2W1-2-phase 1 1 1 4W1-2-phase	The open loader motor does not operate normally.	3
TP2091	Open loader motor excitation mode [OPLD_MT_M2_BUF]			The open loader motor does not operate normally.	3
TP2092	Open loader motor excitation mode [OPLD_MT_M3_BUF]			The open loader motor does not operate normally.	3
TP2093	Open loader motor control enable [XOPLD_MT_EN_BUF]		Disabled: High Enabled: Low	The open loader motor does not operate normally.	3

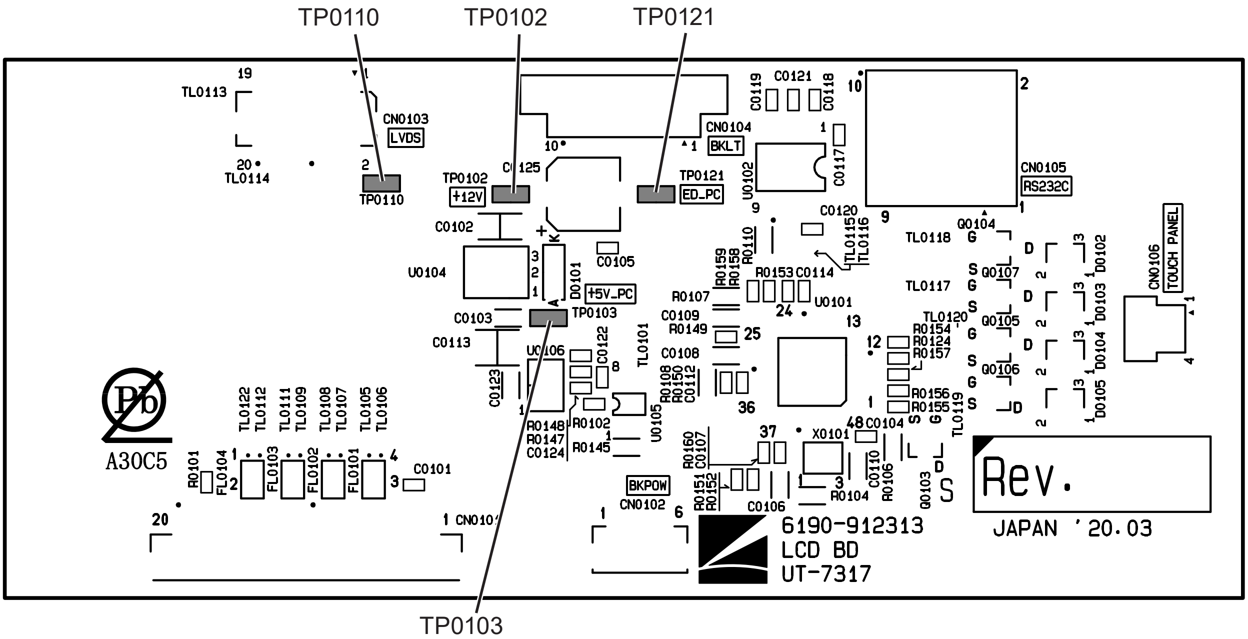
Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP2094	Open loader motor control current setting [OPLD_REF]	ED (TP0101)	During operation: About 0.806 V During current down: About 0.394 V	The open loader motor does not operate normally.	3
TP2095	5 V power loss alarm [ALM_5]		Active: Low Normal: High	The power loss alarm does not operate normally.	1
TP2096	24 V power loss alarm [ALM_24]		Normal: High During 24 V power loss: Returns to High after Low	The power loss alarm does not operate normally.	1
TP2097	24 V power loss alarm monitor signal [DCT_24_IN]	E24 (TP0105)	Normal: About 3.721 to 4.112 V During 24 V power loss: About 0 V	The power loss alarm does not operate normally.	1
TP2098	Pneumatic source control signal [COMP_ONOFF_BUF]	ED (TP0101)	During operation: High When stopped: Returns to High after Low	The pneumatic source does not operate normally.	4

UT-7285 LCD BD



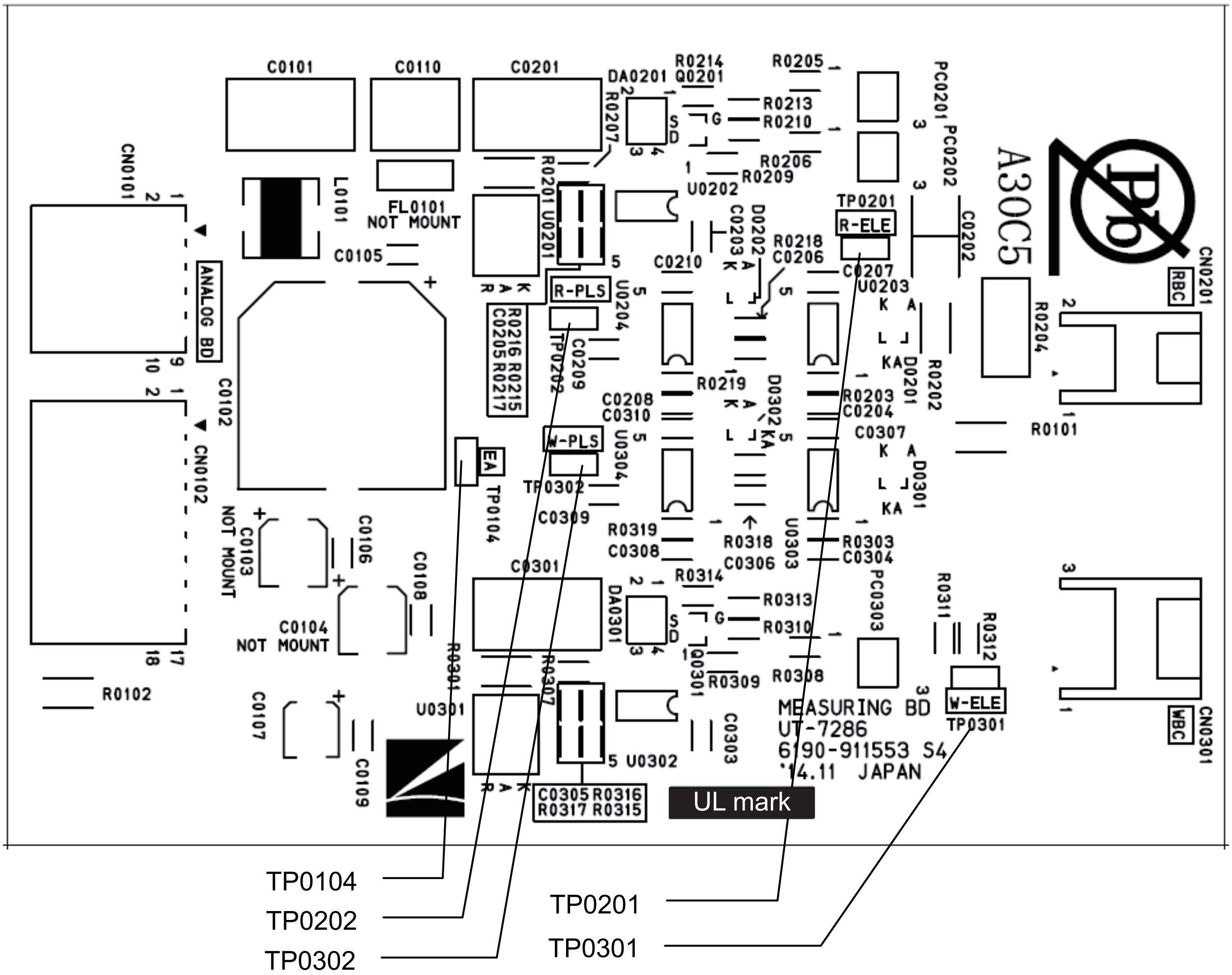
Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0101	LVDS enable signal [LCD_PWR]	ED_PC (TP0121)	3.3 V	The LCD display does not display normally.	1
TP0102	12 V power supply from PC [+12V_PC]		12 V	The LCD display or touch screen does not operate.	2
TP0103	5 V[+5V_PC]		5 V	The touch screen does not operate.	2
TP0104	LVDS power [+3.3V_LCD]		3.3 V	The LCD display does not display normally.	1
TP0110	3.3 V power supply from PC [+3.3V_PC]		3.3 V	The LCD display does not display normally.	1
TP0115	Touch screen transmission [TXD]		Normal: 5 V During communication: Data	The touch screen does not operate.	3
TP0116	Touch screen reception [RXD]		Normal: 5 V During communication: Data	The touch screen does not operate.	3
TP0117	Touch screen analog [OUTYO]		Analog value: 0 to 5 V	The touch screen does not operate normally.	3
TP0118	Touch screen analog [OUTY1]		Analog value: 0 to 5 V	The touch screen does not operate normally.	3
TP0119	Touch screen analog [OUTX0]		Analog value: 0 to 5 V	The touch screen does not operate normally.	3
TP0120	Touch screen analog [OUTX1]		Analog value: 0 to 5 V	The touch screen does not operate normally.	3
TP0121	Ground [ED_PC]		GND	—	2
TP0123	Backlight power: [BKPOW]	ED_PC (TP0121)	12 V	The LCD display backlight is not lit.	2

UT-7317 LCD BD



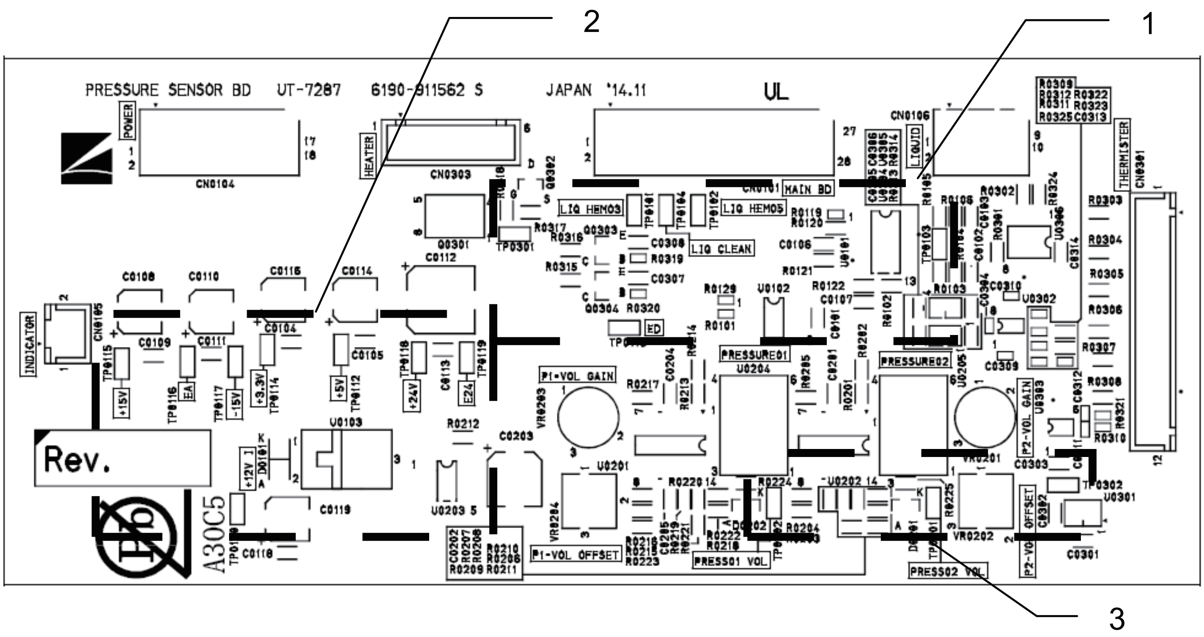
Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects
TP0102	12 V power supply from PC [+12 V_PC]	ED_PC (TP0121)	12 V	The LCD display or touch screen does not operate.
TP0103	5 V [+5 V_PC]		5 V	The touch screen does not operate.
TP0110	3.3 V power supply from PC [+3.3 V_PC]		3.3 V	The LCD display does not display normally.
TP0121	Ground [ED_PC]		GND	—

UT-7286 MEASURING BD



Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects
TP0104	EA	EA (TP0104)	0 V	
TP0201	RBC electrode voltage [R-ELE]		When normal: Low During electrode voltage measurement: 34.5 V or less	Cannot measure the electrode voltage of the RBC measurement section
TP0202	RBC measurement data [R-PLS]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure RBC, PLT system data normally
TP0301	WBC electrode voltage [W-ELE]		When normal: Low During electrode voltage measurement: 34.5 V or less	Cannot measure the electrode voltage of the WBC measurement section
TP0302	WBC measurement data [W-PLS]		When normal: Low During measurement and circuit check: Pulse input	Cannot measure WBC (CBC) data normally

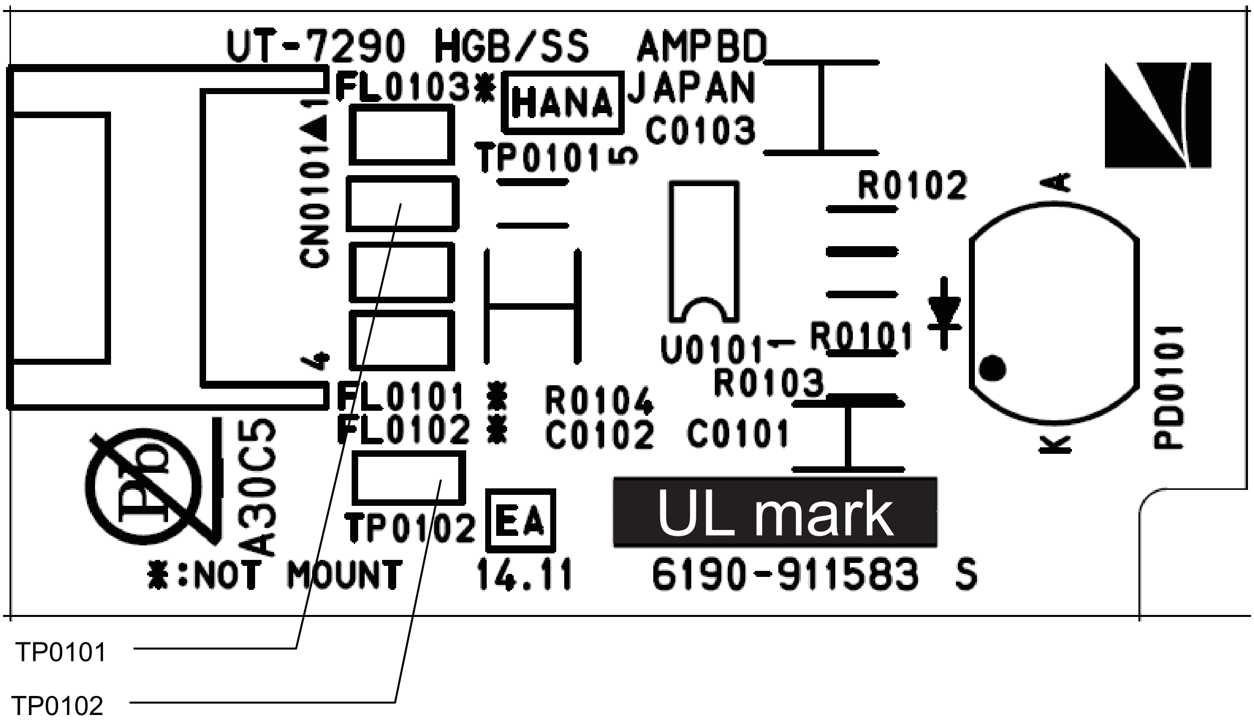
UT-7287 PRESSURE SENSOR BD



Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0101	HEMO3 fluid sensor voltage [LIQ_HEMO3]	ED (TP0113)	Fluid present: 0.8 V or less No fluid: 1.8 V or higher	Cannot read the HEMO3 fluid sensor normally	1
TP0102	HEMO5 fluid sensor voltage [LIQ_HEMO5]		Fluid present: 0.8 V or less No fluid: 1.8 V or higher	Cannot read the HEMO5 fluid sensor normally	1
TP0103	Empty: Unused		—	—	1
TP0104	Detergent fluid sensor voltage [LIQ_CLEAN]		Fluid present: 0.8 V or less No fluid: 1.8 V or higher	Cannot read the detergent fluid sensor normally	1
TP0112	[+5V]		5 V	Cannot perform heater temperature adjustment normally	2
TP0113	[ED]		—	—	1
TP0114	[+3.3V]		3.3 V	The fluid sensor and temperature detection do not operate normally.	2
TP0115	[+15V]	EA (TP0116)	15 V	The pressure sensor does not detect normally.	2
TP0116	EA		—	—	2
TP0117	[−15V]		−15 V	The pressure sensor does not detect normally.	2
TP0118	[+24V]	E24 (TP0119)	24 V	The heater, buzzer or indicator does not operate normally.	2
TP0119	[E24]		—	—	2
TP0120	Indicator voltage [+12V_I]		12 V	The buzzer or indicator is not displayed.	2

Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects	Board Area
TP0201	Pressure sensor voltage (positive pressure) [PRESS02_VOL]	EA (TP0116)	Analog voltage: 0 to 3.3 V	Cannot detect the pressure value normally	3
TP0202	Pressure sensor voltage (positive pressure) [PRESS01_VOL]		Analog voltage: 0 to 3.3 V	Cannot detect the pressure value normally	3
TP0301	Heater voltage [HEATER_VCC]	E24 (TP0119)	24 V	The heater does not operate normally.	1
TP0302	Heater control temperature reference [REF4096]		4.096 V	Cannot perform heater control normally	3

UT-7290 HGB/SS AMP BD



Symbol No.	Check Item	Corresponding GND	Judgment Criteria	Range of Effects
TP0101	HGB, SS measurement data	EA (TP0102)	When normal: Low During measurement: several V	Cannot measure HGB and SS normally
TP0102	EA		0 V	—

6 Maintenance

Maintenance Inspection

If the periodic inspection is not performed, degradation or loss of function may go unnoticed and lead to misdiagnosis.

Service personnel should perform the maintenance inspection at least twice every year. Make sure that the analyzer operates properly and replace the consumables.

If you found abnormalities as a result of inspection and the analyzer is suspected to be faulty, attach an “Unusable” or “Repair request” label to the analyzer and contact your Nihon Kohden representative. For inspection, refer to the service manual.

Repair Parts Availability Policy

Nihon Kohden Corporation (NKC) shall stock repair parts (parts necessary to maintain the performance of the analyzer) for a period of 7 years after delivery of the analyzer.

During that period, NKC or its representatives will repair the analyzer.

This period may be shorter than 7 years if the necessary board or part is not available. For discontinuation announcements, contact your Nihon Kohden representative.

Maintenance Operations

Open the User Maintenance window and perform the required cleaning, priming/draining or other operations.

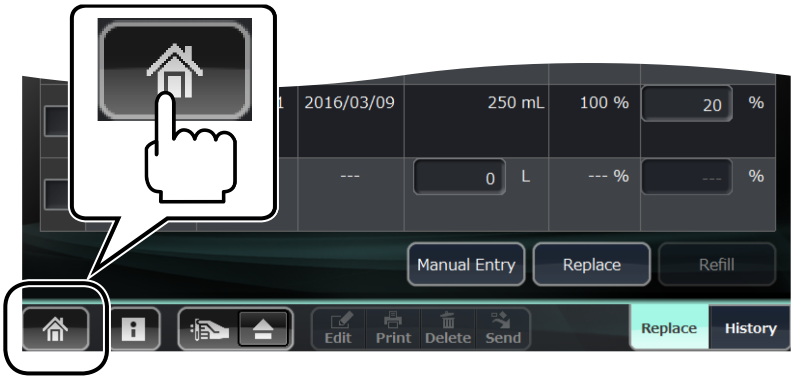
Also, measure the background noise as necessary to check the effect of noise.

Item	Description and Required Time
Clean	Cleans the fluid path inside the analyzer with CLEANAC•710. (Approximately 18 minutes)
Clean Protein	Cleans the fluid path inside the analyzer with CLEANAC•810 (sodium hypochlorite). (Approximately 29 minutes)
Clean Flowcell	Removes dirt and bubbles from the flow cell unit. (Approximately 14 minutes)
Remove Clog	Removes clogs in the fluid path inside the analyzer. (Approximately 7 minutes)
Prime on Installation	Refills reagent inside the analyzer. (Approximately 23 minutes)
Drain All	Drains diluent from the fluid path inside the analyzer. (Approximately 13 minutes)
Clean MC	Removes dirt and bubbles from the MC. (Approximately 16 minutes)
Remove MC Aperture Clog	Cleans the aperture cap. (Approximately 4 minutes)
Self Check	Runs the self check. (Approximately 8 minutes)
Viewing Self Check Results	Views the self check result.
Standby	Returns the autoloader and the actuators in the analyzer (such as electromagnetic valves and pumps) to their initial positions and sets the analyzer to stand by.
Measuring Background Noise	Measures a sample that only contains diluent.

Opening the User Maintenance Window

1 Open the Home screen.

If you are in another window, touch [🏠] at the lower left.



2 Open the Maintenance window.

1) Touch [Maintenance] on the Home screen. The Maintenance Self Check window opens.

2) Touch [User]. The User Maintenance window opens.

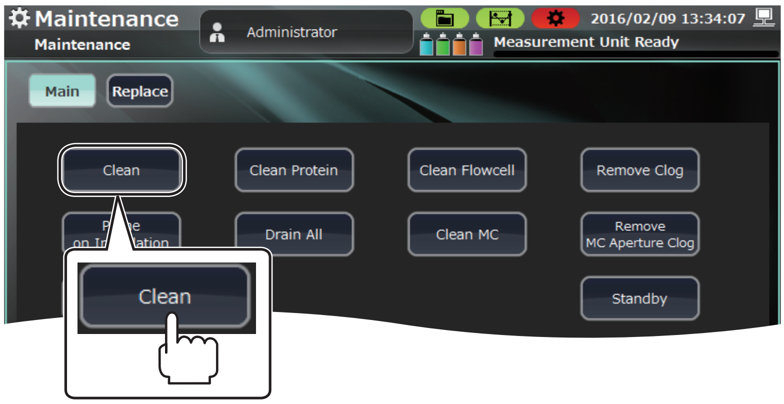
6

Cleaning

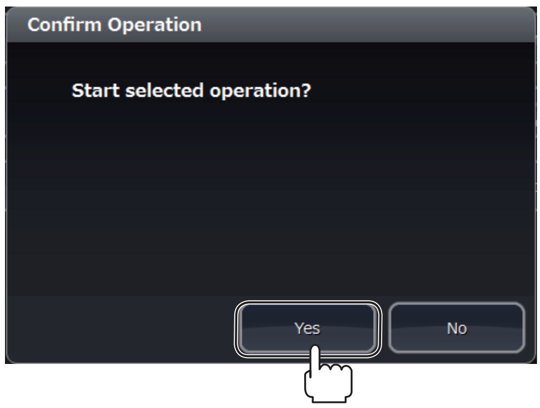
Cleaning the Fluid Path

Clean the fluid path inside the analyzer with CLEANAC•710.

1 Open the User Maintenance window and touch [Clean].



2 Touch [Yes] on the Confirm Operation window.



Cleaning Protein

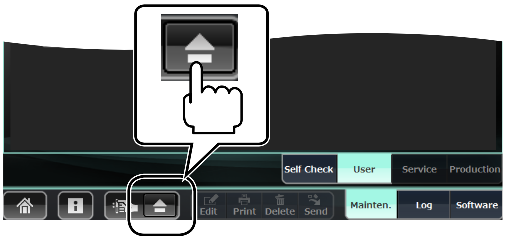
Clean the fluid path inside the analyzer with CLEANAC•810 (sodium hypochlorite).

Do this once a month and whenever normal cleaning was not effective.

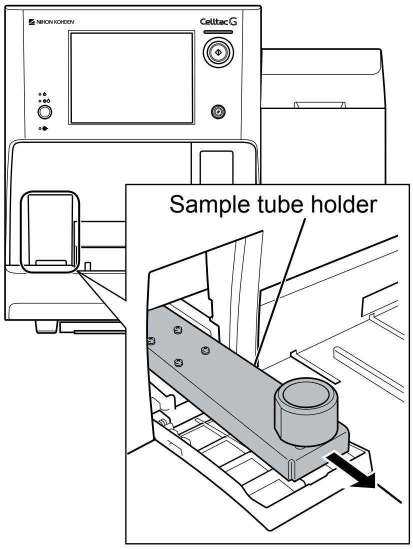
NOTE: Cleaning of protein must be done at least once every month (required after around 2000 measurements).

1 Open the User Maintenance window and place the CLEANAC•810 detergent on the sample tube holder.

1) Touch [⏏] to eject the sample tube holder.



2) Check that the detergent adapter is attached on the ejected sample tube holder.

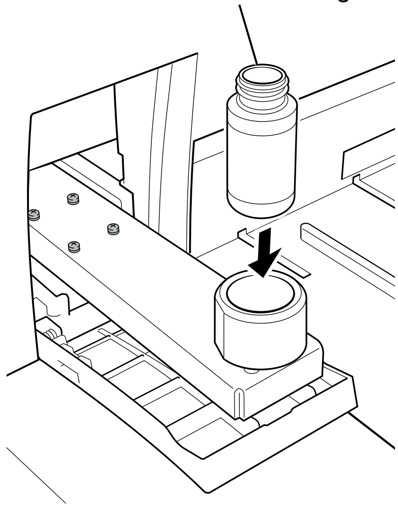


3) Remove the cap from the CLEANAC•810 detergent bottle and insert the bottle into the sample tube holder adapter.

NOTE: • Insert the detergent into the adapter until it stops at the end.

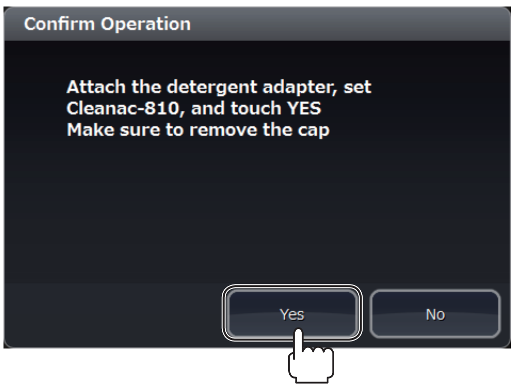
• Make sure to remove the cap.

CLEANAC•810 Detergent



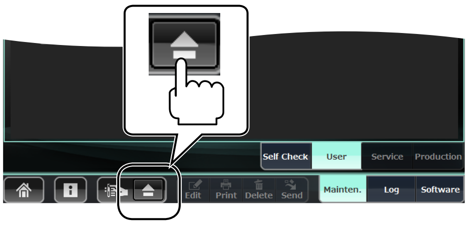
2 Touch [Clean Protein] on the User Maintenance window.

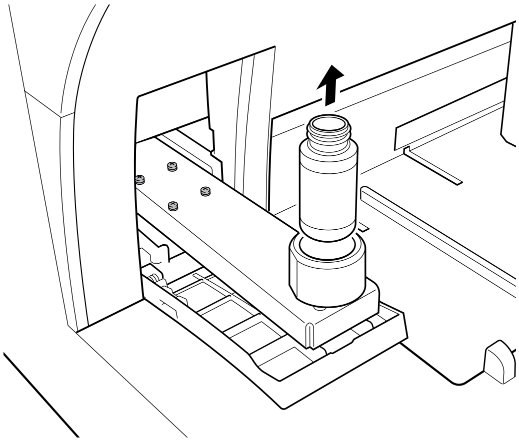
3 Touch [Yes] on the Confirm Operation window.



4 When the protein cleaning operation is complete, the sample tube holder is ejected.

Remove the CLEANAC•810 detergent, and touch [⏏] to slide in the sample tube holder.

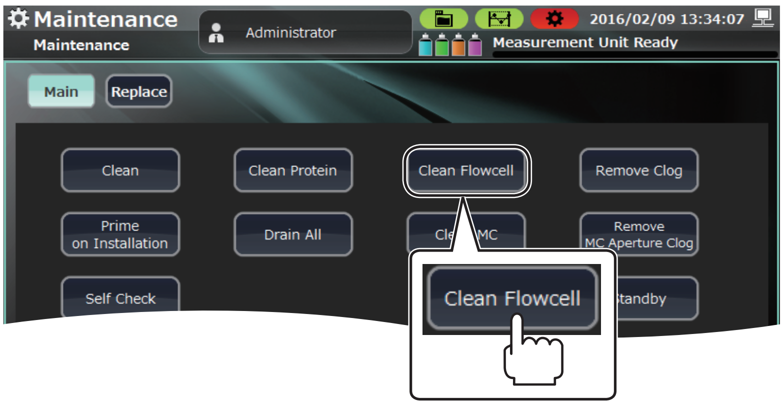




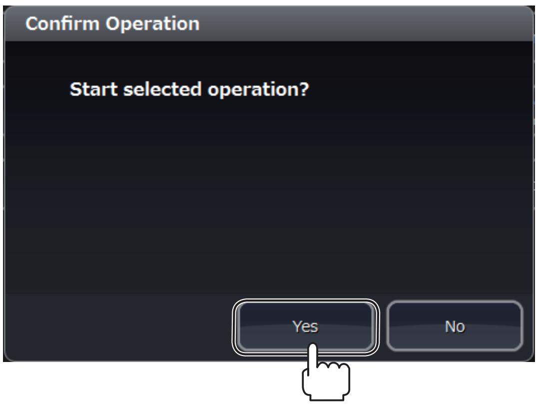
Cleaning the Flowcell

This procedure removes dirt and bubbles from the flow cell unit.

1 Open the User Maintenance window and touch [Clean Flowcell].



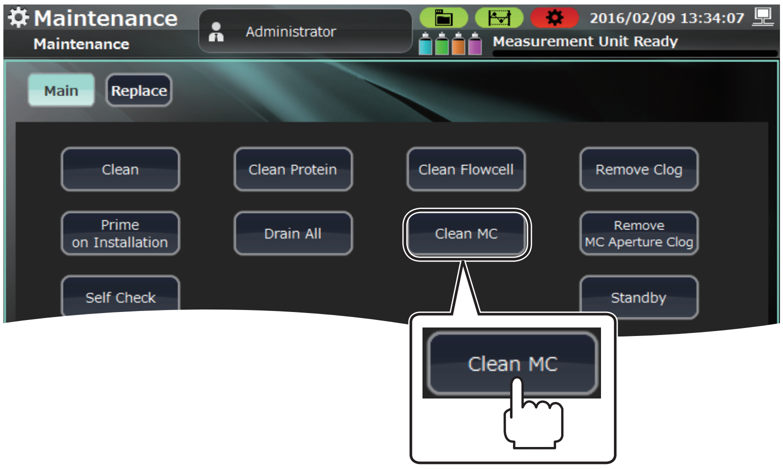
2 Touch [Yes] on the Confirm Operation window.



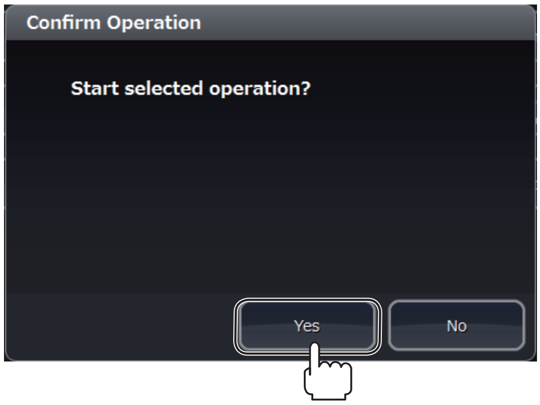
Cleaning the MC

This procedure removes dirt and bubbles from the MC.

1 Open the User Maintenance window and touch [Clean MC].



2 Touch [Yes] on the Confirm Operation window.

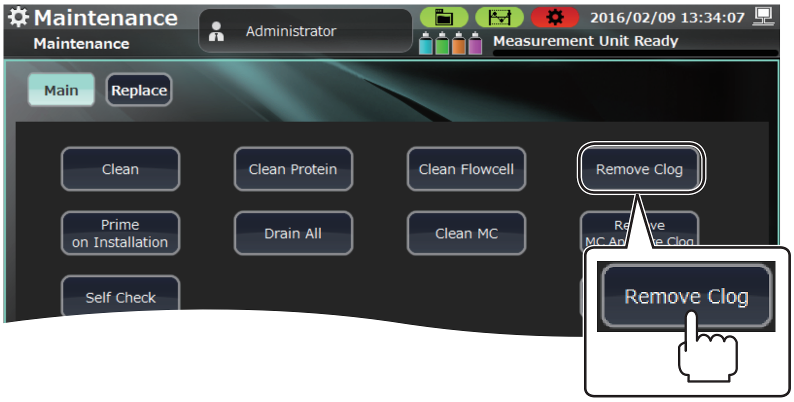


Removing Clogs

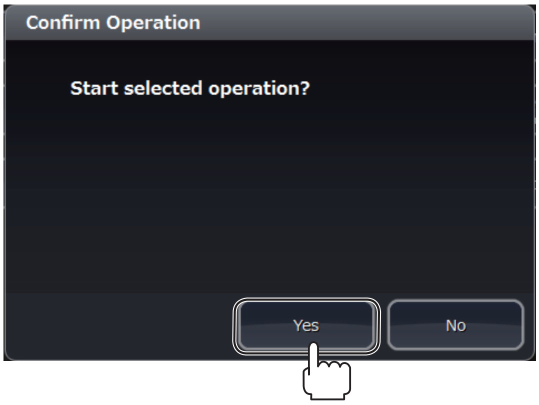
This procedure removes clogs in the aperture cap inside the analyzer.

If a clog occurs during measurement, the aperture cap clear function automatically removes the clog with a brief high voltage pulse.

1 Open the User Maintenance window and touch [Remove Clog].



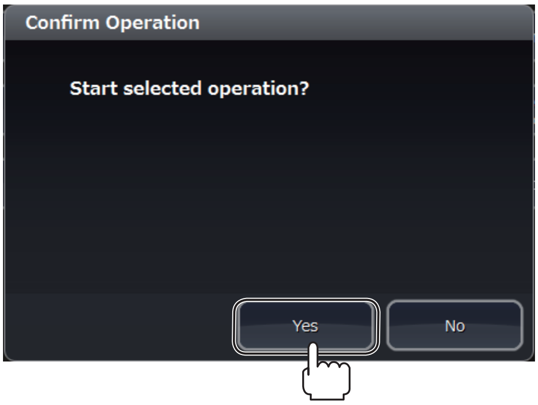
2 Touch [Yes] on the Confirm Operation window.



Priming on Installation

1 Open the User Maintenance window and touch [Prime on Installation].

2 Touch [Yes] on the Confirm Operation window.



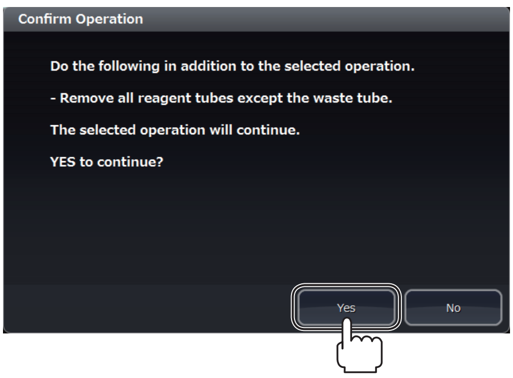
When an analyzer message “21110 Analyzer internal draining status” appears on the Maintenance Log window, touch [RESTORE] to perform priming on installation.

Draining All Fluid

This procedure drains diluent from the fluid path inside the analyzer to prepare for maintenance inspection or long term storage.

1 Open the User Maintenance window and touch [Drain All].

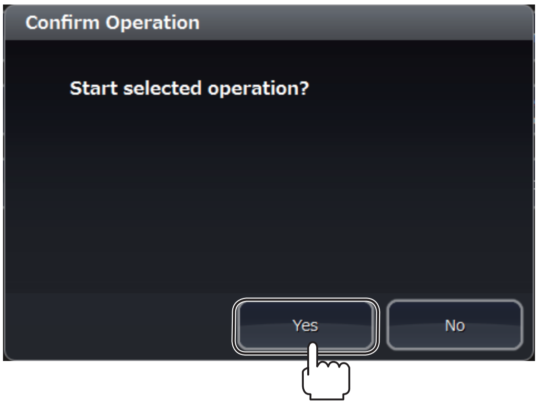
2 When the Confirm Operation window appears, disconnect all reagent tubes (diluent, CBC lysing reagent, DIFF lysing reagent and detergent) except the waste tube and touch [Yes].



Running Self Check

1 Open the User Maintenance window and touch [Self Check].

2 Touch [Yes] on the Confirm Operation window.



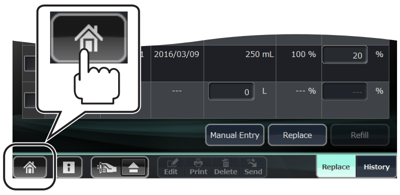
Viewing Self Check Results

On the Self Check window, you can view the operation history and self check results of this analyzer.

The Self Check window has the following windows.

Window	Description
Summary	Shows the check results of each self check item.
Detail1	Shows detailed check results for remaining reagent, instrument internal temperature and pressure.
Detail2	Shows detailed check results for circuit check and background measurement.
Detail3	Shows detailed check results for maintenance parts, maintenance operation, and maintenance log.
Log	Shows self check history (up to 300 times).

Displaying the Self Check Window



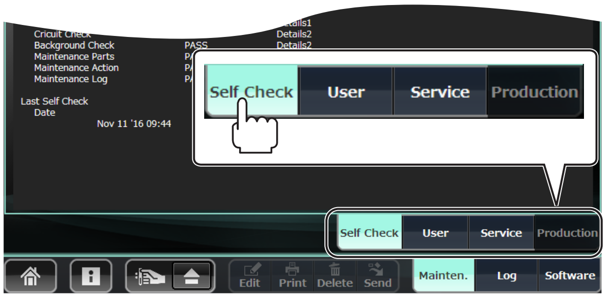
1 Open the Home screen.

If you are in another window, touch [ ] at the lower left.

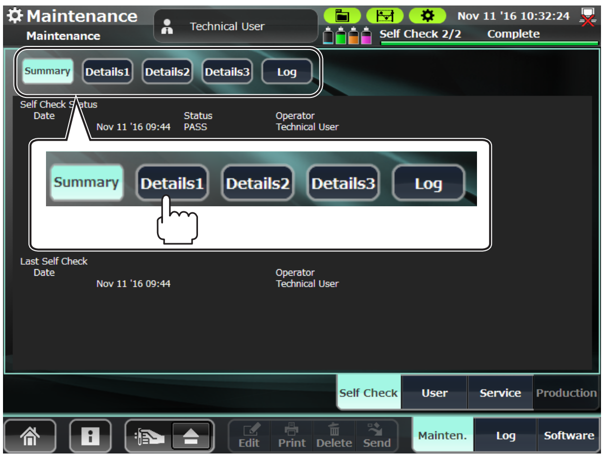
2 Open the Maintenance window.

1) Touch [Maintenance] on the Home screen. The Maintenance Self Check window opens.

2) Touch [Self Check]. The Self Check window opens.



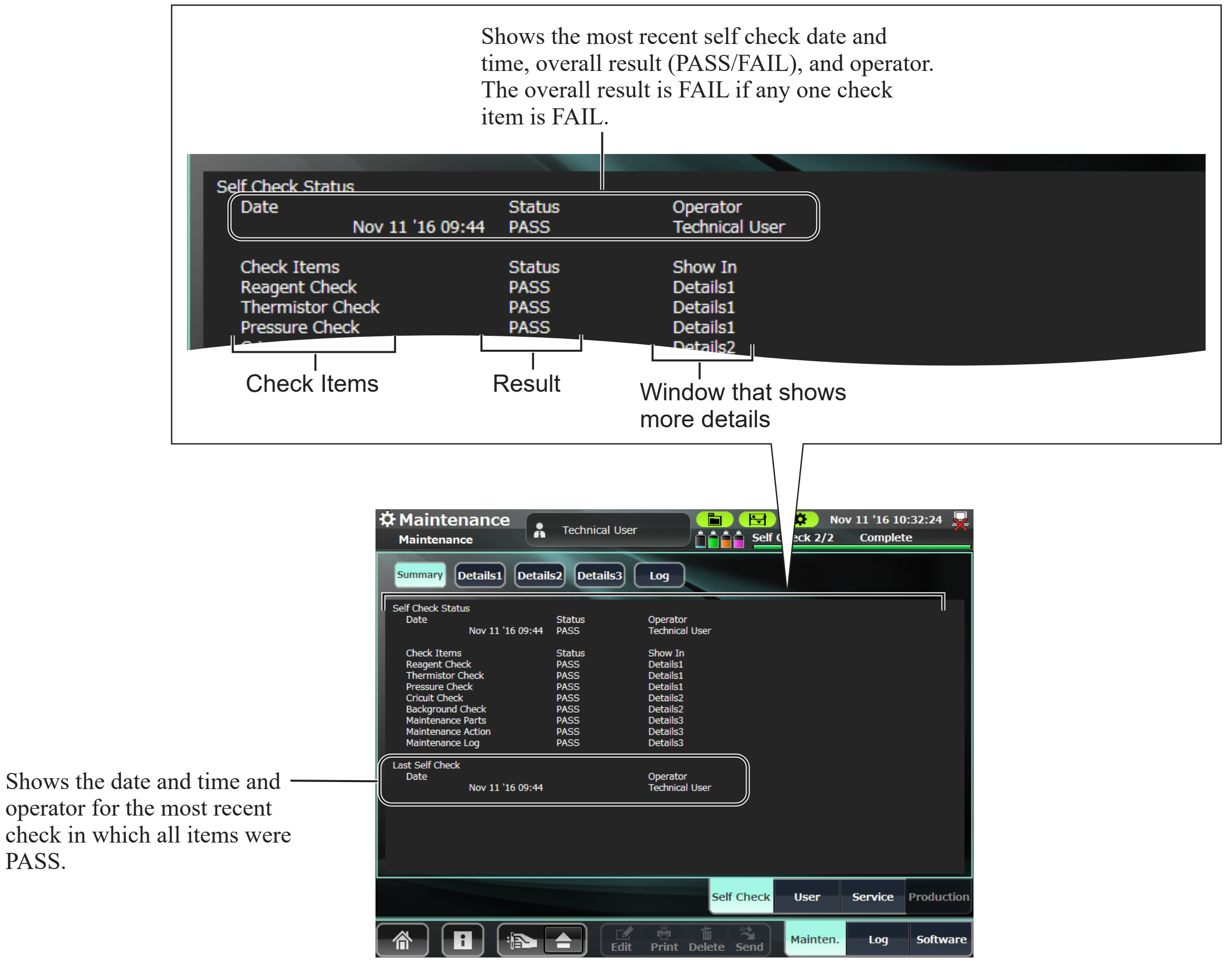
3 On the Self Check window, touch the [Detail1], [Detail2], [Detail3] or [Log] key to display one of those windows.



Summary Window

On the Summary window, you can check the PASS/FAIL result of each check item. To see more details for an item, you can change to one of the detail windows (Detail1, Detail2, Detail3).

If there is a FAIL result, check the error code, name and countermeasure on the Maintenance Log window and Section 3 "Troubleshooting" to resolve the problem.

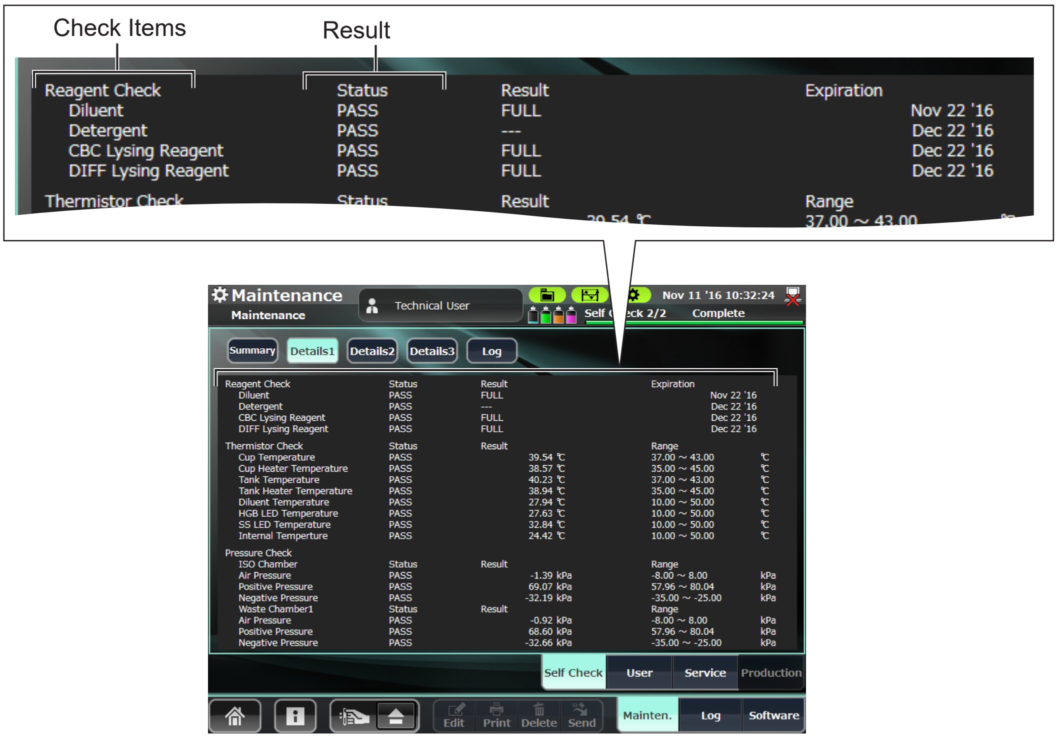


Detail1, Detail2, Detail3 Windows

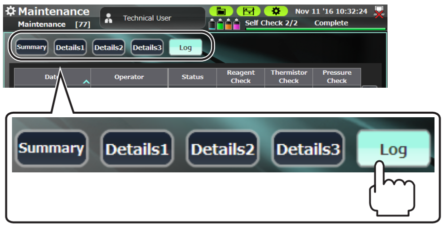
The Detail1, Detail2, and Detail3 windows show detailed check results for each check item. You can check the PASS/FAIL result for each item.

If there is a FAIL result, check the error code, name and countermeasure on the Maintenance Log window and Section 3 “Troubleshooting” to resolve the problem.

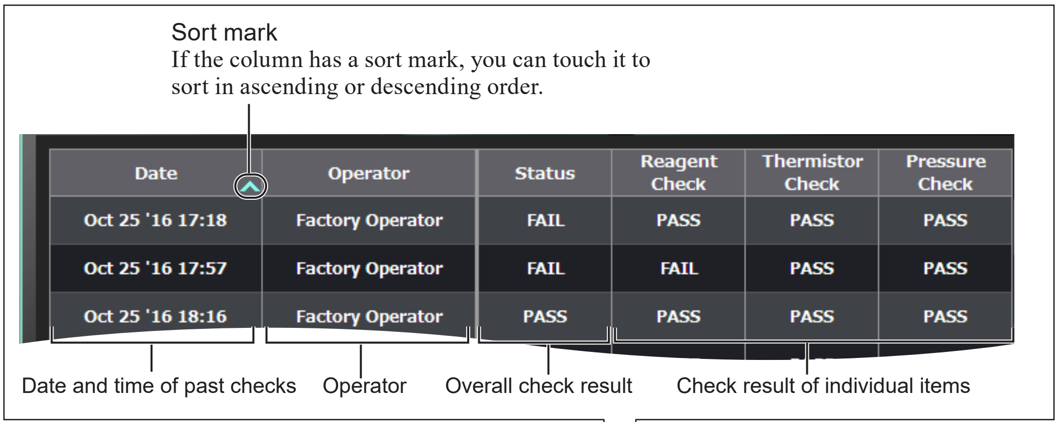
Example: Detail1 screen



Log Window



On the Log window, you can view the results of up to 300 past checks. One line shows the results of one check. The Log window is a brief list of the test results on the Summary window.



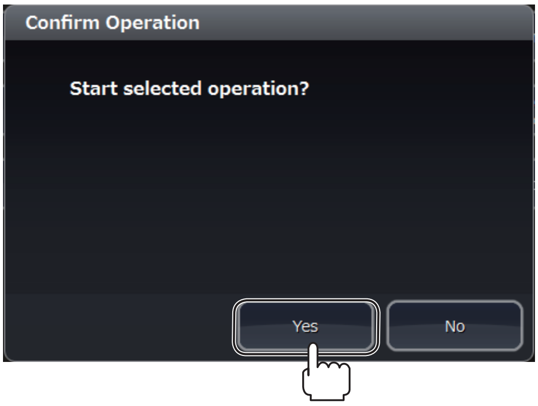
Touch [▲], [▼], [◀] or [▶] to scroll the list vertically or horizontally.

Setting the Analyzer to Stand By

Returns the autoloader and the actuators in the analyzer (such as electromagnetic valves and pumps) to their initial positions.

1 Open the User Maintenance window and touch [Standby].

2 Touch [Yes] on the Confirm Operation window.



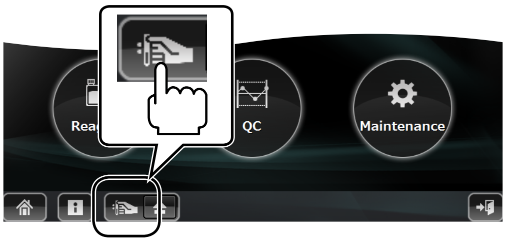
Measuring Background Noise

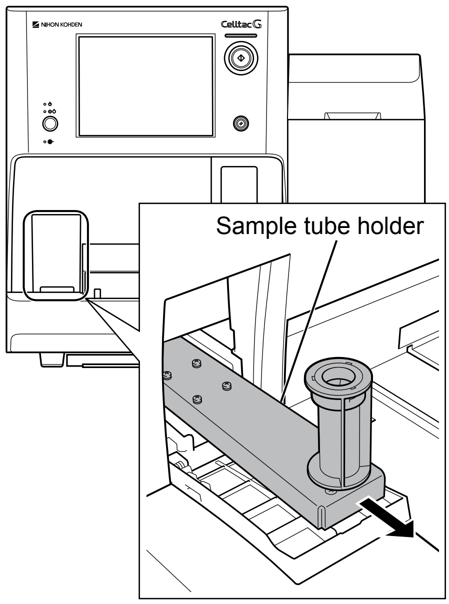
Measure a sample that only contains diluent.

Background noise increases in the following cases.

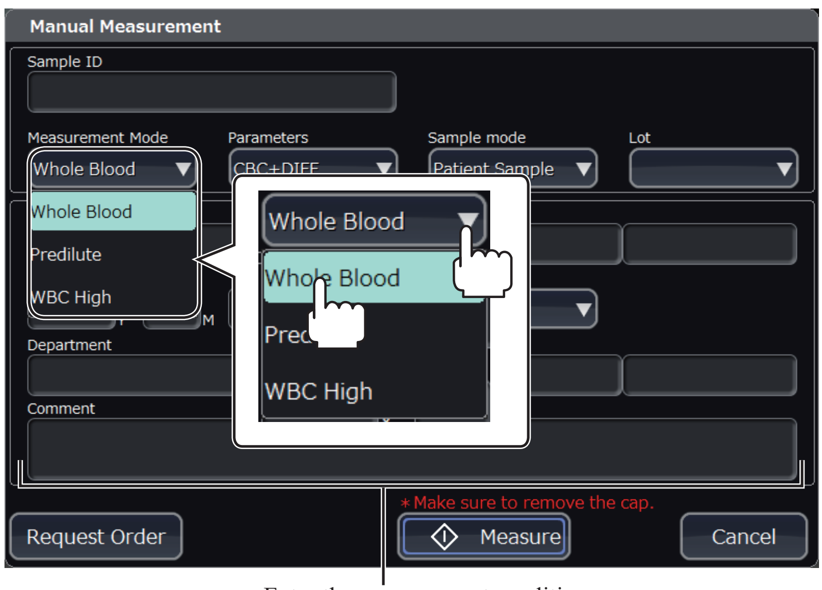
- The diluent is old.
  Replace the diluent if it is past the expiration period after opening the package.
- There is dirt or dust in the diluent container.
- The diluent temperature is extremely high or low.
  The normal operating temperature range is 15 to 30°C (59 to 86°F).

1 Touch [icon] to open the Manual Measurement window and eject the sample tube holder.





2 Set the measurement mode to [Whole Blood] on the Manual Measurement window, and enter the measurement conditions.

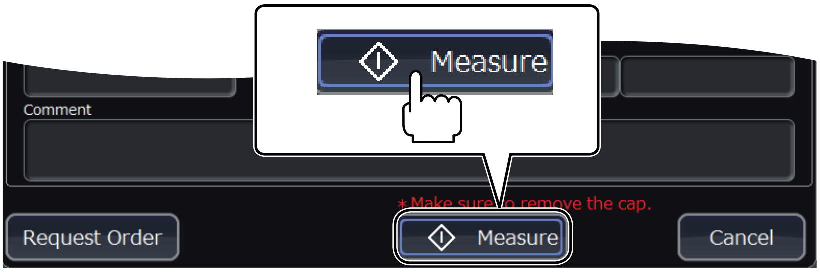


Enter the measurement conditions.

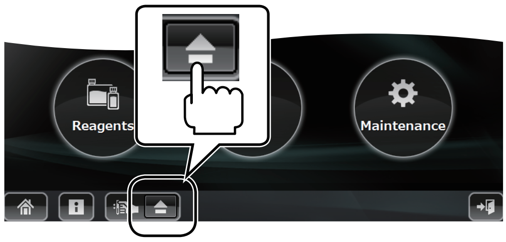
3 Make sure nothing is on the sample tube holder adapter and touch [Measure].

The sample tube holder slides in and measurement starts.

The sample tube holder slides out automatically after measurement is finished.



4 Touch [⏏] to slide in the sample tube holder.



5 Check the measured results on the Data List window to confirm that the measured values fall within the following ranges.

NOTE: Data Management and Setting Guide: Section 4 "Data Review"

- Measured parameters other than WBC, RBC, HGB and PLT are not affected by noise.
- TOC values can be viewed only with "Factory Operator" or "Technical User" operator privileges. Other operators can confirm measured values other than TOC.

Measured Parameters	Normal Range
WBC	2.0×10^2/μL or less
RBC	2×10^4/μL or less
HGB	0.1 g/dL or less
PLT	1.00×10^4/μL or less
TOC	100 counts or less

When the check result exceeds the normal value, check the following points and measure background noise again.

- Diluent is not dirty.
- There are no bubbles in the diluent.

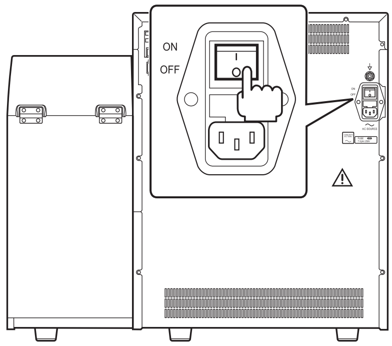
If the measured value exceeds the above range even after it is measured again, refer to "2. High background noise" in Section 3 "Troubleshooting".

Backing Up Measurement Data Summaries

Back up measurement data stored in the analyzer's internal memory to an SD card.

NOTE: If you try to back up to an SD card which already contains backup data, the previous backup data will be overwritten.

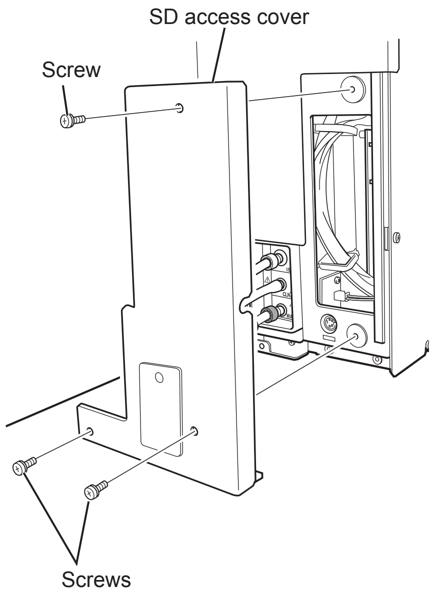
1. Turn off the analyzer and switch off (to ○) the main power on the rear of the analyzer.



2. Disconnect the power cord from the wall AC outlet.

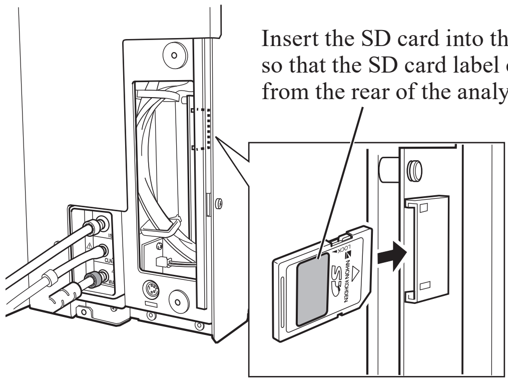
3. Remove the three screws from the right side panel of the analyzer and remove the SD access cover.

   NOTE: Keep the three screws to reattach the cover later.



4 Insert the SD card into the analyzer SD card slot.

NOTE: Handle the SD card according to the "SD Cards" section in the operator's manual.

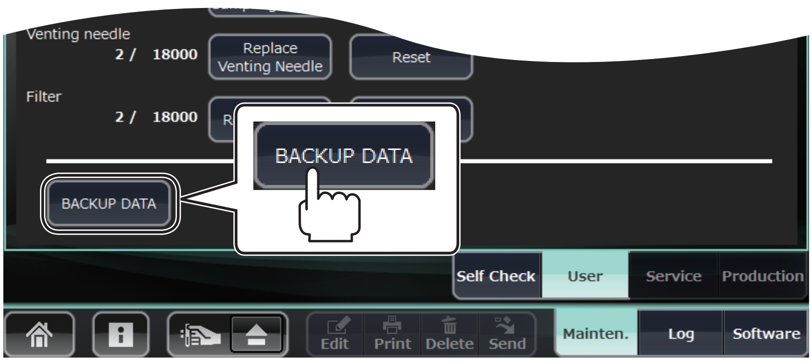


5 Connect the power cord to the wall AC outlet and turn on the analyzer.

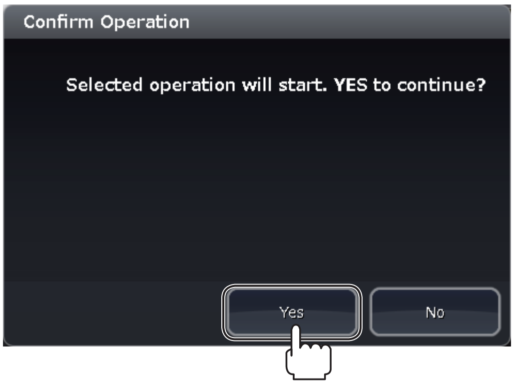
Operator's Manual:
"Turning On the Analyzer" in Section 5

6 Open the User Maintenance window and touch [Replace].

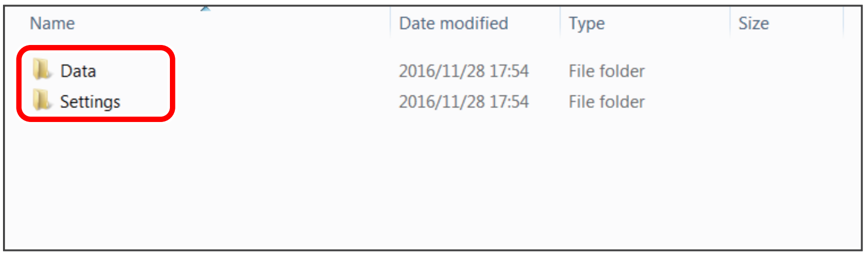
7 Touch [BACKUP DATA].



8 Touch [Yes] on the Confirm Operation window.

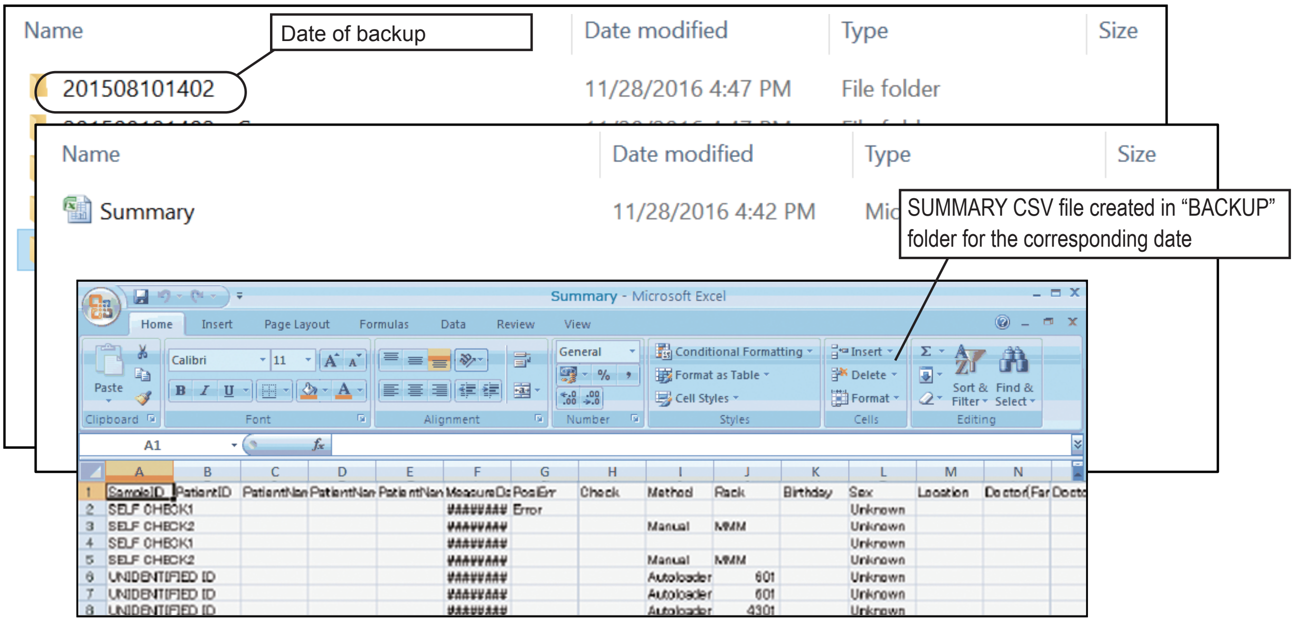


9 A folder named “Data” is created on the SD card and all the data is stored in a single CSV file.



Backup Data

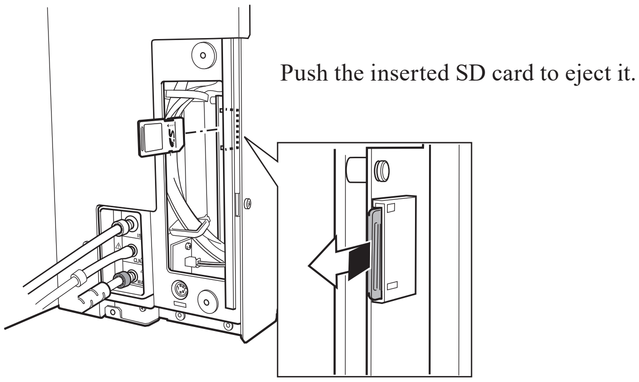
Backup data is stored as a summary CSV in a dated folder which is created upon each backup.



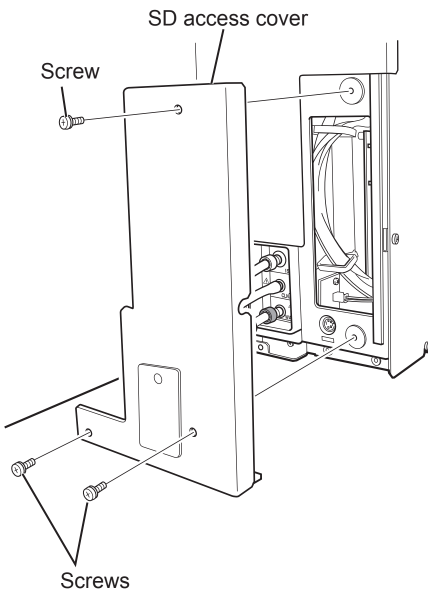
10 After confirming that the data is backed up, switch off (to ○) the main power on the rear of the analyzer.

11 Disconnect the power cord from the wall AC outlet.

12 Push the SD card to eject it.



13 Attach the SD access cover to the right side of the analyzer and fix it with the three screws removed in step **3**.



Service Maintenance Operations

Following is a list of the analyzer's maintenance operations in the Service Maintenance window.

Item		Description and Required Time
Main	Prime All Reagents	Primes the diluent (ISOTONAC•3/4), hemolysing reagent (HEMOLYNAC•310/510) and detergent (CLEANAC•710). (Approximately 8 minutes)
	Prime MC	Passes diluent (ISOTONAC•3/4) into the MC to make an environment suitable for measurement. (Approximately 4 minutes)
	Prime Flowcell	Passes diluent (ISOTONAC•3/4) into the MO to make an environment suitable for measurement. (Approximately 3 minutes)
	Leak Check	Checks internal tubes of the analyzer for leaks and clogging and checks opening and closing of the electromagnetic valves. (Approximately 15 minutes)
	Drain ISO Chamber	Drains reagent from the ISO chamber, emptying it. (Approximately 2 minutes)
	Drain MC	Drains reagent from the MC. (Approximately 4 minutes)
	Drain Flowcell	Drains reagent from the MO. (Approximately 4 minutes)
	Drain Waste Chamber	Drains waste from waste chamber 1 and 2 to empty the waste chambers. (Approximately 1 minute)
	Prime after MC Replacement	Performs MC priming operations including swirl chamber fluid level adjustments for rapid validation after replacing the MC. (Approximately 5 minutes)
	Clean Cup	Cleans the reagent cup (IWBC, OWBC, RBC). (Approximately 4 minutes)
	Circuit Check	Performs a self check of electrical circuits in the analyzer. (Approximately 1 minute)
	Measure Particles	Performs aspiration and measurement of 7 μm standard particles to regulate the flow cell unit. (Approximately 4 minutes)
	Measure 10 Times	Measures the hematology control which is inserted into the left end (first position) of the rack 10 times.
	Release EWF (PC-910W only)	Revokes the enhanced write filter (EWF) for the drives used by the PC-910W. This is not displayed in the PC-911W.
	Calibrate Touch Panel	Performs adjustments for touch points on the touch screen.
	Exchange All	Simultaneously drains all fluid paths to allow replacement of the sampling needle, venting needle and filter at the same time. (Approximately 2 minutes)
Main2	Check network status	Checks the basic network condition of the analyzer.
	Drain All Cups	This drains the remaining reagent in the reagent cup (IWBC/OWBC/RBC). (About 1 min.)
Parts1		Shows the operating time for the relevant consumables.
Parts2		Shows the number of uses for the relevant consumables.
Electromagnetic Valve		Individually controls each electromagnetic valve, pinch valve and compressor.
Motor	Auto Measurement Position Adjustment	Checks the sampling needle and autoloader aspiration position for auto measurement.
	Manual measurement position adjustment	Adjusts and checks the sampling needle and open loader position for manual measurement.
	Motor	Individually controls motors in the analyzer.
Gain		Adjusts the voltage of the infrared sensors in the analyzer.
AD Sensor		Shows relevant pressures, temperatures, etc. from the voltages measured at sensors inside the analyzer.
Infrared Sensor		Shows the detection of the sensors inside the analyzer.

Item		Description and Required Time
Autoloader Operation	Reboot Autoloader	Restarts the autoloader.
	Initialize Autoloader	Restores (initializes) the moving parts of the autoloader to their original positions.
	Autoloader Demo	Performs the transport operations used with the rack and sample tubes when doing auto measurement.
	Read Barcode	Performs a single operation that reads a barcode. (The result of this reading is not displayed.)
	Start Unit	Performs a single operation that draws in a rack positioned in the start unit.
	BCR Unit	Performs a single operation that presses down the sample tubes and reads the affixed barcodes while rotating the sample tubes.
	Agitator Unit	Performs a single operation that holds the sample tubes and agitates them (for 5 inversions).
	Pierce Unit	Performs a single operation that releases the pressure that holds the sample tubes in the pressure release aspiration position by the pierce guide.
	Terminal Unit	Performs a single operation that draws the rack removal tab in or out.
	Feed Unit	Performs a single operation that transports the rack horizontally.
	Motor	Individually controls motors inside the autoloader.
AL Sensor		Shows the detection of the sensors inside the autoloader.

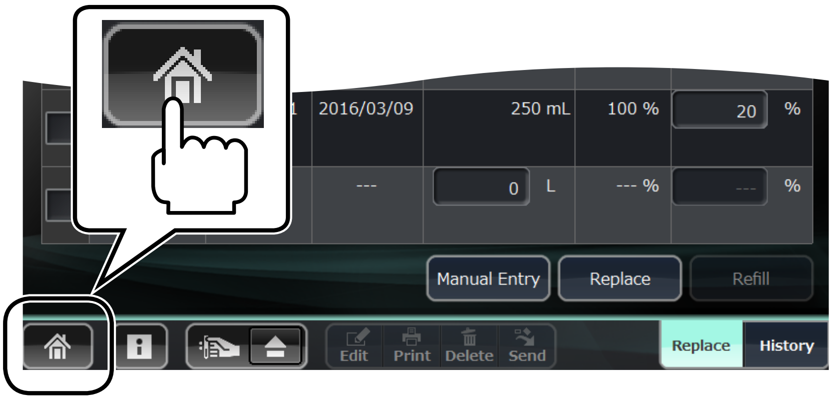
Changing the Operator to a Technical User

Change the operator to a [Technical User] in order to enter the Service Maintenance window.

Modification Procedure

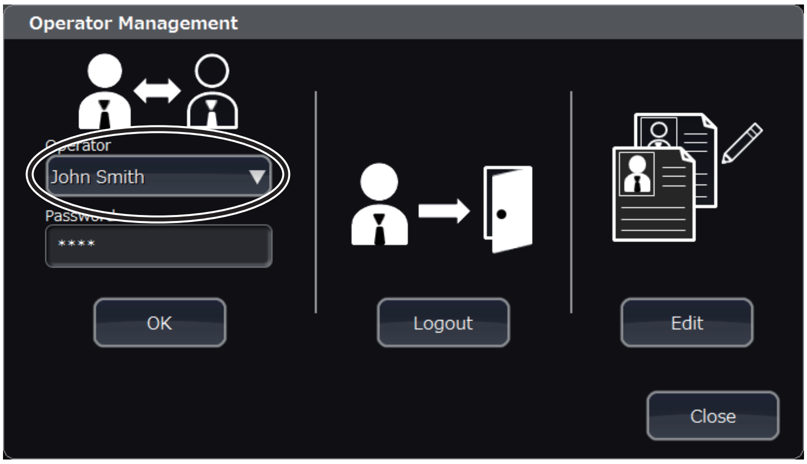
1 Open the Home screen.

If you are in another window, touch [] at the lower left.

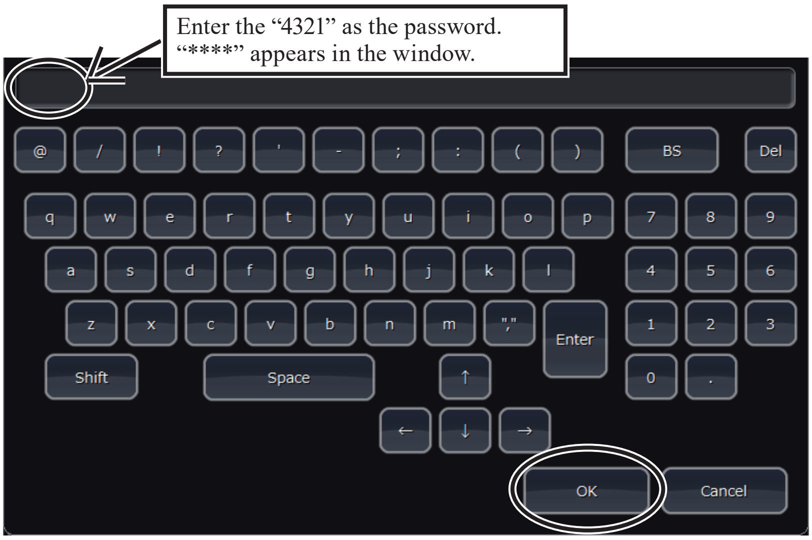


2 Touch [] in the lower right corner of the Home screen. The Operator Management window appears.

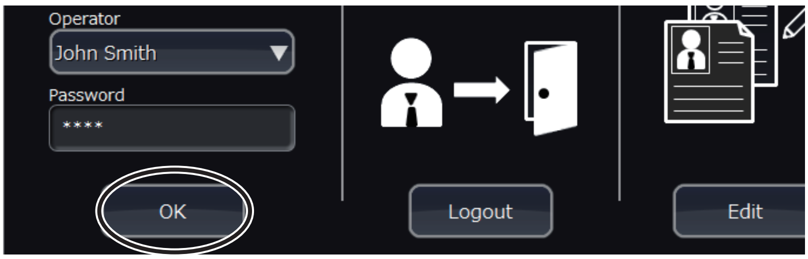
3 Select [Technical User] from the drop-down menu.



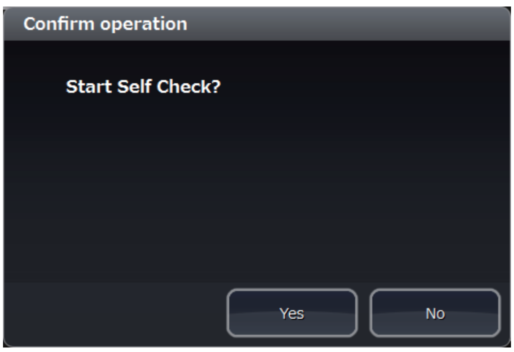
4 Type “4321” (default) in the password input window and touch the OK key.



5 Upon entering the password and touching the OK key, the operator for the Home screen changes to [Technical User].



6 Touch [No] on the window to skip the self check if the self check is not necessary.



Service Maintenance Window

- This window is for use by qualified service personnel. Incorrect use may cause problems such as leakage of reagent inside the analyzer.
- Some functions in the Maintenance window are for use with special jigs at the factory. No operation can occur without these jigs, so do not use functions which are not described in this service manual.
- It is possible to perform operations on individual units and functional blocks. Avoid the leak of fluids or contamination when performing operations with reagents and samples inside the analyzer.
- Functions may be added to the Maintenance window at any time for the purpose of increasing productivity.
- If you are unsure of the procedure, do not use this window because it may damage the analyzer.

6

Opening the Service Maintenance Window

1. Check that a [Technical User] is logged in, then open the Home screen.

   If you are in another window, touch [] at the lower left.

2. Touch [Maintenance] on the Home screen. The Maintenance Self Check window opens.

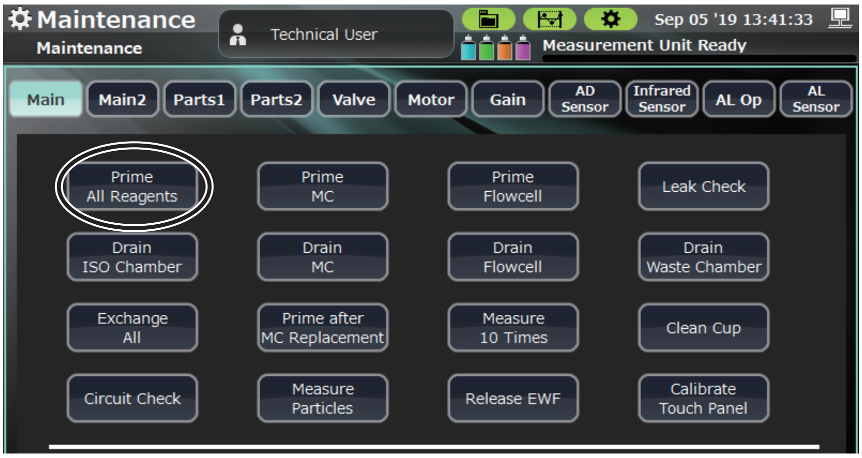
3. Touch [Service] to open the Service Maintenance window.

Priming

Priming All Reagents

This procedure primes the diluent (ISOTONAC•3/4), hemolysing reagent (HEMOLYNAC•310/510) and detergent (CLEANAC•710).

1 Open the Service Maintenance window and touch [Prime All Reagents].



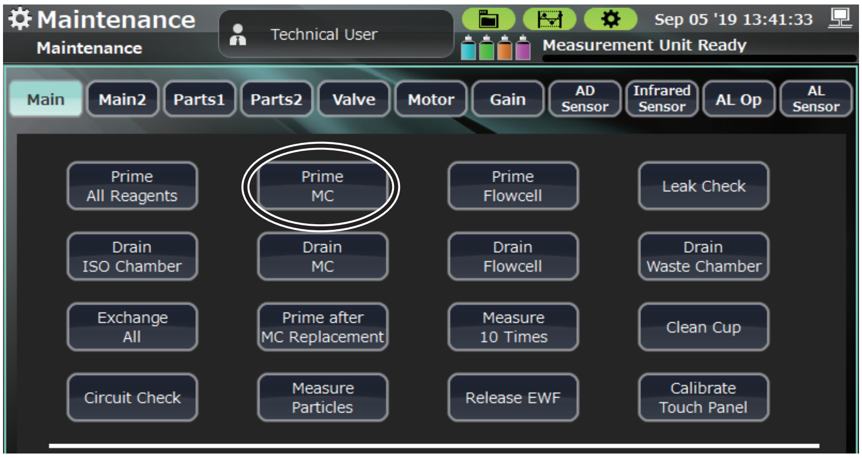
2 Touch [Yes] on the Confirm Operation window.

Priming the MC

This procedure passes diluent (ISOTONAC•3/4) into the MC to make an environment suitable for measurement.

Operating Procedure

1 Open the Service Maintenance window and touch [Prime MC].



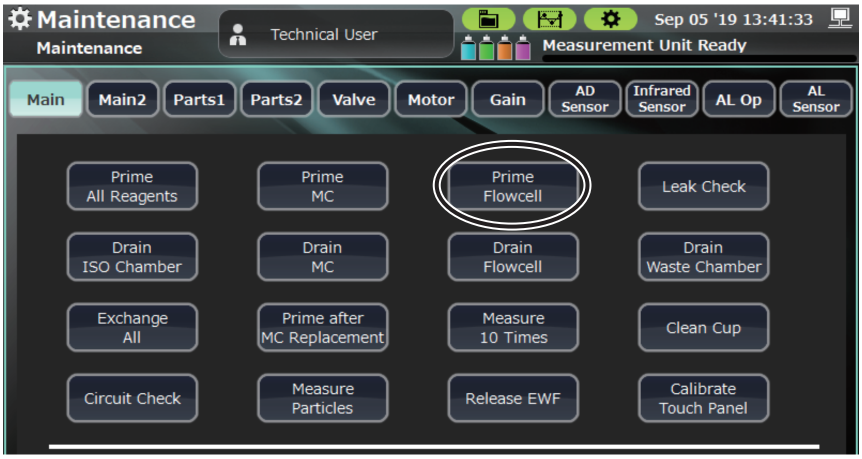
2 Touch [Yes] on the Confirm Operation window.

Priming the Flowcell

This procedure passes diluent (ISOTONAC•3/4) into the MO to make an environment suitable for measurement.

Operating Procedure

1 Open the Service Maintenance window and touch [Prime Flowcell].



2 Touch [Yes] on the Confirm Operation window.

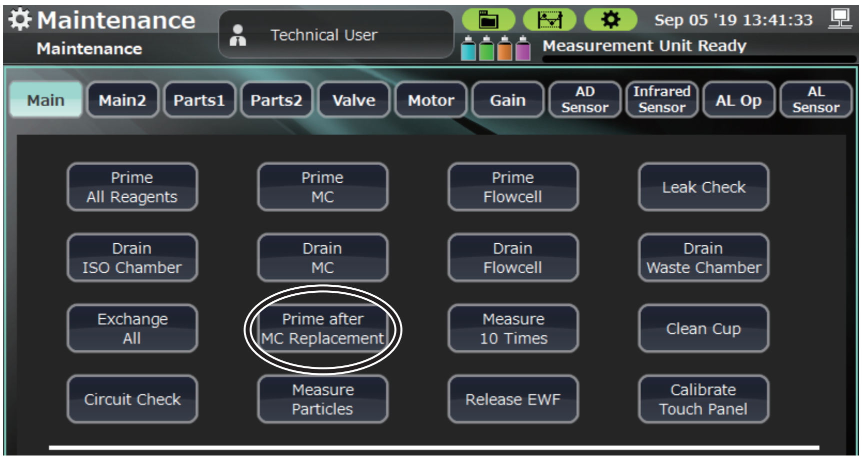
Priming after MC Replacement

This procedure performs MC priming operations, including swirl chamber fluid level adjustments, for rapid validation after replacing the MC.

However, MC cleaning is required for correct measurements. (Since the MC chamber makes a layer of air, it is possible that some air may remain when this operation is performed alone.)

Operating Procedure

1 Open the User Maintenance window and touch [Prime after MC Replacement].



2 Touch [Yes] on the Confirm Operation window.

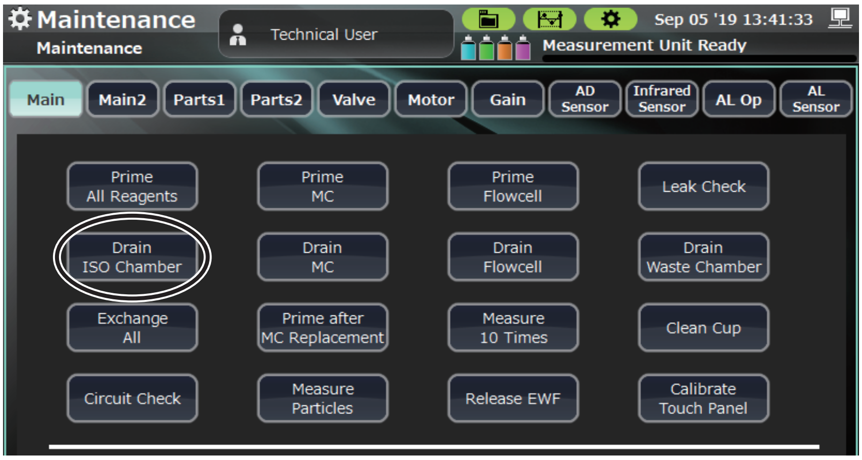
Draining

Draining the ISO Chamber

This procedure drains reagent from the ISO chamber to empty it.

Operating Procedure

1 Open the Service Maintenance window and touch [Drain ISO Chamber].



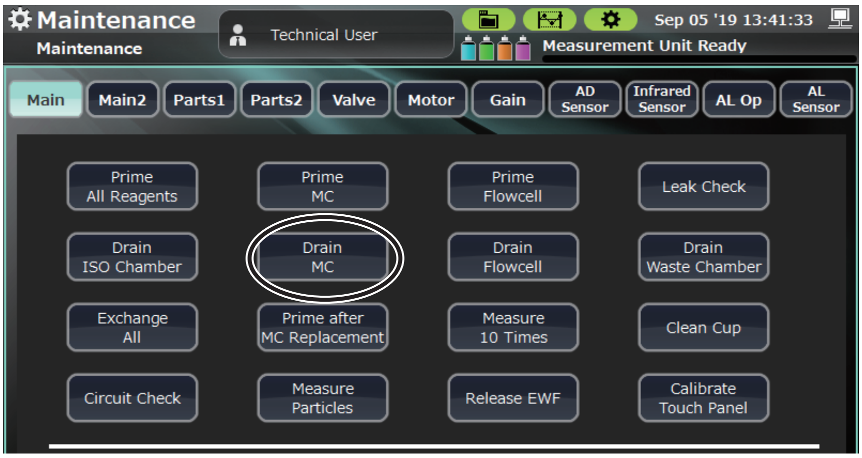
2 Touch [Yes] on the Confirm Operation window.

Draining the MC

This procedure drains reagent from the MC.

Operating Procedure

1 Open the Service Maintenance window and touch [Drain MC].



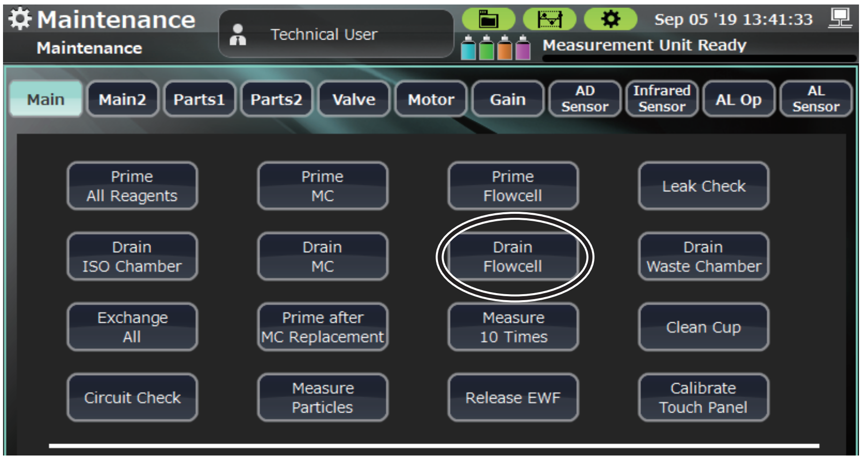
2 Touch [Yes] on the Confirm Operation window.

Draining the Flowcell

This procedure drains reagent from the MO.

Operating Procedure

1 Open the Service Maintenance window and touch [Drain Flowcell].



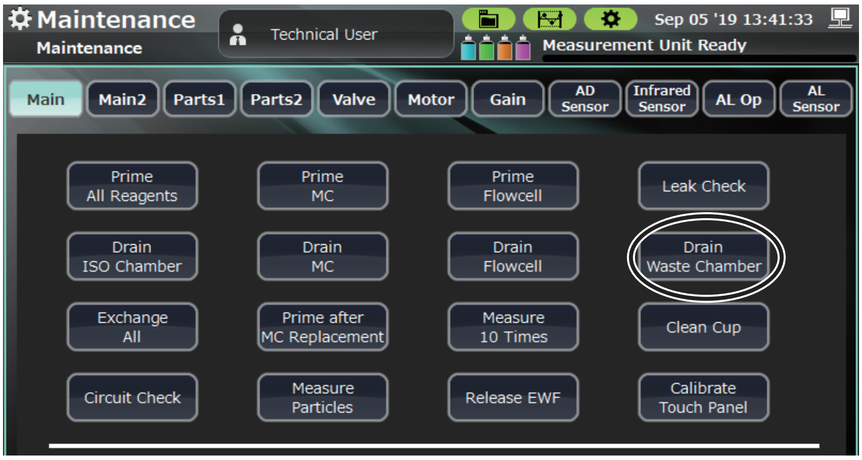
2 Touch [Yes] on the Confirm Operation window.

Draining the Waste Chamber

This procedure drains waste from waste chamber 1 and 2, emptying the waste chambers.

Operating Procedure

1 Open the Service Maintenance window and touch [Drain Waste Chamber].



2 Touch [Yes] on the Confirm Operation window.

Drain All Cups

This drains the reagent in the reagent cups (IWBC/OWBC/RBC).

Operating Procedure

1 Open the Maintenance window. Touch [Main2] and open the Main 2 window.

Touch [Drain All Cups].

2 Touch [Yes] on the Confirm Operation window.

6

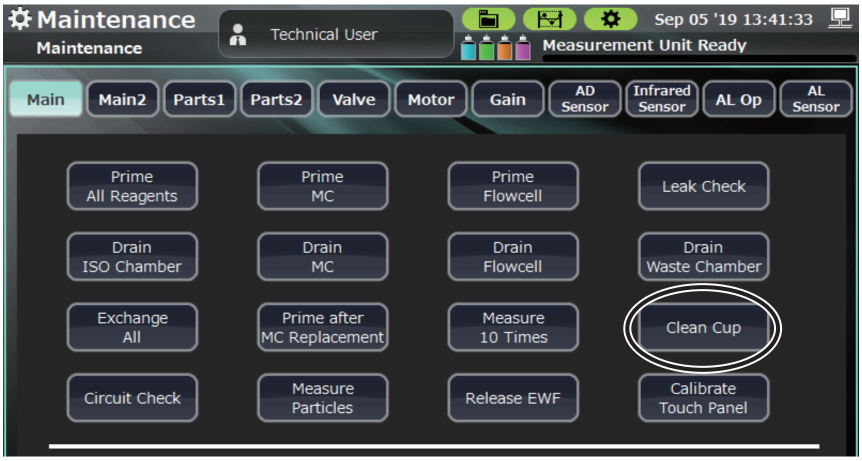
Cleaning

Cleaning the Cup

This procedure removes contaminants in the reagent cup (IWBC, OWBC, RBC) with detergent (CLEANAC•710) then washes it with diluent (ISOTONAC•3/4). Afterwards, the reagent cup is filled with diluent.

Operating Procedure

1 Open the Service Maintenance window and touch [Clean Cup].



2 Touch [Yes] on the Confirm Operation window.

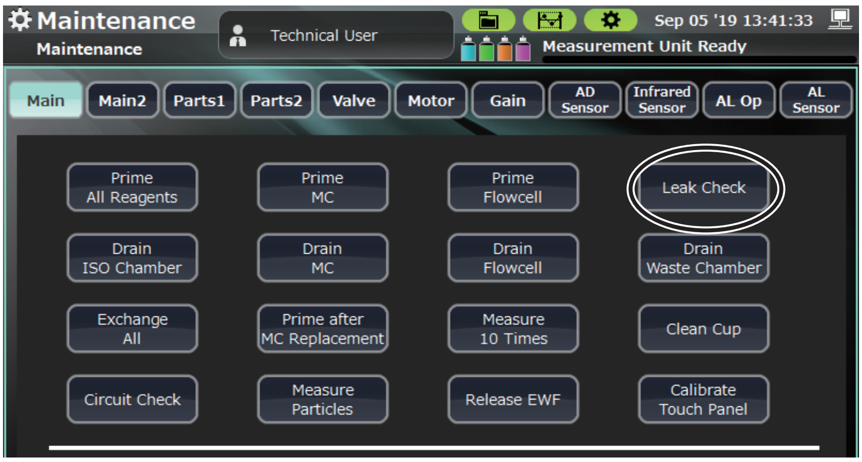
Checking Leak, Circuit and Measuring

Leak Check

This procedure includes a function to check whether electromagnetic valves are open or closed and whether there are leaks or kinks (due to bending or collapse) along the tubes in the analyzer.

This function can only be performed when the analyzer is drained.

NOTE: Further details are recorded in the “Technical Reference Manual”. Perform this function in accordance with the directions in “Technical Reference Manual”.

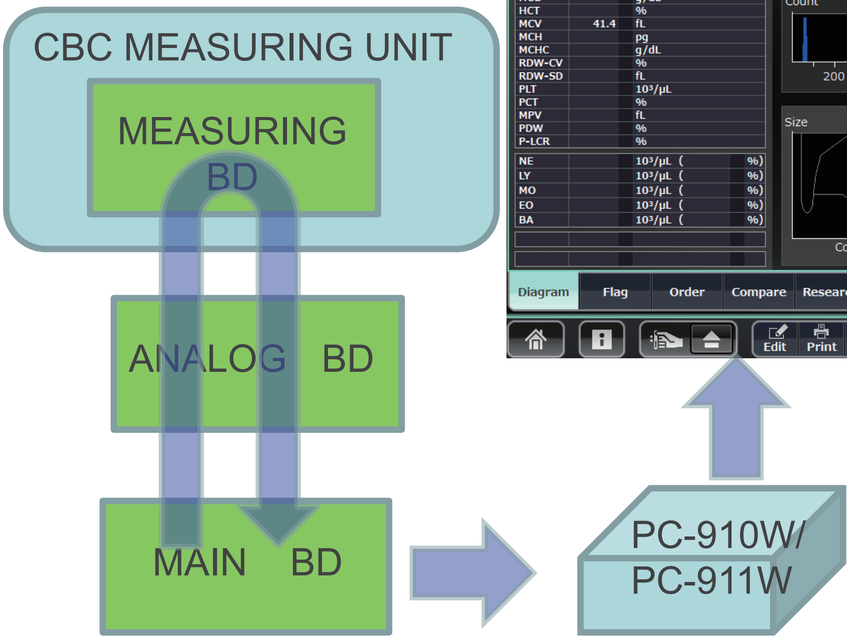


Circuit Check

This procedure does the following.

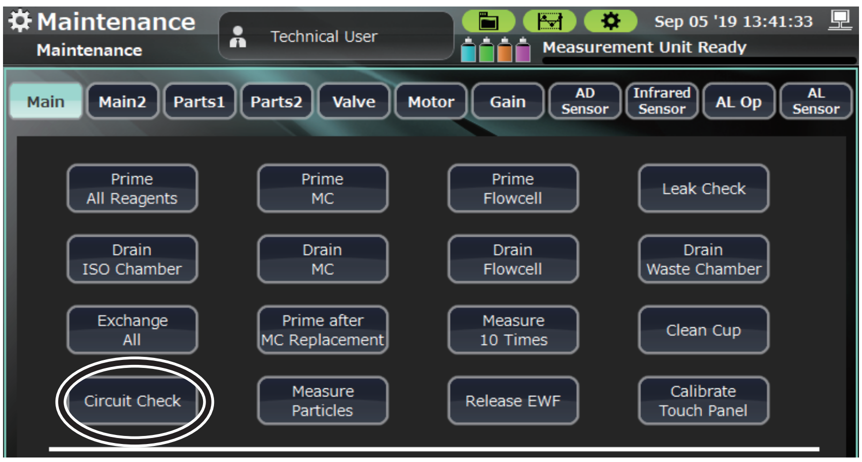
- Performs a self check of internal circuits. Performs a measurement using a pseudo pulse and checks that values are within specifications.
- WBC, RBC and MCV are displayed following an analysis by PC-910W/PC-911W of pulses produced by the MAIN BD and returned from the MEASURING BD.

No judgment is made regarding the success or failure of values in the circuit check.
Run the self check to make a judgment.



Maintenance Procedure

1 Open the Service Maintenance window and touch [Circuit Check].



2 Touch [Yes] on the Confirm Operation window.

3 Check that none of the following errors appear in the Maintenance Log window during the circuit check.

- 00160 CBC Circuit Abnormality
- 00161 DIFF Circuit Abnormality

Measuring Particles

This procedure aspirates and measures of 7 µm standard particles to regulate the flow cell unit.

Measurement Procedure

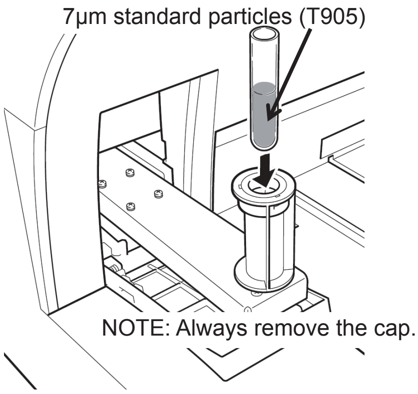
1 Set a sample tube of 7 µm standard particles in the sample tube holder.

1) Touch [ ] to eject the sample tube holder.

2) Check that the sample tube adapter is attached on the ejected sample tube holder.

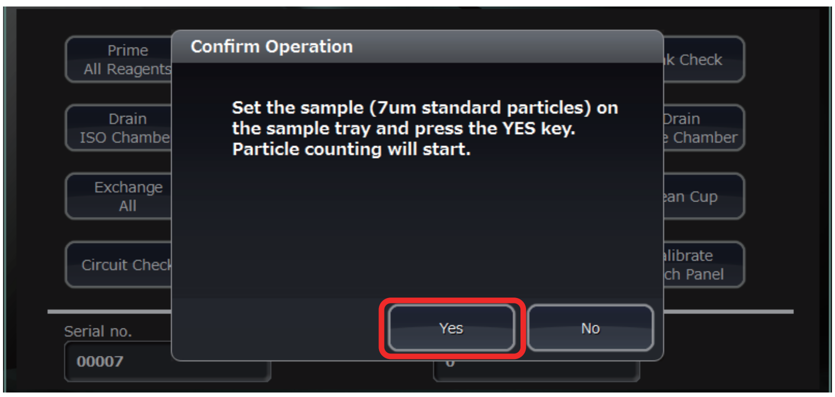
3) Set a sample tube of the 7 µm standard particles in the adapter for the sample tube holder.

NOTE: Always remove the cap from the sample tubes.



2 Open the Service Maintenance window and touch [Measure Particles].

3 Touch [Yes] on the Confirm Operation popup.



4 When aspiration of the particles is completed, the sample tube holder is ejected.

5 Remove the sample tubes and touch [⏏] to slide in the sample tube holder.

6 Open the Data List window and select the latest [PARTICLE] measurement data, then touch the Details tab.

7 Check that the particle measurement results are within the following criteria from the Research tab of the Data Details window.

- FS CV 5% or less
- FL CV 5% or less
- TOC 2000 or more
- The data is stored in the [Data List] with a Sample ID of [PARTICLE].
- Each of the FS, FL and SD results can be checked from: [Data List] > [Details] > [Research].

During the particle measurement, measurements of the diluent are performed with the CBC-type measurement part. Consequently, results for WBC, RBC, HGB, PLT and electrode voltage measurements are displayed.

Measuring 10 Times

Measurement Procedure

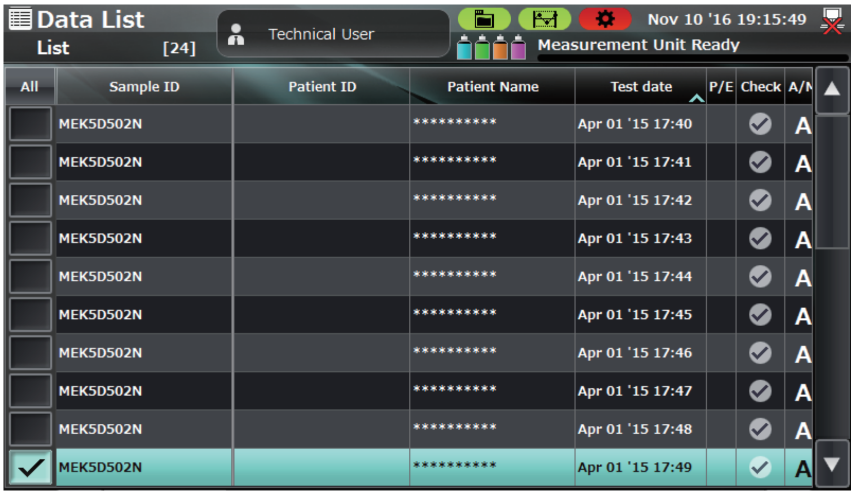
1 Insert the MEK-5DN hematology control into the left end (first position) of the rack.

2 Open the Service Maintenance window and touch [Measure 10 Times].

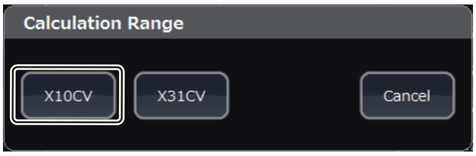
3 Touch [Yes] on the Confirm Operation window.

The analyzer consecutively measures the hematology control 10 times.

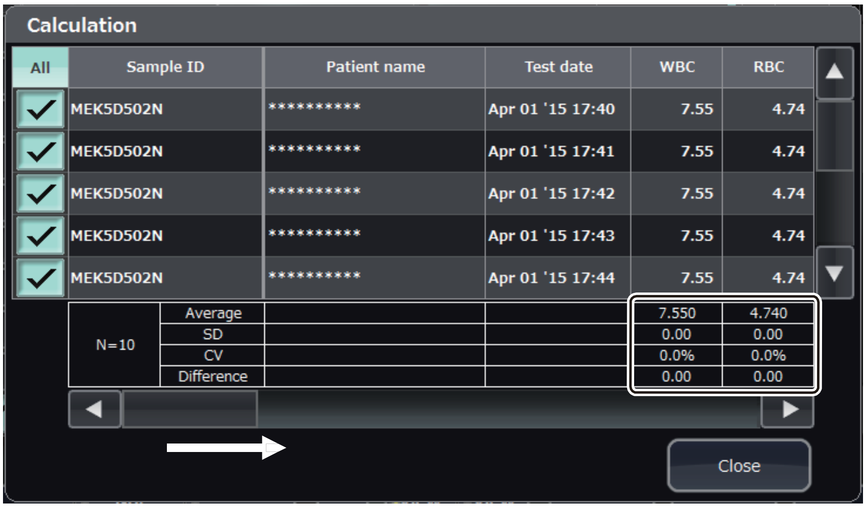
4 Return to the Home screen, select the last data measured from step **3** in the Data List window and touch [Calculation].



5 On touching the [X10CV] key on the Calculation Range window, the average value, CV value and SD value are shown for each measured parameter column for the hematology control measured 10 times.



Touching [X10CV], displays statistical data for the last 10 measurements obtained from the selected measurement results.



Changing the Settings of the PC-910W DATA PROCESSING UNIT

Releasing the EWF

This procedure revokes the enhanced write filter (EWF) for the drives used by the PC-910W (PC board).

Revocation of EWF status is maintained until the PC-910W restarts.

NOTE: The settings saved during the revocation of EWF remain even after restarting the system. Be aware that these settings are vulnerable to file corruption, virus infection, etc.

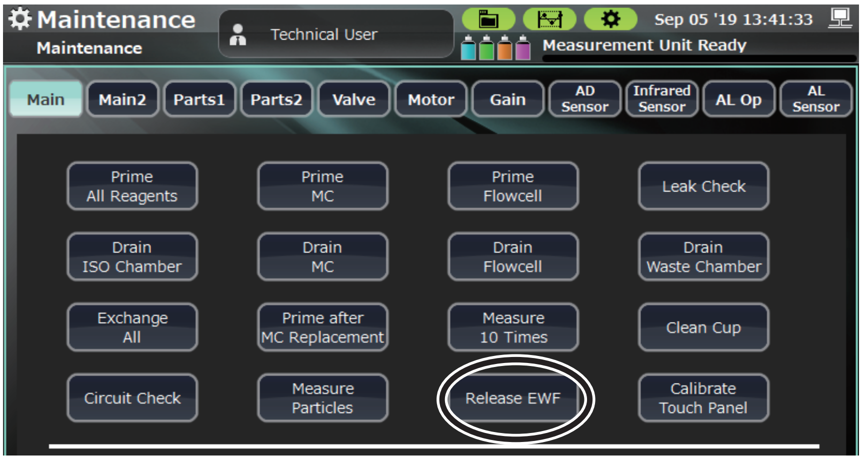
Calibrating the Touch Panel

This procedure adjusts the touch points on the touch screen.

The results of the adjustment are not saved unless they are made after revoking the EWF.

Operating Procedure

1 Open the Service Maintenance window and touch [Release EWF].

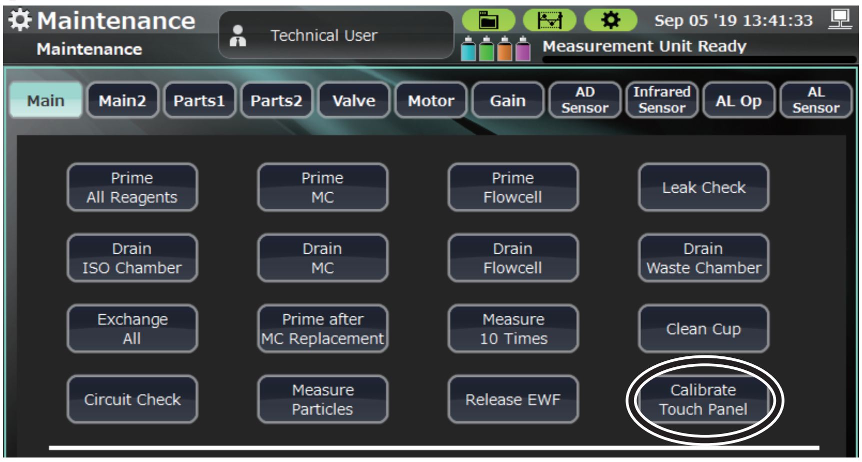


2 Touch [Yes] on the Confirm Operation window.

A popup message appears and the PC-910W (PC board) restarts.

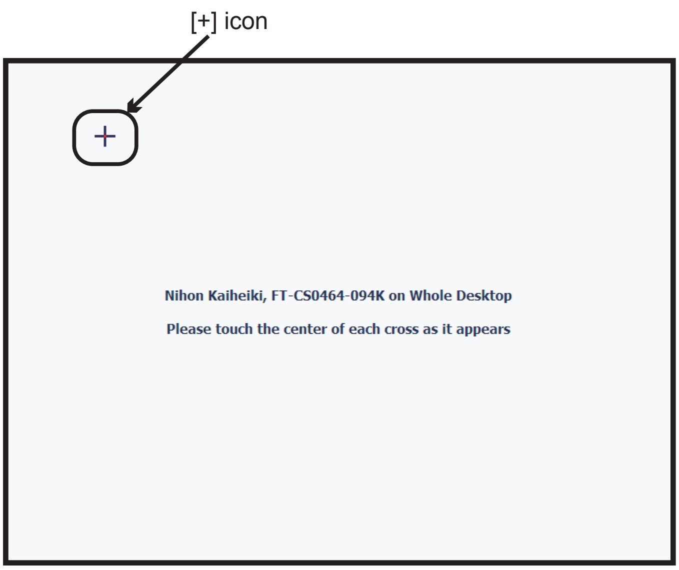
3 Another popup appears a certain time after the restart of the PC-910W (PC board) restarts.

4 Open the Service Maintenance window and touch [Calibrate Touch Panel].



5 Touch [Yes] on the Confirm Operation window.

6 The Calibration window for the touch screen appears. Touch the four [+] icons as they appear.



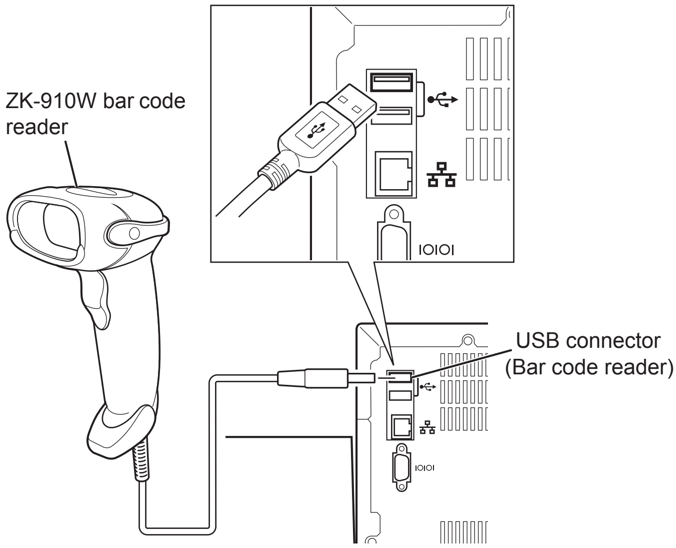
When calibration of the touch screen is finished, the PC-910W (PC board) automatically restarts and saves the calibration results.

Connecting a ZK-910W Bar Code Reader

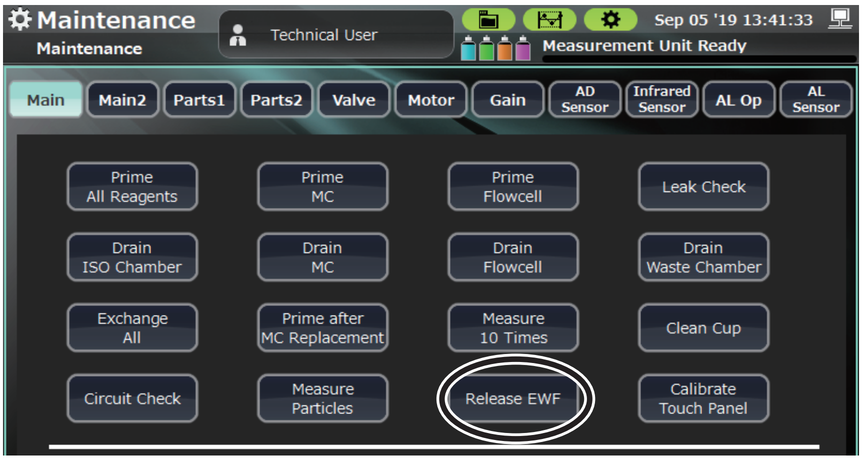
Connection procedures for using an optional ZK-910W bar code reader are explained below.

Additionally, the results of the connection are not saved unless they are made after revoking the EWF. For details on revoking the EWF, refer to “Changing the Settings of the PC-910W DATA PROCESSING UNIT” (p. 6-38).

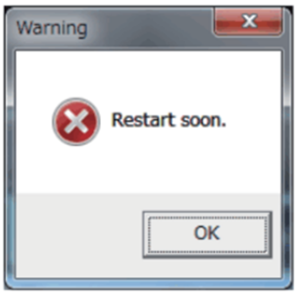
1 Insert a new ZK-910W bar code reader into the USB port.



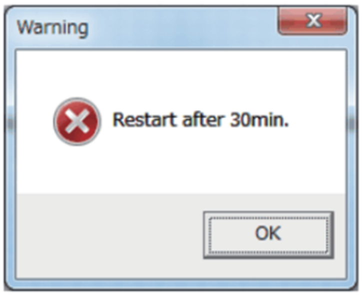
2 Open the Service Maintenance window and touch [Release EWF].



3 Touch [Yes] on the Confirm Operation window. A popup message appears and the PC-910W (PC board) restarts.



4 After the PC-910W (PC board) restarts, the following popup is appears a short time after the restart.



5 Touch [Sample ID] in the Manual Measurement window, read the following bar code below with the bar code reader and check that the sample ID is “123456789”.

123456789

6 Press the Reset key at the same time as the power switch to shut down the analyzer.

7 Press the power switch to restart the analyzer. Once again, touch [Sample ID] in the Manual Measurement window, read the following bar code with the bar code reader, and check that the sample ID is “123456789”.

123456789

Changing the Settings of the PC-911W DATA PROCESSING UNIT

Calibrating the Touch Panel

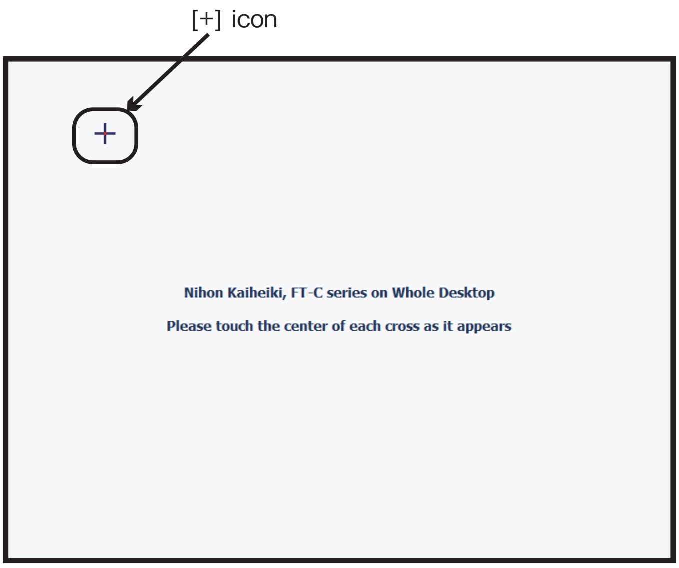
This procedure adjusts the touch points on the touch screen.

Operating Procedure

1 Open the Service Maintenance window, and touch [Calibrate Touch Panel].

2 Touch [Yes] on the Confirm Operation window. The calibration window for the touch screen appears.

3 Touch the four [+] icons as they appear.



When calibration of the touch screen is finished, the PC-911W (PC board) automatically restarts and saves the calibration results.

Checking the Network Condition

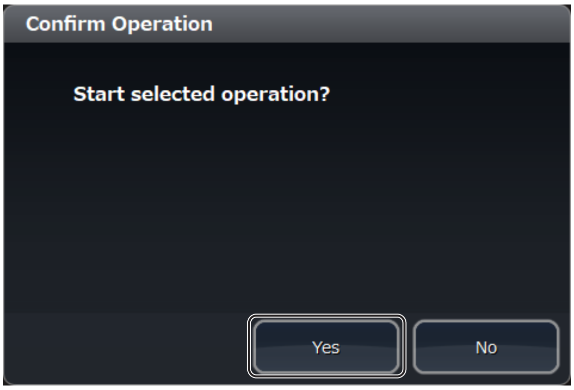
This procedure checks the basic network condition of the analyzer.

1 Open the Maintenance window.

Touch [Main2] and open the Main 2 window.

2 Touch [Check network status].

3 Touch [Yes] on the Confirm Operation window.



4 Check that another popup appears and the following network information is displayed.

- The configuration information of the network adaptor (ipconfig/all).
- All the Receive state port of the TCP protocol (netstart -a -p tcp).
- The routing table of IPv4 (route print -4).

Refer to “Advanced Settings” (p. 7-16) in Section 7 “System Settings (ROUTE setting)”.

- The continuity to ping the connection destination (ping the destination IP address).

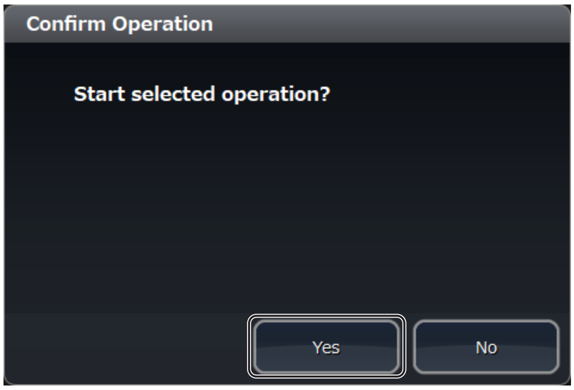
“External Output” in System Settings (p. 7-11)

Checking the Interface Numbers

This procedure is used to verify that the interface numbers assigned by Windows to the LAN (NIC) installed in the DATA PROCESSING UNIT are the same as the system settings.

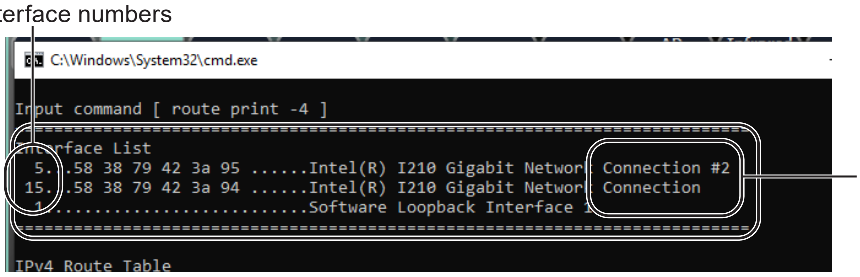
1 Open the Maintenance window. Touch [Main2] and open the Main 2 window. Touch [Check network status].

2 Touch [Yes] on the Confirm Operation window.



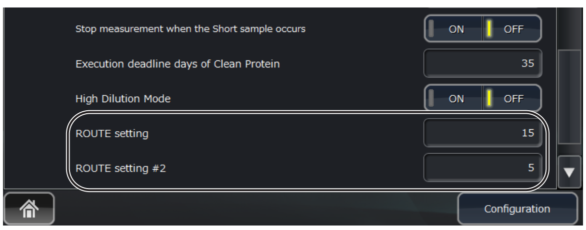
3 A new window opens. Check that the two interface numbers shown in the Interface List are the same as those in the system settings.

Interface numbers



Enter the Connection number into the ROUTE setting.
Enter the number of Connection #2 into the ROUTE setting # 2.

4 Verify that the settings in [System Settings] > [Advanced Settings] > [ROUTE Setting/ROUTE Setting #2] match the interface numbers that you checked in the previous section. If they do not match, change the ROUTE setting/ROUTE setting #2.



Checking the Analyzer Operations

Electromagnetic Valves, Pinch Valves and Compressors

The analyzer's electromagnetic valves, pinch valves and compressors can be individually controlled by operating the [Valve] key in the Service Maintenance window.

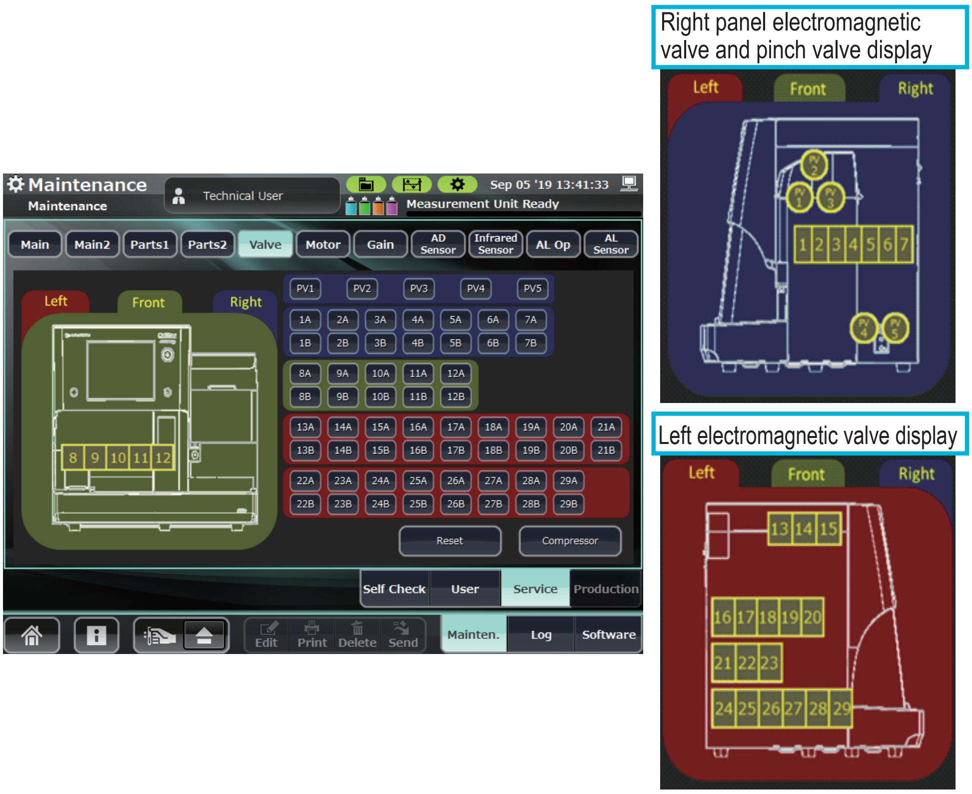
NOTE: Only use this function with a thorough understanding of the fluid paths within the analyzer.

Control Procedure

1 Open the Service Maintenance window and touch [Valve].

2 Touch the key for the individual electromagnetic valve, pinch valve or compressor that you want to control.

Key Name	Description
PV1 to PV5 keys	Keys for individually controlling the pinch valves. When touched (illuminated), the valve is open. If there is a discrepancy between a key's display and the open/closed state of a pinch valve, the first use of the key does not cause any action. To make the key displays correspond with the actual open/closed states, touch the Reset key.
1A to 29B keys	Keys for individually controlling the electromagnetic valves. When touched (illuminated), the valve is open.
Compressor key	Turns the compressor on or off.
Reset key	Sets all electromagnetic valves and pinch valves to "closed".



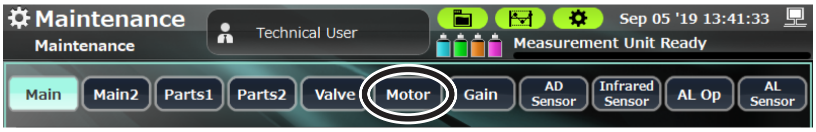
"Electromagnetic Valve Maintenance" (p. 6-134)

Motor (Inside Analyzer)

This procedure controls the individual motors inside the analyzer.

Operating Procedure

1 Open the Service Maintenance window and touch [Motor] to open the Motor window.



2 Using the Motor drop-down menu, select an individually controllable motor from the list below.

- The following motors can be chosen from the drop-down menu:

MP-911W (ISO PUMP)
MP-912W (SAMPLE PUMP)
MP-912W (RBC PUMP)
MS-910W (SAMPLER) X
MS-910W (SAMPLER) Y
MS-911W (OPEN AIR)
MS-912W (OPEN LOADER)
XP-910W (PINCH VALVE) 1
XP-910W (PINCH VALVE) 2
XP-910W (PINCH VALVE) 3
XP-910W (PINCH VALVE) 4
XP-910W (PINCH VALVE) 5

3 Motors are controlled either with a one-touch operation or by parameter-based operation.

The following keys can be used forone-touch operation.

One-touch Operation Key Name	Operation Details
Initialize key	Returns the motor selected in the Motor drop-down menu to its initialized position.
Full Stroke key	Moves the motor selected in the Motor drop-down menu to its full stroke position (the maximum driven position).
5 Times Test key	Repeats the initialization and full stroke 5 times, then initializes.
Adjust Rotary Knob key	This key acts only on the pump's unit (nothing other than the pump is operated), and moves the pump up to the upper sensor detection position. Do not do this operation when the motor is in the initialized position. (Error) This is mainly used during production.

The following keys and fields can be used for parameter-based operation.

Parameter-based Operation Key or Field Name	Operation Details
Step mode drop-down menu	When operating the motor selected in the Motor drop-down menu via parameters, the following step modes can be selected from the drop-down menu. Mode name 2PHASE 1_2PHASE W1_2PHASE 2W1_2PHASE
Speed text field	Input box for the speed parameter of the parameter-based operation (input range: 0 to 500, no default setting)
Pulses text field	Input box for the pulses parameter of the parameter-based operation (input range: 0 to 5000, no default setting)
Forward key	The motor's parameter-based operation is performed in the direction away from its initialized position[1]. The driving force depends on the selected motor and step mode, as well as the entered speed and pulse parameters. [1] The aspirating direction (down) for pumps and leftwards for the samplers
Reverse key	The motor's parameter-based operation is performed in the direction towards its initialized position[2]. The driving force depends on the selected motor and step mode, as well as the entered speed and pulses parameters. [2] The discharge direction (up) for pumps and rightwards for the samplers

Following is a summary of the operations for one-touch operations or parameter-based operations for each motor.

Motor Name	One-touch Operation				Parameter-based Operation	
	Initialize key	Full Stroke key	5 Times Test key	Adjust Rotary Knob key	Forward key	Reverse key
MP-911W (ISO PUMP)	Move to highest point	Move to lowest point	Available	Available	Upwards motion	Downwards motion
MP-912W (SAMPLE PUMP)	Move to highest point	Move to lowest point	Available	Available	Upwards motion	Downwards motion

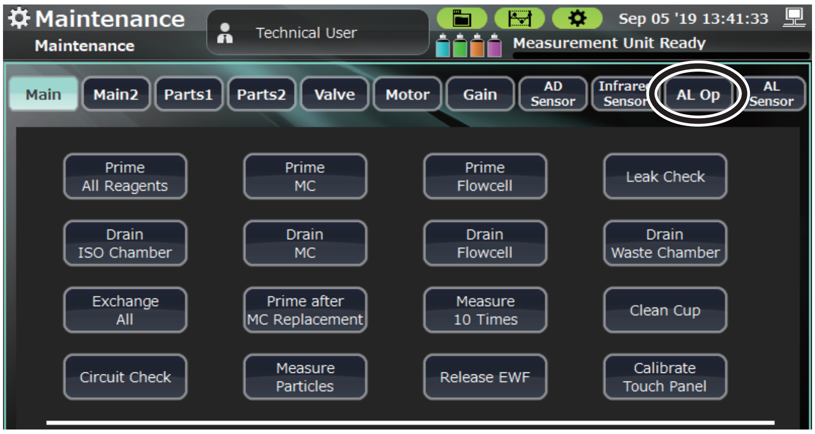
Motor Name	One-touch Operation				Parameter-based Operation	
	Initialize key	Full Stroke key	5 Times Test key	Adjust Rotary Knob key	Forward key	Reverse key
MP-912W (RBC PUMP)	Move to highest point	Move to lowest point	Available	Available	Upwards motion	Downwards motion
MP-913W (WBC PUMP)	Move to highest point	Move to lowest point	Available	Available	Upwards motion	Downwards motion
MS-910W (SAMPLER) X	Move to the rightmost position	Move to the leftmost position	Auto and manual measurement operation	Not available	Left motion	Right motion
MS-910W (SAMPLER) Y	Move to highest point	Move to lowest point	Auto and manual measurement operation	Not available	Downwards motion	Upwards motion
MS-911W (OPEN AIR)	Move to highest point	Move to lowest point	Available	Not available	Downwards motion	Upwards motion
MS-912W (OPEN LOADER)	Stow	Eject	Available	Not available	Not available	Not available
XP-910W (PINCH VALVE) 1	Open	Close	Available	Not available	Not available	Not available
XP-910W (PINCH VALVE) 2	Open	Close	Available	Not available	Not available	Not available
XP-910W (PINCH VALVE) 3	Open	Close	Available	Not available	Not available	Not available
XP-910W (PINCH VALVE) 4	Open	Close	Available	Not available	Not available	Not available
XP-910W (PINCH VALVE) 5	Open	Close	Available	Not available	Not available	Not available

Restarting the Autoloader

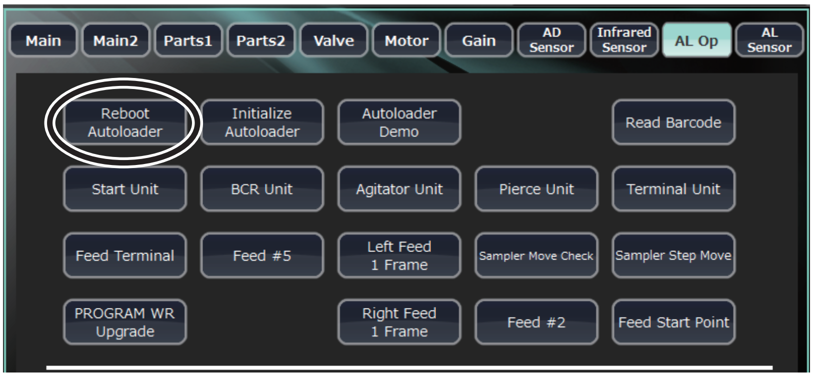
Performs a single operation that restarts the autoloader.

Restart Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Reboot Autoloader] in the Autoloader Operation window.



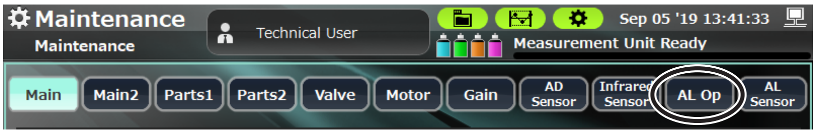
3 Touch [Yes] on the Confirm Operation window.

Initializing the Autoloader

This procedure restores (initializes) the moving parts of the autoloader to their original positions in a single operation.

Initialization Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Initialize Autoloader] in the Autoloader Operation window.

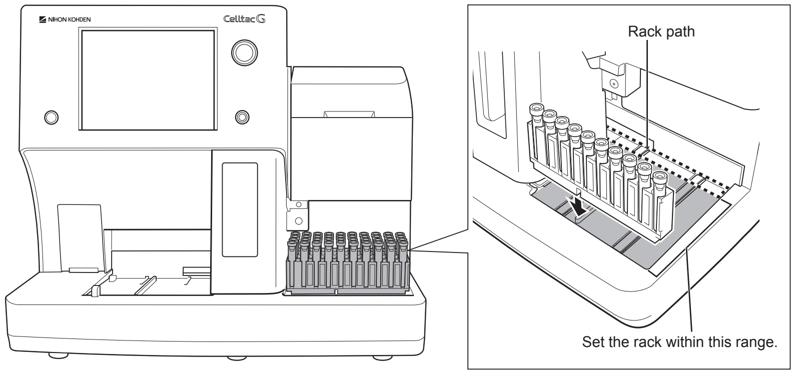
3 Touch [Yes] on the Confirm Operation window.

Autoloader Demo

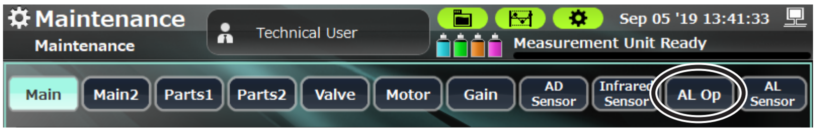
This demonstrates the transport operations used with the rack and sample tubes when performing auto measurements. It is not an adjustment procedure.

Operating Procedure

1 Arrange the sample tubes on the rack and set the rack in the analyzer.



2 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



3 Touch [Autoloader Demo] in the Autoloader Operation window.

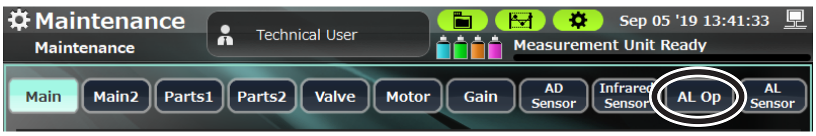
4 Touch [Yes] on the Confirm Operation window.

Barcode Reading

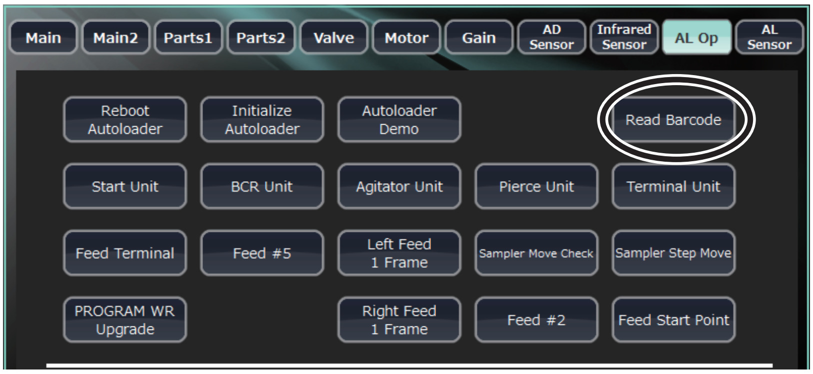
This procedure performs a single operation that reads a barcode.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Read Barcode] in the Autoloader Operation window.



3 Touch [Yes] on the Confirm Operation window.

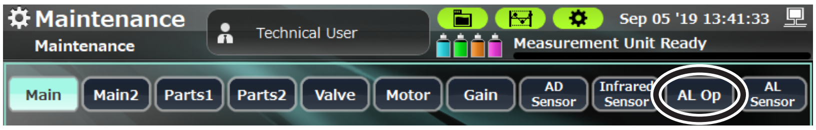
NOTE: The result of this reading is not displayed.

Start Unit

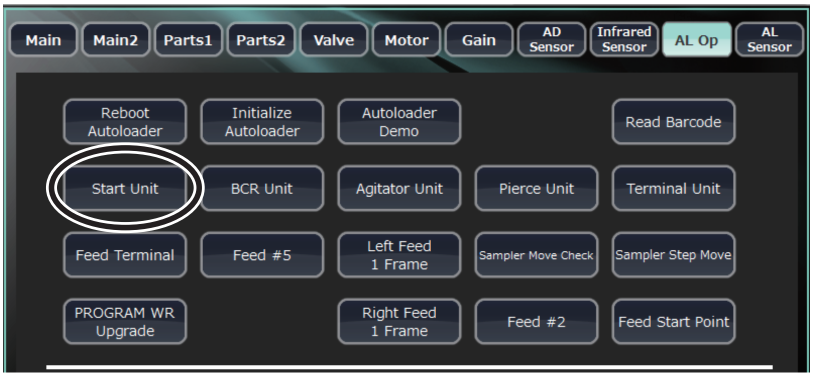
This procedure performs a single operation that draws in a rack positioned in the start unit.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Start Unit] in the Autoloader Operation window.



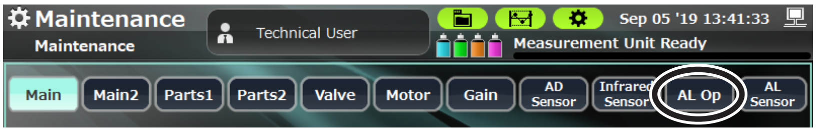
3 Touch [Yes] on the Confirm Operation window.

BCR Unit

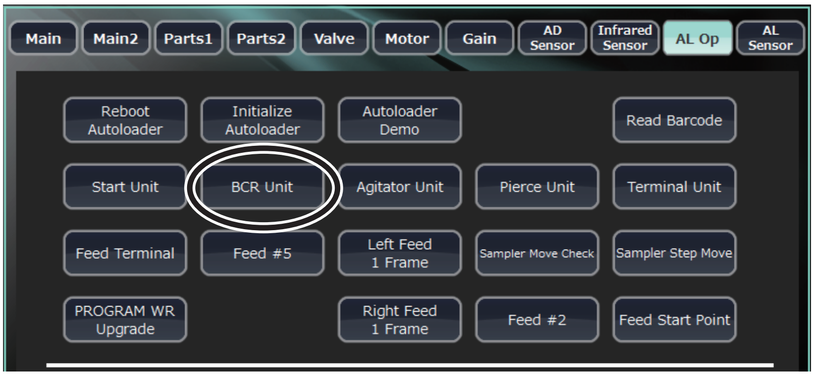
This procedure performs a single operation that presses down the sample tubes and reads the affixed barcodes while rotating the sample tubes.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [BCR Unit] in the Autoloader Operation window.



3 Touch [Yes] on the Confirm Operation window.

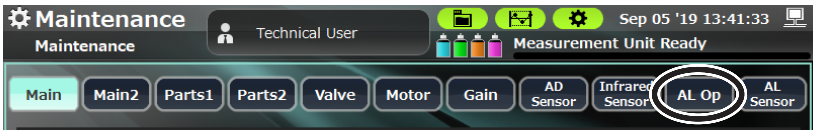
If there are sample tubes in the rack directly below the sample rotator for barcodes, the sample tubes are detected and the barcodes are read.

Agitator Unit

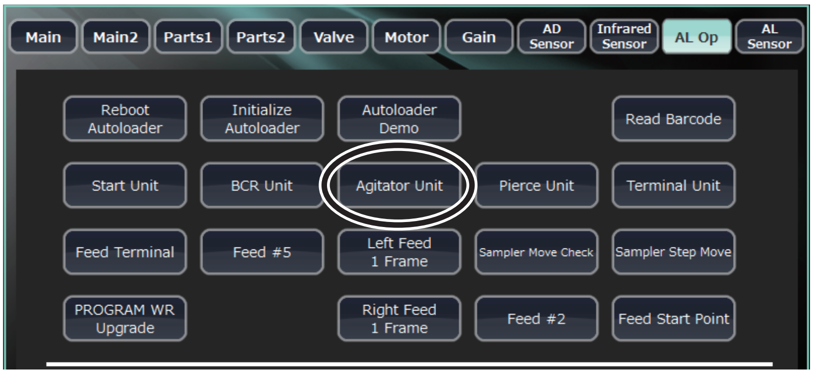
This procedure performs a single operation that holds the sample tubes and agitates them (for 5 inversions).

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Agitator Unit] in the Autoloader Operation window.



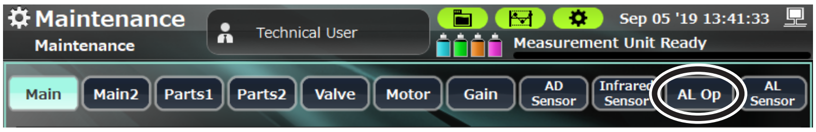
3 Touch [Yes] on the Confirm Operation window.

Pierce Unit

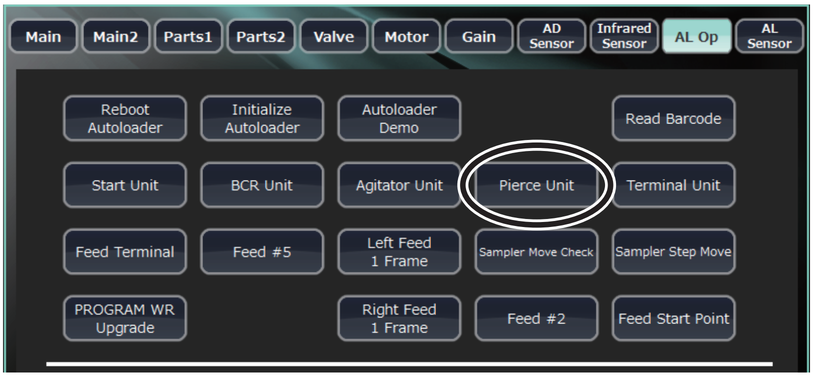
This procedure performs a single operation that releases the pressure that holds the sample tubes in the pressure release aspiration position by the pierce guide.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Pierce Unit] in the Autoloader Operation window.



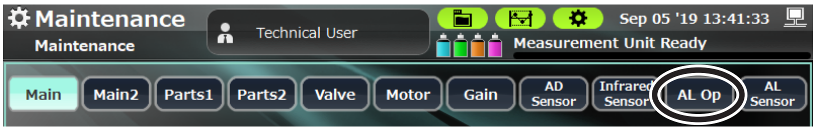
3 Touch [Yes] on the Confirm Operation window.

Terminal Unit

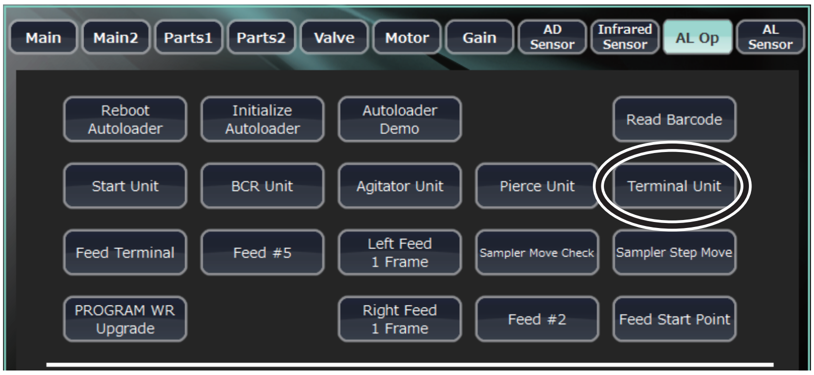
This procedure performs a single operation that draws the rack removal tab in or out.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Terminal Unit] in the Autoloader Operation window.



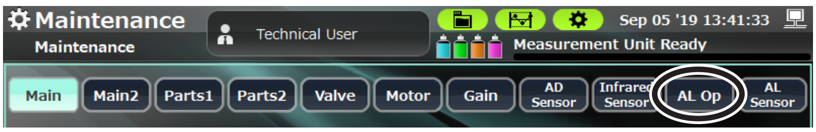
3 Touch [Yes] on the Confirm Operation window.

Feed Start Point, Feed Terminal

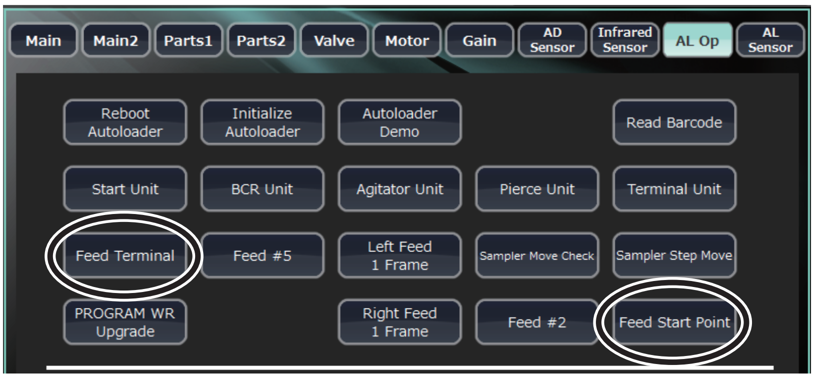
This procedure performs a single operation that transports the feed unit horizontally to a position corresponding to the touched key.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Feed Start Point] or [Feed Terminal] in the Autoloader Operation window.



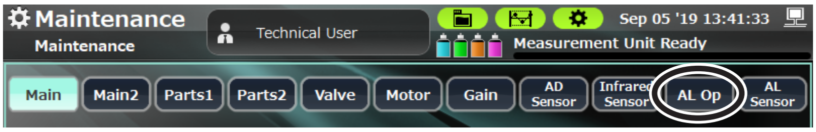
3 Touch [Yes] on the Confirm Operation window.

Feed #2

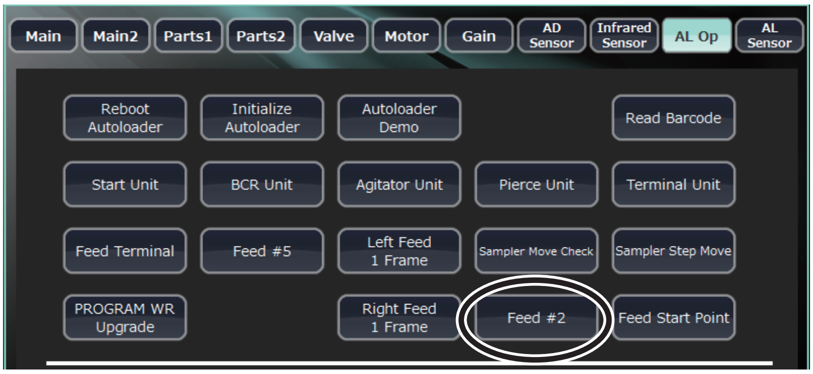
This procedure performs a single operation that transports the feed unit horizontally to a position corresponding to the touched key.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Feed #2] in the Autoloader Operation window.



3 Touch [Yes] on the Confirm Operation window.

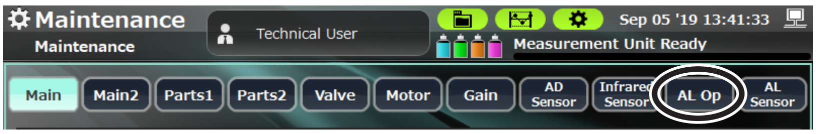
NOTE: This operation only occurs when the feed unit is in the feed 3 to 5 position or feed end position.

Feed #5

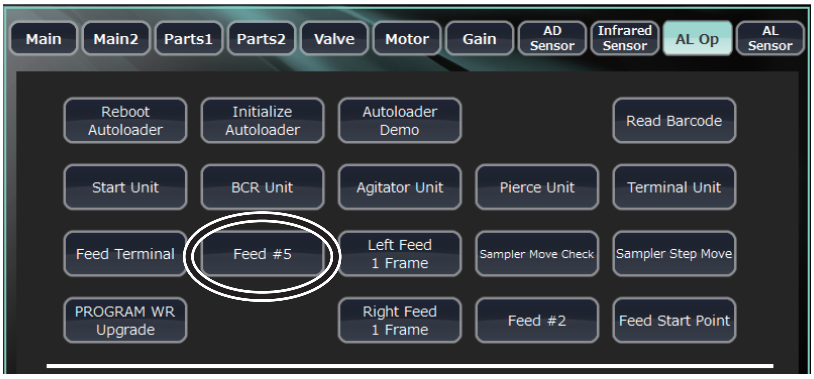
This procedure performs a single operation that transports the feed unit horizontally to a position corresponding to the touched key.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Feed #5] in the Autoloader Operation window.



3 Touch [Yes] on the Confirm Operation window.

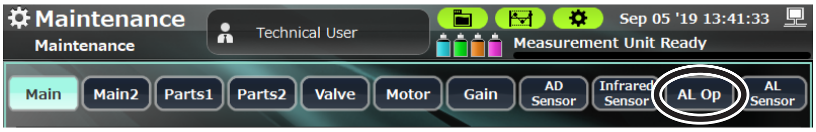
NOTE: This operation only occurs when the feed unit is in the feed 2 to 4 position or feed start position.

Right Feed 1 Frame, Left Feed 1 Frame

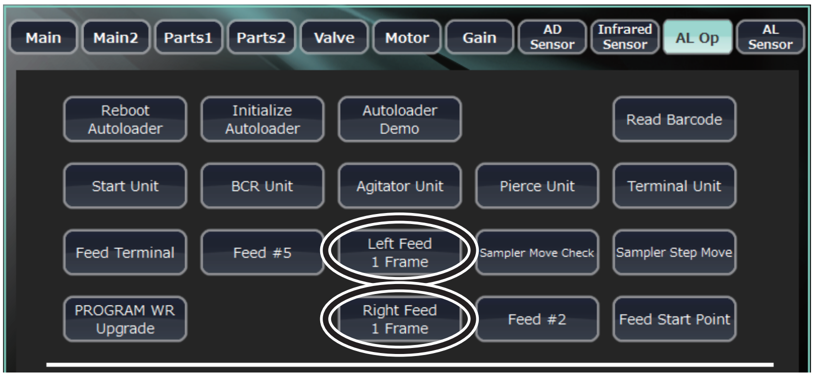
This procedure performs a single operation that transports the feed unit horizontally to the next sample tube position.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.



2 Touch [Right Feed 1 Frame] or [Left Feed 1 Frame] in the Autoloader Operation window.



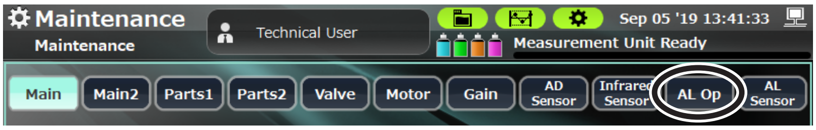
3 Touch [Yes] on the Confirm Operation window.

Motor (Inside Autoloader)

This procedure controls each individual motor inside the autoloader.

Operating Procedure

1 Open the Service Maintenance window and touch [AL Op] to open the Autoloader Operation window.

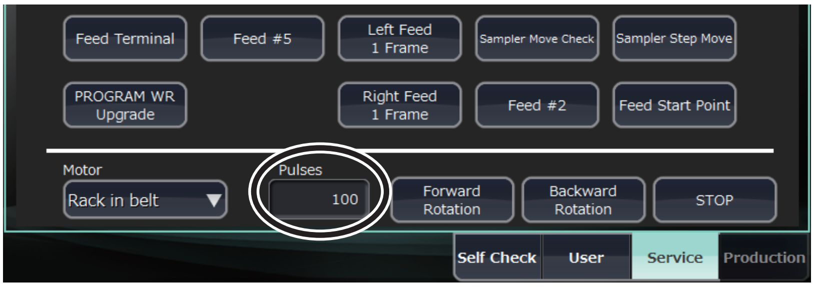


2 Select the motor to control from the drop-down menu in the Autoloader Operation window.

The following motors can be chosen from the drop-down menu:

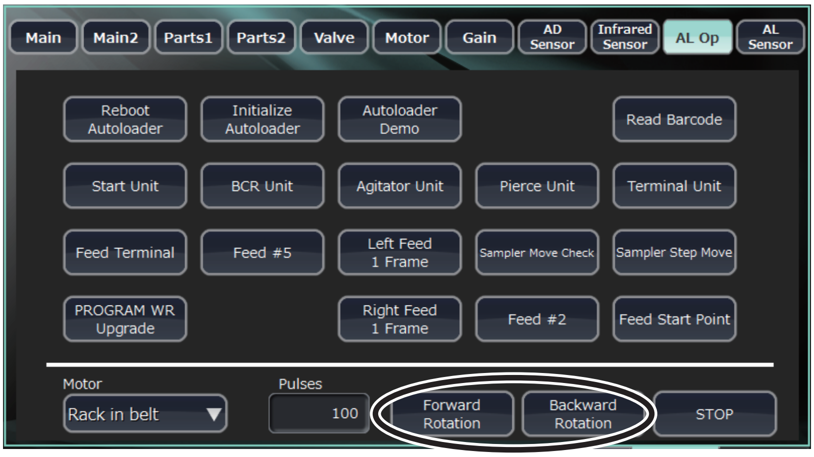
Motor Name	Description
Rack in belt	Controls the motor that draws in racks.
Agitator up/down	Controls the motor that performs inversion-mixing operations.
Raise agitator arm	Controls the motor that raises and lowers the arm to the sample tube rack storage position and inversion-mixing position.
Hold/release feed tab	Controls the motor that operates the tab that fixes the rack and feed units.
Raise sampling tube check arm	Controls the motor that operates the sample tube detection arm.
Rotate sampling tube	Controls the motor that operates the rotation of sample tubes for the reading of affixed barcodes.
Hold/release agitator grip	Controls the motor that operates the grip that engages sample tubes for inversion-mixing.
Feed conveyor	Controls the motor that performs horizontal rack transport operations.
Hold/release sampling tube guide	Controls the motor that operates the pierce guide that holds the sample tubes at the position used for piercing with the sampling needle and venting needle.
Eject tab	Controls the motor that operates the rack's eject tab.

3 Enter the number of operation pulses for the controlled motor.



Pulses:	This is an input box for the pulses parameter that controls the motor selected in the drop-down menu. (Input range: 0 to 19999, no default setting)

4 Touch [Forward Rotation] or [Backward Rotation].



Key Name	Description
Forward Rotation	Controls the motor based on the pulses parameter in the positive direction.
Backward Rotation	Controls the motor based on the pulses parameter in the negative direction.
STOP key	Unused

PROGRAM WR Update

PROGRAM WR Update is not used.

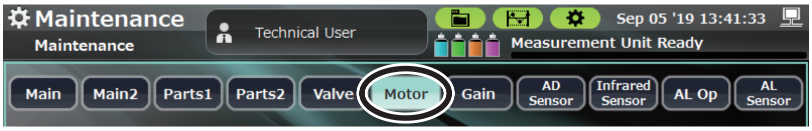
Adjusting the Measurement Position

Auto Measurement Position Adjustment

This procedure checks and adjusts the sampling needle and autoloader aspiration position for auto measurements.

Adjustment Procedure

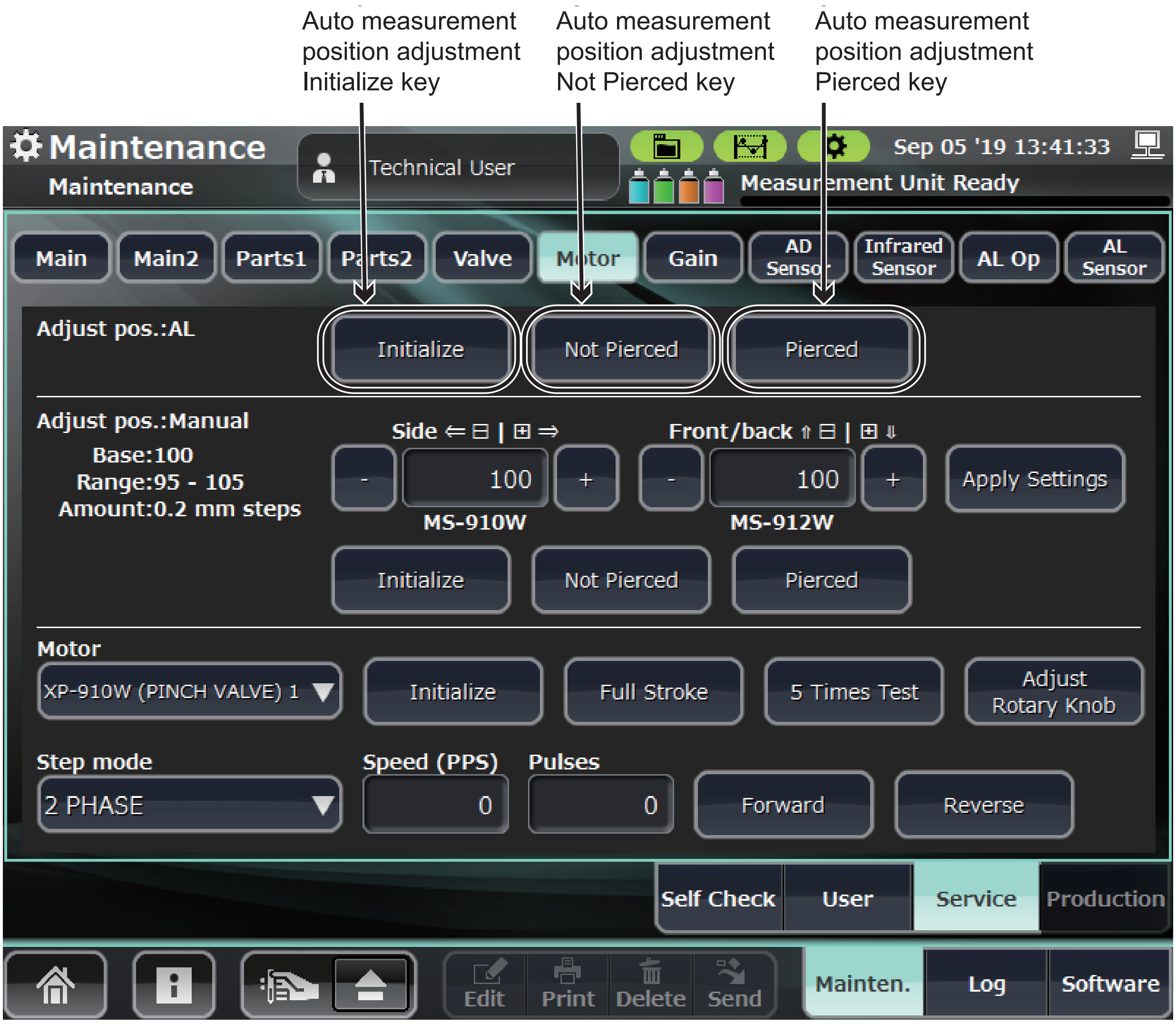
1 Open the Service Maintenance window and touch [Motor].



2 Attach the target jig (RPK-6114935815 needle position adjustment jig [refer to p. 6-62 for a photo]) to the autoloader, touch the operating keys according to the desired adjustments, check the position of the sampling needle, and perform the adjustments.

The following operating keys are used when performing auto measurements:

Operating Key Name	Operation Details
Initialize key	Moves the sampler unit to the initial position.
Not Pierced key	Moves the sampler unit to the start point on the X-axis and directly before piercing of the target on the Y-axis.
Pierced key	Moves the sampler at the (not pierced) position directly before piercing, to a position such that it pierces the target (jig). When this operation is executed before the Not Pierced key, an error occurs. (Error code: 00404)



Manual Measurement Position Adjustment

This procedure adjusts and checks the sampling needle and open loader position for manual measurements.

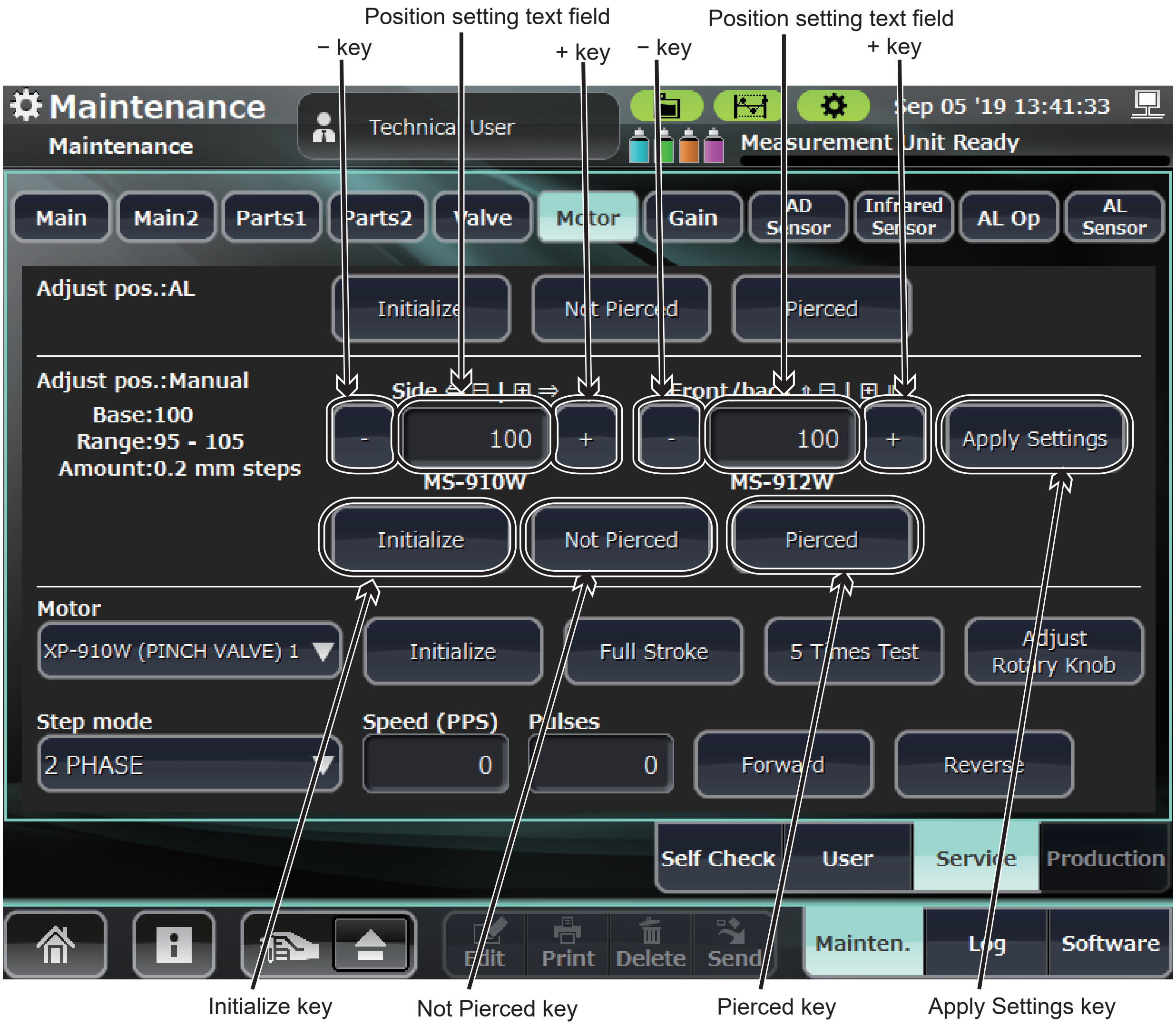
The sampling nozzle aspiration position for manual measurement is adjusted by changing the position of the MS-910W sampler unit and the MS-912W open loader.

Adjustment Procedure

1 Open the Service Maintenance window and touch [Motor].

2 Attach the RPK-6114935815 needle position adjustment jig to be used as a target to the open loader.

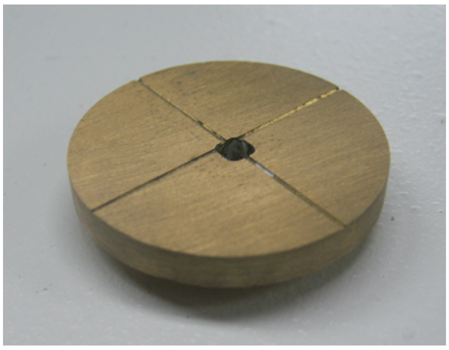
3 When adjusting the position of the sampling needle, sampler or open loader manually, perform the adjustment by touching the keys below.



The following operating keys are used when performing manual measurements:

Manual Measurement Position Adjustment Key Name		Description of Manual Adjustment
MS-910W (sampler) position adjustment Side to side position	Position setting text field	A position input value of 1 corresponds to a movement of 0.2 mm. Increasing the value adjusts the aspiration position to the right, as viewed from the front. Decreasing the value adjusts it towards the left. Sampler unit position input box (input range: 95 to 105, default setting: 100)
	+key, −key	Changes the sampler unit position input value by 1.
MS-912W (open loader) position adjustment Front to back position	Position setting text field	Moves the open loader by 0.2 mm for a position of 1.
	+key, −key	Changes the open loader position input value by 1.
MS-910W/MS-912W	Apply Settings key	Applies each of the MS-910W sampler position adjustments and MS-912W open loader position adjustments. After applying, the sampling nozzle is forced to move to its initial position.
Initialize key		Moves the sampler unit to the initial position.
Not Pierced key		Moves the sampler unit to the open loader position on the X-axis and directly before piercing of the target (jig) on the Y-axis.
Pierced key		Moves the sampler at the (not pierced) position directly before piercing, to a position such that it pierces the target (jig). When this operation is executed before the Not Pierced key, an error occurs. (Error code: 00401)

4 Check the Not Pierced key, move the sampling nozzle to directly before the target (jig) pierce position and check that it is at the center of the target (within the area of the hole).



Needle position adjustment jig
RPK-6114935815

5 If it is not within the area of the hole, enter any value into each of the Position setting text fields for the sampler and open loader so that it is within the area.

Position setting text fields

Input range: 95 to 105

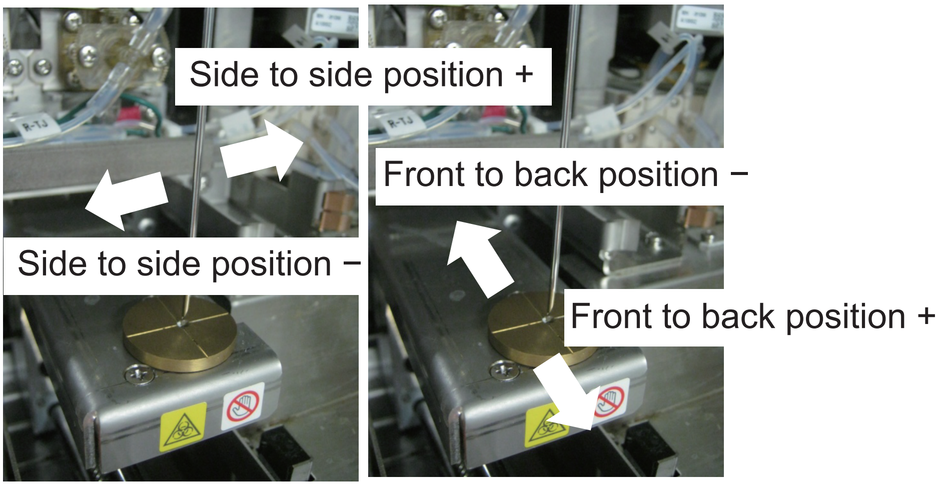
6 Touch the Apply Settings key. The sampling nozzle moves to its initial position.

7 Touch the Not Pierced key again and check the aspiration position of the sampling nozzle.

Apply Settings key

Not Pierced key

- Operations for performing minute adjustments to the sampling needle and open loader position used for manual measurements
  Side to side position: Adjusted by the sampler unit (moving sampler = moving needle)
  Front to back position: Adjusted by the open loader (moving loader = moving needle in opposite direction)



8 Adjust the position of the sampling needle so that it is in the center of the jig, then touch the Pierced key to lower the sampling needle.

9 Check that the sampling needle does not touch the jig.

Adjusting Gain

This procedure adjusts the voltage of the infrared sensors in the analyzer.

There are sensors at each of the CLEANAC•710, HEMOLYNAC•310 and HEMOLYNAC•510 ports. To ensure the sensors are working properly, adjust the gain value while checking measurement values.

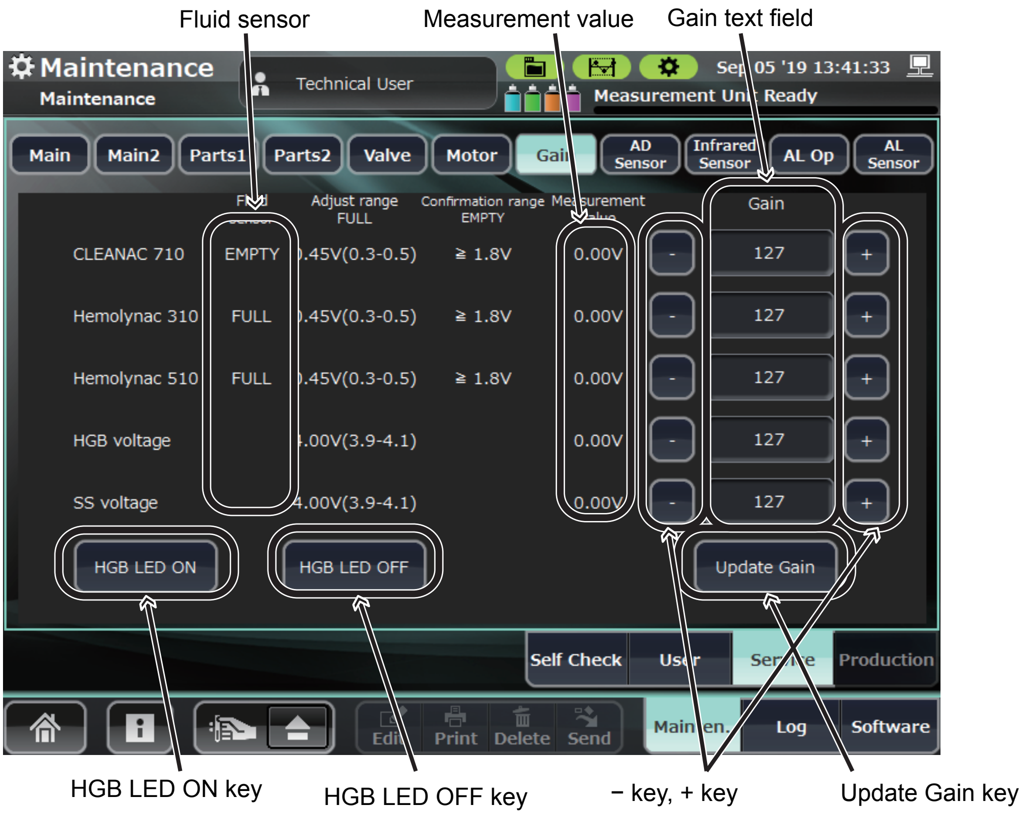
There are also sensors in the HGB unit. To ensure appropriate electrical sensitivity, adjust the gain value while checking measurement values.

Adjusting the Gain

1 Open the Service Maintenance window and touch [Gain].

2 The Gain Adjustment window appears.

Gain window details



Details for each column are shown below.

Column Name	Description
Fluid sensor status	Shows either EMPTY (no fluid) or FULL (fluid present) for the relevant reagent. The reference is 1.65 [V], with fluid present for higher values and no fluid for lower values.
Measurement value	Values obtained from the AD sensor, which determine the fluid sensor status. The HGB voltage is obtained from the voltage when the LED is blinking or lit.
Gain text field	Gain input box for obtaining effective measurement values (input range: 0 to 255, default setting: 127)
+key, −key	Changes the gain value by 1. Measurement values are not updated until the Update Gain key is touched.

Each row represents a sensor.

Sensor Name	Display Description
CLEANAC•710	The measurement value is the same as shown in [Maintenance] > [Service] > [AD Sensor] > [Detergent port].
HEMOLYNAC•310	The measurement value is the same as shown in [Maintenance] > [Service] > [AD Sensor] > [CBC lyse reagent port].
HEMOLYNAC•510	The measurement value is the same as shown in [Maintenance] > [Service] > [AD Sensor] > [DIFF lyse reagent port].
HGB voltage	The measurement value is the same as shown in [Maintenance] > [Service] > [AD Sensor] > [HGB Gain].
SS voltage	The measurement value is the same as shown in [Maintenance] > [Service] > [AD Sensor] > [SS gain].
HGB LED ON key	Causes the HGB LED to blink and starts the acquisition of measurement values.
HGB LED OFF key	Turns off the HGB LED and terminates the acquisition of measurement values.
Update Gain key	Applies the gain values adjusted via direct input or the + key and – key.

3 Change the Gain text field for adjusting the desired item by using the numeric keypad dialog or the + and − keys. Refer to the following table for the adjustment ranges and confirmation ranges.

	Adjust range		Confirmation range	
	Fluid sensor status	Measurement value (V)	Fluid sensor status	Measurement value (V)
CLEANAC•710	FULL (fluid present)	0.45 (0.3 to 0.5)	EMPTY (no fluid)	≥ 1.8
HEMOLYNAC•310	FULL (fluid present)	0.45 (0.3 to 0.5)	EMPTY (no fluid)	≥ 1.8
HEMOLYNAC•510	FULL (fluid present)	0.45 (0.3 to 0.5)	EMPTY (no fluid)	≥ 1.8
HGB voltage [1]	FULL (fluid present)	4.00 (3.90 to 4.10)	FULL (fluid present)	0.05–0.15
SS voltage [1]	FULL (fluid present)	4.00 (3.90 to 4.10)	FULL (fluid present)	0.05–0.15

[1] To adjust the LED ON measurement values, it is necessary to light the HGB LED by touching the [HGB LED ON] key (measurement values cannot be updated when the HGB LED is off).

4 When the measurement values are appropriate, touch the Update Gain key.

Otherwise, repeat steps **3** and **4** until appropriate values are obtained.

Terminating an adjustment

5 If the HGB voltage was adjusted and the HGB LED ON key was touched, touch the HGB LED OFF key to turn off the LED.

Checking the Sensors Inside the Analyzer

AD Sensor

This procedure shows relevant pressures and temperatures from the voltages measured regularly at sensors inside the analyzer.

Open the Service Maintenance window and touch [AD Sensor].

Sensor Name	Sensor Type	Description
Positive tank pressure	Pressure sensor	Measures the pressure in the ISO chamber.
Negative tank pressure	Pressure sensor	Measures the pressure in waste chamber 1.
Sample cup temperature	Thermistor	Measures temperatures in the range of 37 to 43°C (99 to 109°F).
Sample cup heater temperature	Thermistor	Measures temperatures in the range of 35 to 45°C (95 to 113°F).
Sample tank temperature	Thermistor	Measures temperatures in the range of 37 to 43°C (99 to 109°F).
Sample tank heater temperature	Thermistor	Measures temperatures in the range of 35 to 45°C (95 to 113°F).
HGB diluent temperature	Thermistor	Measures temperatures in the range of 10 to 50°C (50 to 122°F).
SS LED Temperature	Thermistor	Measures temperatures in the range of 10 to 50°C (50 to 122°F).
HGB LED Temperature	Thermistor	Measures temperatures in the range of 10 to 50°C (50 to 122°F).
Internal chassis temperature	Thermistor	Measures temperatures in the range of 10 to 50°C (50 to 122°F).
CBC hemolysing reagent port	Infrared sensor	Determines whether the port has fluid (0.8 V or less) or not (1.8 V or more).
DIFF hemolysing reagent port	Infrared sensor	Determines whether the port has fluid (0.8 V or less) or not (1.8 V or more).
Detergent port	Infrared sensor	Determines whether the port has fluid (0.8 V or less) or not (1.8 V or more).
HGB voltage ON	Infrared sensor	Measures the HGB ON voltage (4.00 ±0.50 V).
HGB voltage OFF	Infrared sensor	Measures the HGB OFF voltage (0.05 to 0.15 V).
SS voltage ON	Infrared sensor	Measures the SS ON voltage (4.00 ±0.50 V).
SS voltage OFF	Infrared sensor	Measures the SS OFF voltage (0.05 to 0.15 V).

Infrared Sensor

This procedure shows the detection of the sensors inside the analyzer listed below, based on regular measurements.

Open the Service Maintenance window and touch [Infrared Sensor].

Sensor Name	Sensor Type	Description
ISO chamber	Float sensor	Detects the priming of the reagents. Shows ○ when full.
Waste chamber 1	Float sensor	Detects the amount of water stored in waste chamber 1. Shows ○ when full.
Waste chamber 2	Float sensor	Detects the amount of water stored in waste chamber 2. Shows ○ when full.
Waste bottle	Float sensor	Detects the amount of water stored in the waste container. Shows ○ when full.
Upper diluter	Photo sensor	When detected at the upper part of the diluter pump, ○ is displayed.
Lower diluter	Photo sensor	When detected at the lower part of the diluter pump, ○ is displayed.
Diluter dial	Photo sensor	When detected at the start position of the diluter pump, ○ is displayed.
Sample upper pump	Photo sensor	When detected at the upper part of the sample pump, ○ is displayed.
Sample lower pump	Photo sensor	Not used
Sample pump dial	Photo sensor	When detected at the start position of the sample pump, ○ is displayed.
RBC upper pump	Photo sensor	When detected at the upper part of the RBC pump, ○ is displayed.
RBC pump dial	Photo sensor	When detected at the start position of the RBC pump, ○ is displayed.
WBC upper pump	Photo sensor	When detected at the upper part of the WBC pump, ○ is displayed.
WBC pump dial	Photo sensor	When detected at the start position of the WBC pump, ○ is displayed.
PV1	Photo sensor	Detects the open/closed state of pinch valve 1. Shows ○ when “closed”.
PV2	Photo sensor	Detects the open/closed state of pinch valve 2. Shows ○ when “closed”.
PV3	Photo sensor	Detects the open/closed state of pinch valve 3. Shows ○ when “closed”.
PV4	Photo sensor	Detects the open/closed state of pinch valve 4. Shows ○ when “closed”.
PV5	Photo sensor	Detects the open/closed state of pinch valve 5. Shows ○ when “closed”.
Sampler X start point	Photo sensor	When the sampler X-position is at the start position, ○ is displayed.
Sampler X end point	Photo sensor	When the sampler X-position is at the end position, ○ is displayed.
OWBC upper cup	Photo sensor	When the sampler X-position is directly above the OWBC cup, ○ is displayed.
RBC upper cup	Photo sensor	When the sampler X-position is directly above the RBC cup, ○ is displayed.
IWBC upper cup	Photo sensor	When the sampler X-position is directly above the IWBC cup, ○ is displayed.
Sampler Y start point	Photo sensor	When the sampler Y-position is at the start position, ○ is displayed.
Sampler Y aspiration CL	Photo sensor	When the sampler Y-position is at the auto measurement aspiration position, ○ is displayed.
Sampler Y aspiration OP	Photo sensor	When the sampler Y-position is at the manual measurement aspiration position, ○ is displayed.

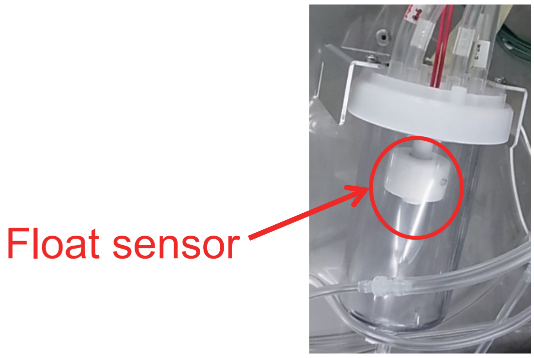
Infrared Sensor Window

This window shows the measured information from each sensor in real time.

- ISO chamber
- Waste chamber 1 and 2
- Waste bottle

Detector: Float sensor; when all 4 float sensors are unconnected or cut off, this always shows ○ (full).

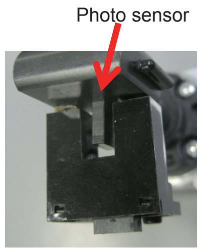
Shows ○: Full

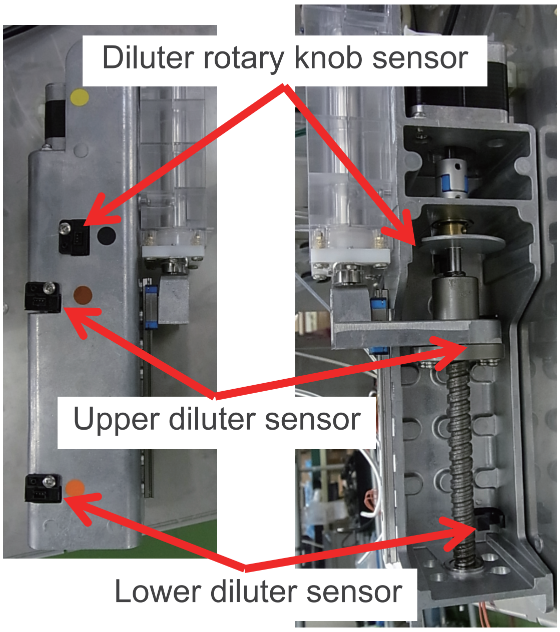


- Upper diluter
- Lower diluter
- Diluter rotary knob

Detector: Photo sensor

Shows ○: Shaded

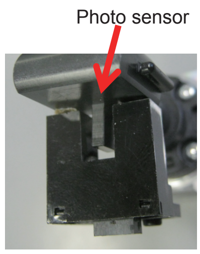


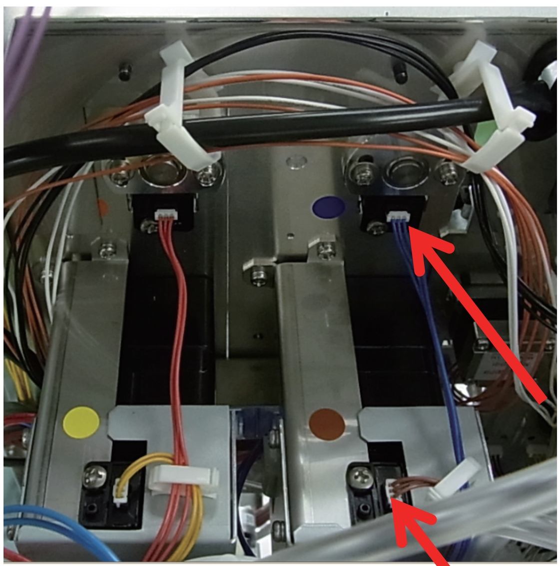


- Sample upper pump
- Sample lower pump: Unused
- Sample pump dial

Detector: Photo sensor

Shows ○: Shaded

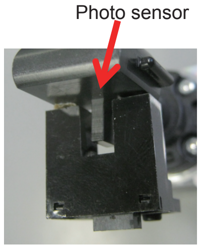


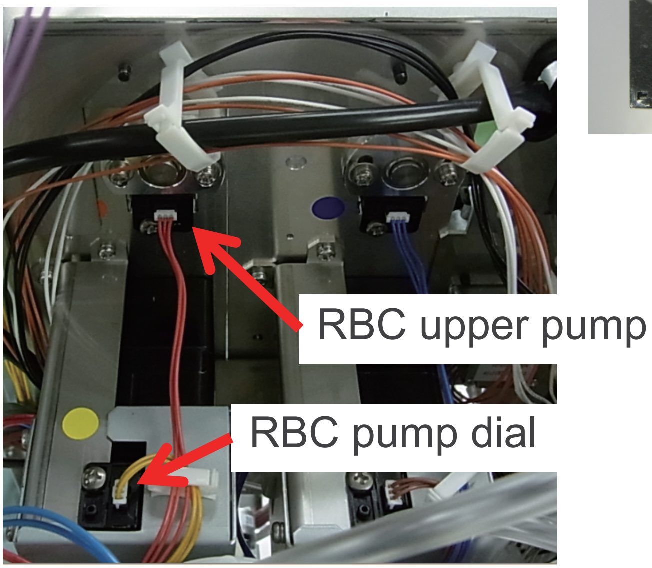


- RBC upper pump
- RBC pump dial

Detector: Photo sensor

Shows ○: Shaded

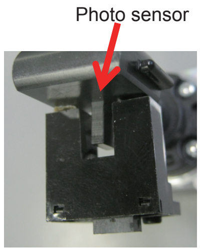


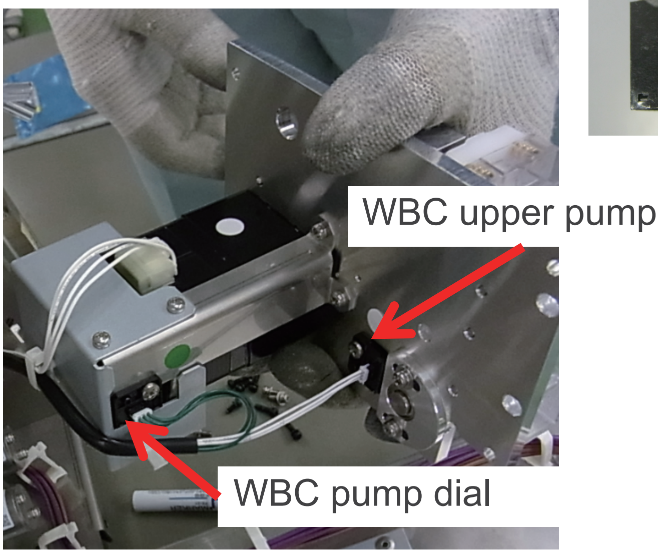


- WBC upper pump
- WBC pump dial

Detector: Photo sensor

Shows ○: Shaded



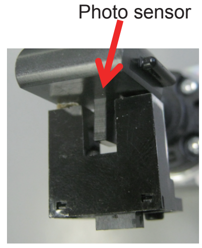


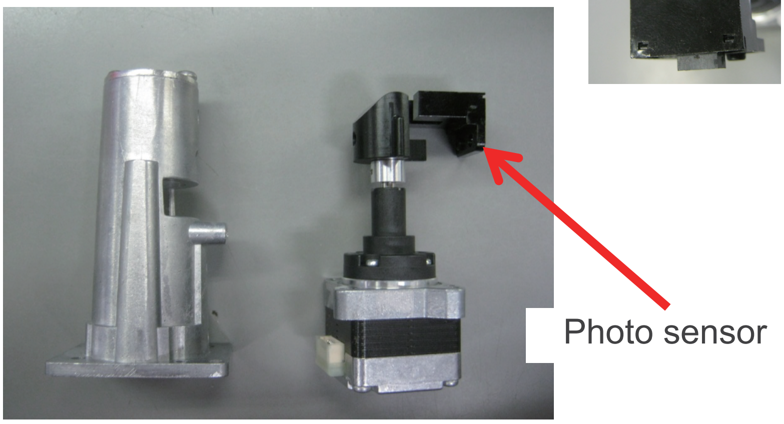
• PV1 to 5

Detector: Photo sensor

Shows ○: Closed (shaded)

×: Open

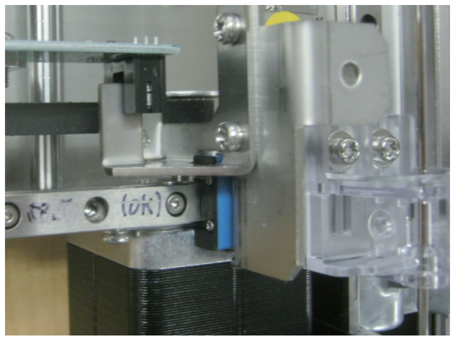


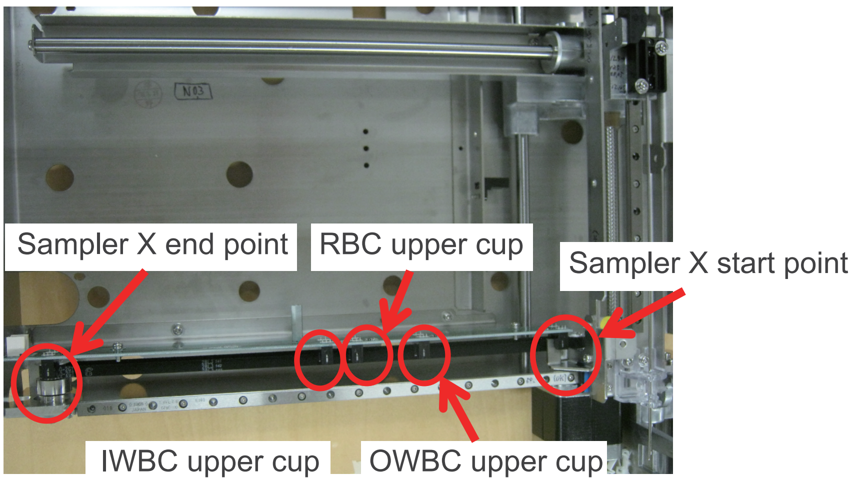


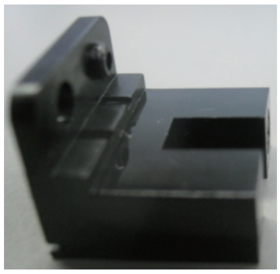
Sensors at Each Position

• Sampler X start point
• Sampler X end point
• OWBC upper cup
• RBC upper cup
• IWBC upper cup

When shaded by the metal sheet: ○

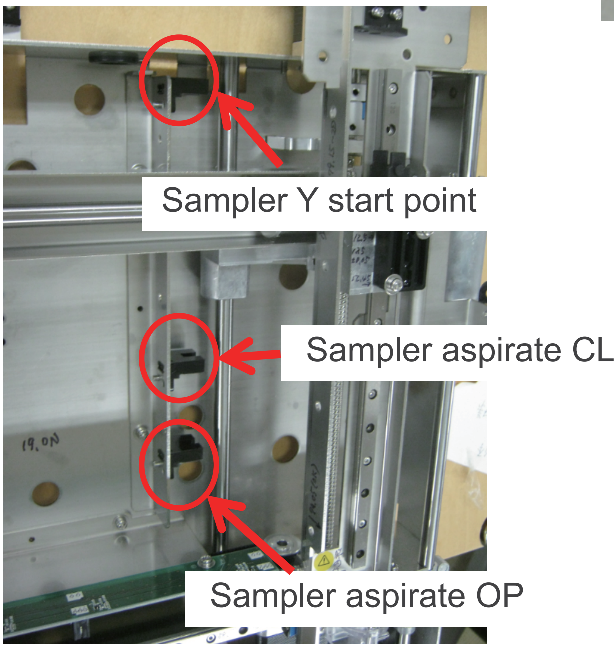






- Sampler Y start point
- Sampler aspiration CL
- Sampler aspiration OP
- Spare: Unused

When shaded: ○



AL Sensor

This procedure shows the detection status of the following sensors inside the autoloader.

1 Open the Service Maintenance window and touch [AL Sensor].

2 Touch [Acquire Sensor Values] to update the sensor status.

Sensor Name	Sensor Type	Description
Stirring rotation down (start point)	Photo sensor	Shows ○ when the inversion/mixing operation of the agitator is detected to be in the lower position of the swinging motion.
Raise stirring arm	Photo sensor	Shows ○ when the stirring arm is detected to be in the raised position (the position where the sample tubes are inversion-mixed).
Rack out detected	Photo sensor	Shows ○ when the rack is detected at the end position of the rack path.
Rack in detected	Photo sensor	Shows ○ when the rack is detected at the start position of the rack path.
Stirring rotation up	Photo sensor	Shows ○ when the inversion/mixing operation of the agitator is detected to be in the upper position of the swinging motion.
Lower stirring arm (start point)	Photo sensor	Shows ○ when the stirring arm is detected to be in the lowered position (the position where the sample tubes are gripped).
Rack eject tab out	Photo sensor	Shows ○ when the eject tab of the transported rack is detected to be in the ejected position.
Agitator cover removal detected.	Switch	Shows ○ when the removal of the mixing cover is detected.
Feed axle tab out	Photo sensor	Shows ○ when the tab that fixes the rack and feed units is detected as being out.
Feed axle tab return (start point)	Photo sensor	Shows ○ when the tab that fixes the rack and feed units is detected in the stowed position.
Sampling tube not detected	Photo sensor	Shows ○ when the sample tube detection arm is detected to be in the lowered position (the position at which the absence of sample tubes can be confirmed). If the sensor does not detect anything after the detection arm lowers, the presence of sample tubes can be confirmed.
Sample tube release (start point)	Photo sensor	Shows ○ when the sample tube detection arm is detected to be in the raised position.
Agitator grip release (start point)	Photo sensor	Shows ○ when the grip is detected to be in the open state (the sample tubes are released). There is no sensor for detecting the closed state.
Feed transport position 1 (start point)	Photo sensor	Shows ○ when the rack transport mechanism is detected as being in the start position.
Feed transport position 2	Photo sensor	Shows ○ when the rack transport mechanism is detected as having moved 1 sample tube from the start position.
Feed transport position 3	Photo sensor	Shows ○ when the rack transport mechanism is detected as having moved 2 sample tube from the start position.
Feed transport position 4	Photo sensor	Shows ○ when the rack transport mechanism is detected as having moved 3 sample tube from the start position.
Feed transport position 5	Photo sensor	Shows ○ when the rack transport mechanism is detected as having moved 4 sample tube from the start position.
Feed transport position 6	Photo sensor	Shows ○ when the rack transport mechanism is detected as having moved 5 sample tube from the start position.
Feed transport end point	Photo sensor	Shows ○ when the rack transport mechanism is detected as being in the end position.
Pierce guide fixed	Photo sensor	Shows ○ when the pierce guide is detected to be in the position that fixes the sample tubes.
Pierce guide release (start point)	Photo sensor	Shows ○ when the pierce guide is detected to be in the position that releases the sample tubes.
Rack eject tab return (start point)	Photo sensor	Shows ○ when the eject tab of the rack is detected to be in the stowed position.

Autoloader Sensor Window

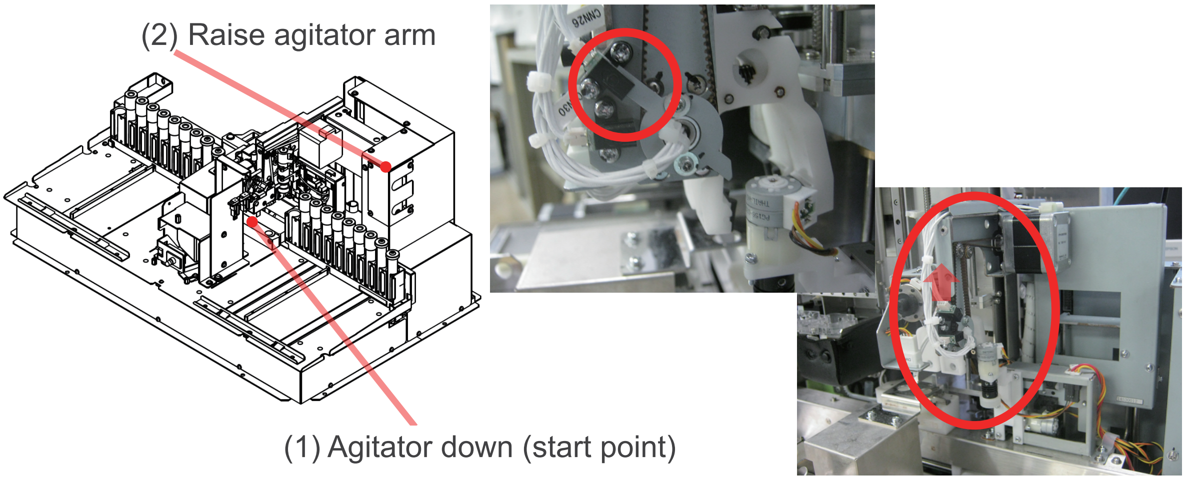
This shows the operations of the photo sensors in the autoloader.

Autoloader Sensor (1) to (6)

(1) Agitator down (start point): A sensor for the agitating operation of the agitator, at the start position
A sensor at the position in the direction in which the sample tubes are gripped.

(2) Agitator arm raised: A sensor at the reference position at the peak of the agitator's raise/lower operation

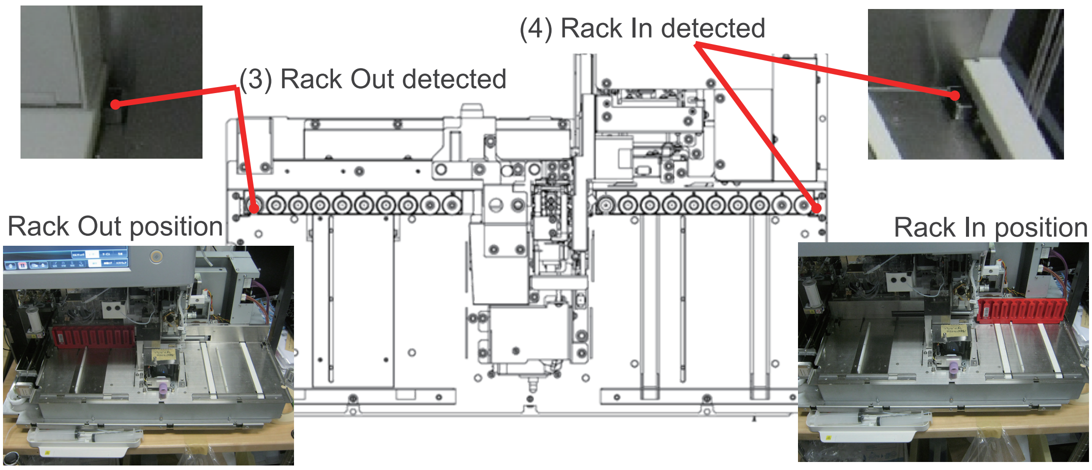
This is the position at which agitation is performed.



(3) Rack Out detected: Positioned for the ejection of the rack following the completion of measurements

(4) Rack In detected: Position where the rack is returned to within the analyzer after measurements begin

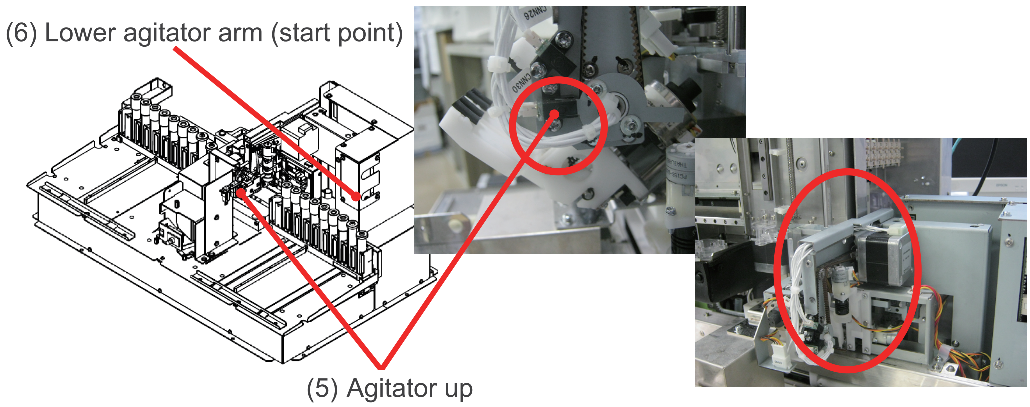
Reference position that is moved to horizontally from here



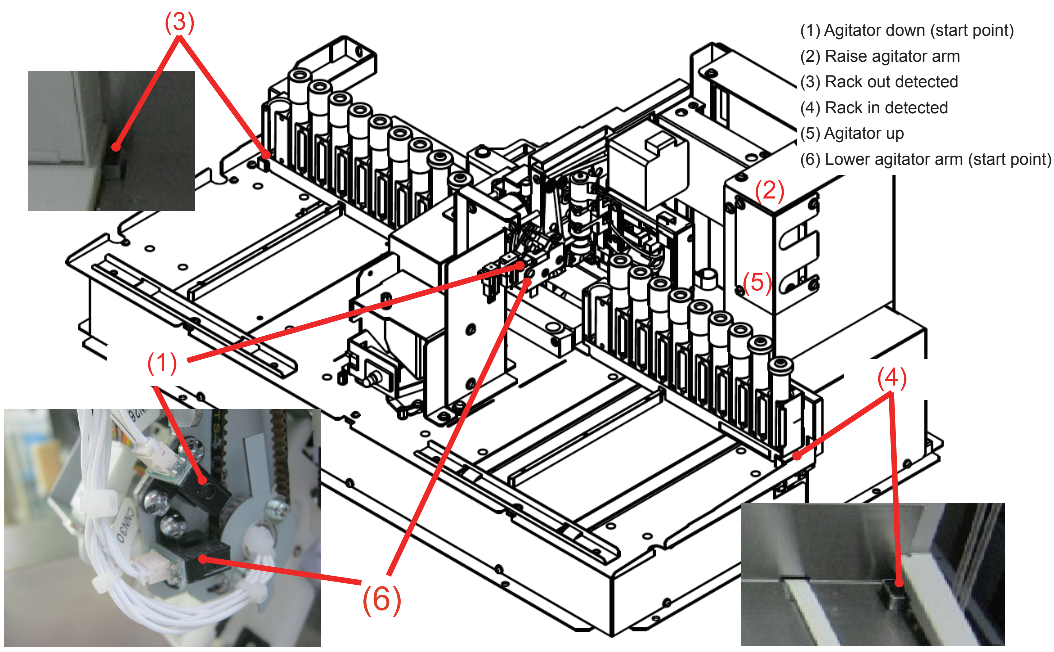
(5) Agitator up: A sensor for the agitating operation of the agitator, at the elevated position where the sample tubes are agitated

(6) Agitator arm lowered (start point): A sensor at the reference position at the bottom of the agitator's raise/lower operation

This is the position where the sample tubes are gripped.



Autoloader Sensor (1) to (6) Positions

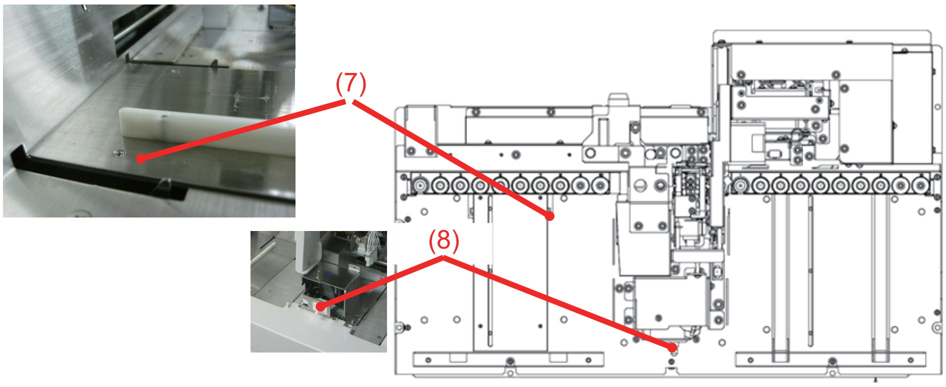


Autoloader Sensor (7) to (13)

(7) Rack eject tab out: A sensor positioned where the rack is ejected at the front

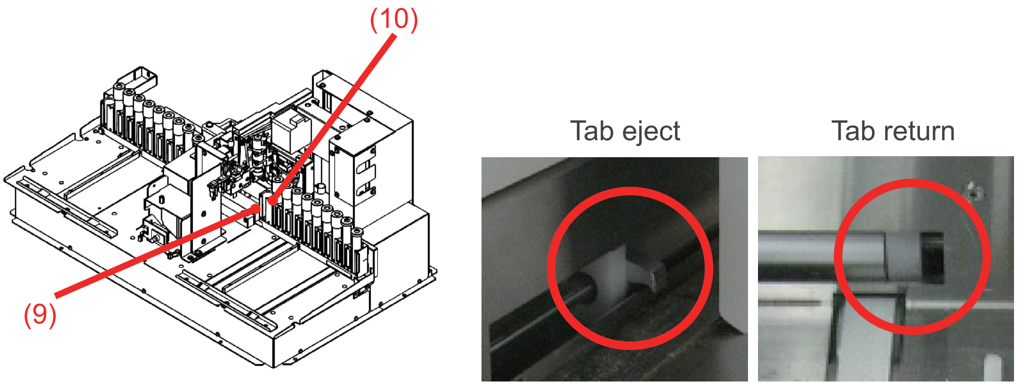
(8) Agitator cover removal detected: A sensor that detects when the MIX cover is removed

Detects emergency stops to prevent accidents due to moving parts.



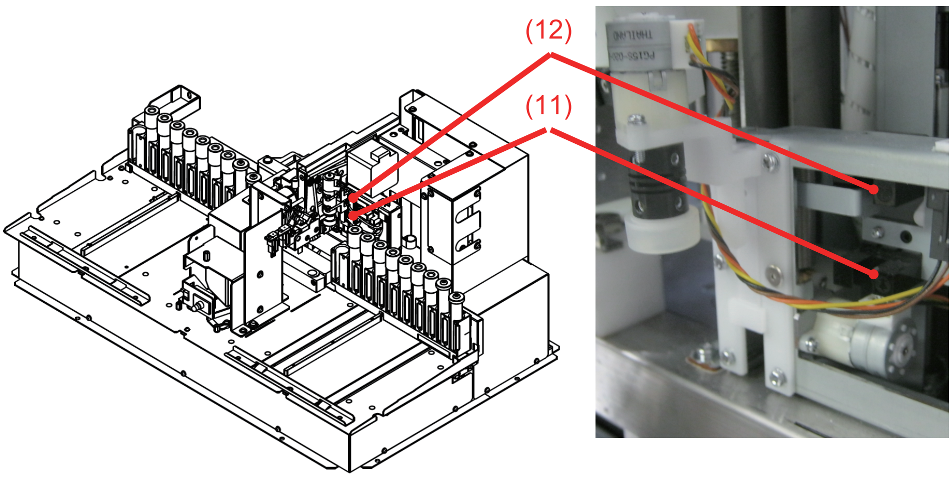
(9) Feed axle tab out: A sensor that checks if the tab for the rack's horizontal motion is out

(10) Feed axle tab return (start point): A sensor that checks that the tab is stowed

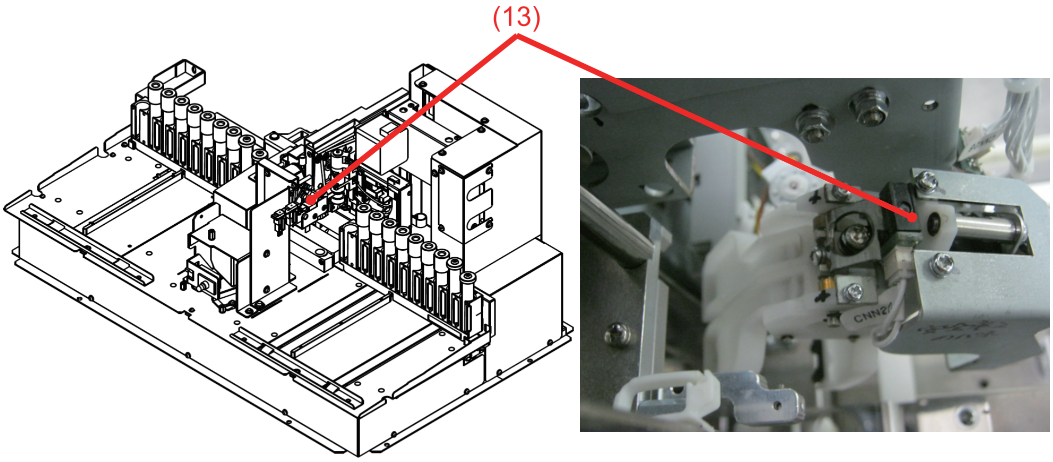


(11) Sampling tube not detected: A sensor that detects the presence of a sampling tube
A determination of "present" is made when the sensor cannot make a detection when the detection arm is lowered.

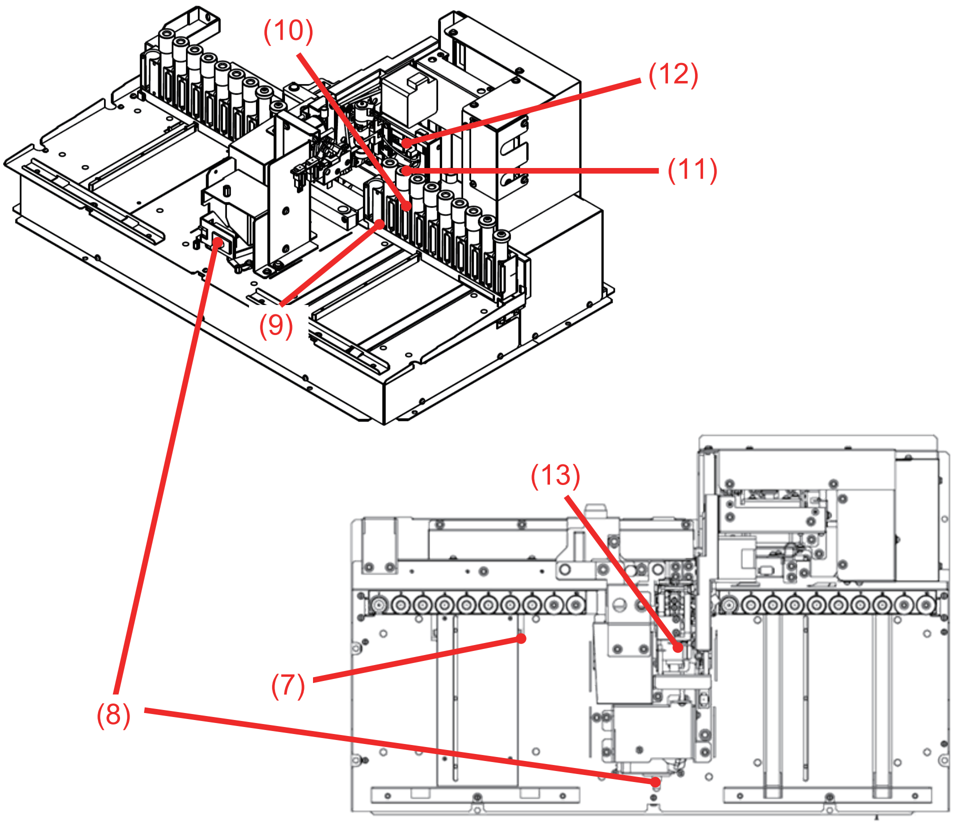
(12) Sampling tube release (start point): A sensor positioned at the start point of the detection arm



(13) Agitator grip release (start point): A sensor that checks that the sample tubes are released
(The sensor checks that the grip that grasps the sample tubes is open.)
There is no sensor for the pinching; a pulse drives the motor.



(7) Rack eject tab out
(8) Agitator cover removal detected
(9) Feed axle tab out
(10) Feed axle tab return (start point)
(11) Sampling tube not detected
(12) Sampling tube release (start point)
(13) Agitator grip release (start point)



Autoloader Sensor (14) to (20)

(14) Feed transport position 1 (start point): A sensor at the initial position of the feed that carries the rack

(15) Feed transport position 2: A sensor positioned 1 sample tube from the initial position

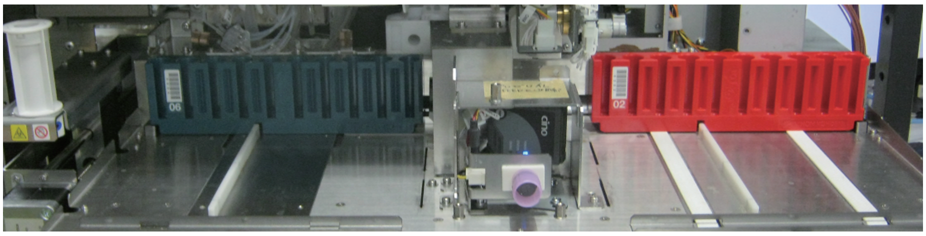
(16) Feed transport position 3: A sensor positioned 2 sample tubes from the initial position

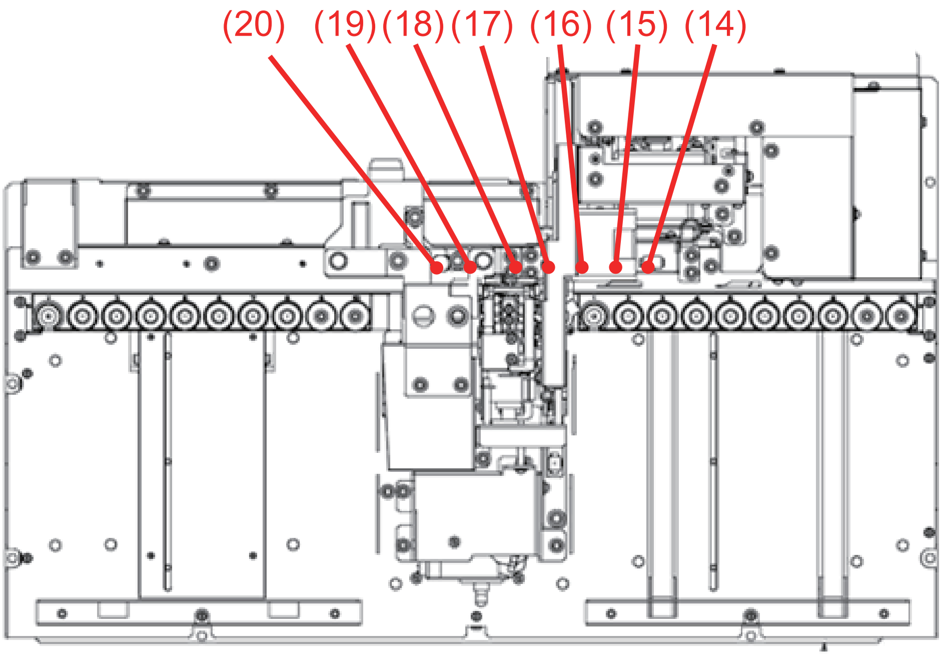
(17) Feed transport position 4: A sensor positioned 3 sample tubes from the initial position

(18) Feed transport position 5: A sensor positioned 4 sample tubes from the initial position

(19) Feed transport position 6: A sensor positioned 5 sample tubes from the initial position

(20) Feed transport end point: A sensor positioned where the rack is ejected

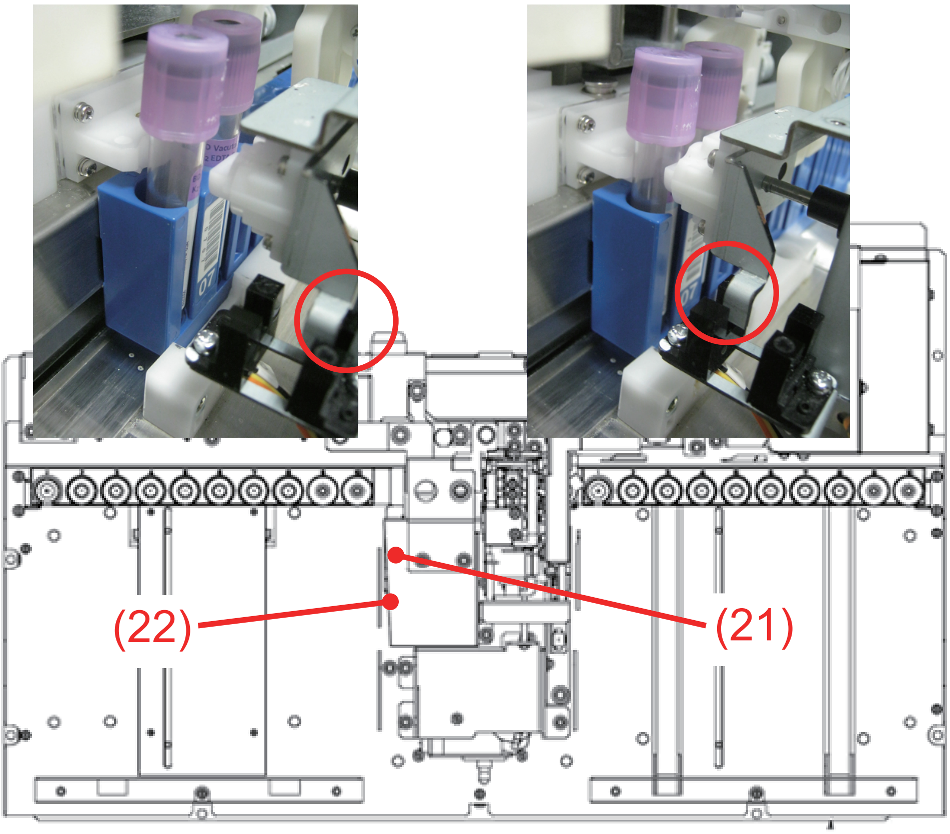




Autoloader Sensor (21) to (22)

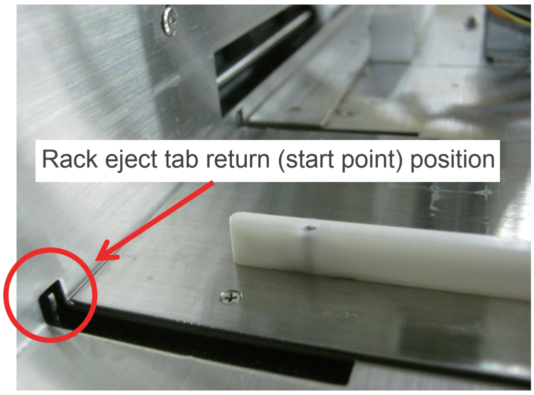
(21) Pierce guide fixed: A sensor positioned where the guide holds the sample tubes

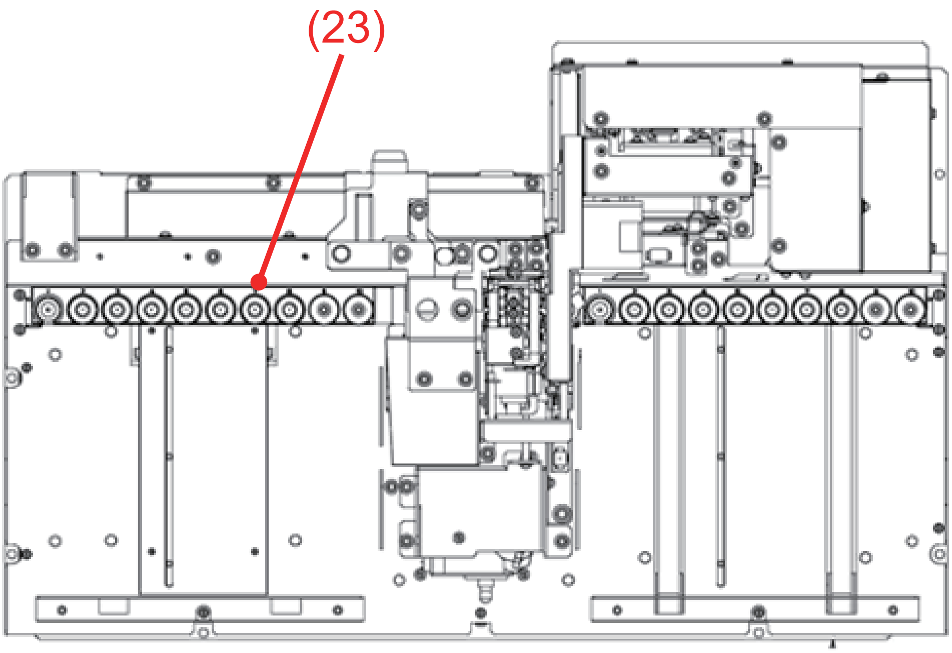
(22) Pierce guide release (start point): A sensor positioned where the guide releases the sample tubes



Autoloader Sensor (23)

(23) Rack eject tab return (start point): A sensor at the initial position for the rack eject tab (the sensor is positioned where the tab is stowed)





Checking Self Check Results

The self check has the following windows:

Window	Displayed Check Items
Summary	Summary of each check item
Details1	Remaining reagents, internal temperature and pressure
Details2	Circuit checks and background measurement results
Details3	Maintenance parts, maintenance operations and maintenance log
Log	History of self checks

Self Check (Summary)

Self Check Status

1 Show the [Date], [Status] and [Operator] for the most recent self check.

2 Show the window with information for [Status] details for the check items.

Reagent Check

Maintenance Log

3 Last Self Check:

The date when the all of the self check statuses were PASS

When the self checks were always PASS, the same date and time appear for the most recent and last checks.

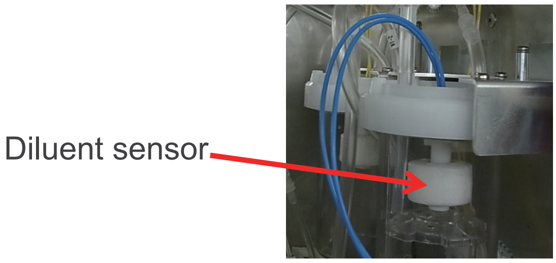
Self Check (Details1)

Check the results of self checks for remaining reagents, internal temperature and pressure from [Maintenance] > [Self Check] > [Details1].

Reagent Check

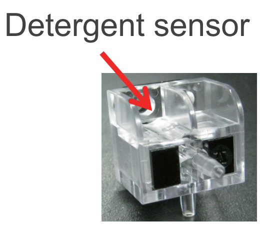
Diluent

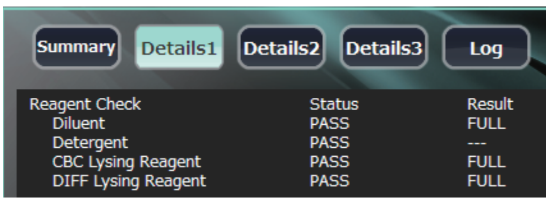
This procedure performs diluent priming operations, detects the presence of diluent in the ISO chamber and checks that the expiration dates have not expired.



Detergent

This procedure performs detergent priming operations, detects the presence of detergent with the infrared sensor and checks that the expiration dates have not expired.

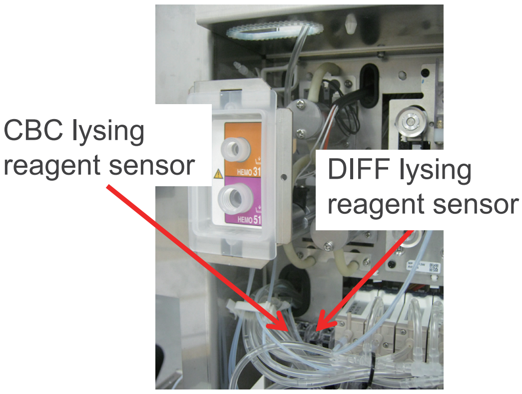




It never shows [FULL] for the detergent because there is no place that fills up.

CBC Lysing Reagent, DIFF Lysing Reagent

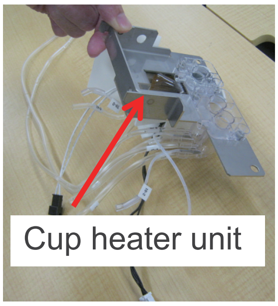
This procedure performs lysing agent priming operations, detects the presence of lysing agent with the infrared sensor and checks that the expiration dates have not expired.

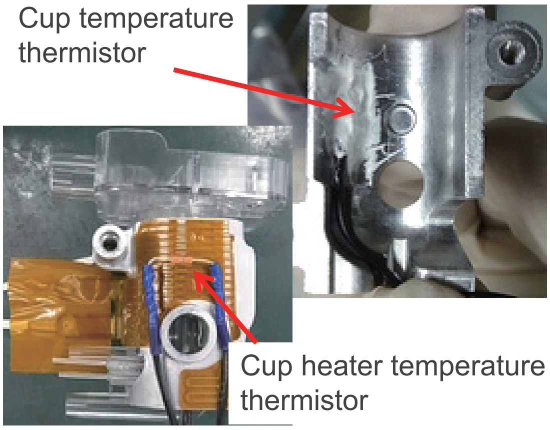


Checking Thermistor

Cup Temperature, Cup Heater Temperature

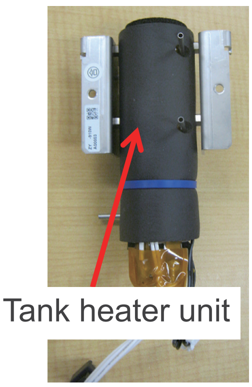
This procedure uses each of the thermistors in the cup heater unit to check that temperatures are within their criteria.

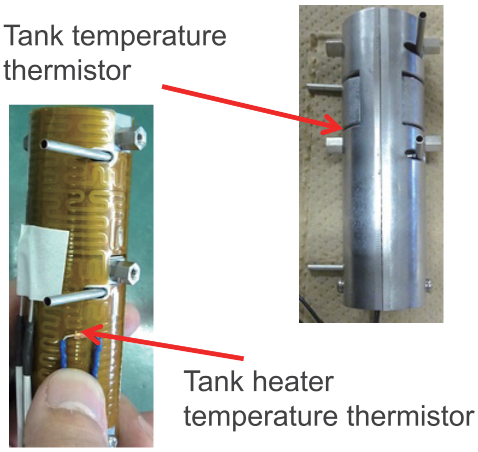




Tank temperature, Tank heater temperature

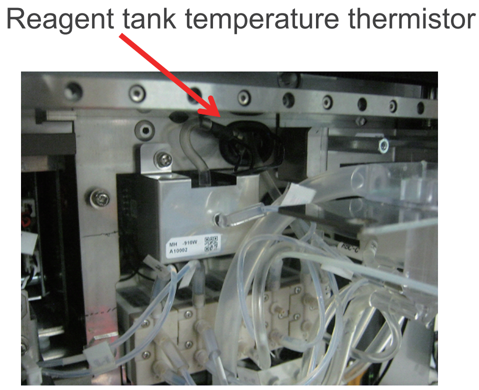
This procedure uses each of the thermistors in the reagent tank heater unit to check that temperatures are within their criteria.





Diluent Temperature

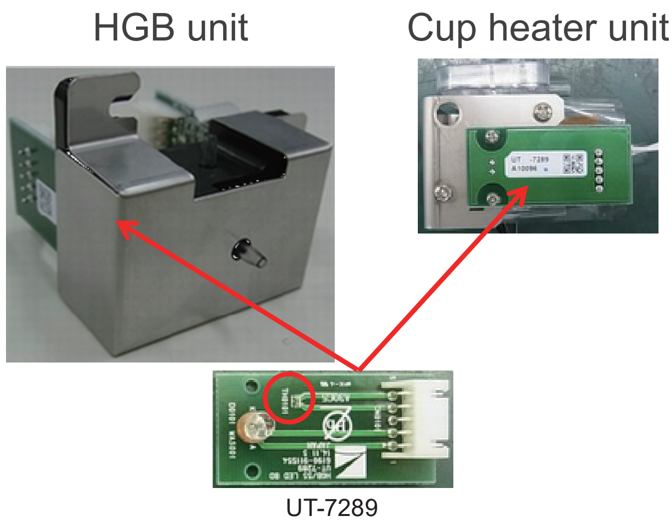
This procedure checks the temperatures of the measured reagents and diluents using a thermistor before they enter the HGB measurement part.



HGB LED Temperature, SS LED Temperature

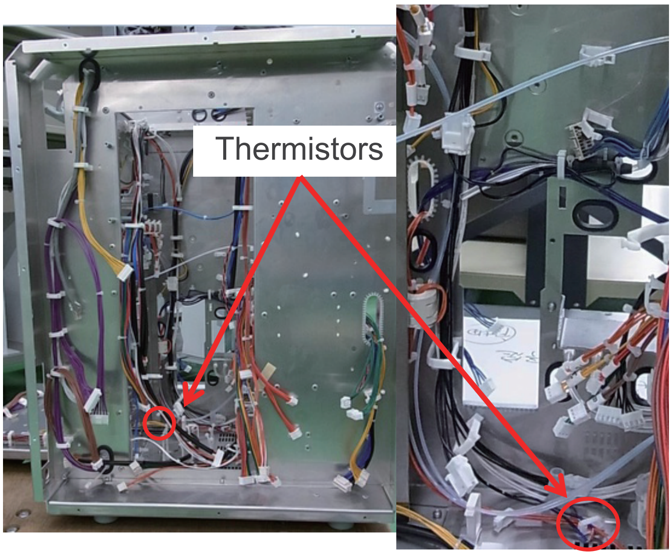
This procedure uses the thermistor on the UT-7289 to check that temperatures are within their criteria. The HGB unit and SS (short sample) are both UT-7289.

The SS is mounted in the cup heater unit.



Internal Temperature

This procedure uses thermistors inside the casing to check that temperatures are within their criteria.



Pressure Check

This procedure checks the following.

- Checks the pressure in the ISO chamber and waste chamber 1
- Checks 3 states: positive pressure, negative pressure and air pressure

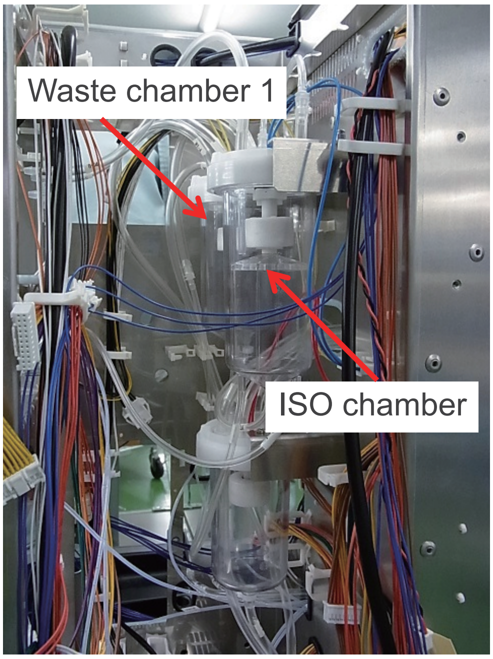
Detection uses a pressure sensor on the UT-7287 PRESSURE SENSOR BD.

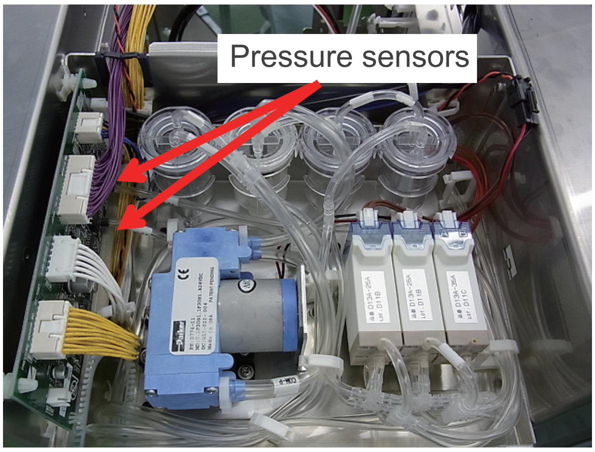
The pressure of the ISO chamber is checked via Pressure Sensor 1 on the board.

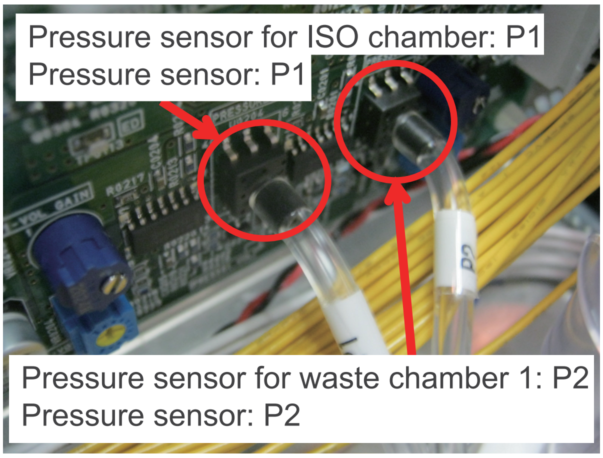
The pressure of waste chamber 1 is checked via Pressure Sensor 2 on the board.

Atmospheric pressure is checked by releasing MV15.
(The compressor does not stop.)

Waste chamber 2 is always open to environmental air pressure.







Pressure Check

ISO Chamber	Status	Result	Range	
Air Pressure	PASS	-1.39 kPa	-8.00 ~ 8.00	kPa
Positive Pressure	PASS	69.07 kPa	57.96 ~ 80.04	kPa
Negative Pressure	PASS	-32.19 kPa	-35.00 ~ -25.00	kPa
Waste Chamber1	Status	Result	Range	
Air Pressure	PASS	-0.92 kPa	-8.00 ~ 8.00	kPa
Positive Pressure	PASS	68.60 kPa	57.96 ~ 80.04	kPa
Negative Pressure	PASS	-32.66 kPa	-35.00 ~ -25.00	kPa

Self Check (Details2)

This procedure checks the results of self checks for circuit checks and background measurements from [Maintenance] > [Self Check] > [Details2].

Circuit Check

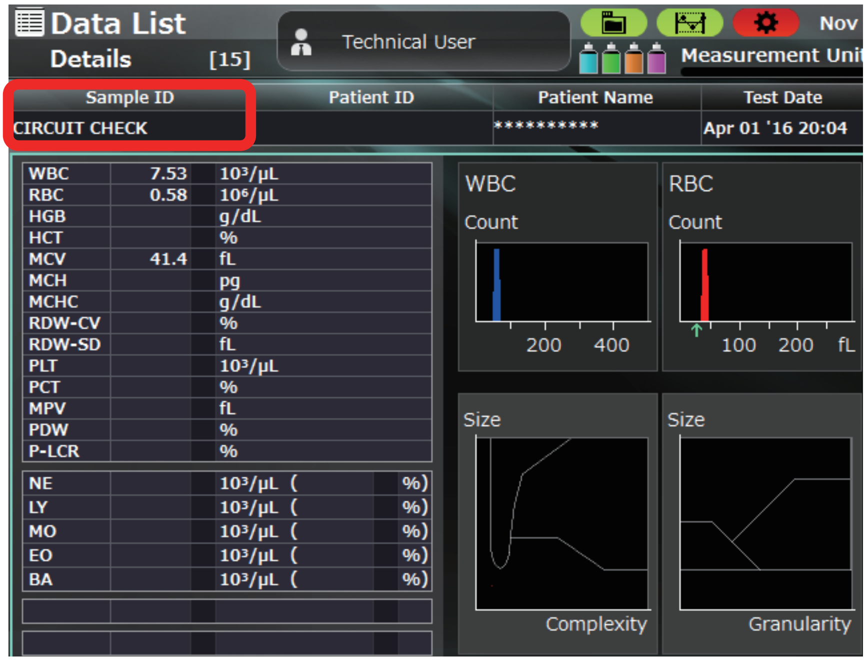
This checks the following.

- The circuit check does not perform checks for fluid paths or sensors, etc.

  → When the results of a check show a status of [FAIL], it is likely that there is a hardware problem.

- WBC: Checks the circuits that perform WBC measurements.
- RBC, MCV: Checks the circuits that perform RBC measurements.
- DIFF: Checks the circuits that perform 5 part differential measurement.
- WBC Voltage, RBC Voltage: Checks the WBC and RBC electrode voltages.
- HGB ON Voltage, HGB OFF Voltage: Checks the circuits that perform HGB measurements.
- SS ON Voltage, SS OFF Voltage: Checks the circuits that perform SS measurements.

- The results of circuit checks in self check remain in the data list as “CIRCUIT CHECK”.



Background Check

This procedure checks the measurement results from measurements of the diluent only.

Checks the reliability of the measurement results.

- The results of background measurements in self check remain as “BACKGROUND CHECK” in the data list.

Self Check (Details3)

Check the results of self checks for the usage state of maintenance parts, previous maintenance results and the maintenance log confirmation status from [Maintenance] > [Self Check] > [Details3].

Replace Maintenance Parts

This procedure shows the result of a check that the number of uses for each maintenance part has not exceeded the upper limit.

For details on the expiration dates, replacement and disposal of each maintenance part, refer to the following pages in “Expiration, Replacement and Disposal” in Section 6 “Maintenance”.

- For the sampling needle, refer to “Replacing the Sampling Needle” (p. 6-92)
- For the venting needle, refer to “Replacing the Venting Needle” (p. 6-100)
- For the filter, refer to “Replacing the Filter” (p. 6-104)

Periodic Maintenance

Check that the period for cleaning protein has not been exceeded.

For details on cleaning protein, refer to “Cleaning Protein” in “Maintenance Operations” in Maintenance (p. 6-6).

Maintenance Log

Check that there are no unconfirmed logs.

Self Check (Log)

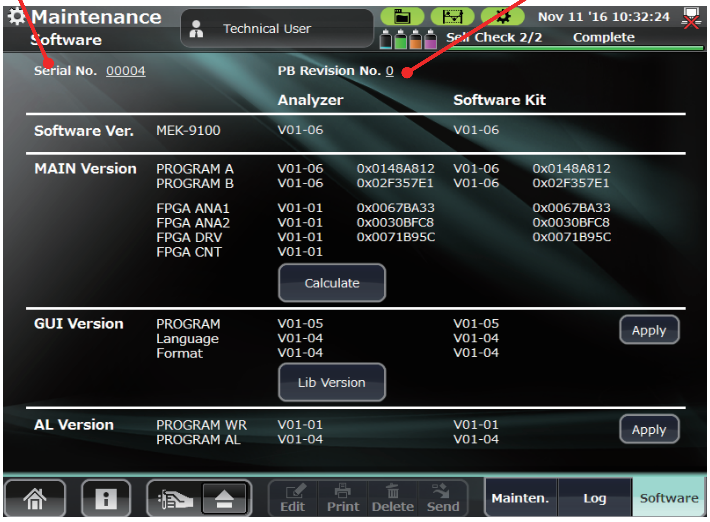
A history of performed self checks (maximum 300) is displayed in [Maintenance] > [Self Check] > [Log].

Software

This window shows the version and other software that controls the analyzer.

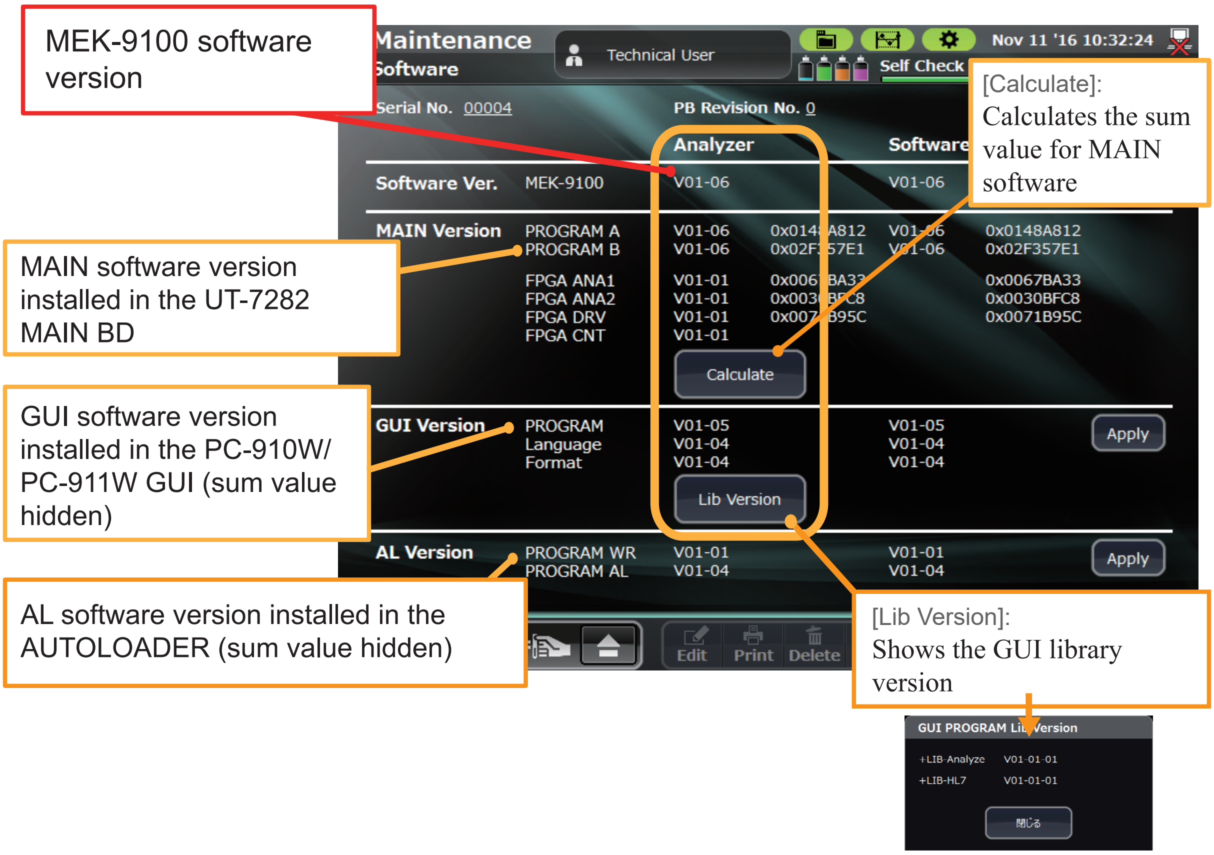
The numbers are entered from [Maintenance] > [Service] > [Main].

Numbers entered for [Maintenance], [Service] and [Main]
- Analyzer serial number
- PC-910W/PC-911W PC port serial number



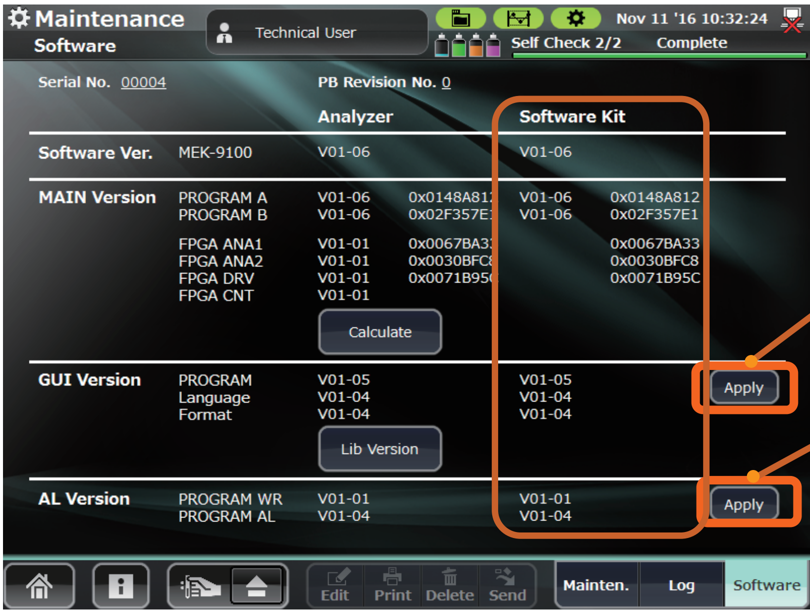
Analyzer

This area shows the version of the software installed on the analyzer.



Software Kit

This area shows the version of the software on the SD card stored in the analyzer.



Install GUI software from the SD card to the analyzer

Install AL software stored from the SD card to the analyzer

Expiration, Replacement and Disposal

Analyzer

Periodic Replacement Parts

The following components need to be replaced regularly according to the following schedule to maintain the functions and performance of the analyzer.

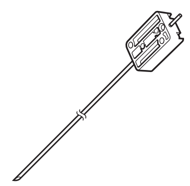
Periodic Replacement Parts	Schedule
Analyzer	
Sampling needle	Every 12,000 to 18,000 measurements
Venting needle	
Filter	
Internal battery	Around every 4 years
Relief valve tube assy	Around every 1 year

Replacing the Sampling Needle

Schedule: Every 12,000 to 18,000 measurements

Maintenance item: Sampling nozzle (supply code: T444E)

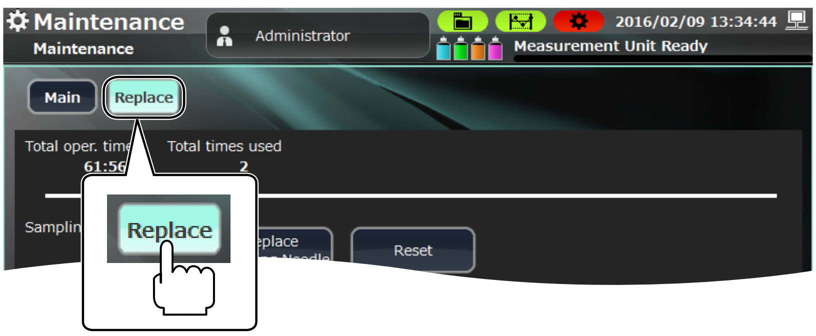
NOTE: Keep the screws that were removed during replacement for reuse.



Sampling needle
(Maintenance item:
sampling nozzle)

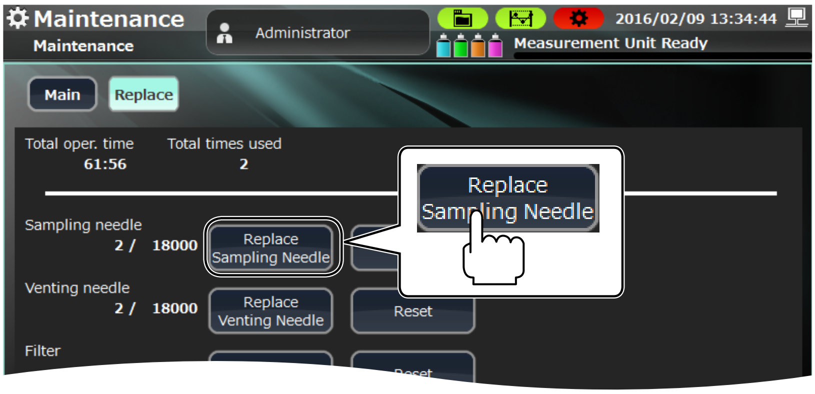
Replacement Procedure

1 Open the User Maintenance window and touch [Replace].

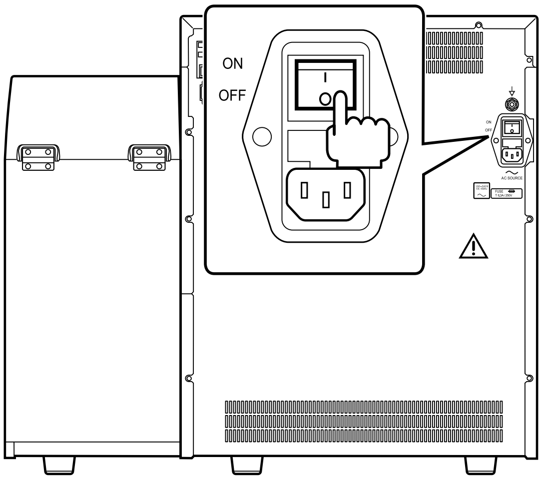


2 Touch [Replace Sampling Needle].

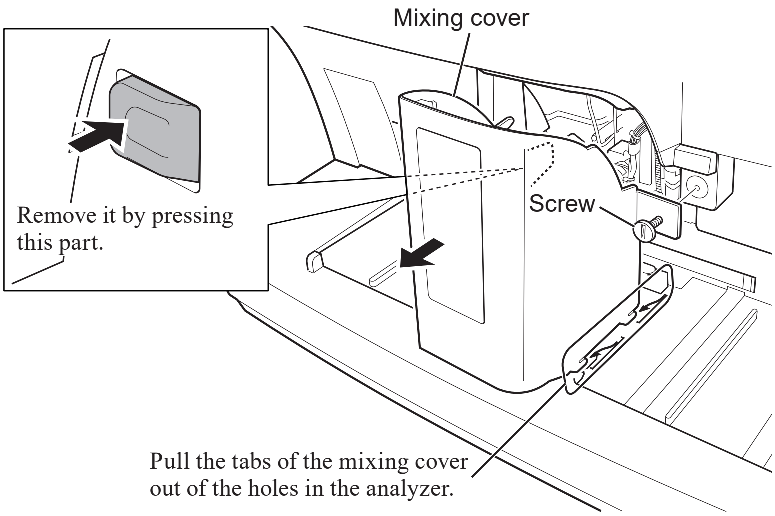
The sampling needle and related fluid paths are drained and the power is automatically turned off.



3 Turn off the Main power switch on the rear panel of the analyzer (to O) and disconnect the power cord from the wall AC outlet.



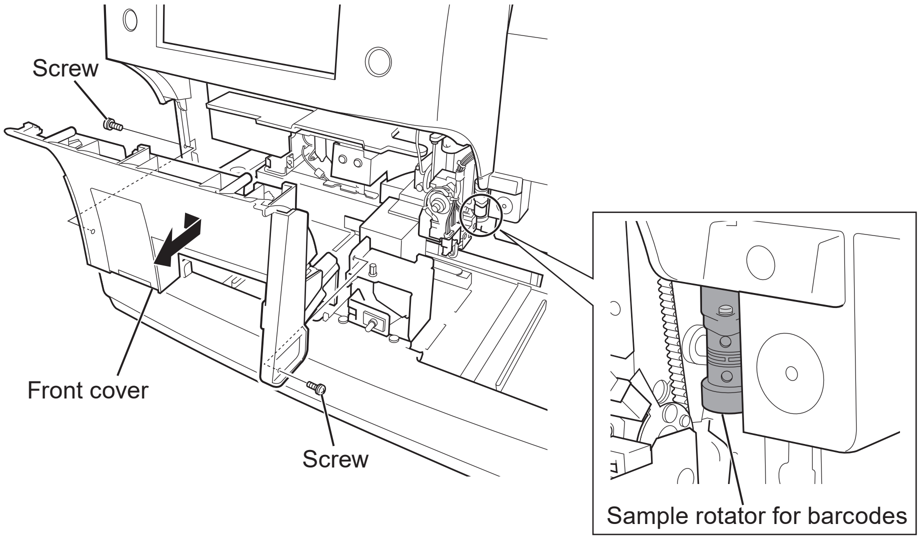
4 Loosen the screw on the front panel of the analyzer to remove the mixing cover.



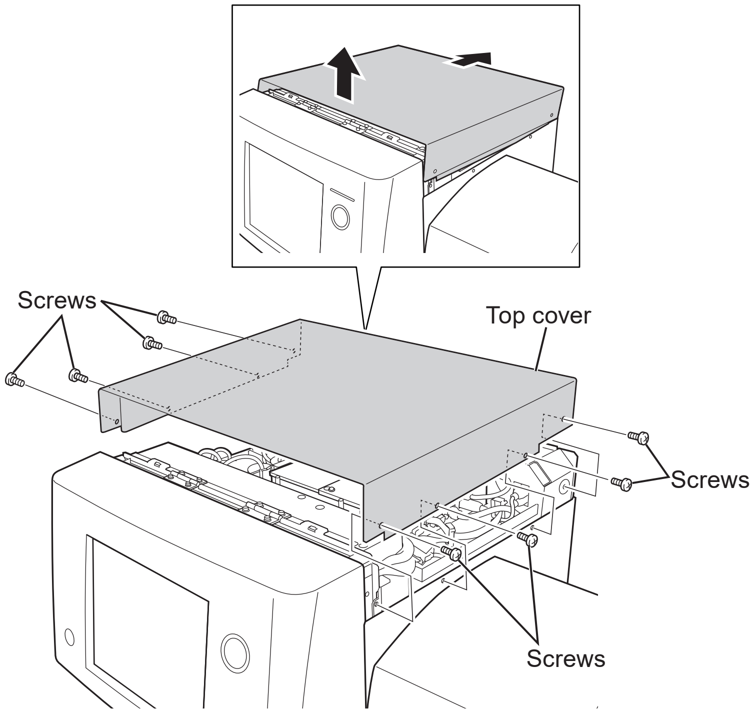
5 Remove the two screws to remove the front cover.

6 Check that the sample rotator for barcodes is clean. Clean it if necessary.

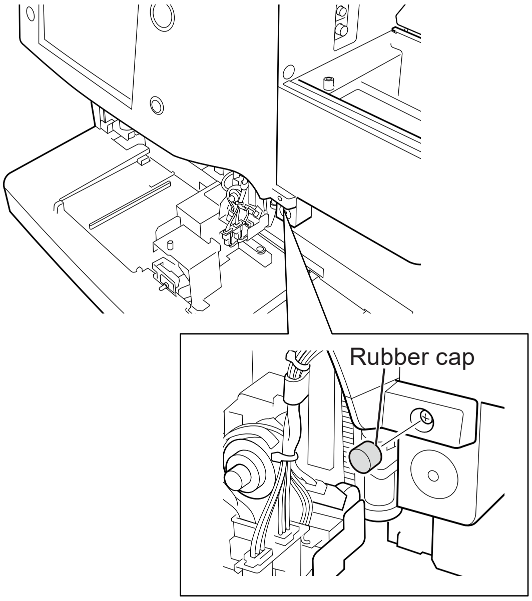
To check and clean sample rotator for barcodes: “Cleaning the Sample Rotator for Barcodes” (p. 6-125)



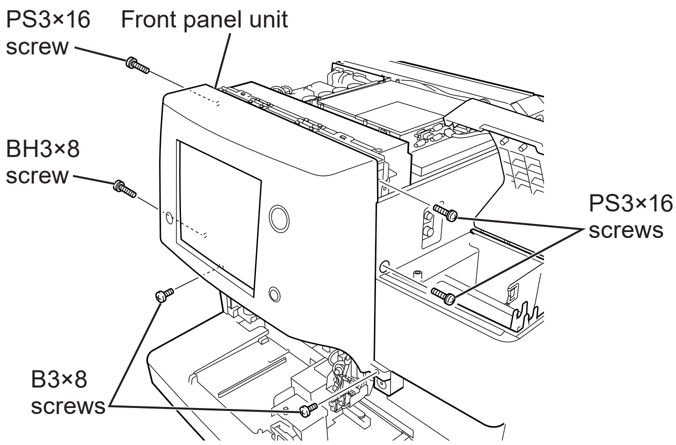
7 Remove the eight screws to remove the top cover.



8 Remove the rubber cap.

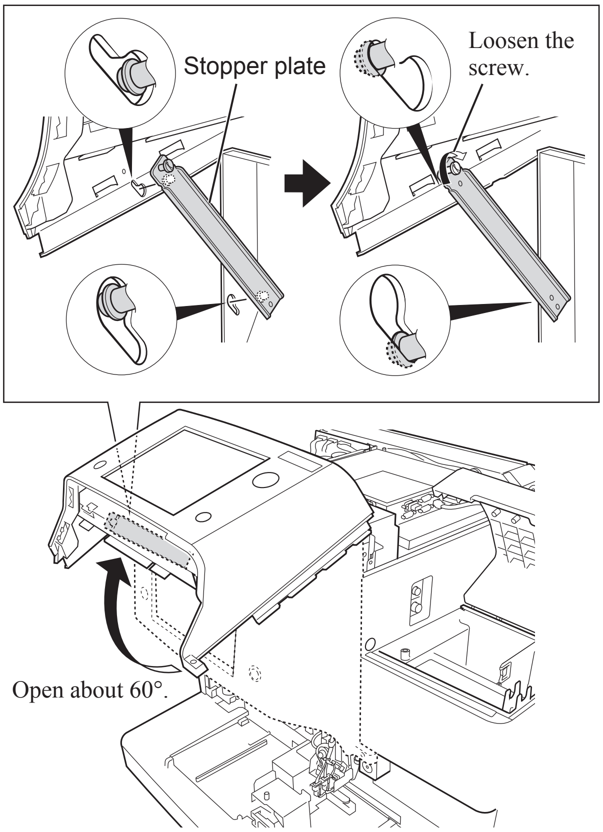


9 Remove the six screws which secure the front panel unit.

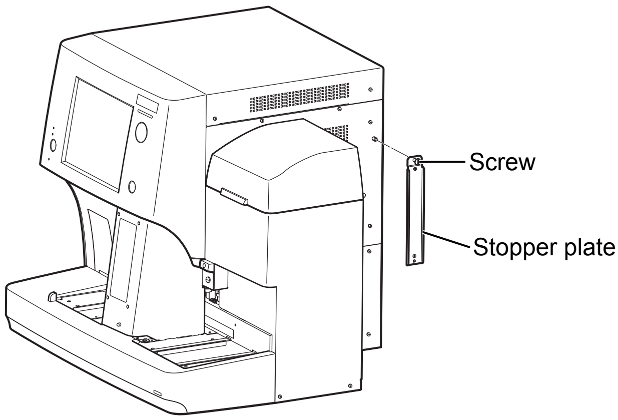


10 Open the front panel unit about 60° and fix it with the provided stopper plate as shown in the figure.

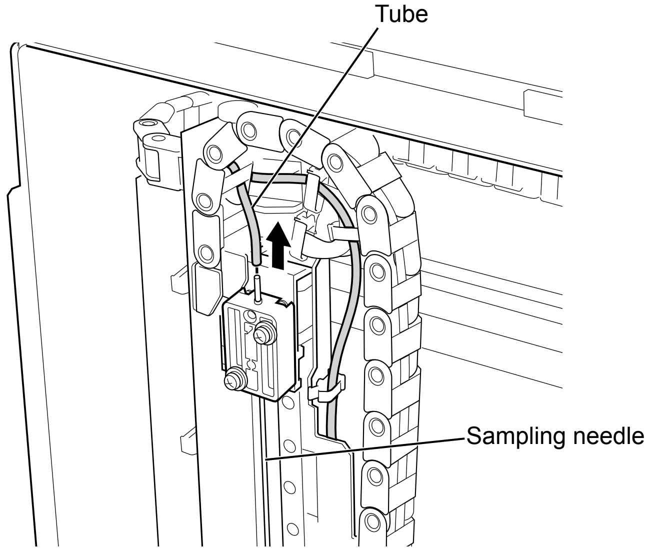
NOTE: Do not open the front panel unit 90° or more.
This may damage the analyzer.



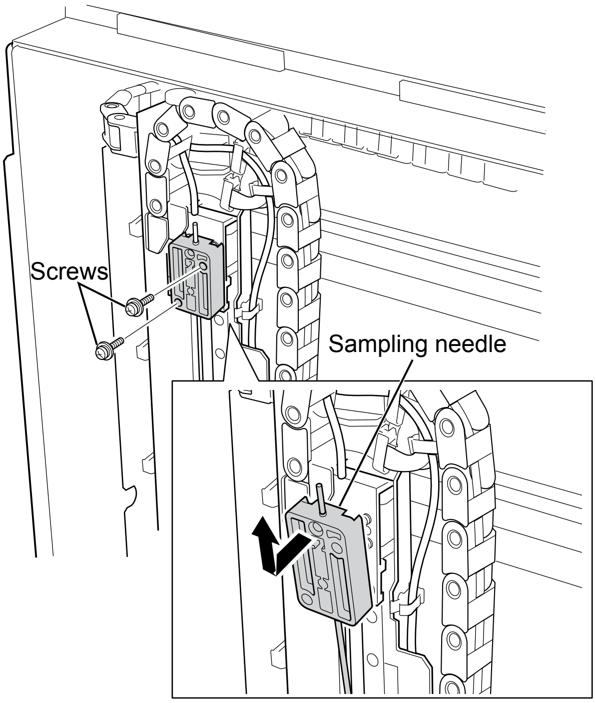
The provided stopper plate is fixed with a screw at the position shown in the figure.



11 Remove the tube from the top of the sampling needle.

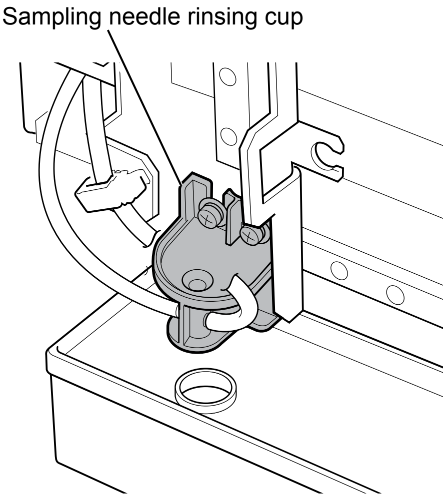


12 Remove the two screws to remove the sampling needle.



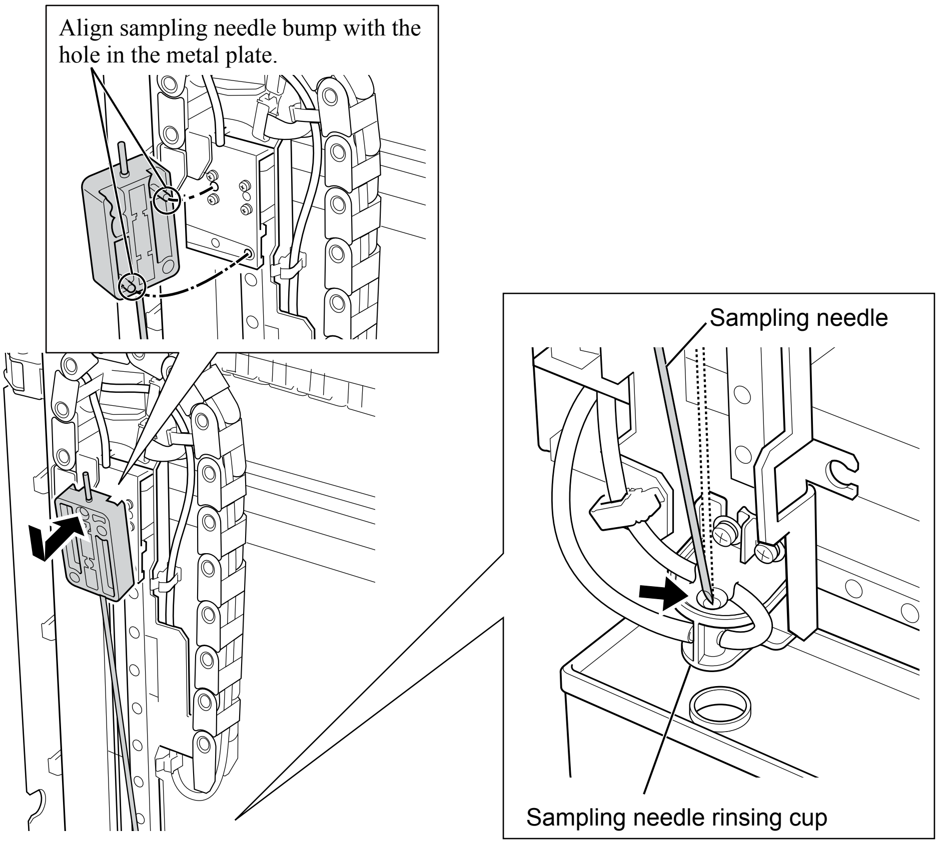
13 Clean the sampling needle rinsing cup.

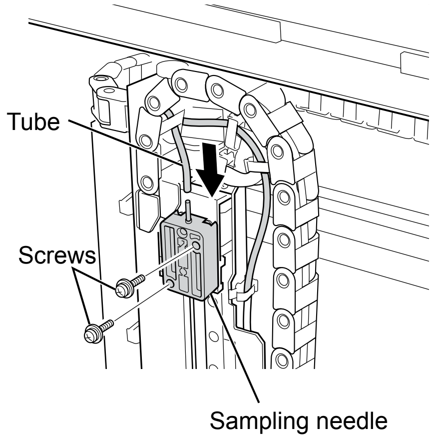
“Cleaning the Sampling Needle Rinsing Cup” (p. 6-124)



14 Insert the tip of the new sampling needle into the sampling needle rinsing cup and then install the sampling needle.

NOTE: Be careful not to damage the tube or the sampling needle rinsing cup when inserting the sampling needle into the rinsing cup.





15 Fix the sampling needle with the two screws removed in step **12** and connect the tube.

16 Do steps **4** to **10** in reverse order to return the analyzer to its original state.

17 Connect the power cord to the wall AC outlet and turn on the analyzer. Touch [No] on the Confirm Operation window to skip the self check.

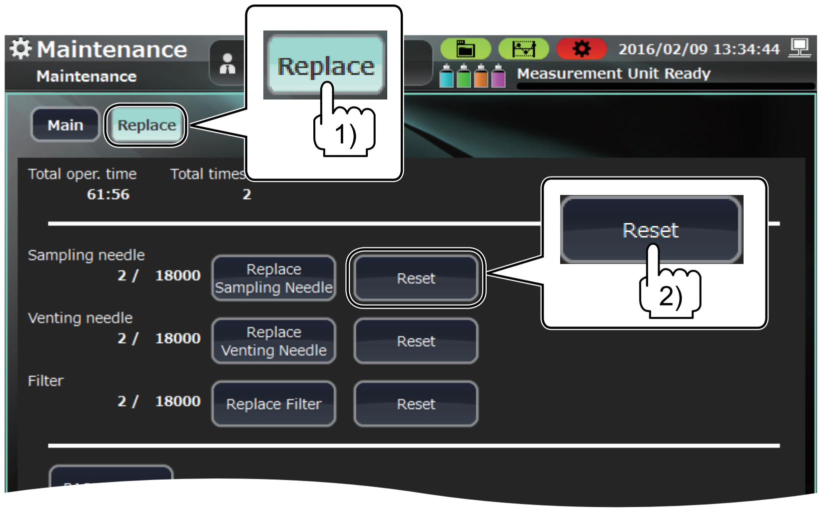
Operator's Manual:
"Turning On the Analyzer" in Section 5

18 Check that the analyzer message "21200 Maintenance part replacement status" appears and touch [RESTORE] on the Maintenance Log window.

19 Reset the number of times the sampling needle is used.

1) Display the User Maintenance window and touch [Replace].

2) Touch [Reset] in [Sampling needle].



20 Run the self check.

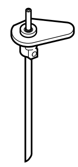
"Running Self Check" (p. 6-12)

Replacing the Venting Needle

Schedule: Every 12,000 to 18,000 measurements

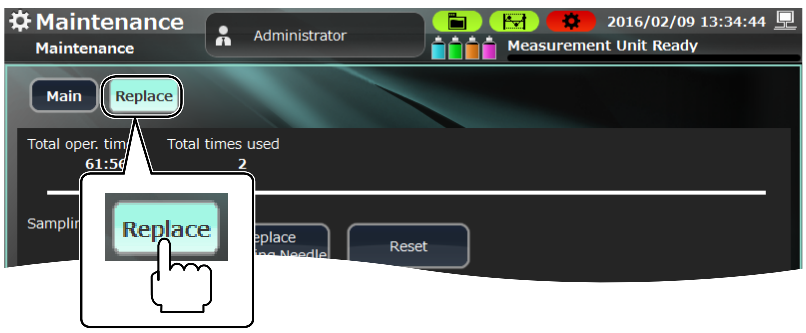
Maintenance item: Release nozzle assy (supply code: T449C)

NOTE: Keep the screws that were removed during the replacement for reuse.



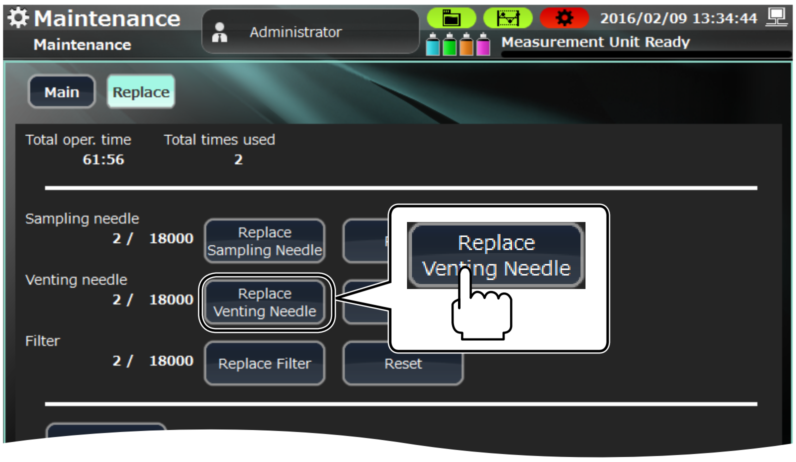
Venting needle
(Maintenance item:
Release nozzle assy

1 Open the User Maintenance window and touch [Replace].

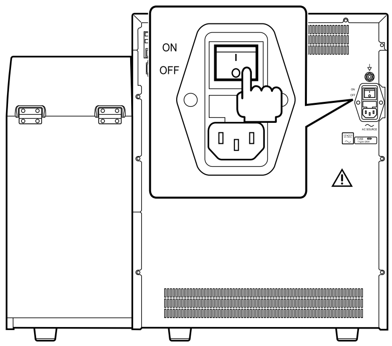


2 Touch [Replace Venting Needle].

The venting needle and related fluid paths are drained and the power is automatically turned off.



3 Turn off the Main power switch on the rear panel of the analyzer (to ◯) and disconnect the power cord from the wall AC outlet.



4 Remove the mixing and front covers. Refer to steps **4** and **5** in “Replacing the Sampling Needle”.

📖 “Replacing the Sampling Needle” (p. 6-92)

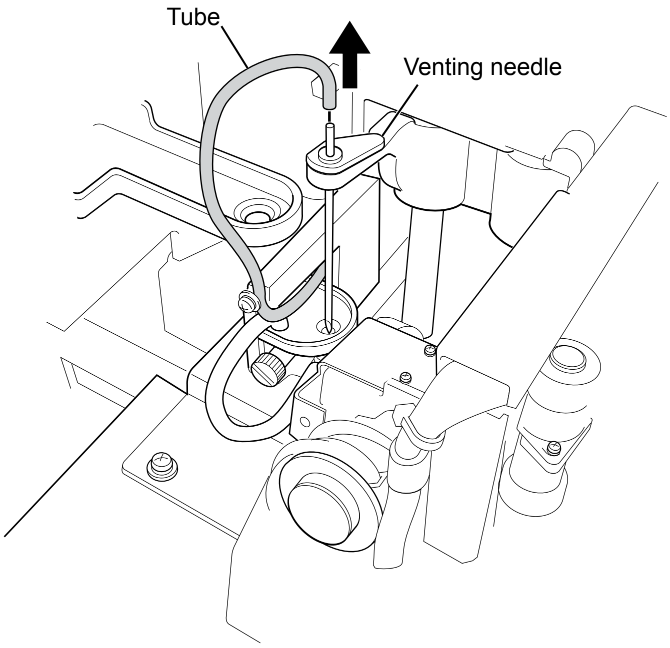
5 Check that the sample rotator for barcodes is clean. Clean it if necessary.

📖 To check and clean sample rotator for barcodes: “Cleaning the Sample Rotator for Barcodes” (p. 6-125)

6 Refer to steps **7** to **10** in “Replacing the Sampling Needle” and fix the stopper plate while the front panel unit is opened.

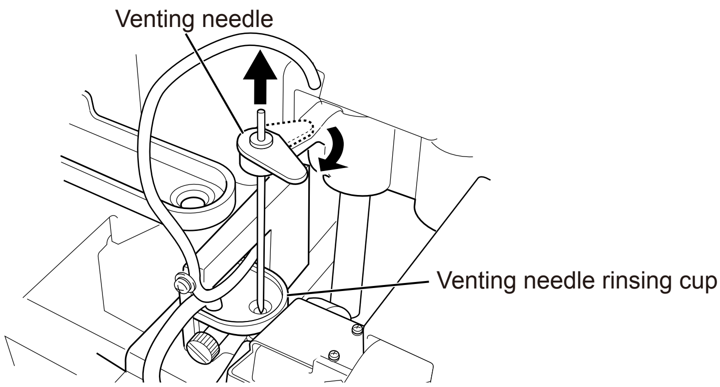
📖 “Replacing the Sampling Needle” (p. 6-92)

7 Remove the tube from the top of the venting needle.



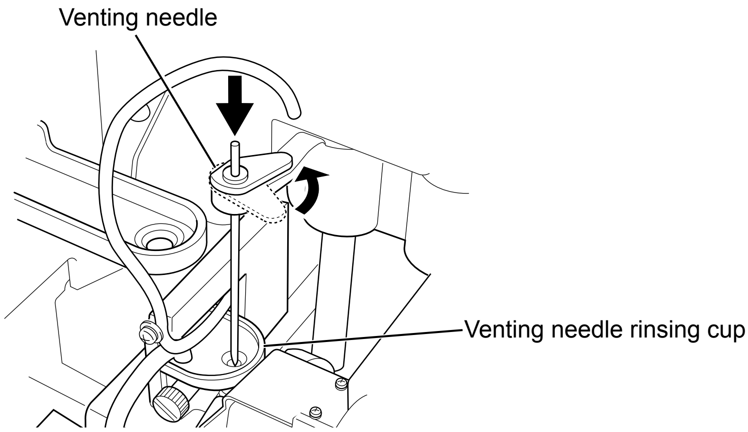
8 Rotate the venting needle to remove it and clean the venting needle rinsing cup.

“Cleaning the Venting Needle Rinsing Cup” (p. 6-125)

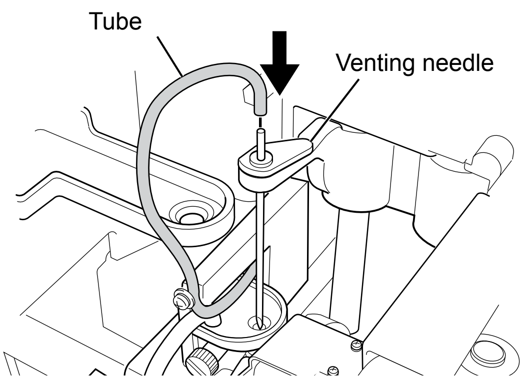


9 Insert the tip of the new venting needle into the venting needle rinsing cup and then rotate the venting needle to fix it in place.

NOTE: Be careful not to damage the tube or the venting needle rinsing cup when inserting the venting needle into the rinsing cup.



10 Connect the tube to the top of the venting needle.



11 Do steps **4** to **6** in reverse order to return the analyzer to its original state.

12 Connect the power cord to the wall AC outlet and turn on the analyzer. Touch [No] on the Confirm Operation window to skip the self check.

Operator's Manual:
"Turning On the Analyzer" in Section 5

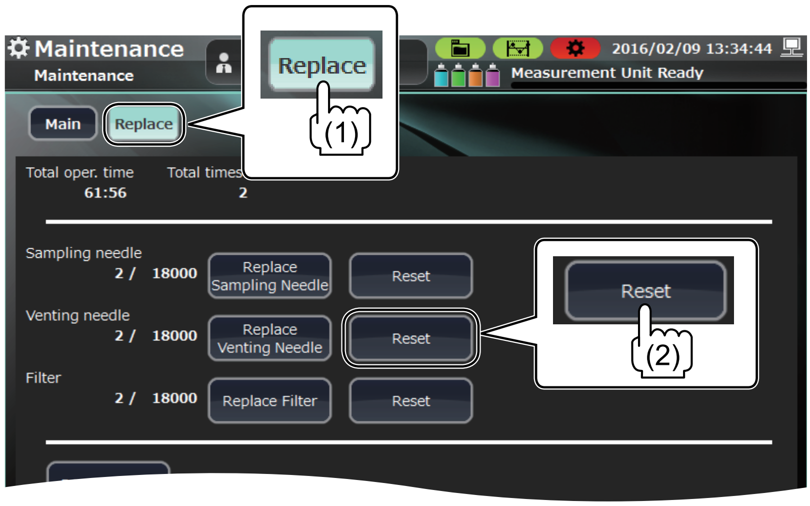
13 Check that the analyzer message "21200 Maintenance part replacement status" appears and touch [RESTORE] on the Maintenance Log window.

14 Reset the number of times the venting needle is used.

1) Display the User Maintenance window and touch [Replace].

"Opening the User Maintenance Window" (p. 6-4)

2) Touch [Reset] in Venting needle.



15 Run the self check.

"Running Self Check" (p. 6-12)

Replacing the Filter

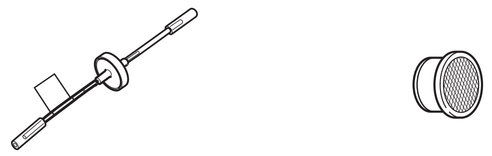
Replace the 2 WBC filters and 3 hemoglobin filters at the same time.

Schedule: Every 12,000 to 18,000 measurements

Maintenance items: WBC filter assy (Supply code: T802A), 2 pcs

Hemoglobin filter assy (Supply code: T802), 3 pcs

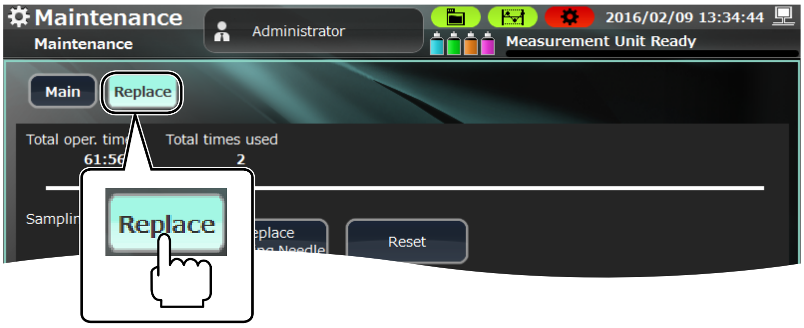
NOTE: Keep the screws that were removed during the replacement for reuse.



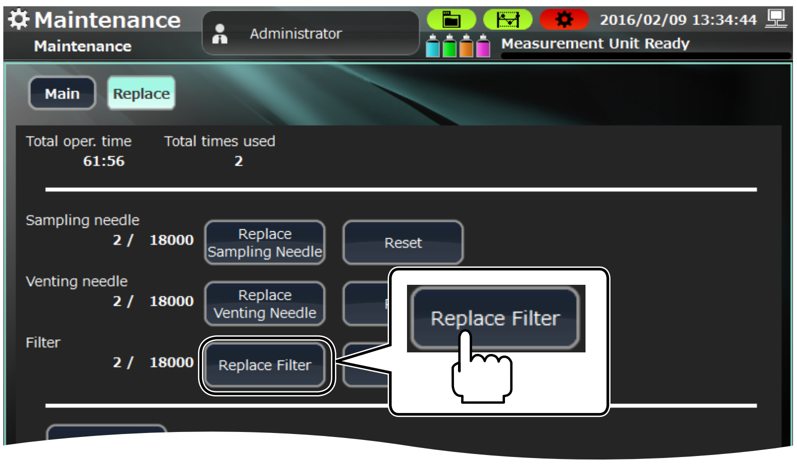
WBC filter: 2 pcs
(Maintenance item:
WBC filter assy)

Hemoglobin filter: 3 pcs
(Maintenance item:
Hemoglobin filter assy)

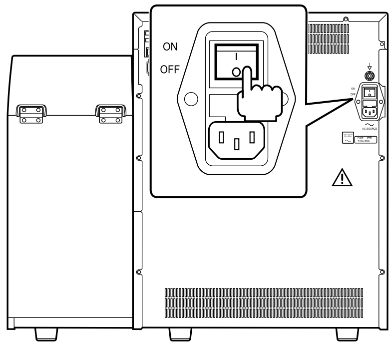
1 Open the User Maintenance window and touch [Replace].



2 Touch [Replace Filter]. The filter and related fluid paths are drained and the power is automatically turned off.



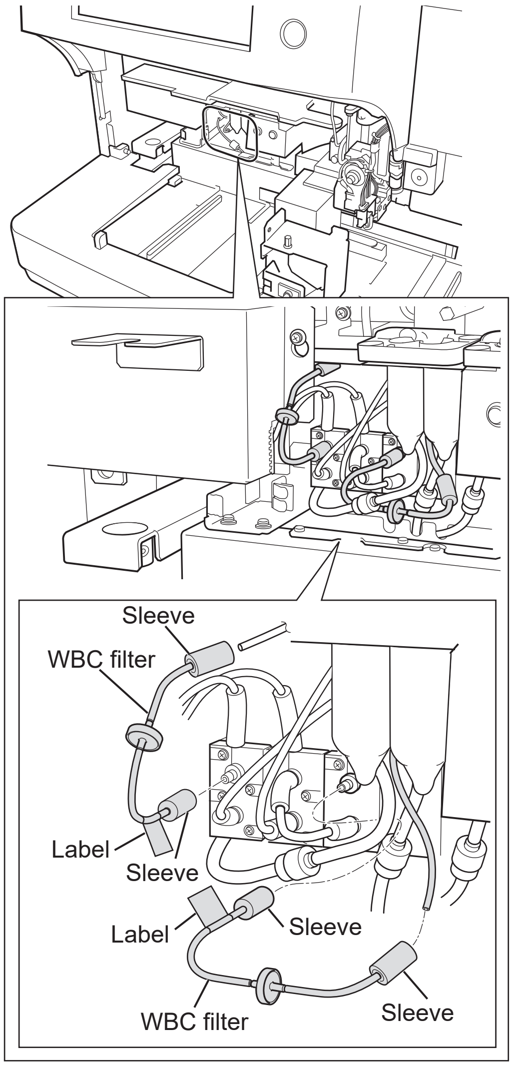
3 Turn off the Main power switch on the rear panel of the analyzer (to ○) and disconnect the power cord from the wall AC outlet.



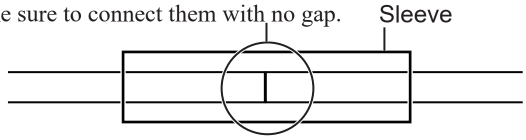
4 Remove the mixing and front covers. Refer to steps **4** and **5** in “Replacing the Sampling Needle”.

“Replacing the Sampling Needle” (p. 6-92)

5 Remove the 2 WBC filters together with the sleeves and replace the filters with new ones.



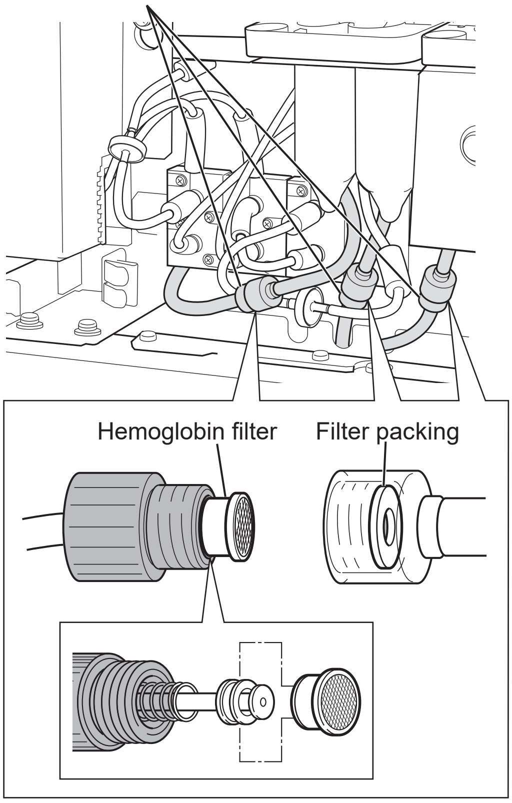
NOTE • Connect the new filter firmly to prevent gaps in the sleeves.



• Connect the label side of the WBC filter to the electromagnetic valve. Be careful not to connect the filter to a different electromagnetic valve.

6 Pull out the 3 tubes with the joints where the 3 tubes are connected and rotate the 3 valves of the joints to disconnect the tubes.

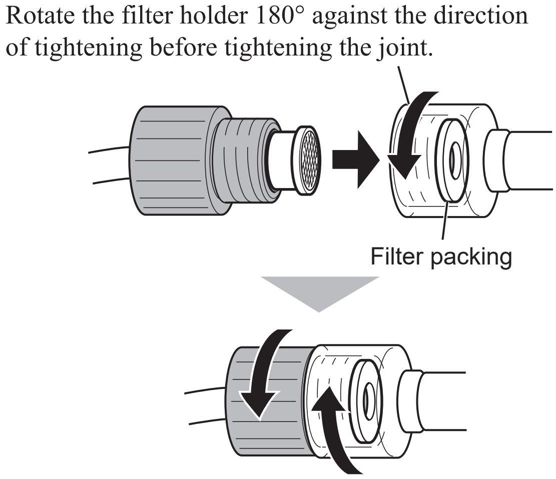
NOTE: Be careful not to bend or kink the tubes.



7 Pull out the 3 hemoglobin filters and replace them with new ones.

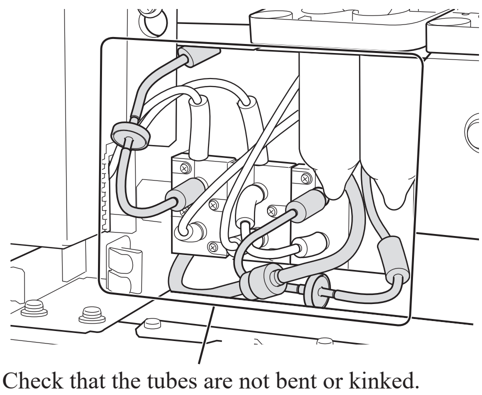
When the filter packing is extremely dirty, deformed or scratched, replace it with new filter packing. To replace the filter packing, contact your Nihon Kohden representative.

8 Retighten the joints.



NOTE
- When inserting the filter into the filter holder, be careful not to break or bend the internal filter packing.
- Make sure the filter fits into the packing and the joint is securely tightened.
- If there is a leak, check that there are no scratches or cracks around the filter and reattach the joint.
- To prevent the twisting of the tube, rotate the joint on the sample cup side 180° against the direction of tightening and then tighten the joint. Be careful not to bend or kink the tube.

9 Store the tubes in the analyzer and check that the tubes are not bent and kinked.



NOTE: Store the tubes in a location which does not interfere with the rack when the rack is moved.

10 Do step **4** in reverse order to put the analyzer back to its original state.

11 Connect the power cord to the wall AC outlet and turn on the analyzer. Touch [No] on the Confirm Operation window to skip the self check.

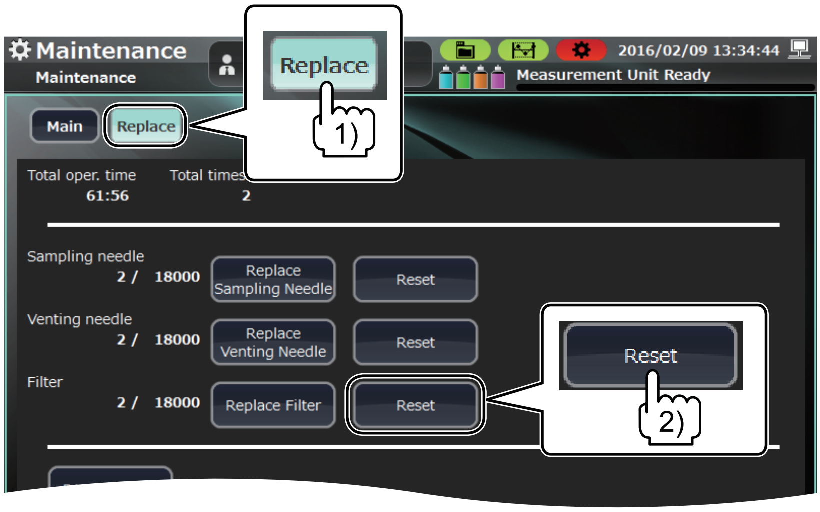
Operator's Manual:
"Turning On the Analyzer" in Section 5

12 Check that the analyzer message "21200 Maintenance part replacement status" appears and touch [RESTORE] on the Maintenance Log window.

13 Reset the number of times the filter is used.

1) Display the User Maintenance window and touch [Replace].

2) Touch [Reset] in Filter.



14 Run the self check.

Replacing Maintenance Parts in Batches

Do this when replacing 4 types of periodic replacement parts at the same time.

Maintenance items: Sampling nozzle (supply code: T444E), 1 pc

Release nozzle assy (supply code: T449C), 1 pc

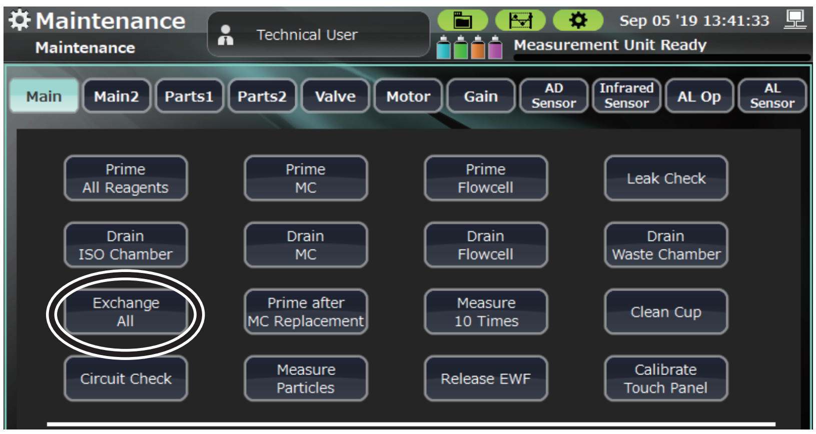
WBC filter assy (supply code: T802A), 2 pcs

Hemoglobin filter assy (Supply code: T802), 3 pcs

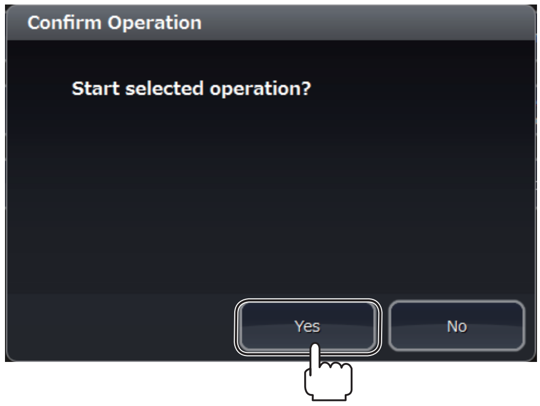
NOTE: Keep the screws that were removed during the replacement for reuse.

Replacement Procedure

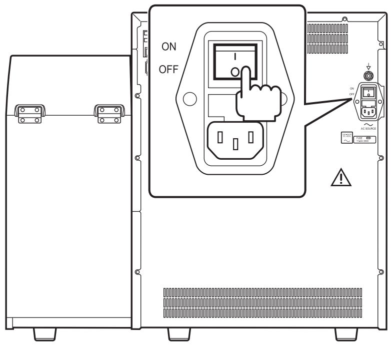
1 Open the Service Maintenance window and touch [Exchange All].



2 When you touch [Yes] on the Confirm Operation window, the fluid paths related to the maintenance items are drained then the secondary power of the analyzer automatically turns off.



3 Turn off the Main power switch on the rear panel of the analyzer (to ○) and disconnect the power cord from the wall AC outlet.



4 Remove the mixing and front covers. Refer to steps **4** and **5** in "Replacing the Sampling Needle".

"Replacing the Sampling Needle" (p. 6-92)

5 Check that the sample rotator for barcodes is clean. Clean it if necessary.

To check and clean sample rotator for barcodes: "Cleaning the Sample Rotator for Barcodes" (p. 6-125)

6 Replace the filter. Refer to step **5** to **9** in "Replacing the Filter".

"Replacing the Filter" (p. 6-104)

7 Open the top cover. Refer to step **7** in "Replacing the Sampling Needle". Then, open the front panel unit about 60° and fix it with the provided stopper plate. Refer to steps **8** to **10** in "Replacing the Sampling Needle".

"Replacing the Sampling Needle" (p. 6-92)

8 Check that the sample rotator for barcodes is clean. Clean it if necessary.

"Cleaning the Sample Rotator for Barcodes" (p. 6-125)

9 Replace the venting needle. Refer to steps **8** to **10** in “Replacing the Venting Needle”.

“Replacing the Venting Needle” (p. 6-100)

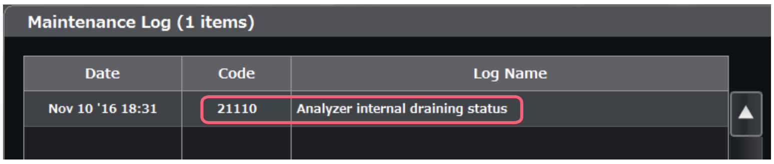
10 Do steps **11** to **15** in “Replacing the Sampling Needle”, replace the sampling needle, do steps **4** to **10** in “Replacing the Sampling Needle” in reverse, and return the analyzer to its original state.

“Replacing the Sampling Needle” (p. 6-92)

11 Connect the power cord to the wall AC outlet and turn on the analyzer. Touch [No] on the Confirm Operation window to skip the self check.

Operator’s Manual:
“Turning On the Analyzer” in Section 5

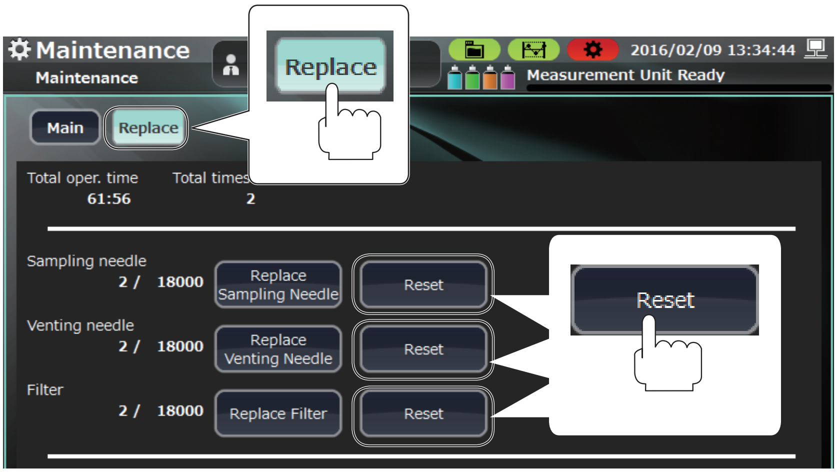
Check that “21200 Maintenance part replacement status” appears then touch [RESTORE] on the Maintenance Log window.



12 Run the self check.

“Running Self Check” (p. 6-12)

13 Open the User Maintenance window, touch [Replace], then reset the number of uses for each of the repair parts.



Touch the 3 [Reset] keys to reset the number of uses for each of the maintenance parts to 0.

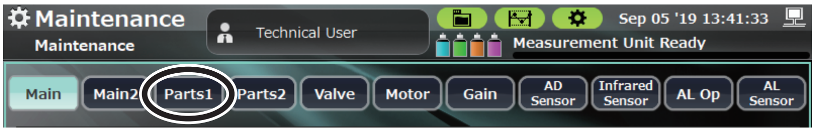
Checking the Operating State of the Consumables

Parts1

This window shows the operating time for the relevant consumables.

This is used as a reference for recommending the replacement of parts that have exceeded their lifespans.

1 Open the Service Maintenance window and touch [Parts1].



2 Check the operating state of the following consumables.

These are displayed in red when the operation limit is exceeded.

Part Name	Notes
Compressor	MP-910W
CPU fan	PC-910W/PC-911W
Laser	MO-910W

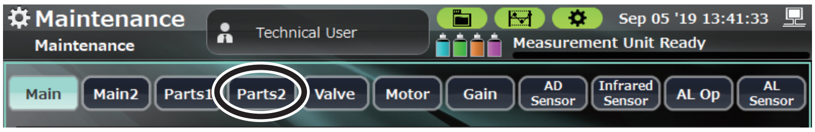
3 When replacing parts, set the operating time to 0 in the popup window displayed by touching operating time.

Parts2

This window shows the number of uses for the relevant components.

This is used as a reference for recommending the replacement of parts that have exceeded their lifespans.

1 Open the Service Maintenance window and touch [Parts2].



2 The operating state of the following consumables can be checked and the operation limit can be edited.

These are displayed in red when the operation limit of the part is exceeded and in yellow when the operation limit has exceeded 80%.

Part Name	Notes
Sampling needle	—
Venting needle	—
Filter	—
Electromagnetic valve	MV1 to 29
Pinch valve	PV1 to 5
Diaphragm pump	DP_1ML (1), DP_1ML (2), DP_HEMO3, DP_HEMO5
Motor	ISO pump, WBC pump, RBC pump, SAMPLE pump, sampler Y, sampler X, pressure release
Autoloader agitator rotations	—

3 When replacing parts, set the operation counter to 0 in the popup window that is displayed by touching the operation counter.

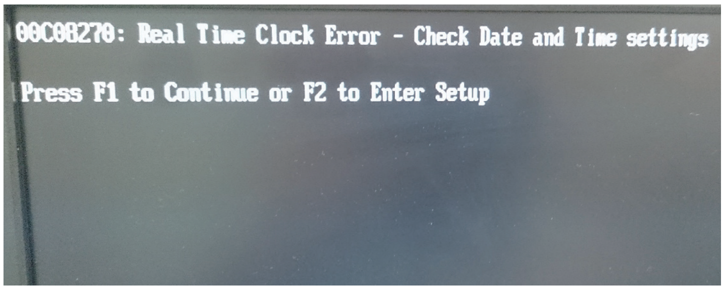
Replacing the Internal Battery of the PC-910W

Schedule: Around every 4 years

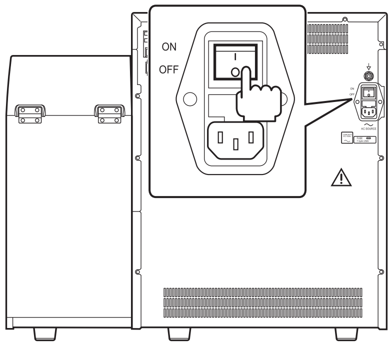
Maintenance item: CR2032 lithium ion battery (locally purchased)

NOTE: Keep the screws that were removed during the replacement for reuse.

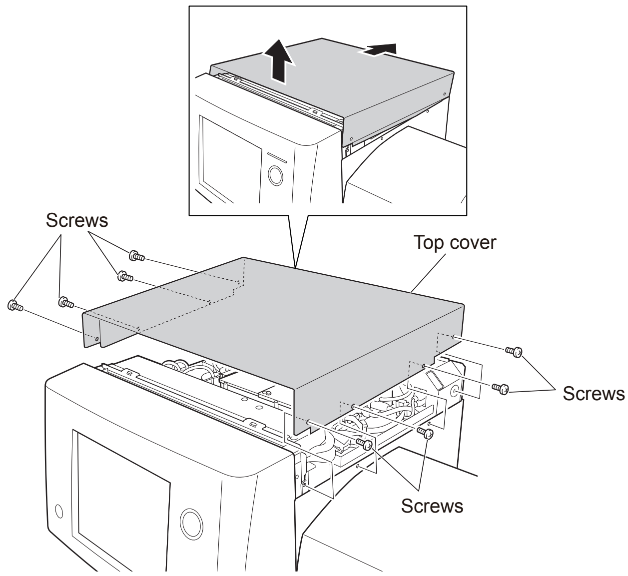
Replace the internal battery when the following window is displayed.



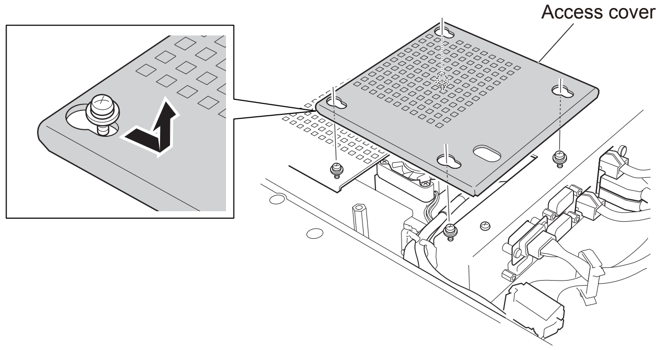
1 Turn off the Main power switch on the rear panel of the analyzer (to ○) and disconnect the power cord from the wall AC outlet.



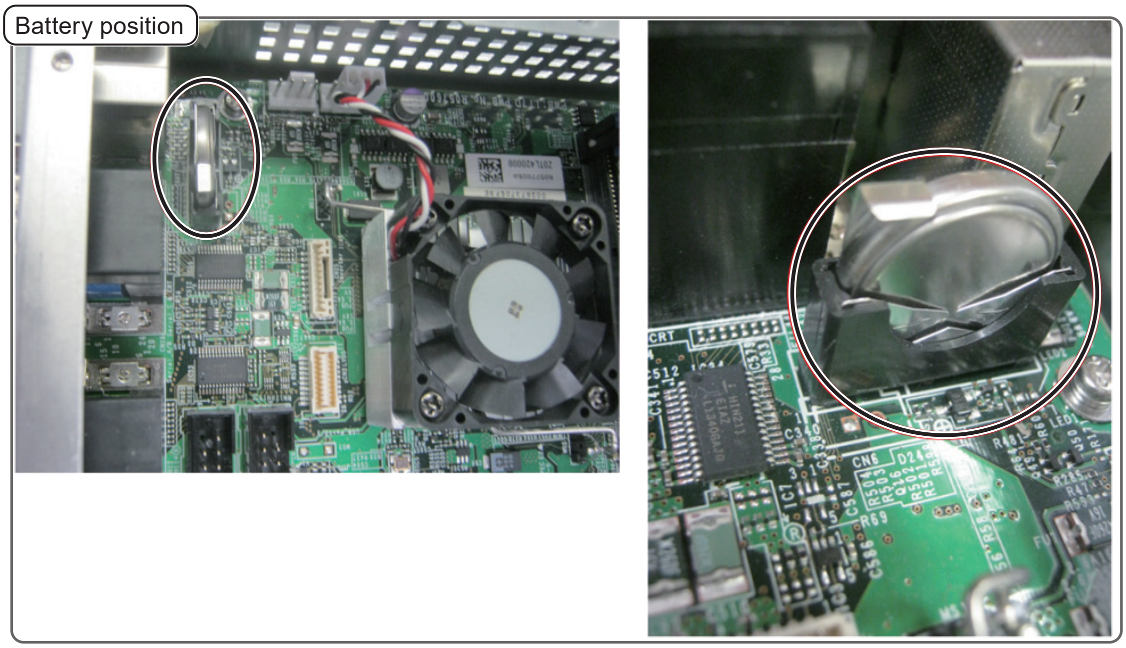
2 Remove the top cover.



3 Remove the access cover.

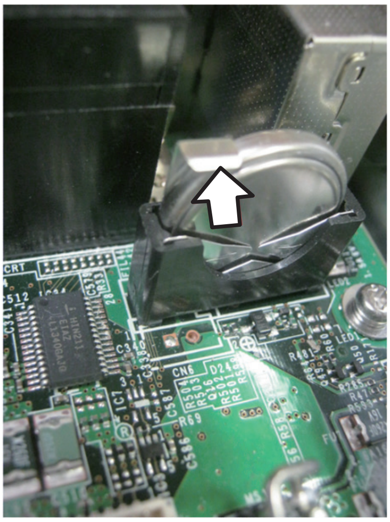
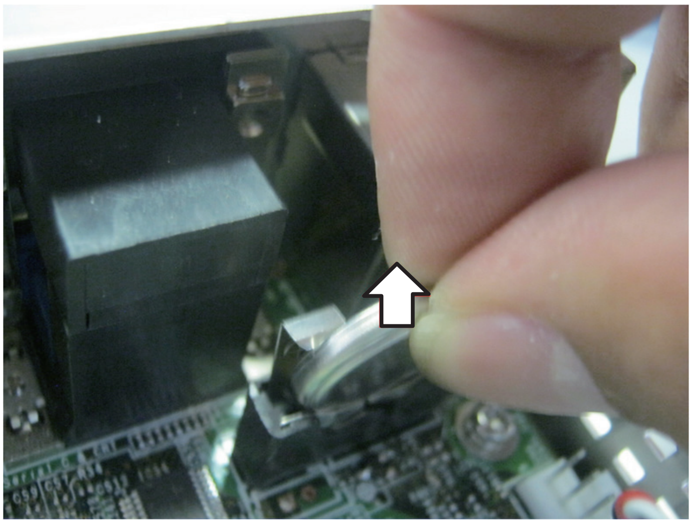


4 Replace the internal battery.



Replacement Procedure

1) Unfasten the metal fixing that holds the battery and pull the battery upwards.

2) Set a new battery in the position shown above.

5 Set the time.

Set the date and time on the System Setting window.

For details on how to set the date and time, refer to “Date and Time” (p. 7-10).

Replacing the Relief Valve Tube Assy

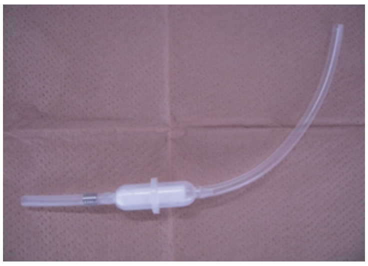
Schedule: Around every 1 year

Maintenance item: Valve for MP-910W Rev. AE or later

Required tools: Driver, nipper

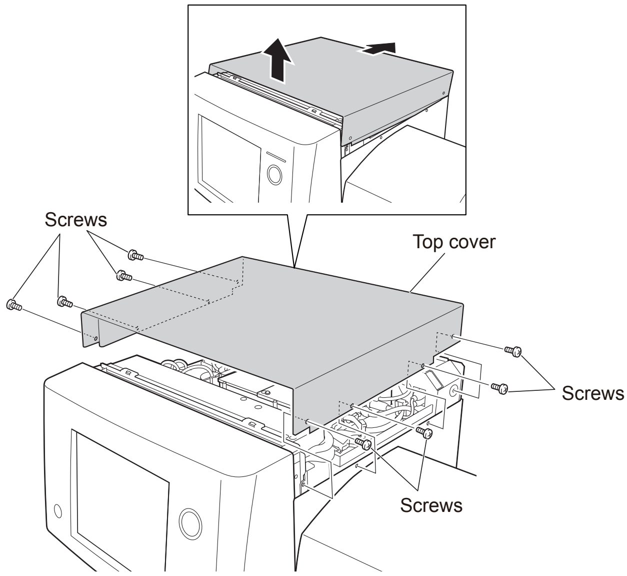
Required part: Cable tie

NOTE
- Calibration is not required.
- If the analyzer is connected to the LIS system, the External Output settings do not have to be changed.
- Measure the hematology control and check that the analyzer operates properly after replacement.

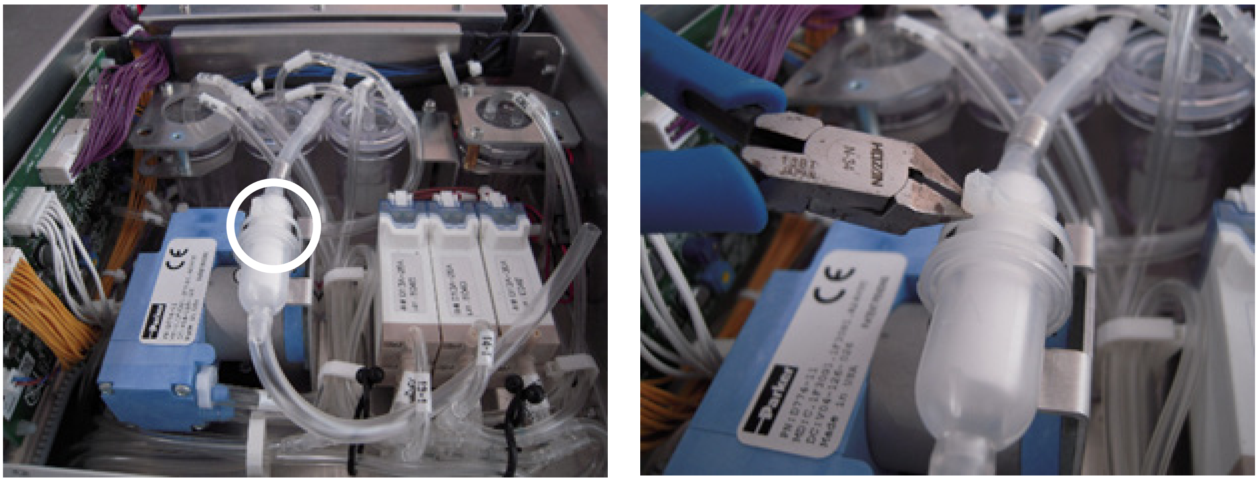


(Maintenance item: RPA-6114936370 Valve for MP-910W Rev. AE or later)

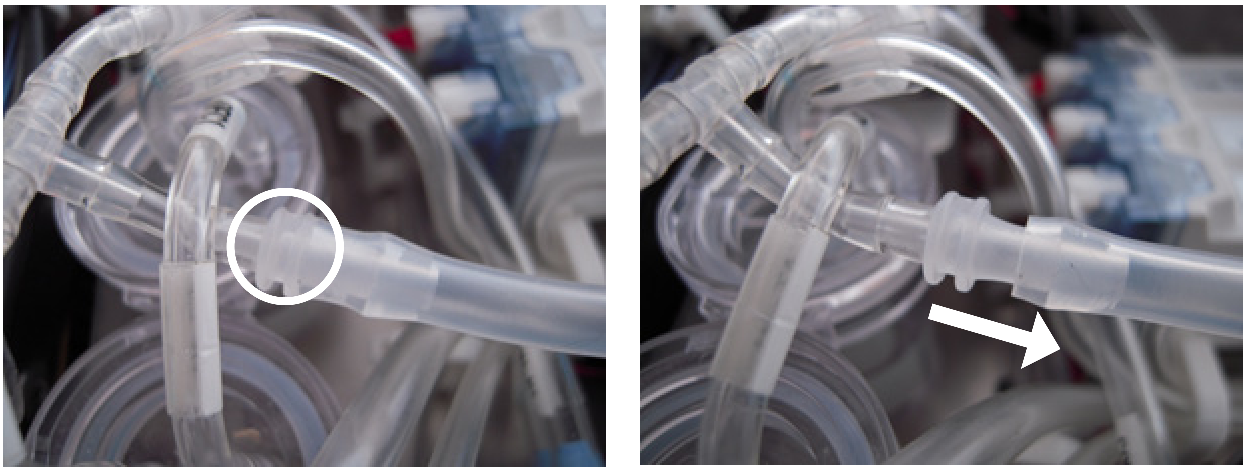
1. Press the Power switch while pressing the Reset button to turn off the analyzer.
2. Disconnect the power cord from the wall AC outlet.
3. Remove the eight screws to remove the top cover.



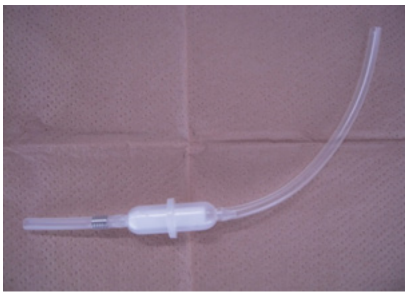
4 Cut the cable tie which secures the filter with a nipper.



5 Remove the tube from the tube joint.

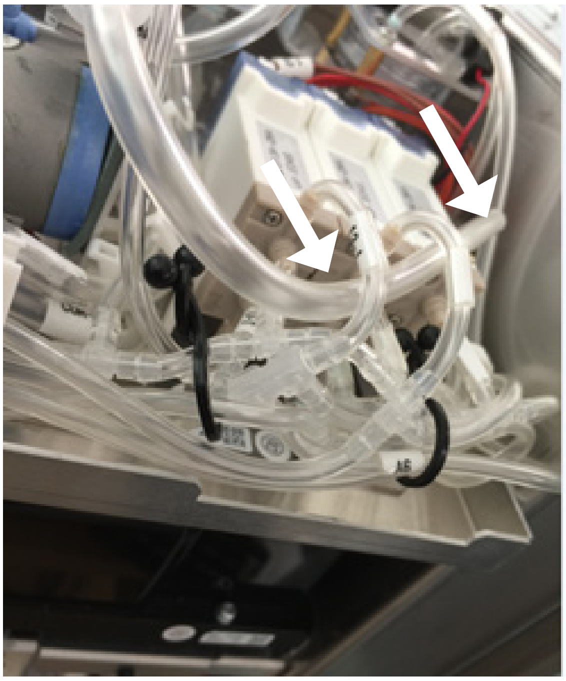


6 Replace the relief valve tube assy with a new one.

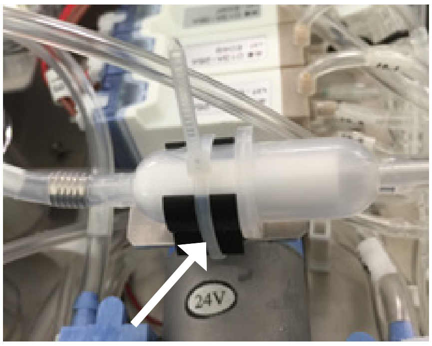


7 Pass the long end of the relief valve tube assy (Atmospheric pressure release side) under the tubes of the electromagnetic valves.

NOTE: Be careful not to obstruct the tube end with the chassis wall.

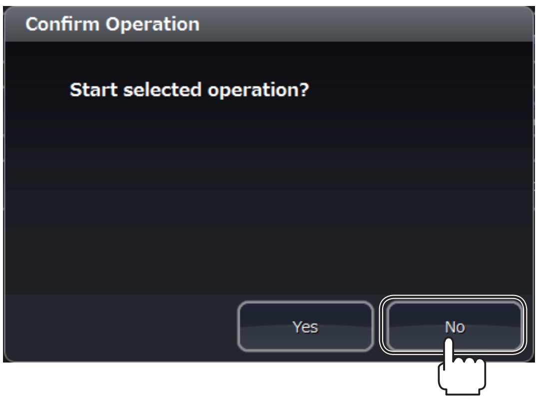


8 Attach the filter of the relief valve tube assy to the compressor heatsink and secure it with a cable tie. Cut off the excess length of the cable tie.



9 Attach the top cover with the eight screws that were removed in step **3**.

10 Connect the power cord to the wall AC outlet, turn on the analyzer and log in as a [Technical User]. Touch [No] on the Confirm Operation window to skip the self check.



“Changing the Operator to a Technical User” (p. 6-25)

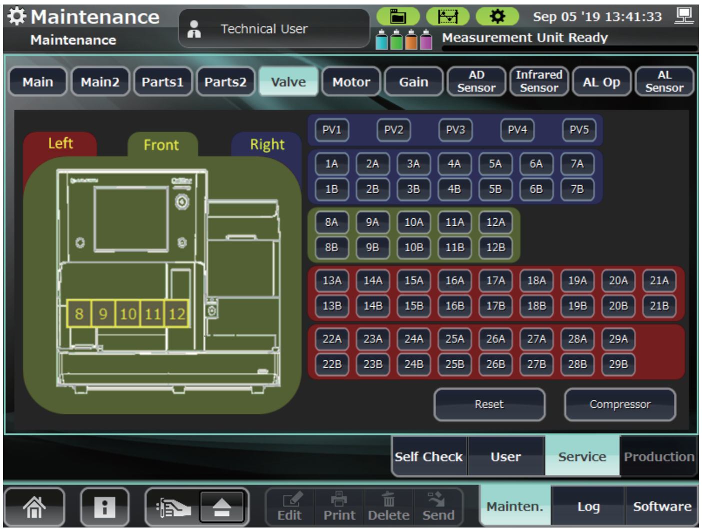
11 Check for leaks.

1) Open the [Valve] window. (Touch [Maintenance] > [Service] > [Valve])

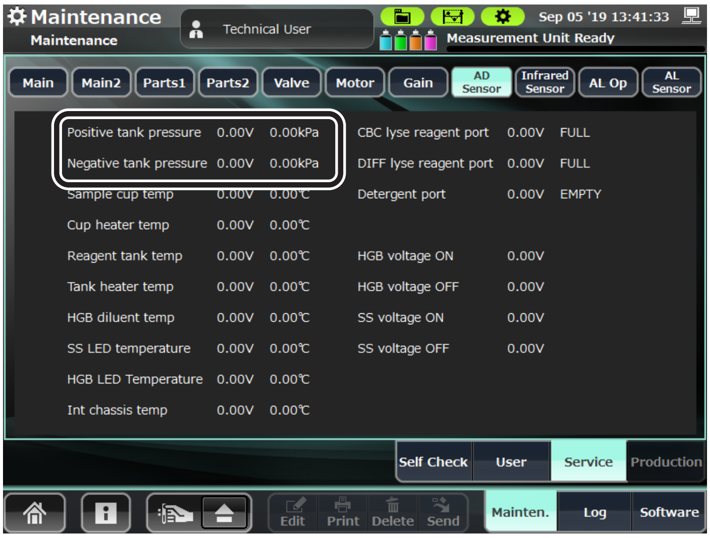
2) Touch [Reset] and initialize the magnetic valves.

3) Touch [13B] and [14B] to open the valves and make a path between the compressor and sensor.

4) Touch [Compressor] to start the compressor.



5) Touch [AD Sensor] and check the pressure in the chamber. Check that the positive tank pressure and negative tank pressure values are within the range of −35 kPa to −25 kPa.



6) Returns to the [Valve] window and touch [Reset] to release the pressure in the chamber.

12 Run the self check.

"Running Self Check" (p. 6-12)

13 Perform a quality control measurement using a hematology control and check that the result is within the control range.

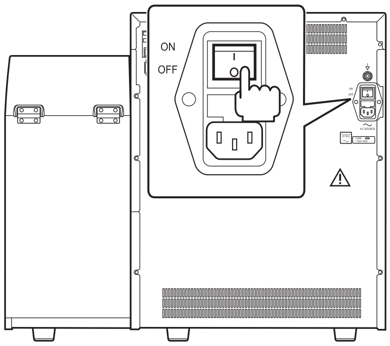
Operator's Manual:
"Measuring the Hematology Control" in Section 6

Replacing the Fuses

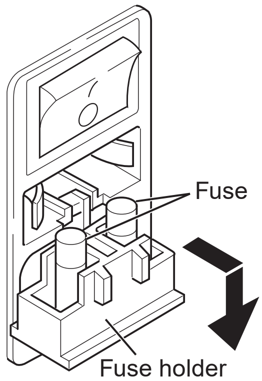
Maintenance item: 6.3A time-lag fuse

Replace the fuses.

1 Turn off the Main power switch on the rear panel of the analyzer (to ○) and disconnect the power cord from the wall AC outlet.



2 Pull out the fuse holder, located between the Main power switch and Power socket, in the direction of the arrow.



3 Remove the fuses from the fuse holder and set new fuses.

Disposing of the Analyzer and Medical Waste

> ⚠ **WARNING**
>
> - Dispose of the analyzer, replaced parts (such as sampling needle and venting needle), waste fluid and parts used for collecting sample blood (such as needles, syringes and vials) according to your local laws for disposing of infectious medical waste (for incineration, melt treatment, sterilization and disinfection).
> - Before disposing of the analyzer, perform strong cleaning and remove the sampling needle and venting needle from the analyzer.
>   If the above warning is not followed, it causes infection or environmental contamination.

> ⚠ **WARNING**
>
> Always wear rubber gloves to protect yourself from infection.

Outsourcing Medical Waste Processing

The most reliable method of processing medical waste is outsourcing to specialists rather than handling it yourself. This is different for each country. For more information, please ask your local government or healthcare center.

Reagents

For information about the diluent, detergent and lysing reagent, refer to the package and manual provided with them.

Options

Refer to the manual provided with the options.

Cleaning and Disinfection

Analyzer

⚠ **WARNING**
- Be careful not to directly touch any place where blood sample is or may have contacted.
- Always wear rubber gloves to protect yourself from infection.

⚠ **CAUTION**
Before maintenance, perform cleaning, drain the cups, and turn off the analyzer main power and disconnect the power cord from the AC outlet. If the analyzer is lifted or tilted without cleaning and draining it, the liquid in the cups may spill and damage the electronic circuit or the operator may receive electrical shock. If maintenance is performed while the power is on, the operator may receive electrical shock or the analyzer may start unexpectedly when a key is pressed.

NOTE
- Clean and disinfect the analyzer by the following procedure.
- Wipe off moisture with a dry cloth and thoroughly dry the analyzer before use.
- When using a flammable solvent such as ethanol for cleaning and disinfecting, ventilate the room adequately.

Cleaning the Surface of the Analyzer

Cleaning schedule: At least once a month

Wipe the surface with a soft cloth moistened with disinfecting ethanol (concentration: 76.9 to 81.4 vol% at 15°C (59°F)), neutral detergent diluted with water, or isopropyl alcohol. After cleaning, dry it completely.

Wipe the LCD display with a soft dry cloth.

NOTE
- Do not use volatile liquids such as thinner, benzine or bleach. These will cause the plastic surface to melt or crack.
- If you use a wet cloth with water (or detergent), wring the cloth well to prevent the liquid from spilling into the analyzer.
- Note that disinfecting ethanol or detergent that spills into the analyzer through the gap at the edge of the display may cause a failure.

Disinfecting the Surface of the Analyzer

Disinfecting schedule: When an infectious substance (blood) is present on the surface of the analyzer or when the analyzer is moved to another facility.

Wipe the surface with a soft cloth moistened with disinfecting ethanol (concentration: 76.9 to 81.4 vol% at 15°C (59°F)).

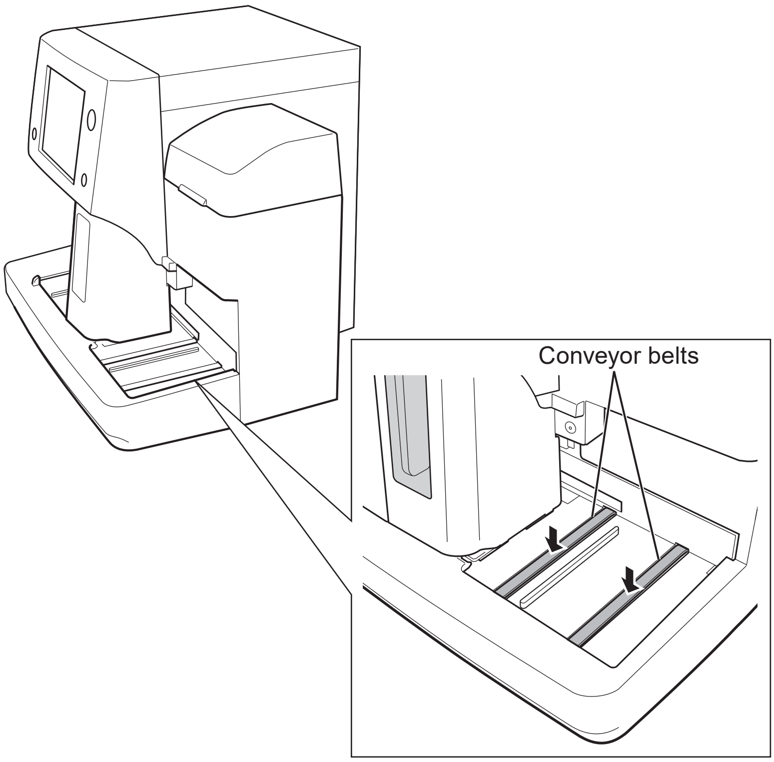
NOTE
- Use disinfectants in the correct concentration.
- Do not use volatile liquids such as thinner, benzine or bleach. These will cause the plastic surface to melt or crack.
- Wipe the analyzer thoroughly after disinfecting it with a sprayer.

Cleaning the Conveyor Belt

Cleaning schedule: When the conveyor belt is not clean

Wipe the conveyor belt with a soft cloth moistened with disinfecting ethanol (concentration: 76.9 to 81.4 vol% at 15°C (59°F)), neutral detergent diluted with water, or isopropyl alcohol. After cleaning, dry it completely.

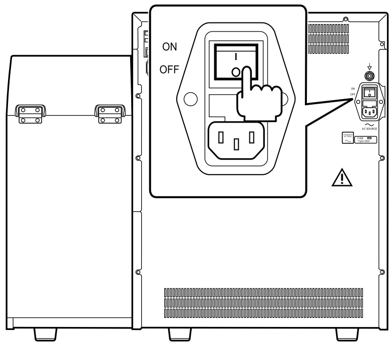
NOTE
- Do not use volatile liquids such as thinner, benzine or bleach. These will cause the plastic surface to melt or crack. These will cause the plastic surface to melt or crack.
- If you use a wet cloth with water (or detergent), wring the cloth well to prevent the liquid from spilling into the analyzer.
- Note that disinfecting ethanol or detergent that spills into the analyzer through the gap may cause a failure.



Cleaning the Rack Path

Cleaning schedule: When the rack path is not clean

1 Turn off the analyzer and switch off (to ○) the main power on the rear of the analyzer.



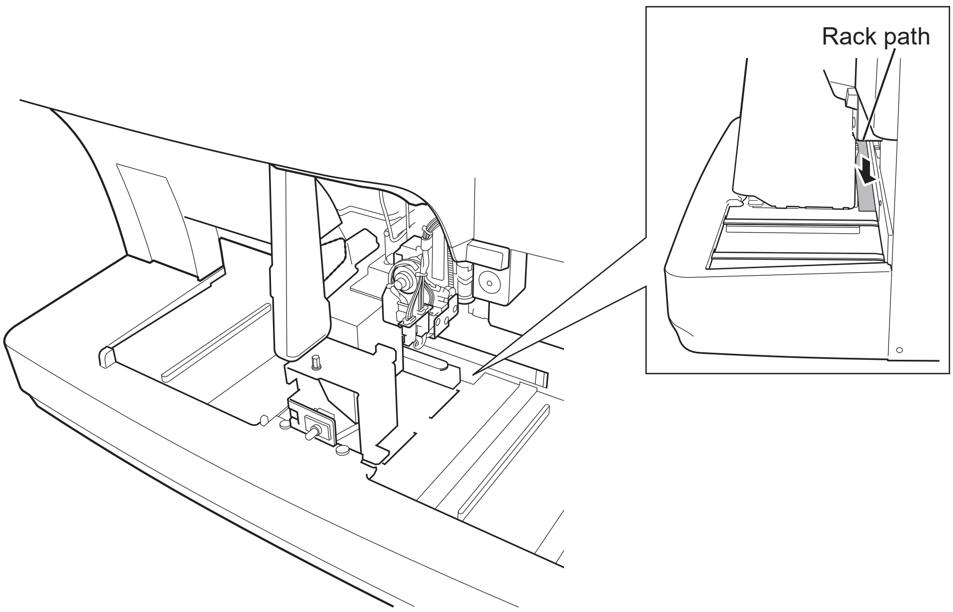
2 Disconnect the power cord from the wall AC outlet.

3 Remove the mixing cover. Refer to step **4** in “Replacing the Sampling Needle”.

“Replacing the Sampling Needle” (p. 6-92)

4 Wipe the rack path with a soft cloth moistened with disinfecting ethanol (concentration: 76.9 to 81.4 vol% at 15°C (59°F)), neutral detergent diluted with water, or isopropyl alcohol. After cleaning, dry it completely.

NOTE
- Do not use volatile liquids such as thinner, benzine or bleach. These will cause the plastic surface to melt or crack.
- If you use a wet cloth with water (or detergent), wring the cloth well to prevent the liquid from spilling into the analyzer.
- Note that disinfecting ethanol or detergent that spills into the analyzer through the gap may cause a failure.



5 Do steps **2** to **3** in reverse order to return the analyzer to its original state.

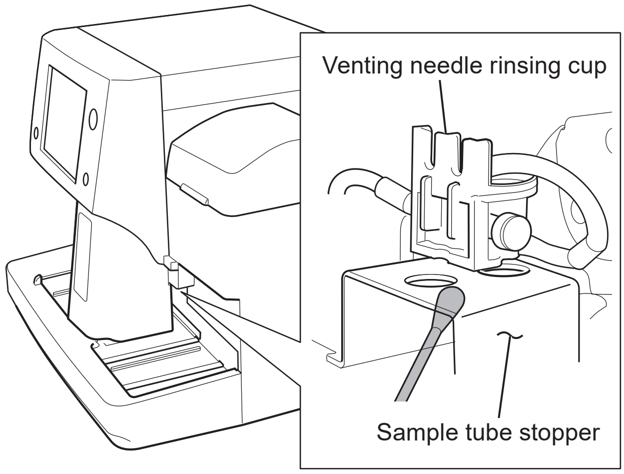
Cleaning the Sample Tube Stopper

Cleaning schedule: When the sample tube stopper is not clean

Check for dirt on the sample tube stopper.

Wipe off the dirt on the surface contacting the sample tubes using a cotton swab moistened with disinfecting ethanol (concentration: 76.9 to 81.4 vol% at 15°C (59°F)) or isopropyl alcohol.

The sample tube stopper is located right below the venting needle rinsing cup.
You do not need to remove any covers to clean the stopper.



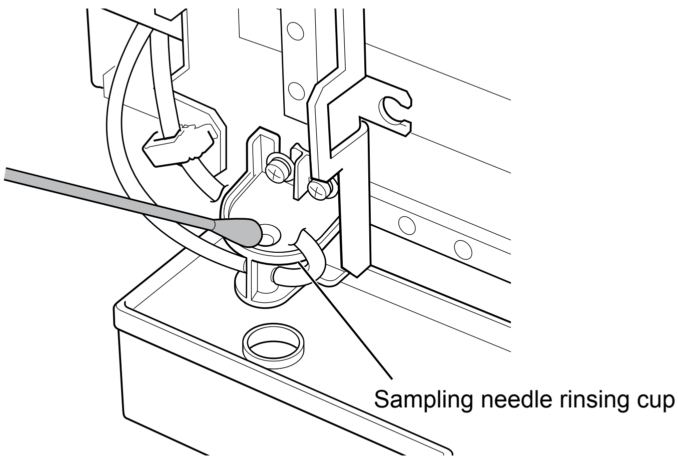
Cleaning the Sampling Needle Rinsing Cup

Cleaning schedule: When replacing the sampling needle

After removing the sampling needle, clean the sampling needle rinsing cup with a cotton swab as shown in the figure.

"Replacing the Sampling Needle" (p. 6-92)

NOTE: Do not use disinfecting agents (disinfecting ethanol or isopropyl alcohol) when cleaning the sampling needle rinsing cup.



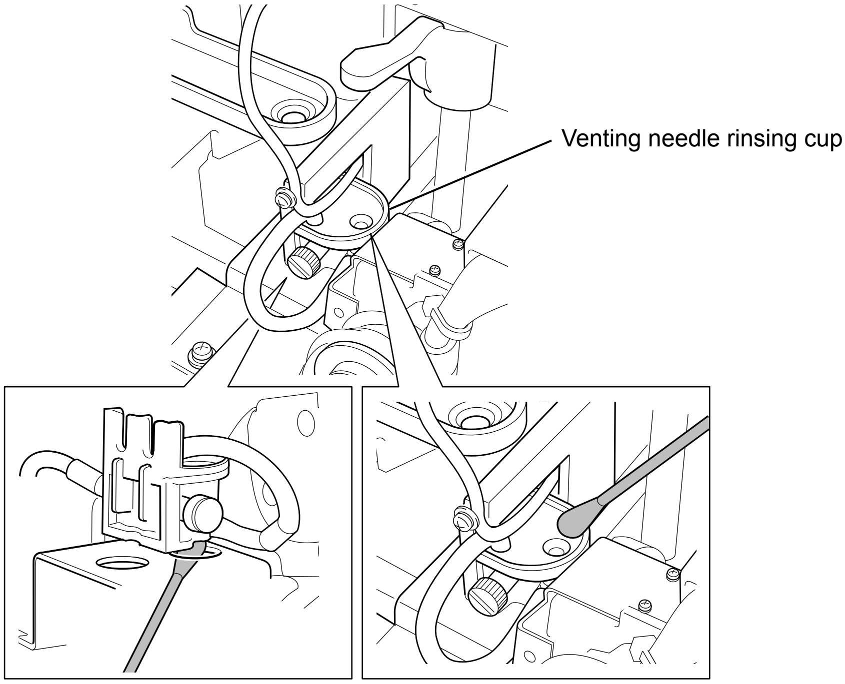
Cleaning the Venting Needle Rinsing Cup

Cleaning schedule: When replacing the venting needle

After removing the venting needle, clean the venting needle rinsing cup with a cotton swab as shown in the figure.

"Replacing the Venting Needle" (p. 6-100)

NOTE: Do not use disinfecting agents (disinfecting ethanol or isopropyl alcohol) when cleaning the venting needle rinsing cup.

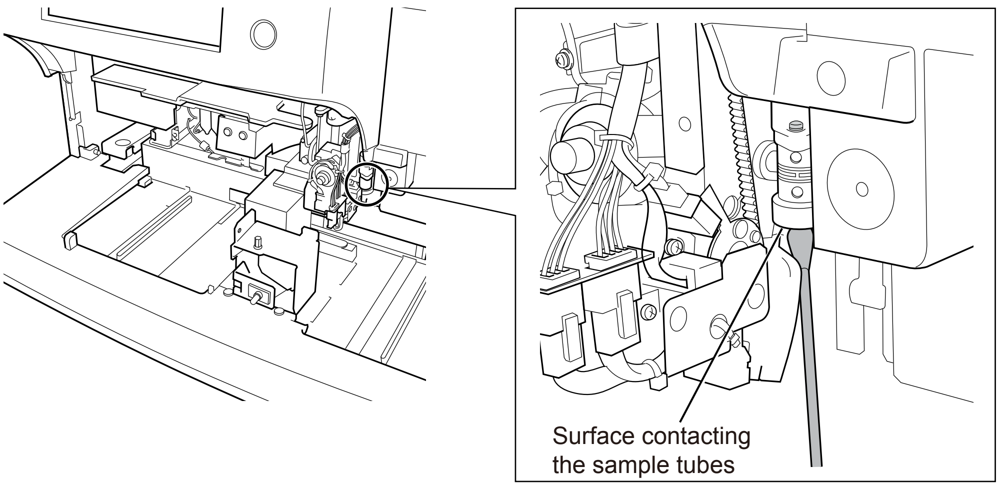


Cleaning the Sample Rotator for Barcodes

Cleaning schedule: When the sample rotator for barcodes is not clean (when replacing the sampling needle or the venting needle)

Check for dirt when replacing the sampling needle or the venting needle.

Wipe off the dirt on the surface contacting the sample tubes using a cotton swab moistened with disinfecting ethanol (concentration: 76.9 to 81.4 vol% at 15°C (59°F)) or isopropyl alcohol.



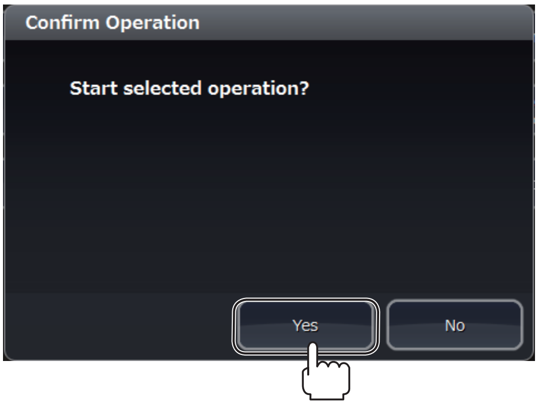
Cleaning the Aperture Caps

Cleaning schedule: When troubleshooting

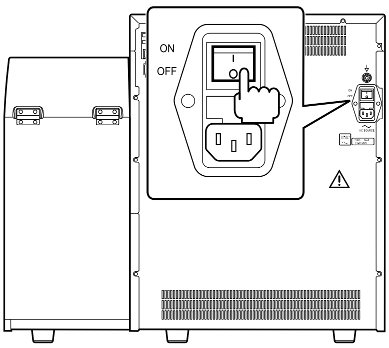
NOTE: Keep the screws that were removed during the cleaning for reuse.

1 Open the User Maintenance window and touch [Remove MC Aperture Clog].

2 Touch [Yes] on the Confirm Operation window.



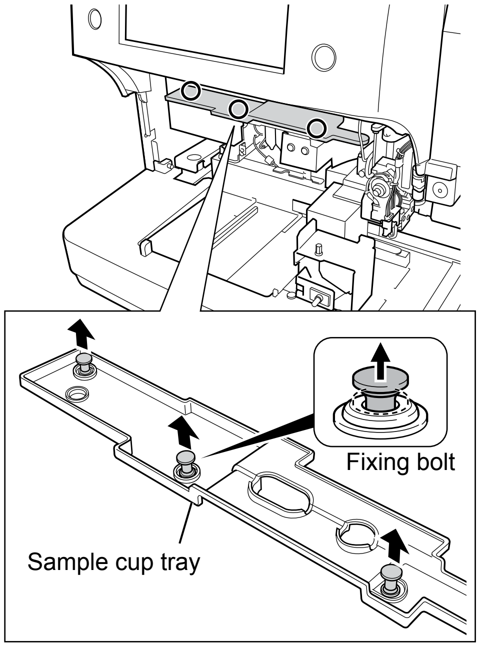
3 Turn off the Main power switch on the rear panel of the analyzer (to ○) and disconnect the power cord from the wall AC outlet.



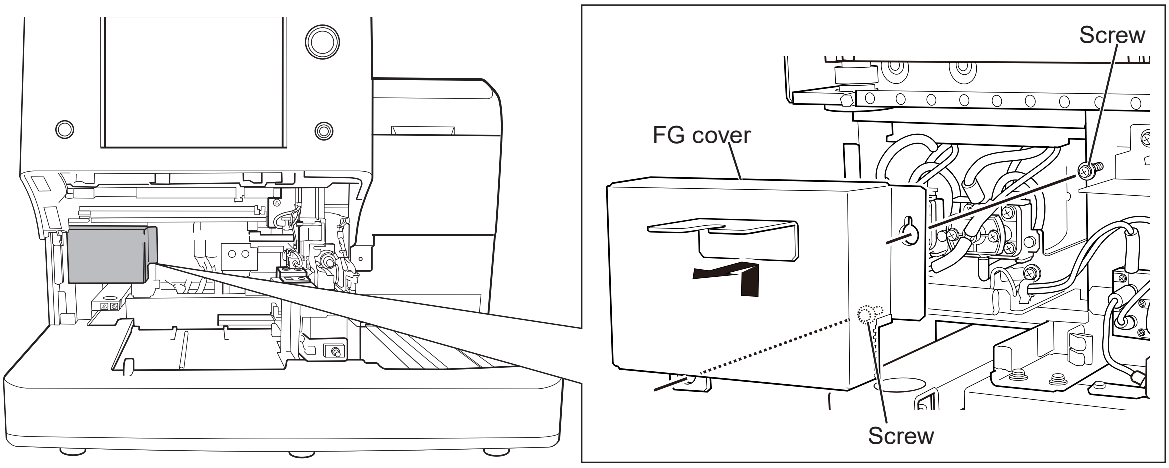
4 Remove the mixing and front covers. Refer to steps **4** and **5** in “Replacing the Sampling Needle”.

“Replacing the Sampling Needle” (p. 6-92)

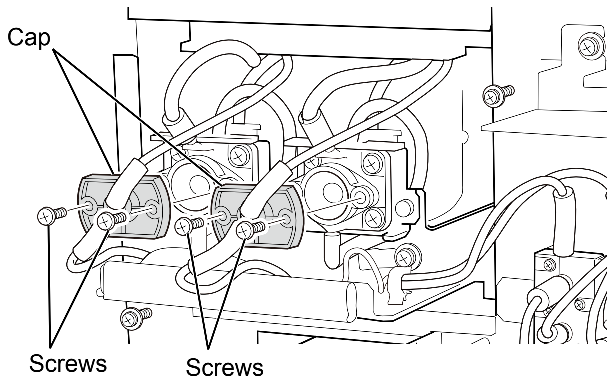
5 Pull up the 3 fixing bolts until they click then remove the sample cup tray.



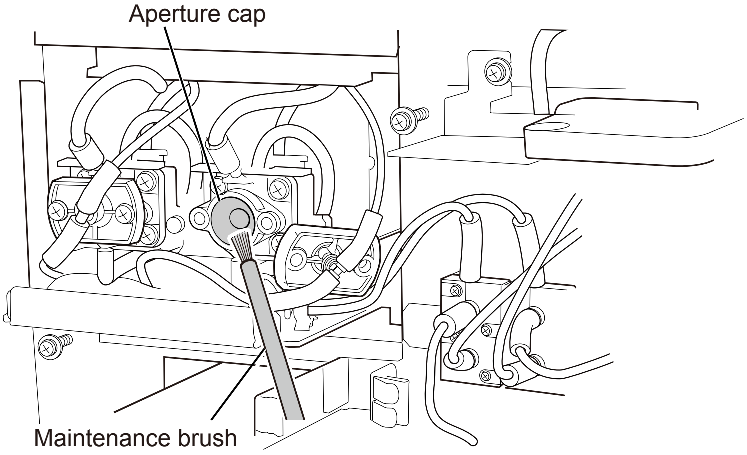
6 Loosen the two screws to remove the FG cover.



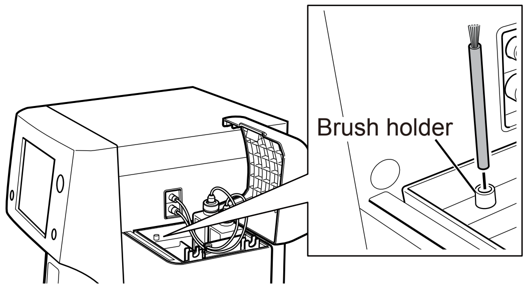
7 Remove the four screws to pull out the left and right caps.



8 Using the provided maintenance brush dipped in CLEANAC•810, clean the left and right aperture caps by lightly tapping them.



- The provided maintenance brush is housed in the brush holder in the reagent bottle compartment.



- After cleaning the aperture caps, wash the brush well with tap water, fully dry the tip, and then insert it into the reagent bottle compartment.

9 Do steps **4** to **7** in reverse order to return the analyzer to its original state.

10 Connect the power cord to the wall AC outlet and turn on the analyzer. Touch [No] on the Confirm Operation window to skip the self check.

Operator's Manual:
"Turning On the Analyzer" in Section 5

11 Clean the MC chamber.

"Cleaning the MC" (p. 6-9)

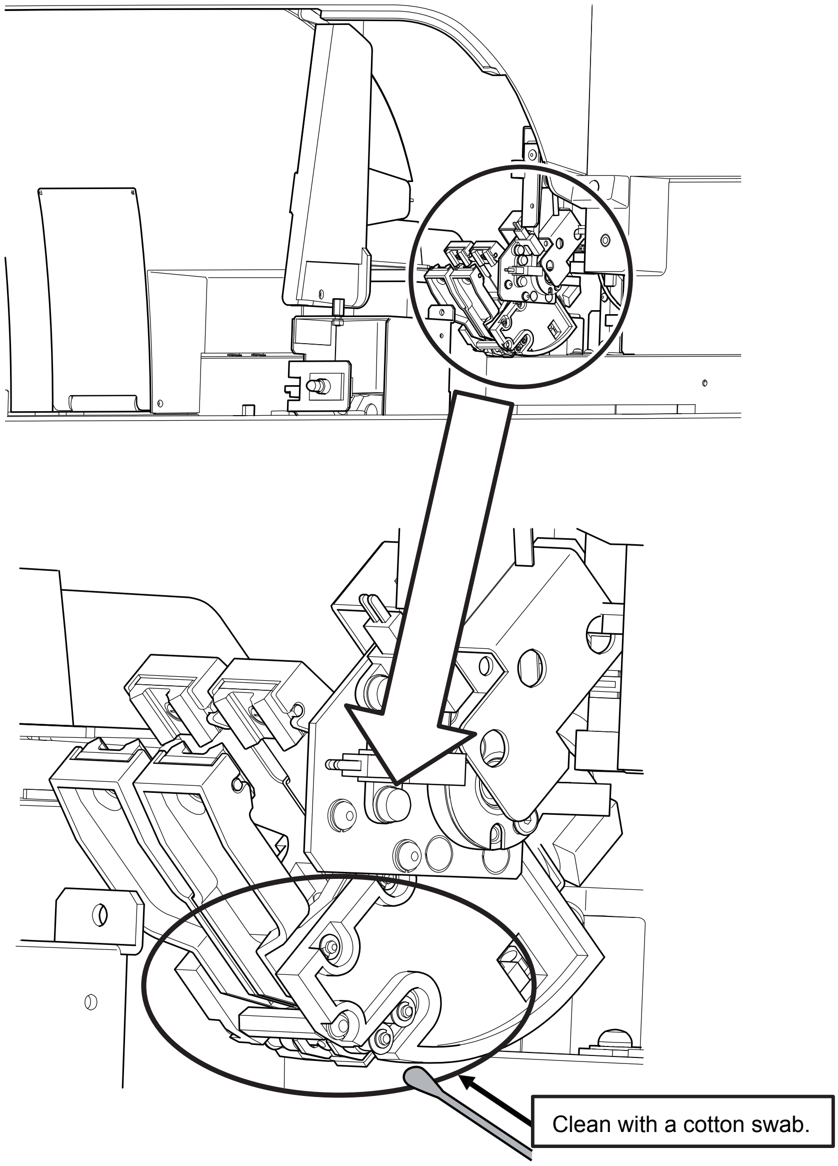
12 Run the self check.

"Running Self Check" (p. 6-12)

Cleaning the Sample Tube Clamp

Cleaning schedule: When replacing the sampling needle, when replacing the venting needle, when replacing the filter

Inspect the sample tube clamp and wipe with a cotton swab when there is any dirt present.



Standard Accessories

Cleaning the Rack

Cleaning schedule: When the rack is not clean

Wipe off the dirt on the rack with a soft cloth moistened with neutral detergent diluted with water.

After cleaning, dry it completely.

NOTE: When cleaning the rack, make sure to avoid peeling off the label (identification barcode) on the rack.

Options

Refer to the manual provided with the options.

Storage and Transport

Long Term Storage and Transport

⚠ **CAUTION**

Before moving the analyzer, do the following.

- Perform cleaning and drain the cups. If the analyzer is lifted or tilted without cleaning and draining it, the liquid in the cups may spill and damage the electronic circuit or the operator may receive electrical shock.
- Turn off the analyzer main power and disconnect the power cord from the AC outlet. If the analyzer is moved while the power is on, the operator may receive electrical shock or the analyzer may start unexpectedly when a key is pressed.

If any diluent remains inside the analyzer when transporting it or storing it for longer than 1 week, the inside of the analyzer will become dirty because of dried diluent crystals or other contaminants. This increases background noise. If the analyzer needs to be transported or to be stored for longer than 1 week, clean the inside by flushing the fluid path with distilled water and doing the Drain All operation.

1. Perform cleaning.

   “Cleaning” (p. 6-5)

2. Removing the tubes connected to the diluent inlet, detergent inlet and lysing reagent inlet, leaving only the waste fluid tube connected.

   Operator’s Manual:
   “Connecting the Reagent and Waste Container” in Section 4

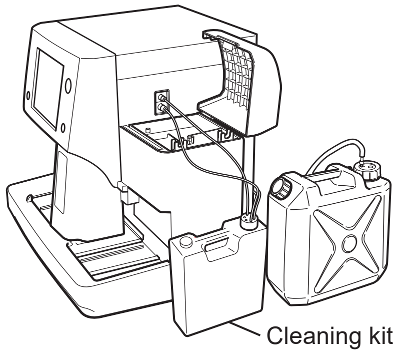
3. Perform the draining operation to completely drain all reagent from the inside of the analyzer.

   “Draining All Fluid” (p. 6-11)

6

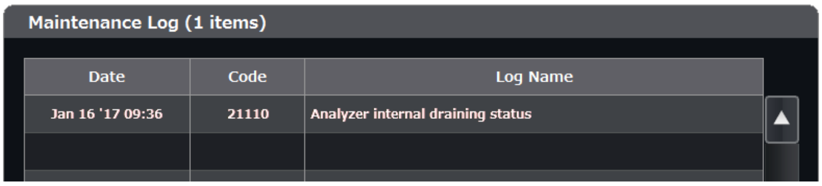
4 Pour distilled water into the bottle of the cleaning kit and connect the tubes of the cleaning kit to the diluent inlet, detergent inlet and lysing reagent inlet.

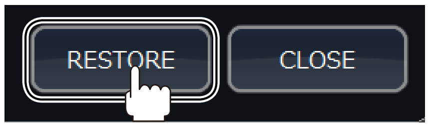
The cleaning kit consists of a distilled water container and tubes.



5 Perform priming on installation to fill the analyzer with distilled water.

When an analyzer message "21110 Analyzer internal draining status" appears on the Maintenance Log window, touch [RESTORE] to start priming on installation.



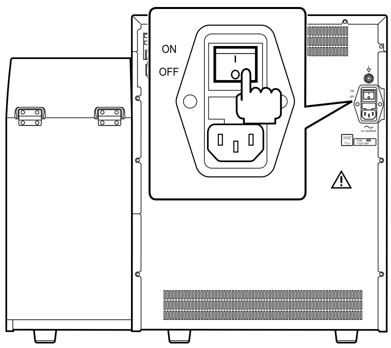


"Priming on Installation" (p. 6-10)

6 Repeat steps **2** to **3** to drain the analyzer of all the distilled water.

7 Remove the waste tube connected to the waste port.

8 Turn off the analyzer and switch off (to ○) the main power on the rear of the analyzer.



9 Disconnect the power cord from the wall AC outlet and store or transport the analyzer.

Using the Analyzer After Long Term Storage

NOTE: When the analyzer is not used for a long time (longer than 1 week), the fluid path becomes dirty. Do the following operation to clean them.

1. Clean the aperture caps.

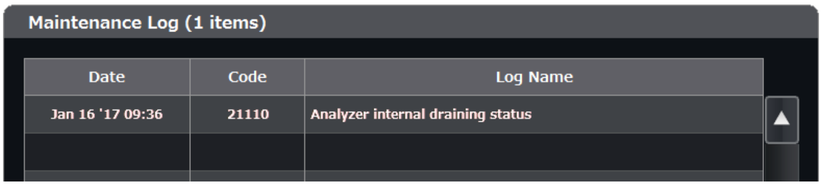
   “Cleaning the Aperture Caps” (p. 6-126)

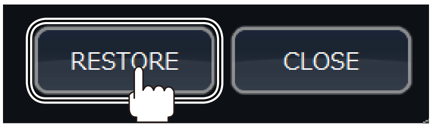
2. Turn the analyzer on.

3. Perform priming on installation.

   When an analyzer message “21110 Analyzer internal draining status” appears on the Maintenance Log window, touch [RESTORE] to start priming on installation.

   “Priming on Installation” (p. 6-10)



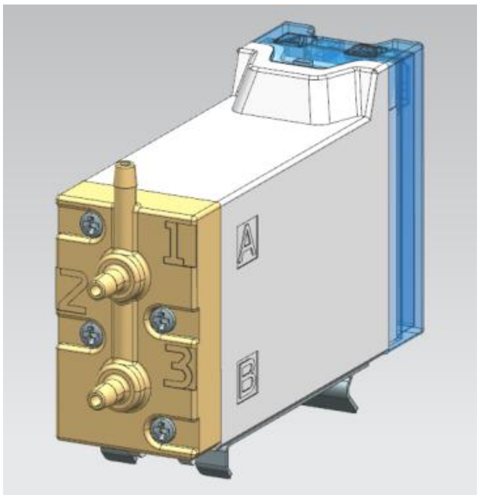


Electromagnetic Valve Maintenance

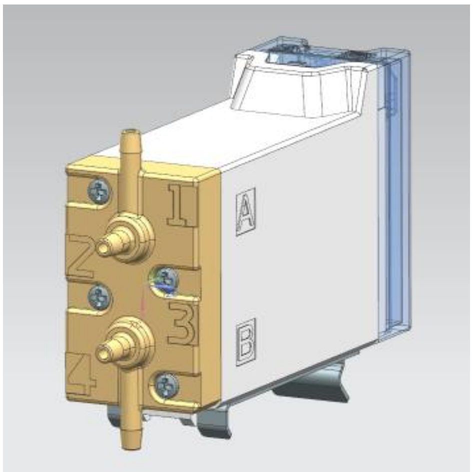
Electromagnetic Valve Structure

Appearance

D13-35A 3-way valve



D13-25A 2-way valve

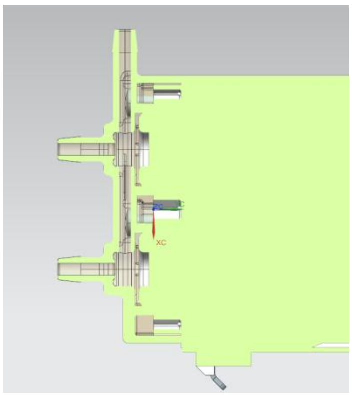


Fluid path	From the top, 1 to 4 (4 only exists for the D13-25A)
Solenoid	From the top, A and B

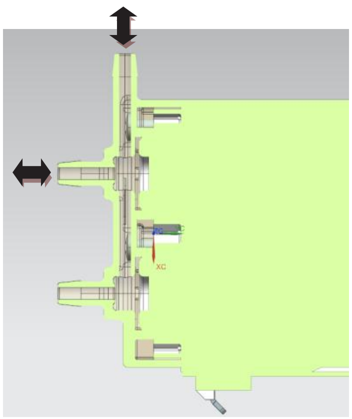
Internal

D13-35A 3-way valve

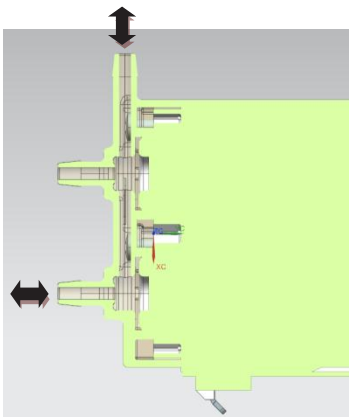
(CLOSED)



(A OPENED)

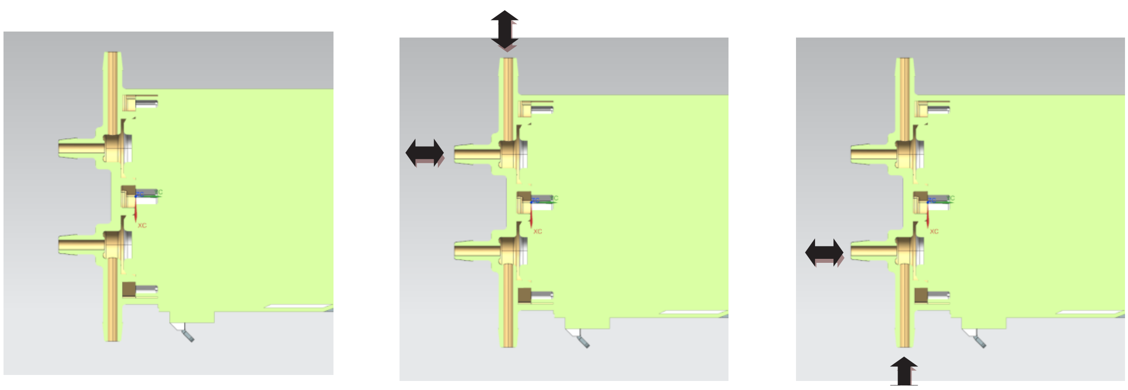


(B OPENED)



D13-25A 2-way valve

(CLOSED) (A OPENED) (B OPENED)



Checking the Operation of Electromagnetic Valves

Check Procedure

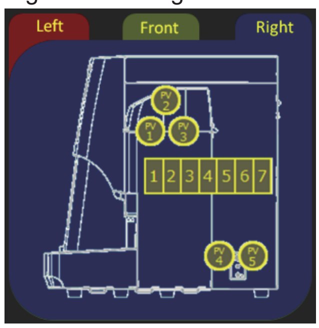
1 Open the Service Maintenance window and touch [Valve].

2 In the Electromagnetic Valve window there are 1 to 29 (A & B) operating keys. Check the opening and closing operation of each electromagnetic valve.

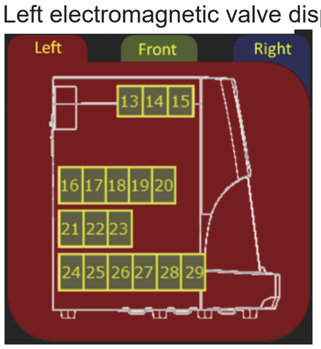
Electromagnetic valve closed when:

Energized state differs from XP-600 series
Both sides have color
Electromagnetic valve LED is on
Analyzer power is off
Self check is complete

Right electromagnetic valve display



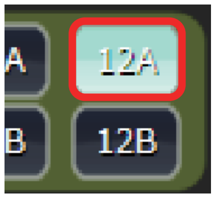
Left electromagnetic valve display



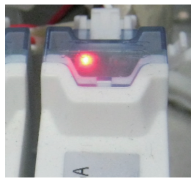
Electromagnetic Valve Opening and Closing Check

- Opens when touching the electromagnetic valve’s [number A or B] key. Also, the color on the window changes and the LED lights up.

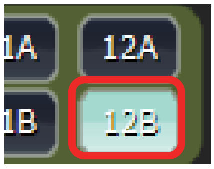
A: Color changes



Red LED lights



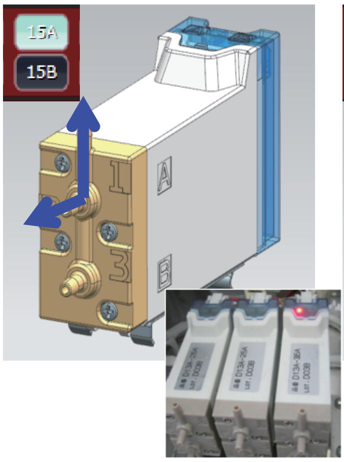
B: Color changes



Green LED lights

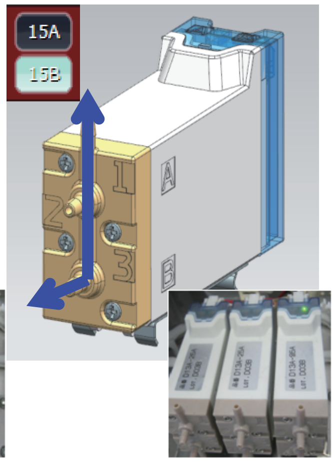
- Opening and closing of 3-way valves

Port 1 and 2 open



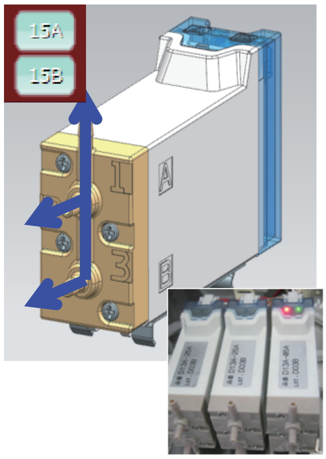
A: Red lights

Port 1 and 3 open



B: Green lights

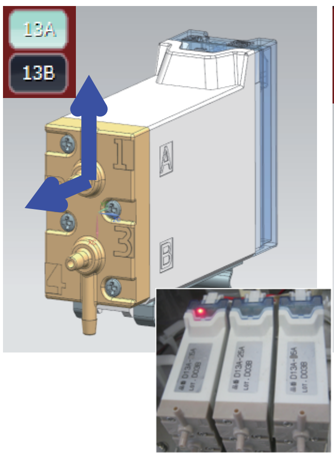
All ports open



A and B: Red and Green light

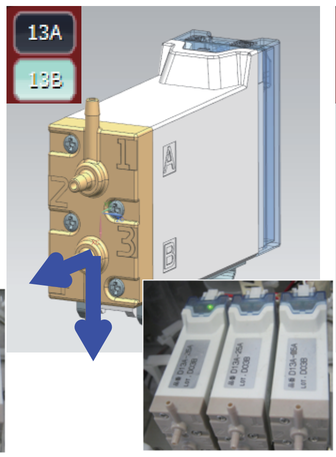
- Opening and closing of 2-way valves

Port 1 and 2 open



A: Red lights

Port 3 and 4 open



B: Green lights

Port 1 and 2 open
Port 3 and 4 open

A and B: Red and Green light

Checking Suspected Problems

Use the following electromagnetic valve maintenance set to check the operation of the electromagnetic valve.

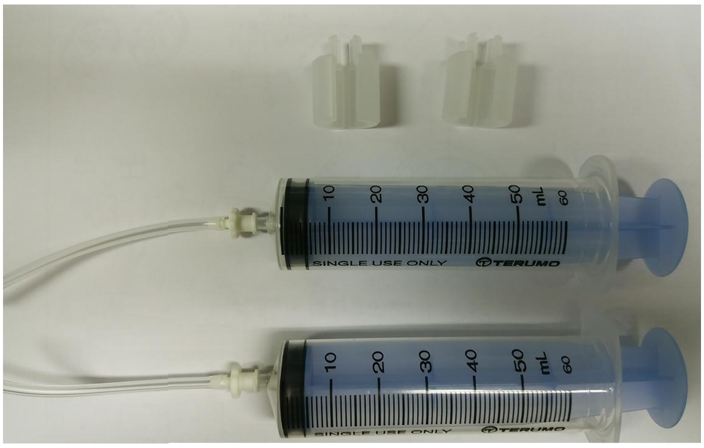
Do "I. Checking Electrification" and "II. Checking the Fluid Path" and replace the electromagnetic valve if there is abnormality.

Afterwards, Do "I" and "II" again for the replacement electromagnetic valve to check that the problem is resolved.

RPK-9000061776 Electromagnetic Valve Maintenance Set

Included Parts

- Two 50 mL syringes
- Two tube connection sleeves
- Two tube removal jigs
- Two tubes



I. Checking Electrification of the Electromagnetic Valve

A OPEN (red LED lit)

B OPEN (green LED lit)

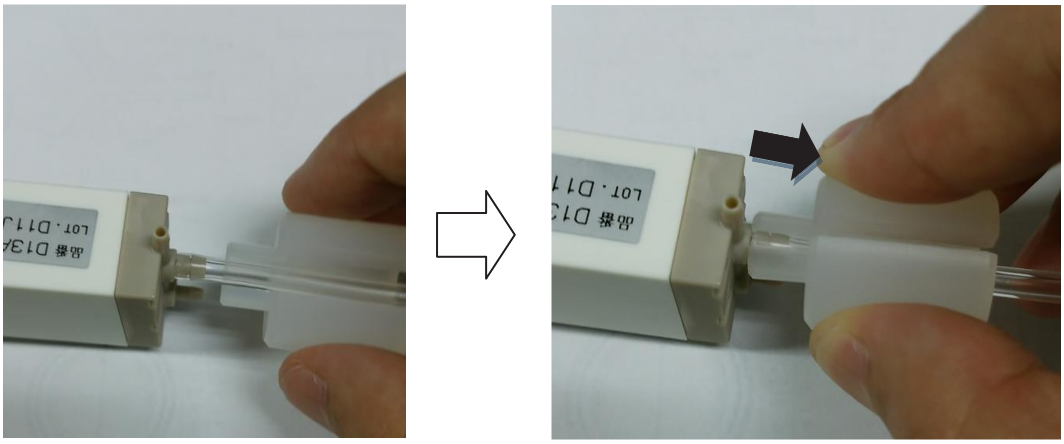
If the appropriate LED on the selected electromagnetic valve does not light, check the following possible causes:

- Failure of the MEK-9100 BD
- Failure of the electromagnetic valve's internal BD
- Damaged electromagnetic valve cable
- Incorrectly inserted electromagnetic valve cable

II. Checking the Fluid Path of the Electromagnetic Valve

1) Remove the tube connected to the suspected faulty electromagnetic valve. Use the tube removal jig to remove the tube.

Hold the tube　　　　Pull



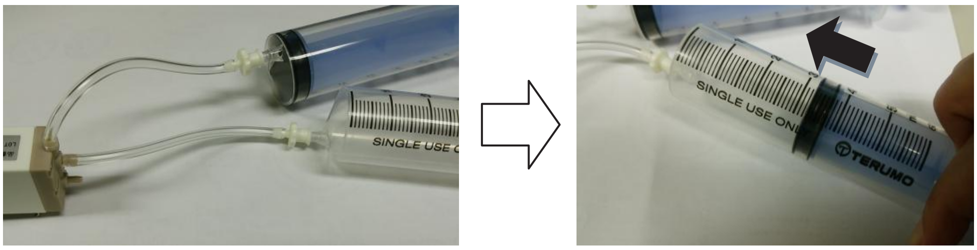
It is easier to remove when slightly twisting while pulling.

2) Pressure application test 1
Attach the syringes in the state shown below for the fluid path requiring a check.

Syringe 1: Storage state

Syringe 2: Draw to the 60 mL graduation.

(After attaching)　　　　(Applying pressure)



Push syringe 2 to the 30 mL graduation (pushing from 60 mL to 30 mL applies approximately 150 kPa of pressure.)
Take your hands away and check the state:

- Normal state
  Returns to the 60 mL graduation.
- Abnormal state
  Does not return to the 60 mL graduation.

If the state is abnormal, the following problems below may have occurred. Replace the electromagnetic valve.

- Failure of the diaphragm seal due to clogging with foreign substances
- External leak from inside the electromagnetic valve

3) Pressure application test 2
Attach the syringes in the state shown below for the fluid path requiring a check.

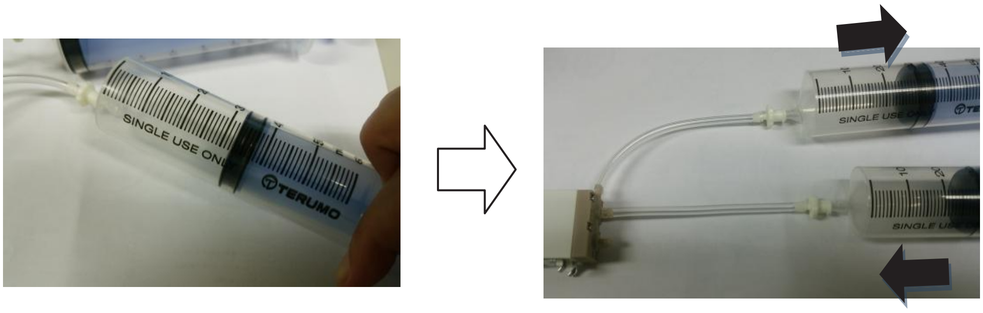
Syringe 1: Storage state

Syringe 2: Draw to the 60 mL graduation.

(After attaching)

Conduct a discharge operation.

Apply pressure by pushing from 60 mL to 30 mL

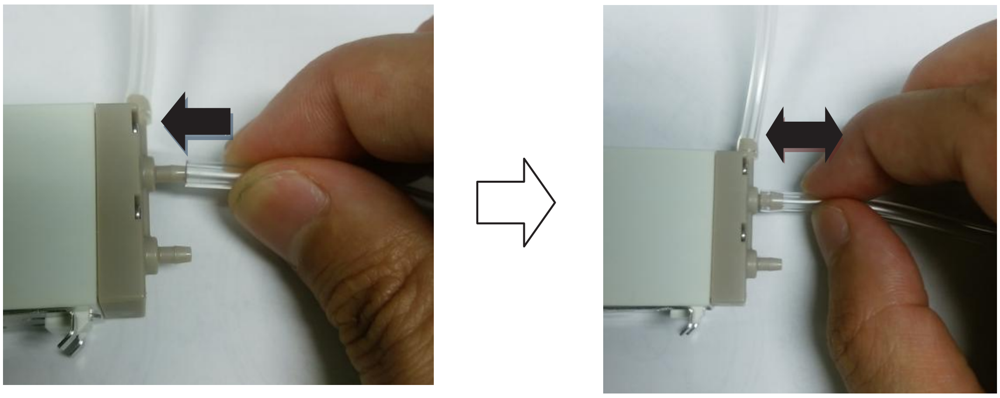


- Normal state
  The syringe that did not have an applied pressure moves to the position expected for the increase in pressure.
- Abnormal state
  Returns to the 60 mL graduation.

If the state is abnormal state, the following problems may have occurred. Replace the electromagnetic valve.

- Failure of the electromagnetic valve’s internal BD
- Deficiency in the operation of the solenoid in the electromagnetic valve

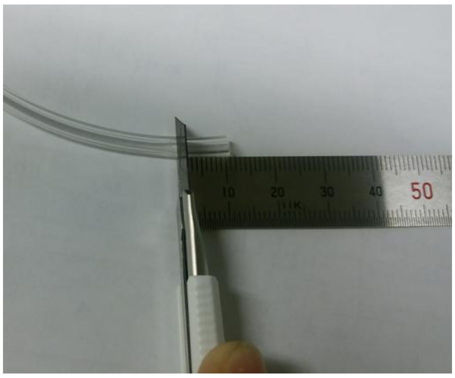
Reconnecting the Electromagnetic Valve and Tube



NOTE: When connecting the tube, insert it to the end firmly. If the connection is not firm, fluid leakage, contamination or pressure error may occur.

After reconnecting the tube, pull it several times to check the connection.

If the tube comes off easily, it may be deteriorated. Cut off about 10 mm from the end of the tube with a cutter. Make sure the cut is perpendicular and not at an angle. Then, reconnect the tube.

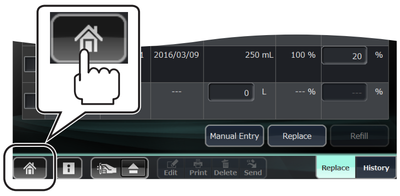


7 System Settings

Opening the System Setting Window

On the System Setting window, you can change settings that are appropriate for the purpose and condition of the analyzer.

NOTE: Only the administrator or qualified personnel can change system settings.

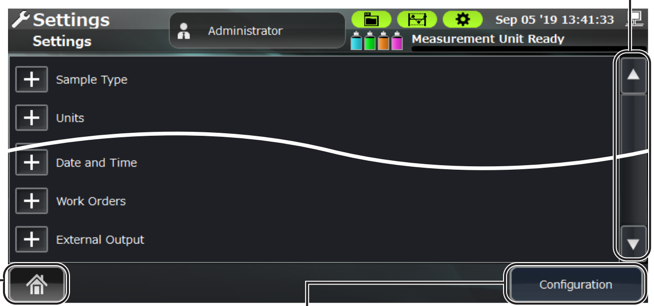


1 Open the Home screen.

If you are in another window, touch [🏠] at the lower left.

2 Touch [System] on the Home screen. The System Setting window opens.

Touch [▲] or [▼] to scroll up and down the setting items.



[🏠] : Opens the Home screen.

[Configuration]:
Touch [Configuration] to open the Configuration window and initialize, back up or restore system settings.

3 Set each item.

1) Touch [+] to expand an item.

2) Set the item.

📖 Operator's Manual: "Basic Operations" in Section 1

System Settings Items

Sample Type

You can set the measurement value upper and lower limits according to the sample type.

If the sample corresponds to one of the Types 1 to 8, the upper and lower limits of that sample type become the criteria for abnormal values.

NOTE: If a sample does not correspond to Types 1 to 8, the upper and lower limits for the default type become the criteria for abnormal values.

<table>
<tr><th colspan="5">Setting Item</th><th>Settings
(___: Default Setting)</th><th>Description</th></tr>
<tr><td rowspan="9">Sample Type</td><td colspan="4">Sample type name</td><td>Up to 20 characters (<u>Blank</u>)</td><td>You can set names for the sample Types 1 to 8.</td></tr>
<tr><td rowspan="8">Sample Types 1 to 8</td><td colspan="3">Apply this sample type</td><td>ON, <u>OFF</u></td><td>Set whether to apply the upper or lower limits of each sample type.
When this is set to OFF, the upper and lower limits of the default type are applied.</td></tr>
<tr><td colspan="3">Gender</td><td>Male, Female, Unspecified
• Type 1 to 5, 8: <u>Unspecified</u>
• Sample Type 6: <u>Male</u>
• Sample Type 7: <u>Female</u></td><td>Set the gender.</td></tr>
<tr><td rowspan="6">Age range</td><td rowspan="3">From</td><td>Year</td><td>0 to 200</td><td rowspan="6">Set the age range.
(___: Default setting)
• Type 1: <u>0 year 0 month 0 week to 0 year 0 month 1 week</u>
• Type 2: <u>0 year 0 month 1 week to 0 year 1 month 0 week</u>
• Type 3: <u>0 year 1 month 0 week to 1 year 0 month 0 week</u>
• Type 4: <u>1 year 0 month 0 week to 10 year 0 month 0 week</u>
• Type 5 to 7: <u>10 year 0 month 0 week to 60 year 0 month 0 week</u>
• Type 8: <u>60 year 0 month 0 week to 200 year 0 month 0 week</u></td></tr>
<tr><td>Month</td><td>0 to 12</td></tr>
<tr><td>Week</td><td>0 to 48</td></tr>
<tr><td rowspan="3">To</td><td>Year</td><td>0 to 200</td></tr>
<tr><td>Month</td><td>0 to 12</td></tr>
<tr><td>Week</td><td>0 to 48</td></tr>
</table>

Setting Item				Settings (___: Default Setting)	Description
Sample Type	Sample Types 1 to 8, Default Types	Criteria Lower – Upper	WBC (10^2/µL)	0 to 2999.0 (40.0 – 90.0)	Set the normal range upper and lower limits which become the judgment criteria for each measured parameter.
			RBC (10^4/µL)	0 to 999 (376 – 570)	
			HGB (g/dL)	0 to 29.90 (12.00 – 18.00)	
			HCT (%)	0 to 99.9 (33.5 – 52.0)	
			MCV (fL)	20.0 to 199.0 (80.0 – 100.0)	
			MCH (pg)	10.0 to 50.0 (28.0 – 32.0)	
			MCHC (g/dL)	10.0 to 50.0 (31.0 – 35.0)	
			RDW-CV (%)	0 to 50.0 (11.6 – 14.0)	
			RDW-SD (fL)	0 to 199.0 (42.8 – 51.0)	
			PLT (10^4/µL)	0 to 149.00 (15.00 – 35.00)	
			PCT (%)	0 to 2.90 (0.16 – 0.33)	
			MPV (fL)	0 to 20.0 (7.0 – 11.0)	
			PDW (%)	0 to 50.0 (15.5 – 18.9)	
			P-LCR (%)	0 to 100.0 (20.0 – 58.0)	
			NE%	0 to 100.00 (28.00 – 78.00)	
			LY%	0 to 100.00 (17.00 – 57.00)	
			MO%	0 to 100.00 (0.00 – 10.00)	
			EO%	0 to 100.00 (0.00 – 10.00)	
			BA%	0 to 100.00 (0.00 – 2.00)	
			NE (10^2/µL)	0 to 2999.0 (11.0 – 70.0)	
			LY (10^2/µL)	0 to 2999.0 (7.0 – 51.0)	
			MO (10^2/µL)	0 to 2999.0 (0.0 – 9.0)	
			EO (10^2/µL)	0 to 2999.0 (0.0 – 9.0)	
			BA (10^2/µL)	0 to 2999.0 (0.0 – 2.0)	

Units

Setting Item		Settings (___: Default Setting)	Description
Units	WBC	10^2/µL, 10^3/µL, 10^9/L	Set the unit for the measurement parameter.
	RBC	10^4/µL, 10^6/µL, 10^{12}/L	
	HGB	g/dL, g/L, mmol/L	
	PLT	10^4/µL, 10^3/µL, 10^9/L	

Operation Settings

	Setting Item	Settings (___: Default Setting)	Description
Operation settings	Auto login	ON, OFF	Set whether to automatically log in when the analyzer is turned on. • ON: Log in automatically when the power is turned on. • OFF: Turn on the power then perform the log in manually.
	Auto Validation	None, All, Negative, Negative+Positive	Set whether to automatically check (validate) the measurement results after measurement. • None: Do not automatically check (validate) all the measurement results. • ALL: Automatically check (validate) all measurement results. • Negative: Automatically check (validate) the negative measurement results. • Negative+Positive: Automatically check (validate) the negative and positive measurement results. Data with error are not validated.
	Notification sound	ON, OFF	A buzzer sounds when the analyzer detects an abnormality.

Pathological Flags

You can set the criteria for flag display. If a parameter flag is set to ON, the analyzer display a flag when a measurement value for that parameter exceeds the flag value.

You can set the value for each flag.

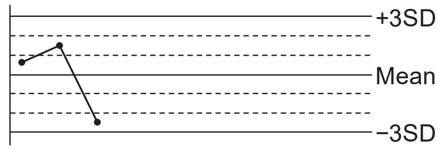
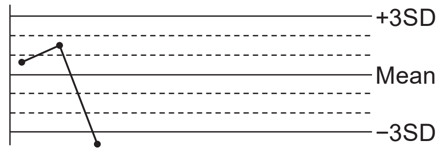
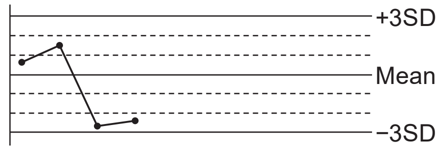
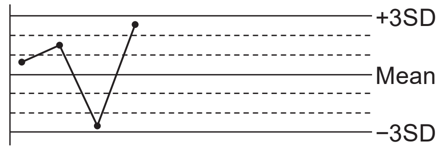
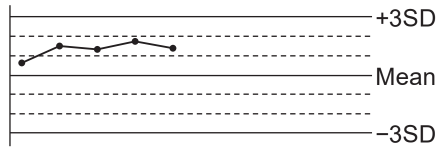
For details of flags, refer to “Abnormal Flags” (p. 2-17)

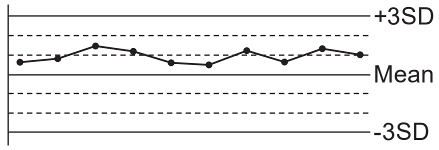
	Setting Item	Settings (___: Default Setting)	Description
Pathological flags	Leukocytosis (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 180.0)	Set the positive flagging ON/OFF and the flagging criteria. If the flagging criteria is met, the analyzer judges it as a positive.
	Leukopenia (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 25.0)	
	Neutrophilia (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 110.0)	
	Neutropenia (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 10.0)	
	Lymphocytosis (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 40.0)	
	Lymphopenia (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 8.0)	
	Monocytosis (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 10.0)	
	Eosinophilia (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 7.0)	
	Basophilia (10^2μL)	ON, OFF 0 to 2999.9 (when it is ON: 2.0)	

Setting Item		Settings (___: Default Setting)	Description
Pathological flags	Blast	<u>ON</u>, OFF Level 1 to 5 (<u>Level 4</u>)	Set the flag detection sensitivity level from Levels 1 to 5. Higher levels have better detection sensitivity but more false positives.
	Immature Granulocyte	<u>ON</u>, OFF Level 1 to 5 (<u>Level 5</u>)	
	Left Shift	<u>ON</u>, OFF Level 1 to Level 5 (<u>Level 3</u>)	
	Atypical Ly	<u>ON</u>, OFF Level 1 to Level 5 (<u>Level 3</u>)	
	WBC Poor Hemolyzation	<u>ON</u>, OFF	Set the positive flagging ON/OFF and the flagging criteria. If the flagging criteria is met, the analyzer judges it as a positive.
	Small Nucleated Cell	ON, <u>OFF</u>	
	Ly-Mo Interference	ON, <u>OFF</u>	
	Ne-Eo Interference	ON, <u>OFF</u>	
	Erythrocytosis (10^4μL)	ON, <u>OFF</u> 0 to 999 (when it is ON: <u>650</u>)	
	Anemia (g/dL)	ON, <u>OFF</u> 0 to 29.90 (when it is ON: <u>10.00</u>)	
	Anisocytosis (%)	ON, <u>OFF</u> 0 to 50.0 (when it is ON: <u>20.0</u>)	
	Microcytosis (fL)	ON, <u>OFF</u> 0 to 199.0 (when it is ON: <u>70.0</u>)	
	Macrocytosis (fL)	ON, <u>OFF</u> 0 to 199.0 (when it is ON: <u>110.0</u>)	
	Hypochromia (g/dL)	ON, <u>OFF</u> 10.0 to 50.0 (when it is ON: <u>29.0</u>)	
	Abnormal MCHC	ON, <u>OFF</u>	
	Thrombocytosis (10^4μL)	ON, <u>OFF</u> 0 to 149.00 (when it is ON: <u>60.00</u>)	
	Thrombocytopenia (10^4μL)	ON, <u>OFF</u> 0 to 149.00 (when it is ON: <u>6.00</u>)	
	PLT Clumps	<u>ON</u>, OFF	
	PLT-RBC Interference	ON, <u>OFF</u>	

Quality Control

You can set the quality control settings.

Setting Item				Settings (___: Default Setting)	Description
Quality Control	Quality control operation			Every login, Every day	Set the quality control operation.
	Auto judgment method	Assay value/limit		ON, OFF	Set whether to use the assay values and limits.
		Average/SD		ON, OFF	Set whether to use the average and standard deviations.
		Westgard Multirules		ON, OFF	Set whether to use Westgard multirules.
	Auto judgment details	Average/SD	X Limit	±2SD, ±3SD	Set the calculation method for X limit.
		Westgard Multirule	1-2S	ON, OFF	When set to ON, the run is rejected if a single measurement exceeds the mean ±2SD. 
			1-3S	ON, OFF	When set to ON, the run is rejected if a single measurement exceeds the mean ±3SD. 
			2-2S	ON, OFF	When set to ON, the run is rejected if two consecutive measurements exceed the mean +2SD or the mean −2SD. 
			R-4S	ON, OFF	When set to ON, the run is rejected if one measurement in the group exceeds the mean +2SD and another measurement in the same group exceeds the mean −2SD. 
			4-1S	ON, OFF	When set to ON, the run is rejected if four consecutive measurements exceed the mean +1SD or four consecutive measurements exceed the mean −1SD. 

Setting Item				Settings (__: Default Setting)	Description
Quality Control	Auto judgment details	Westgard Multirule	10-X	ON, OFF	When set to ON, the run is rejected if ten consecutive measurements are above the mean or ten consecutive measurements are below the mean. 
		XB	Batch number	0 to 100 (20)	Set the number of data in one batch for the $X\overline{B}$ control.
			MCV Median (fL)	20.0 to 199.0 (89.5)	Set the median and the limit for the $X\overline{B}$ control. NOTE: Set the median + limit does not exceed the maximum value of median (MCV: 199.0 and MCH and MCHC: 50.0) and the median − limit does not lower the median of the minimum value (MCV: 20.0 and MCHC: 10.0) for the limit of each parameter.
			MCV Limit (fL)	0 to 100 (3.0)	
			MCH Median (pg)	10.0 to 50.0 (30.5)	
			MCH Limit (pg)	0 to 10.0 (1.0)	
			MCHC Median (g/dL)	10.0 to 50.0 (33.8)	
			MCHC Limit (g/dL)	0 to 10.0 (1.0)	
		QC Graph Other Items	Select Parameter 1	WBC, NE%, LY%, MO%, EO%, BA%, RBC, HGB, HCT, MCV, MCH, MCHC, RDW-CV, RSW-SD, PLT, PCT, MPV, PDW	Select the parameters to display on the QC Graph window when [Other] is touched.
			Select Parameter 2		
			Select Parameter 3		
			Select Parameter 4		
			Select Parameter 5		

How to calculate limits for the L-J control chart

The upper and lower limits for the L-J control chart are calculated as follows.

X: mean σ: standard deviation

Upper limit (+3SD) = X+3σ

Lower limit (−3SD) = X−3σ

Reagent Management

Setting Item			Settings (___: Default Setting)	Description
Reagent Management	Show units	Diluent	mL, <u>L</u>	Set the units for each reagent on the Reagent Management window.
		Detergent	mL, <u>L</u>	
		CBC lysing reagent	<u>mL</u>, L	
		DIFF lysing reagent	<u>mL</u>, L	
		Waste	mL, <u>L</u>	
	Waste sensor		ON, <u>OFF</u>	Set the optional waste fluid sensor to ON (use) or OFF (do not use). The waste fluid volume count operation depends on this setting. • ON: The waste fluid sensor takes priority and the waste fluid capacity count is not performed. Measurement continues even if the warning value is exceeded. • OFF: The waste fluid capacity count is performed. Measurement is stopped if the warning value is exceeded. When the waste fluid tank is not used and the waste fluid is not managed, the waste fluid capacity is not counted if the waste fluid capacity is set to 0 L.

Auto Clean

Setting Item			Settings (___: Default Setting)	Description
Auto Clean	1st	Clock hour	00 to <u>23</u>	Set the operation to perform (automatic cleaning or self checking) and the clock time and number of times to perform the set operation. NOTE • Cleaning or self checking begins automatically at the set time. If measurement is being performed or settings are changed during the scheduled time, the auto clean or self check is not performed. • If the analyzer power is continuously on for longer than 24 hours, do cleaning and self-checking once every day. Auto clean settings can be set so that the cleaning and self-check are performed once every day.
		Minute	<u>00</u> to 59	
		Operation	Self check, <u>Clean</u>, None	
	2st	Clock hour	<u>00</u> to 23	
		Minute	<u>00</u> to 59	
		Operation	Self check, Clean, <u>None</u>	
	3rd	Clock hour	<u>00</u> to 23	
		Minute	<u>00</u> to 59	
		Operation	Self check, Clean, <u>None</u>	
	4th	Clock hour	<u>00</u> to 23	
		Minute	<u>00</u> to 59	
		Operation	Self check, Clean, <u>None</u>	

Date and Time

Setting Item			Settings (___: Default Setting)	Description
Date and Time	Format		YY/MM/DD, DD/MM/YY, ‘YY MM DD, DD MM ‘YY, DD MMM ‘YY, MMM DD ‘YY	Set the date and time format.
	Date and Time	Year	YYYY, MM, DD, hh, mm (Current date and time)	Set the date and time.

Work Orders

Setting Item			Settings (___: Default Setting)	Description
Work Orders	LIS connection		None, Order request + warning, Order received + warning, Warning only	Set the order request condition.
	Order key		Sample ID, Aspiration tube	Set the item which is associated with the patient information and measuring sample tube. NOTE: If there is an unprocessed and scheduled order, the setting cannot be changed. While changing the setting, the analyzer cannot be connected to the LIS.
	Action If order failure		Default order, Cancel	Set the action if a work order is not acquired.
	Unrecognized sample ID		Up to 20 alphanumeric characters (UNIDENTIFIED ID)	Set the ID for unidentified samples on the analyzer.
	Default Settings	Items	CBC, CBC+DIFF	Set the test item when [Action if order failure] is set to [Default order].

External Output

Setting Item				Settings (___: Default Setting)	Description
External Output	LAN	Communication format		HL7, ASTM	Set the communication format. NOTE: No order can be received when ASTM is set.
		Host IP address		Up to 15 alphanumeric characters (192.168.2.10)	Set the IP address of the host device such as LIS.
		Device IP address		Up to 40 alphanumeric characters (192.168.2.11)	Set the IP address of the analyzer.
		Subnet mask		Up to 15 alphanumeric characters (255.255.255.0)	Set the subnet mask of the analyzer.
		Default gateway		Up to 15 alphanumeric characters (Blank)	Set the IP address of the analyzer default gateway.
		Work order request port		0 to 65535 (50001)	Set the communication port to request orders to a system such as HIS or LIS.
		Receive work order port		0 to 65535 (50002)	Set the communication port to receive order from a system such as HIS or LIS.
		Send results port		0 to 65535 (50003)	Set the communication port to send measurement results to a system such as HIS or LIS.
		HL7 start bit		ON, OFF	Set whether to add a start bit at the beginning of the measurement data.
		HL7 graph output		ON, OFF	Output image data of histograms and scattergrams in BASE64 format.
		ASTM Graph output		ON, OFF	Output image data of histograms and scattergrams in BASE64 format.
	RS-232C	Communication protocol		WA-461V, MEK-8222 (V02-03) compatible, MEK-8222 (V02-07) compatible, MEK-8222 (V03-01) compatible	Set the protocol to communicate with the device connected to the serial port of the analyzer.
		Ports	Baud rate	19200, 9600, 4800, 2400	Set the data send format to the device connected to the serial port.
			Parity	Even, Odd, None	
			Data bits	7, 8	
			Stop bits	1, 2	

Setting Item				Settings (___: Default Setting)	Description
External Output	Auto Output After Meas	Print after Measurement		Yes, No (default: No)	Set whether to automatically print the measurement results on the printer connected to the analyzer after measurement.
		Negative	Auto Print	ON, OFF (default: ON)	Select ON to turn on auto printing of the negative measurement results. Select OFF to turn off auto printing of the negative measurement results.
			Only print validated data	ON, OFF (default: OFF)	Select ON to turn on the auto print of the checked (validated) negative measurement results. Select OFF to turn off the auto print of the checked (validated) negative measurement results.
		Positive	Auto Print	ON, OFF (default: ON)	Select ON to turn on auto printing of the positive measurement results. Select OFF to turn off auto printing of the positive measurement results.
			Only print validated data	ON, OFF (default: OFF)	Select ON to turn on auto printing of the checked (validated) positive measurement results. Select OFF to turn off auto printing of the checked (validated) positive measurement results.
		Error	Auto Print	ON, OFF (default: ON)	Select ON to turn on auto printing of the measurement results with errors. Select OFF to turn off auto printing of the measurement results with errors.
			Only print validated data	ON, OFF (default: OFF)	Select ON to turn on auto printing of the checked (validated) measurement results with errors. Select OFF to turn off auto printing of the checked (validated) measurement results with errors.
		QC	Auto Print	ON, OFF (default: ON)	Select ON to turn on auto printing of the quality control measurement results. Select OFF to turn off auto printing of the quality control measurement results.
		Self Check	Auto Print	ON, OFF (default: ON)	Select ON to turn on auto printing of the self check results. Select OFF to turn off auto printing of the self check results.
		Send to LIS After Measurement		ON, OFF (default: OFF)	Set whether or not to automatically send measurement results to a system such as LIS after measurement. NOTE: Unchecked (Unvalidated) measurement results are not sent to the system.
		QC	Auto Print	ON, OFF (default: ON)	Select ON to turn on auto sending of the quality control measurement results. Select OFF to turn off auto sending of the quality control measurement results.
		Self Check	Auto Print	ON, OFF (default: ON)	Select ON to turn on auto sending of the self check results. Select OFF to turn off auto sending of the self check results.

Report Format

Setting Item			Settings (__: Default Setting)	Description
Report format	Header text		Up to 20 characters (Blank)	Enter text for printed headers.
	Footer text		Up to 20 characters (Blank)	Enter text for printed footers.
	Measurement result report	Research Parameters	ON, OFF	Select ON to print the research parameters on the measurement result report. Select OFF not to print the research parameters on the measurement result report.
		Visual count results	ON, OFF	Select ON to print the visual count results on the measurement result report. Select OFF to not print the visual count results on the measurement result report.
		Histogram	ON, OFF	Select ON to print the histogram on the measurement result report. Select OFF to not print the histogram on the measurement result report.
		Scattergram	ON, OFF	Select ON to print the scattergram on the measurement result report. Select OFF to not print the scattergram on the measurement result report.

7

Data List Items

Setting Item				Settings (__: Default Setting)	Description
Data List Items	Show/hide	View 1	Sample ID, Patient ID, Patient Name, Date, Posi/Err, Validation, A/M, Rack Position, Date of Birth, Gender, Ward, Physician, Operator, WBC, RBC, HGB, HCT, MCV, MCH, MCHC, RDW-CV, RDW-SD, PLT, PCT, MPV, PDW, P-LCR, NE%, LY%, MO%, EO%, BA%, NE#, LY#, MO#, EO# , BA#	ON, OFF	Set the items to display on the Data List window.
		View 2	Sample ID, Patient ID, Patient Name, Date, Posi/Err, Validation, A/M, Rack Position, Operator, WBC, RBC, HGB, HCT, MCV, MCH, MCHC, RDW-CV, RDW-SD, PLT, PCT, MPV, PDW, P-LCR, NE%, LY%, MO%, EO%, BA%, NE#, LY#, MO#, EO# , BA#	ON, OFF	
		Work Order	Sample ID, Patient ID, Patient Name, Work Order Received Date and Time, Rack Position, Test Result Time, Test Items, Date of Birth, Gender, Ward, Physician	ON, OFF	Set the items to display on the Work Order window.
	Normally Displayed	Sample ID		ON, OFF	Set the items that are always displayed on the Data List window and Work Order window.
		Patient ID, Patient Name		ON, OFF	

Flag Details

Setting Item			Settings (___: Default Setting)	Description
Flag details	Mode Select		STEP, FREE	Toggle the detection mode between STEP or FREE for the flags below. • Blasts • Atypical Ly • Immature Granulocyte • Left Shift - Ne-Eo Interference - PLT Clumps - PLT-RBC Interference
	Blast	Area Counts >	0 to 30000 (15)	Set the threshold for detecting blasts.
		155 Ratio Low >	0 to 100 (50)	
		155 Ratio High >	0 to 100 (50)	
		Mononuclear% >	0 to 10000 (8000)	
		|PeakDiff-90| >	0 to 255 (30)	
	AtypicalLy	WOC/WIC <	0 to 100 (40)	Set the threshold for detecting atypical lymphocytes.
		LY# >	0 to 29990 (1000)	
		155 Ratio Low >	0 to 100 (50)	
		155 Ratio High >	0 to 100 (80)	
		|PeakDiff-90| >	0 to 255 (34)	
	Immature Granulocytes	Area Ratio >	0 to 1000 (96)	Set the threshold for detecting immature granulocytes.
	LeftShift	Area Counts >	0 to 30000 (40)	Set the threshold for detecting left shift.
	NE-Eo Interference	Area Counts >	0 to 30000 (50)	Set the threshold for detecting Ne-Eo interference.
	PLT Clumps	Difference >=	0 to 9999 (300)	Set the threshold for detecting PLT clumps.
	PLT-RBC Interference	Ratio >	0 to 100 (30)	Set the threshold for detecting PLT-RBC interference.

Measurement Conditions

	Setting Item	Settings (___: Default Setting)	Description
Measurement Conditions	WBC Sensitivity	1 to 15 (5)	Set the electrical sensitivity for WBC impedance measurement.
	WBC Threshold	1 to 15 (4)	Set the ghosts threshold for the WBC histogram.
	RBC Sensitivity	1 to 15 (5)	Set the electrical sensitivity for RBC/PLT impedance measurement.
	RBC Threshold	auto or 1 to 15 (auto)	Set the ghosts threshold level for RBC and PLT. When set to auto, this will be set automatically.
	PLT Threshold	1 to 15 (5)	Set the ghosts threshold for the PLT histogram.
	Optical FS Gain	0 to 255 (100)	Set the electrical sensitivity for FS (forward small-angle scatter).
	Optical FL Gain	0 to 255 (127)	Set the electrical sensitivity for FL (forward large-angle scatter).
	Optical SD Gain	0 to 255 (127)	Set the electrical sensitivity for SD (side scatter).
	Optical FS Threshold	0 to 255 (20)	Set the ghosts threshold for the FS scattergram.
	High Background Mode	ON, OFF	Set to ON when the analyzer is used at a high altitude.
	Ghost cut	ON, OFF	Toggle exclusion of unnecessary portions for 5 part differential ON or OFF.
	Detergent port	0 to 255 (127)	Set the gain value for adjusting CLEANAC•710 fluid sensor voltage.
	CBC lysing reagent port	0 to 255 (127)	Set the gain value for adjusting HEMOLYNAC•310 fluid sensor voltage.
	DIFF lysing reagent port	0 to 255 (127)	Set the gain value for adjusting HEMOLYNAC•510 fluid sensor voltage.
	HGB Gain	0 to 255 (127)	Set the gain value for adjusting HGB voltage.
	SS gain	0 to 255 (127)	Set the gain value for adjusting SS voltage.
	Laser output	ON, OFF	Toggle MO-910W laser output ON or OFF.
	Sample tube type	Normal bottom, Raised bottom	This setting is required when the YZ-008B1 SARSTEDT kit or YZ-008B2 KABEVETTE G kit is used with the analyzer. Set the sample tube type. The maximum downward extension of the sampling needle depends on the sample tube type. NOTE: If the setting is incorrect, an abnormal measurement value may be displayed or the analyzer may be damaged. For details, refer to the installation guide of YZ-008B1 SARSTEDT kit or YZ-008B2 KABEVETTE G kit.

7

Setting of Graphview

Setting Item			Settings (___: Default Setting)	Description
Setting of Graphview	WBC, RBC, PLT Histogram	Display type	Particle size distribution, Histogram	Toggle display between particle size distribution and histogram.
		Smoothing	ON, OFF	Toggle histogram smoothing ON and OFF.
	Optical Scattergram	Show dividing line	ON, OFF	Toggle display of dividing line.
		Show ghosts	ON, OFF	Toggle ghost display.

Print Settings

Setting Item		Settings (___: Default Setting)	Description
Print	Paper Size	Letter, A4	Select the paper size used for printing.
	Color Mode	Monochrome, Color	Select the color mode used for printing.
	PCL output	OFF, PCL3GUI, PCL5/5e/5c	Select output by PCL (Printer Control Language).
	QC Report Format	Lot report, Monthly report	Select the printing method of trend graph for the hematology control. • Lot report: Plots up to 300 measurement data per page. • Monthly report: Plots up to 30 measurement data per page.

NOTE: Connect to the printer compatible with PCL.

Advanced Settings

Setting Item			Settings (___: Default Setting)	Description
Advanced Settings	Language		English, Japanese, Russian, Czech, German, Polish, Spanish, Italian, French, Portuguese, Turkish, Serbian, Romanian	Select the display language.
	Show cursor		ON, OFF	Toggle display of the mouse cursor.
	Maintenance system connection setting	Output	ON, OFF	Select the connection of the maintenance system.
		IP address	Up to 15 alphanumeric characters (blank)	Set the IP address of the maintenance system.
		Port	0 to 65535 (57545)	Set the communication port number to communicate with the maintenance system.

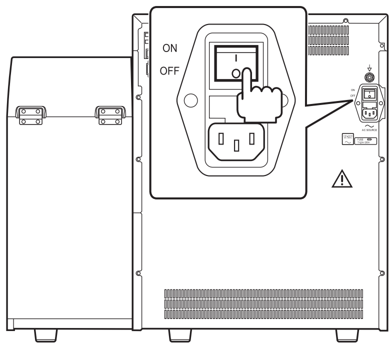
Setting Item		Settings (___: Default Setting)	Description
Advanced Settings	Sample ID increment mode	ON, OFF	Assign a unique sample ID (0001 -) to the sample when the bar code on the sampling tube cannot be read during measurement. Equivalent workflow is provided for the users using the increment mode of MEK-8222. For the use of this function, contact your Nihon Kohden representative. NOTE: When turning off the main power, the next sample ID to be assigned will reset to 0001.
	Latest data view	ON, OFF	"Latest result" tab can be selected to display the latest result in the data list at all times. ON: use "Latest result" tab OFF: use "Detail" tab.
	Stop measurement when the Short sample occurs	ON, OFF	Stop measurement of the short sample. When the short sample is detected during sample measurement, the measurement can be stopped (21054 Short Sample). NOTE: For the short sample, refer to "Short Sample" in Section 3 Troubleshooting (p. 3-6).
	Execution deadline days of Clean Protein	10 to 35 (35)	Specify the deadline of cleaning protein. NOTE: The specified deadline is exceeded, the "Clean Protein" in the self check items is judged FAIL.
	High Dilution Mode	ON, OFF	Minimize the amount of blood discharge during 5 part difference sample dispensing and resist poor hemolysis. For the use of this function, contact your Nihon Kohden representative.
	ROUTE setting	0 to 255 (2)	Set the interface numbers assigned by Windows to the LAN (NIC) installed in the DATA PROCESSING UNIT. For the setting procedure, refer to "Checking the Interface Numbers" (p. 6-44) in Section 6 "Maintenance".
	ROUTE setting #2	0 to 255 (3)	

Backing Up System Settings

You can back up the system settings onto an SD card.

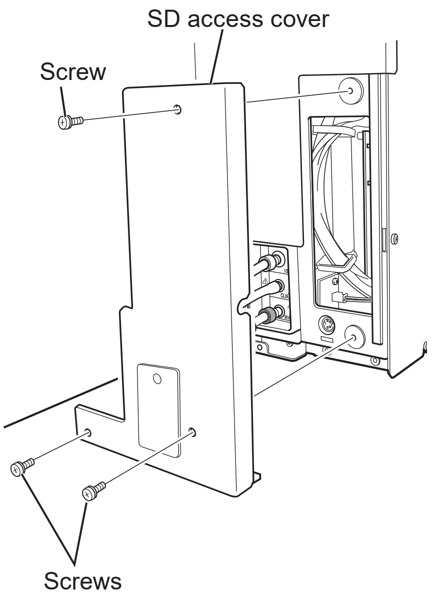
NOTE • One SD card can only hold one backup set.

• If you try to back up to an SD card which already contains backup data, the previous backup data will be overwritten.



1 Turn off the analyzer and switch off (to ◯) the main power on the rear of the analyzer.

Operator’s Manual: “Turning Off the Analyzer” in Section 5



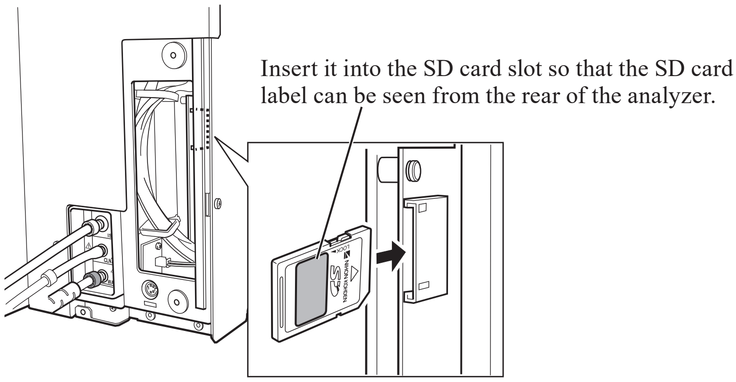
2 Remove the 3 screws from the right side panel of the analyzer and remove the SD access cover.

NOTE: Keep the three screws to reattach the cover later.

3 Insert the SD card into the analyzer SD card slot.

NOTE: Handle the SD card according to “SD Cards” in the operator’s manual.

Operator’s Manual: “SD Card” in Section 3



4 Turn on the analyzer.

Operator’s Manual: “Turning On the Analyzer” in Section 5

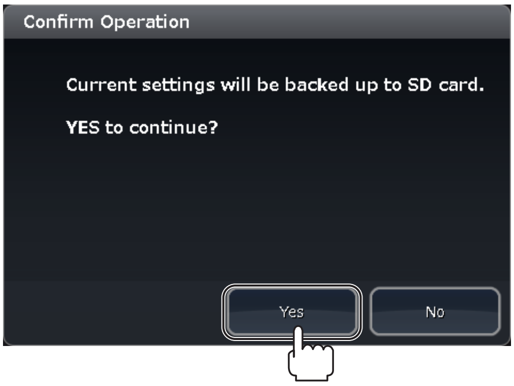
5 Back up the system settings.

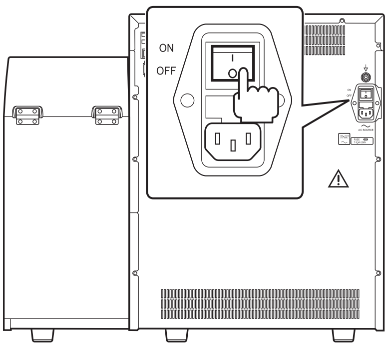
1) Open the System Settings window and touch [Configuration].

2) Touch [BACKUP SETTINGS] on the Configuration window.

NOTE: Be careful not to touch [RESTORE SETTINGS].

6 When the Confirm Operation window appears, touch [Yes].

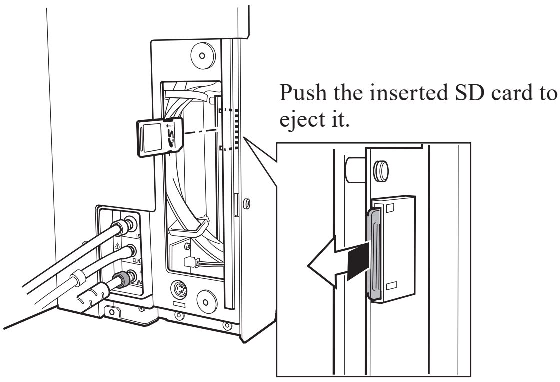


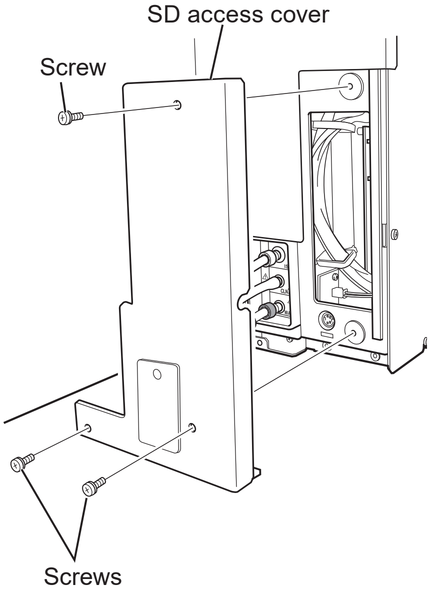


7 Turn off the analyzer and switch off (to ○) the main power on the rear of the analyzer.

Operator's Manual: "Turning Off the Analyzer" in Section 5

8 Eject the SD card.





9 Attach the SD access cover to the right side of the analyzer and fix it with the three screws removed in step **2**.

Restoring System Settings

You can restore the previously backed up data from an SD card.

"Backing Up System Settings" p. 7-18

1 Refer to steps **1** to **3** in "Backing Up System Settings" and insert the SD card with the backed up data into the SD card slot of the analyzer.

2 Turn on the analyzer.

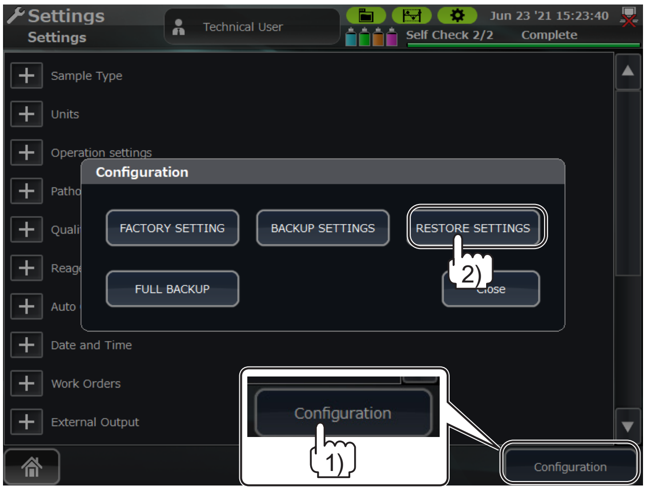
Operator's Manual: "Turning On the Analyzer" in Section 5

3 Restore the backed up settings.

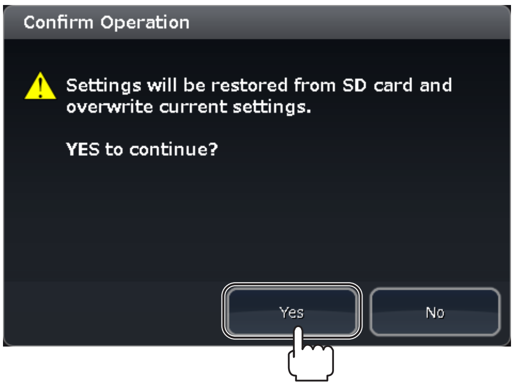
1) Open the System Settings window and touch [Configuration].

2) Touch [RESTORE SETTINGS] on the Configuration window.

NOTE: Be careful not to touch [BACKUP SETTINGS].



4 When the Confirm Operation window appears, touch [Yes].



5 Refer to steps **7** to **9** in "Backing Up System Settings" and eject the SD card and attach the SD access cover to the right side of the analyzer.

Initializing System Settings

You can initialize the system settings to the factory default settings.

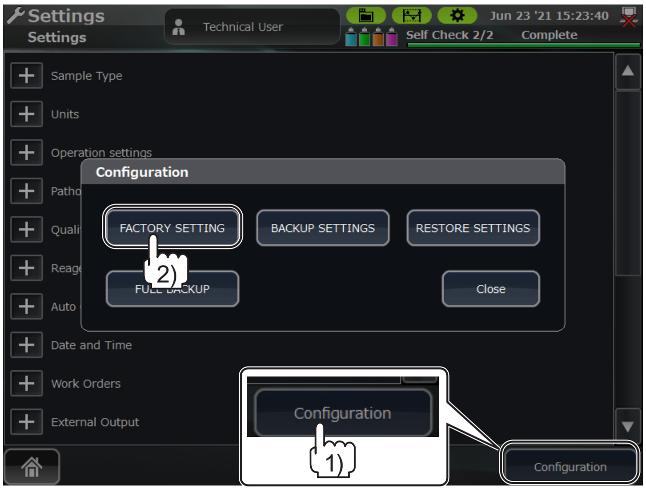
1 Turn on the analyzer.

Operator's Manual: "Turning On the Analyzer" in Section 5

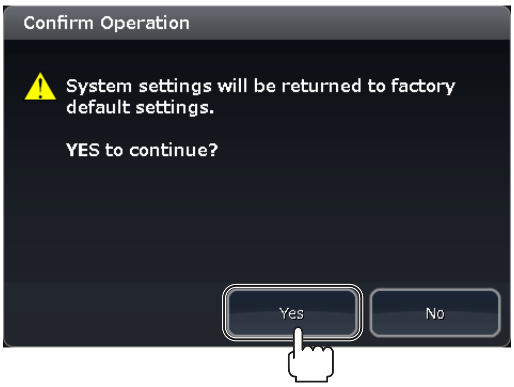
2 Initialize the system settings.

1) Open the System Settings window and touch [Configuration].

2) Touch [FACTORY SETTING] on the Configuration window.



3 When the Confirm Operation window appears, touch [Yes].



Backing Up All Information

Back up all the information stored into the PC-910W/PC-911W (such as system settings, measurement data and QC data) to the external memory.

For the use of this function, contact your Nihon Kohden representative.

Appendix

Maintenance Procedure/ Maintenance Check Sheet

Maintenance Procedure

This product is a hematology analyzer. Any reduction or loss in the analyzer function may affect measurement accuracy.

Perform periodic maintenance to check that the analyzer functions normally and replace the consumables.

NOTE
- For maintenance inspection, use tools and equipment for which quality control has been performed.
- For details on operating the tools and equipment used in maintenance inspection, refer to the manual provided with the equipment or tool.

Parts Requiring Periodic Replacement

Repair Part Name	Supply Code	Repair Part No.	Qty	Schedule
Assy, Sample tube	T444E	RP-6144902189	1	Every 12,000 measurements
Assy, release tube	T449C	RP-6144902190	1	Every 12,000 measurements
Assy, filter	T802A	RPA-9000061230	2	Every 12,000 measurements
Assy, filter	T802	T802	3	Every 12,000 measurements
Internal battery [1]	X209	—	1	Around every 4 years
Relief valve tube assy	—	—	1	Around every 1 year

[1] The replacement procedure for the internal battery is not included in the Maintenance Procedure and Maintenance Check Sheet in this section.

"Replacing the Internal Battery of the PC-910W" (p. 6-112)

Maintenance kit: RPK-6144902189 MEK-9100 periodic replacement part

Repair Part Name	Repair Part No.	Qty
Assy, Sample tube	RP-6144902189	1
Assy, release tube	RP-6144902190	1
Assy, filter	RPA-9000061230	1

Cleaning Protein

(1) Check the protein cleaning operation.

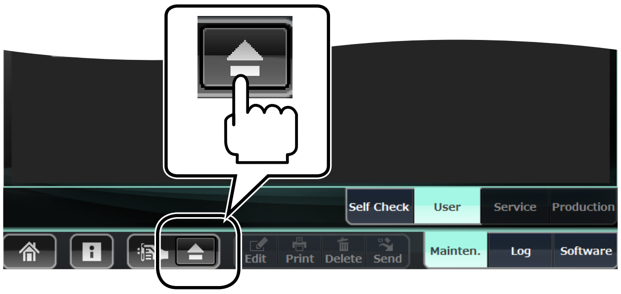
Clean the fluid path inside the analyzer with CLEANAC•810 (sodium hypochlorite).

Do this when normal cleaning was not effective.

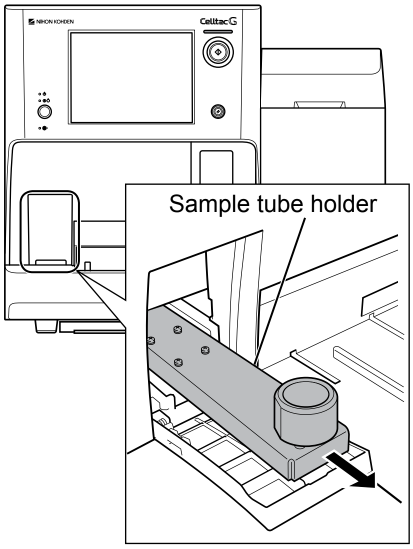
NOTE: Instruct the user to clean the protein at least once every month (required after around 2000 measurements).

1 Open the User Maintenance window and place the CLEANAC•810 detergent on the sample tube holder.

1) Touch [⏏] to eject the sample tube holder.

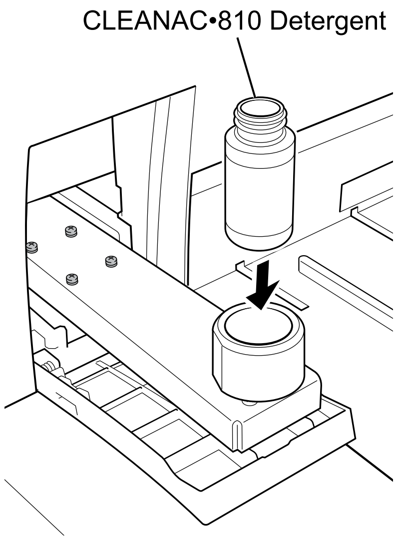


2) Check that the detergent adapter is attached on the ejected sample tube holder.



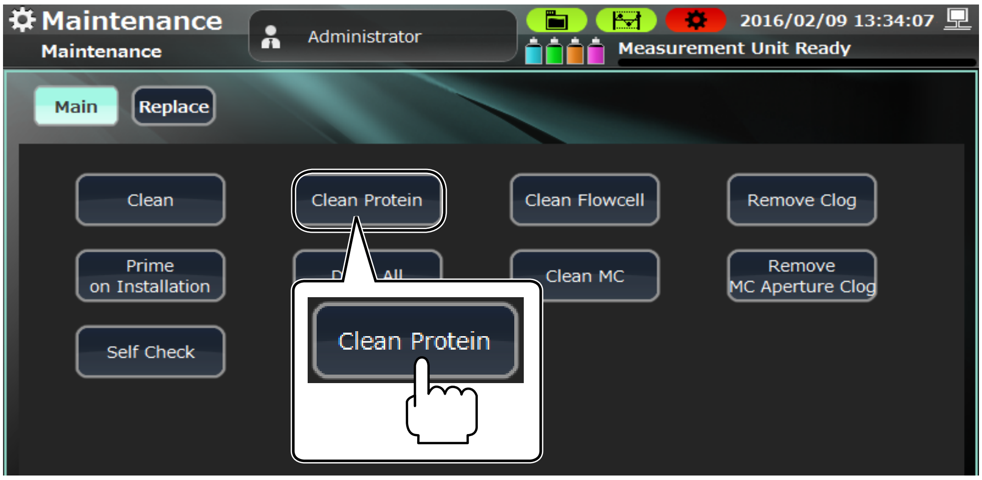
3) Remove the cap from the CLEANAC•810 detergent bottle and insert it into the sample tube holder adapter.

NOTE
- Insert the detergent into the adapter until it stops at the end.
- Always remove the cap.

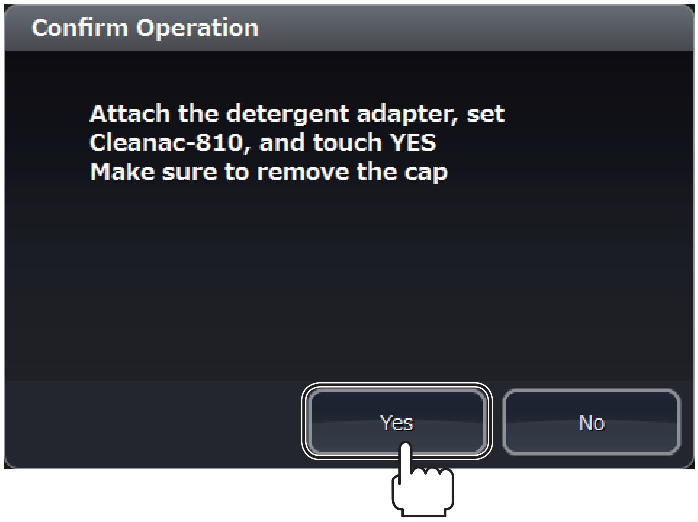


A

2 Touch [Clean Protein] on the User Maintenance window.

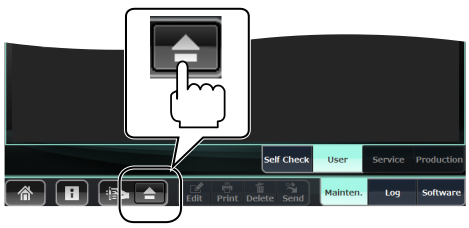


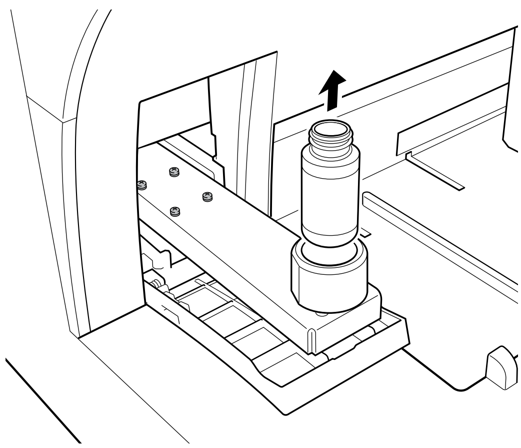
3 Touch [Yes] on the Confirm Operation window.



4 When the cleaning protein operation is completed, the sample tube holder is ejected.

Remove the CLEANAC•810 detergent, and touch [⏏] to slide in the sample tube holder.





Cleaning with Sodium Hypochlorite

(2) Perform cleaning with sodium hypochlorite.

This is a procedure of MC-910W and JQ-912W internal cleaning with sodium hypochlorite.

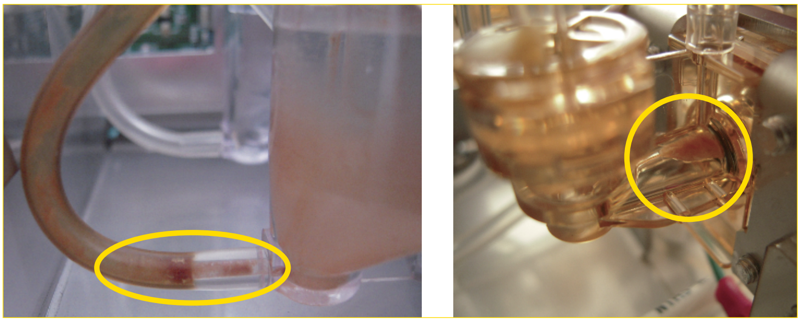
Perform this operation at least once a year as periodic maintenance.

The cleaning frequency varies depending on the use condition.

Perform this operation before “Calibration”.

NOTE
- When the following two alarms occur, do not perform this operation, but perform the cleaning procedure of abnormal state.
- WBC Noise
- WBC Time-Series Message

Example of dirt inside of the MC-910W



Required tools: RPK-9000068732 Syringe 10 mL

Connecting tube

Pean 2 pcs

Phillips head screwdriver

φ2×φ4 200 mm   Connecting joint   Syringe 10 ml

Detergent MK-810W (T438T) 10 mL

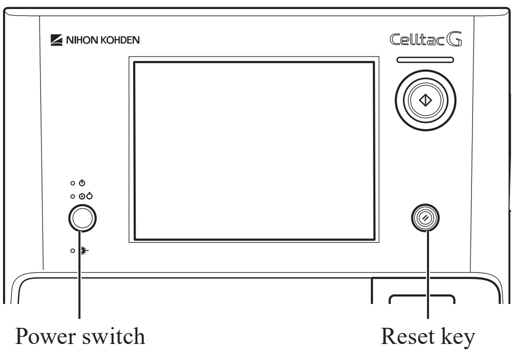
MK-710W (T438H) 12 mL

NOTE
- This operation needs to touch the fluid path which blood passes through. Always wear rubber gloves to protect yourself from infection.
- This operation includes a procedure of manually injecting the detergent with syringe. Always wear protective glasses to prevent the detergent from entering your eyes.

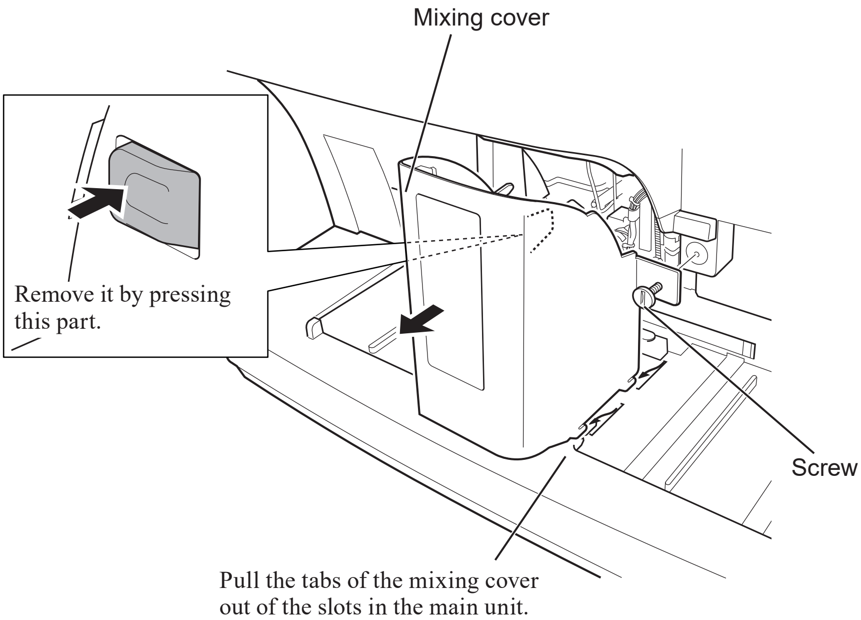
Draining and removal of exterior parts

1 Open the User Maintenance window and touch [Drain MC] > [Yes] to remove dirt and bubbles from the MC.

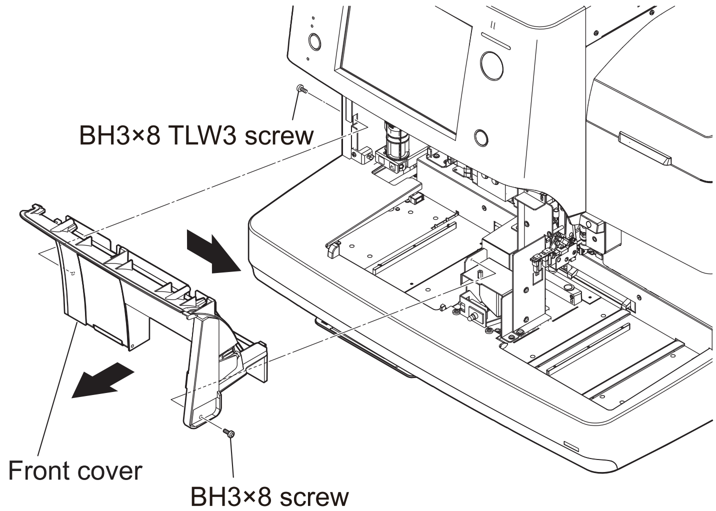
2 While pressing the Reset key, press the power switch to shut down the analyzer.



3 Loosen the screw on the front panel of the main unit and remove the mixing cover.



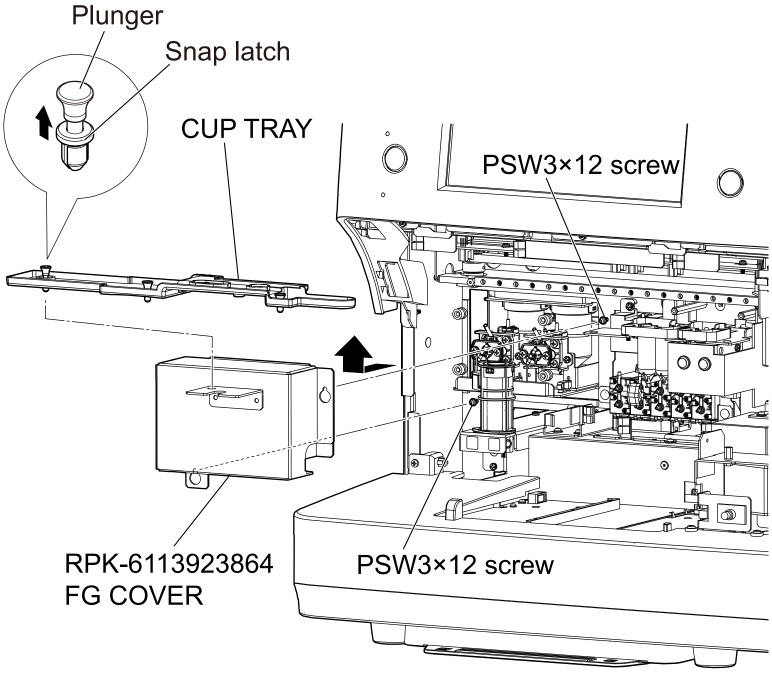
4 Remove the BH3×8 TLW3 screw and the BH3×8 screw. Move the front cover slightly to the right and slide the left side of the front cover toward you.



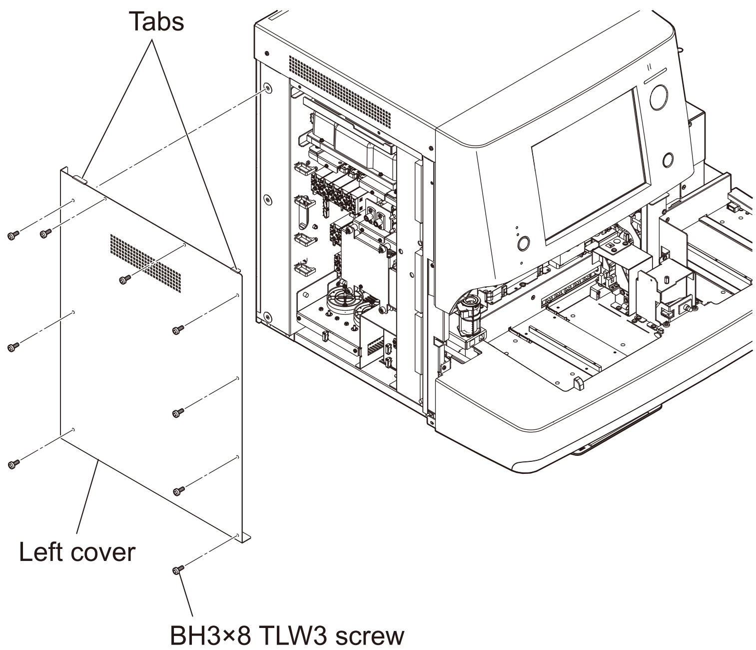
5 Pull out the plunger of each of the three snap latches and remove the cup tray.

6 Loosen the two PSW3×12 screws, and remove the FG COVER by moving it upward and sliding it toward you.

NOTE: These screws can be loosened by turning them with a tool about ten times. When removal is difficult, loosen the screws more.



7 Remove the nine BH3×8 TLW3 screws and remove the left cover.

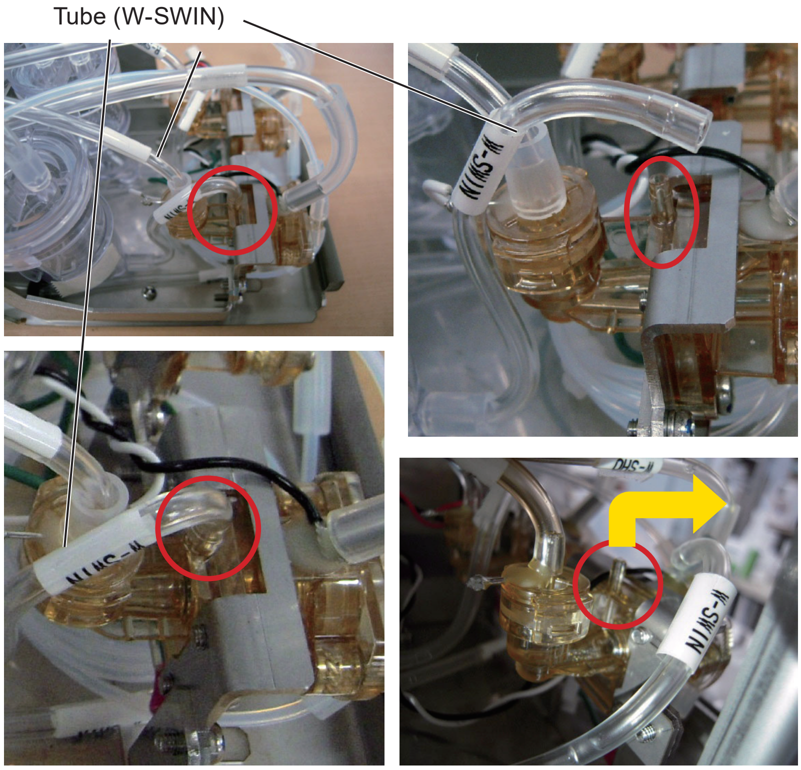


NOTE: Do not drop the left cover while removing the screws.

Checking clogs

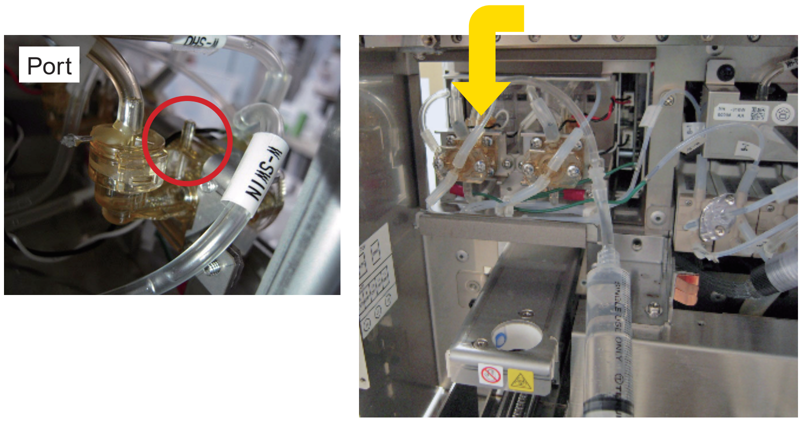
1 Disconnect the upper tube at the back of the WBC detection hole.

NOTE: When disconnecting the tube, cover the periphery with waste cloth to prevent contamination with the fluid.

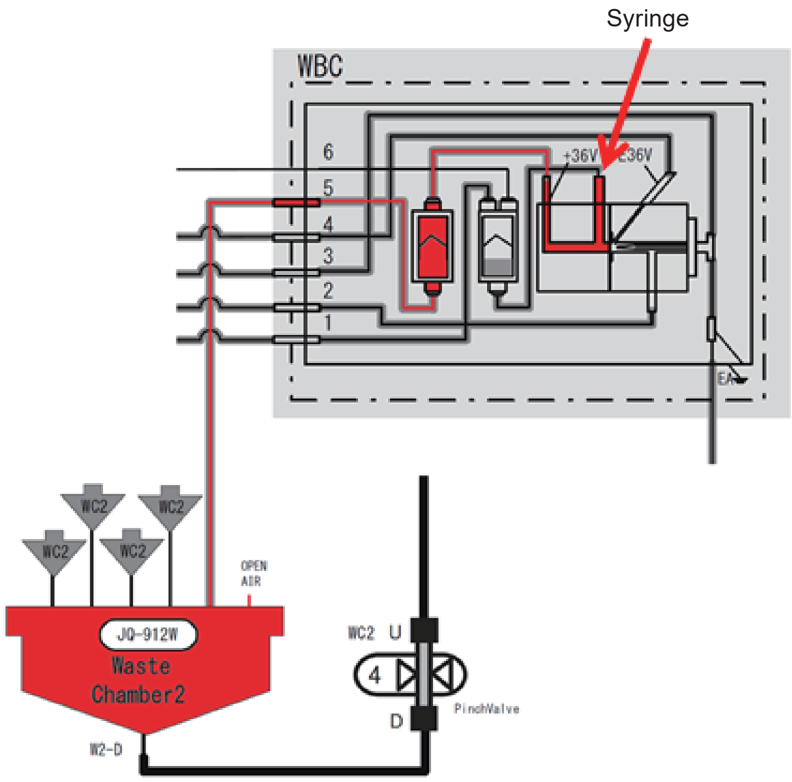


2 Connect the syringe with connecting tube to the port.

NOTE: When removing the tube, cover the periphery with waste cloth to prevent contamination with the fluid.



3 Use the syringe to check the clog in the fluid path shown below.

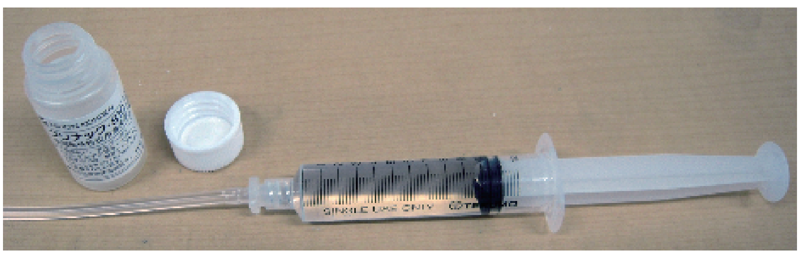


NOTE
- When pushing the syringe and the syringe is not pushed back, it is judged as no complete clogs. In that case, perform the cleaning.
- If the syringe is pushed back, it is judged as complete clog. Remove the MC-910W and remove clogs.
- If clogs are detected, always remove the clogs before proceeding the next procedure.

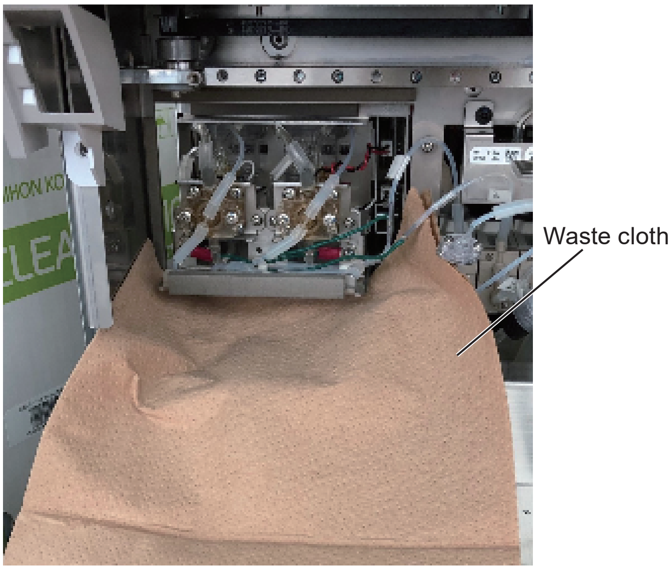
Cleaning MC-910W with sodium hypochlorite (MK-810W: T438T)

1 Aspirate MK-810W 10 ml in the 10 ml syringe.

NOTE: To prevent the excessive injection of the detergent, use the 10 ml syringe

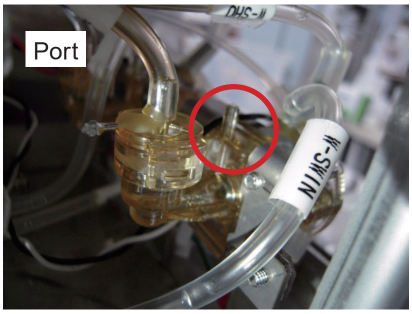


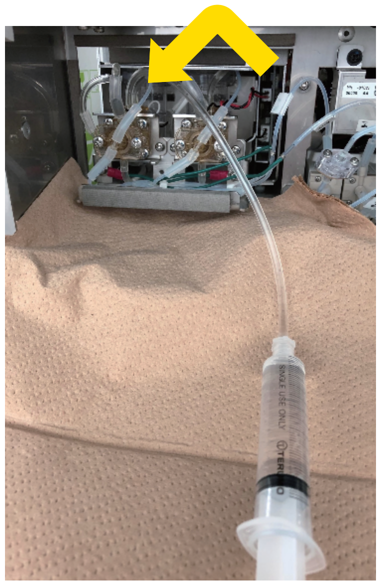
2 Cover the periphery with waste cloth.



3 Connect the syringe with the connecting tube to the port.

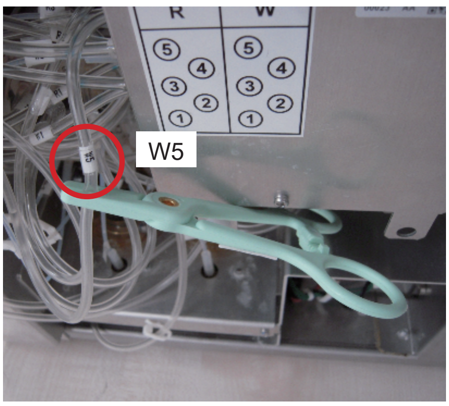
NOTE: When connecting the tube to the port, cover the periphery with waste cloth.

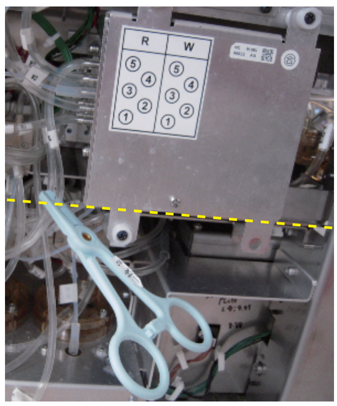




4 Clamp the tube (W5) of the W5 port on the left of the MC-910W with pean.

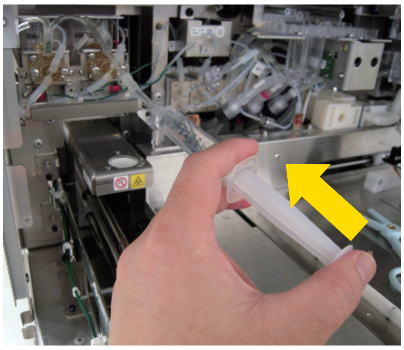
NOTE
- Clamp the tube at the position referring to the yellow dotted line in the figure.
- Be careful not to clamp the other tubes.

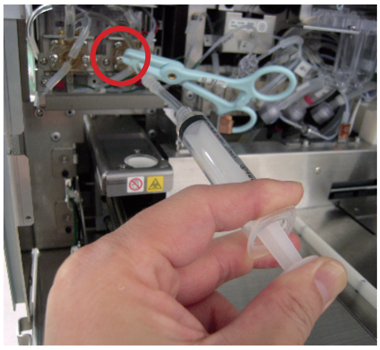




5 Slowly inject all the 10 ml detergent over at least three seconds, and then hold the piston rod and clamp the connecting tube with pean.

NOTE
- To prevent accidental disconnection of the tube, slowly push the syringe over at least three seconds.
- When injecting the detergent, the syringe can be pushed back, but push the syringe to the end.

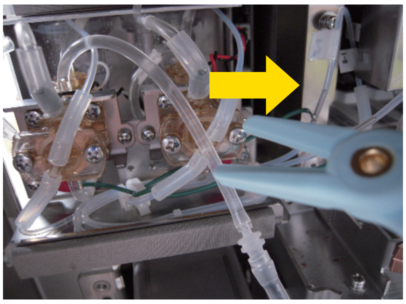


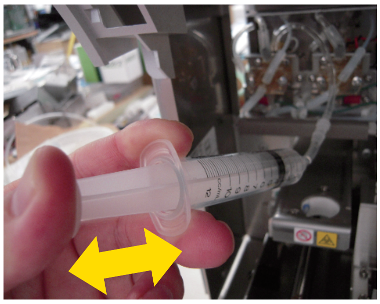


6 Leave in this state for five minutes.

7 Remove the pean at the connecting tube, and push and pull the syringe ten times slowly.

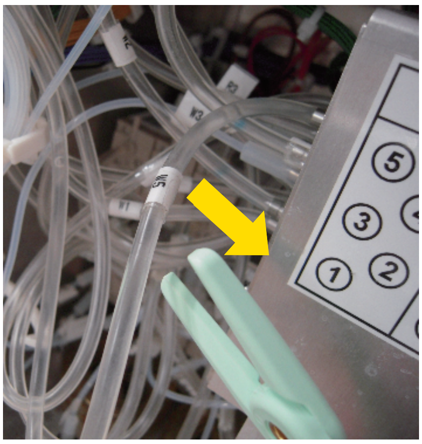
NOTE: Slowly push and pull the syringe over at least six seconds per one stroke. Be sure to follow the syringe capacity and the operation time. This may cause damage the parts of the unit.





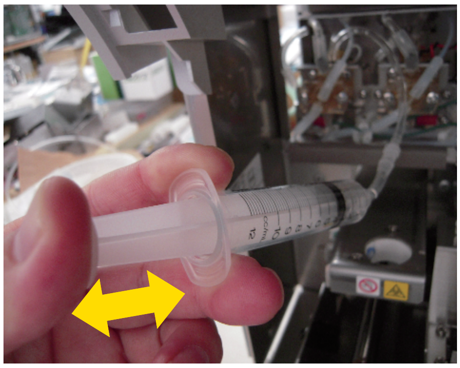
Cleaning JQ-912W (WASTE CHAMBER 2) with sodium hypochlorite (MK-810W)

1 Remove the pean at the tube (W5).



2 Push and pull the syringe five times slowly to drain the detergent in the MC-910W into the WASTE CHAMBER 2.

NOTE: Slowly push and pull the syringe over at least six seconds per one stroke. Be sure to follow the syringe capacity and the operation time. This may cause damage the parts of the unit.

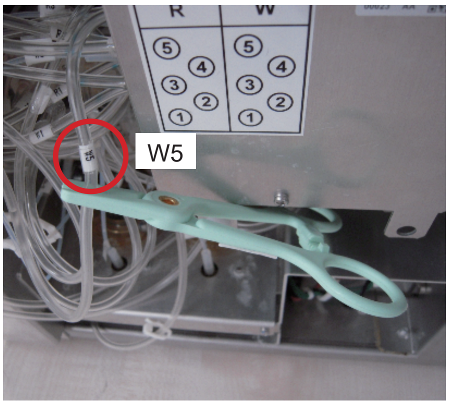


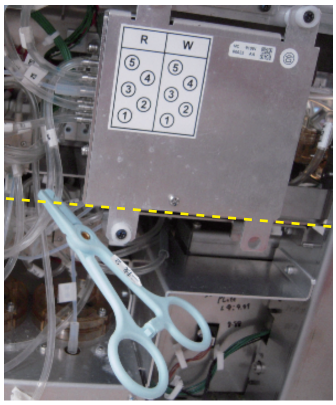
3 Leave in this state for five minutes to clean the bottom of the WASTE CHAMBER2.

Cleaning MC-910W with CLEANAC•710W (MK-710W : T438H)

1 Clamp the tube (W5) of the W5 port on the left of the MC-910W with pean.

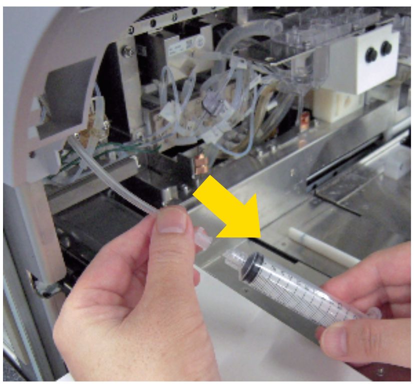
NOTE
- Clamp the tube at the position referring to the yellow dotted line in the figure.
- Be careful not to clamp the other tubes.



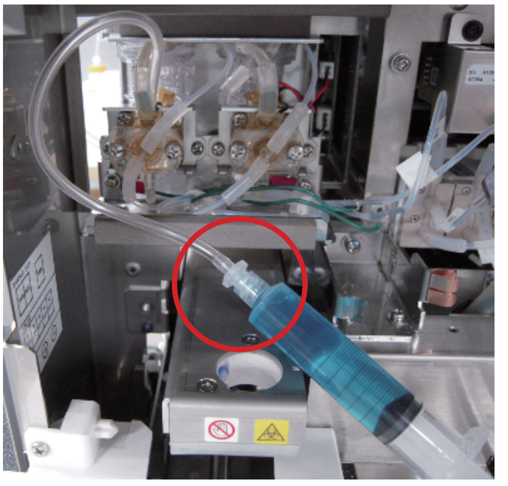


2 Disconnect the syringe at the joint shown below and aspirate the MK-710W 12 ml.

NOTE: MK-710W is mixed with MK-810W and changes its color.

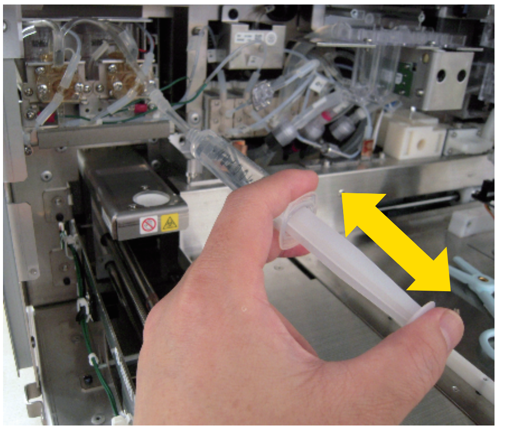


3 Connect the syringe to the connecting tube.

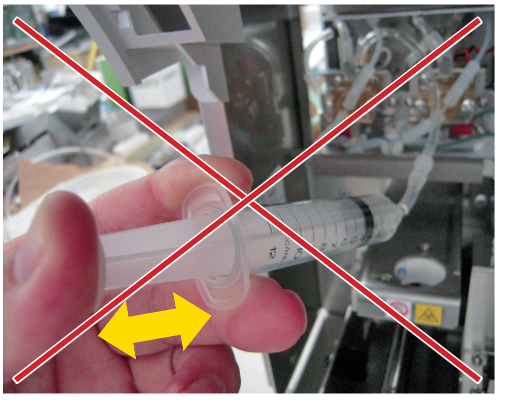


4 Slowly inject all the 12 ml detergent over at least three seconds.

NOTE
- To prevent accidental disconnection of the tube, slowly push the syringe over at least three seconds.
- When injecting the detergent, the syringe can be pushed back, but push the syringe to the end.



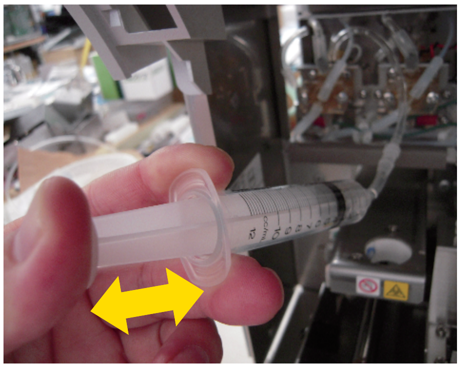
NOTE: Do not push and pull the syringe for cleaning due to the occurrence of bubbles.



5 Remove the pean at the tube (W5).

6 Push and pull the syringe five times slowly to drain the detergent in the MC-910W into the WASTE CHAMBER 2.

NOTE: Slowly push and pull the syringe over at least six seconds per one stroke. Be sure to follow the syringe capacity and the operation time. This may cause damage the parts of the unit.

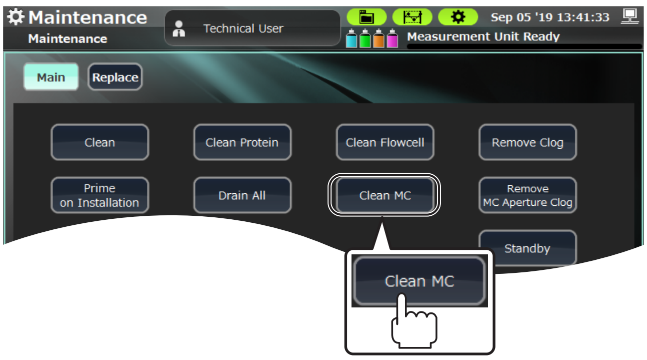


Cleaning by the MC-910W function

1 Return to the tubes and the removed parts to their original position.

NOTE: When connecting and disconnecting the tubes, cover the periphery with waste cloth to prevent contamination with the fluid.

2 Open the User Maintenance window and touch [Clean MC] > [Yes] to perform the MC cleaning.



Reagents

(3) Check that Nihon Kohden products are used as reagents.

> ⚠ **CAUTION**
> Only use Nihon Kohden specified reagents and consumables. Otherwise the measurement result cannot be guaranteed and incorrect reagent concentration can cause equipment damaged.

Nihon Kohden products	Diluent	ISOTONAC•3/4
	Detergent	CLEANAC•710
		CLEANAC•810
	Lysing reagent	HEMOLYNAC•310
		HEMOLYNAC•510

Inform the customer when the level of consumables is low.

(4) Check that the diluent (ISOTONAC•3/4) is not past the expiration date.

(5) Check that the detergent (CLEANAC•710) is not past the expiration date.

(6) Check that the detergent (CLEANAC•810) is not past the expiration date.

(7) Check that the hemolysing reagent (HEMOLYNAC•310) is not past the expiration date.

(8) Check that the hemolysing reagent (HEMOLYNAC•510) is not past the expiration date.

Check that all the used reagents are not past the expiration date.

Appearance

Check the appearance visually. Actually press switches and keys to check that a pressing sensation is present, and check that cables are connected securely.

(9) Check that the exterior is not damaged, dirty or scratched.

(10) Check that fluid is not leaking.

(11) Check that the waste tray does not contain residue from a fluid leak.

(12) Check that the racks are not dirty.

(13) Check that the rack barcodes are not dirty or peeling.

(14) Check that the adapter is not dirty.

(15) Check that the sample conveyor (autoloader) is not dirty.

(16) Check that the aspiration unit or a switch or key is not cracked or loose.

(17) Check that the labels are not dirty or peeling.

(18) Check that the reagents are connected correctly, and the tubes are not broken, bent or clogged.

(19) Check that the peripheral devices are connected correctly, and the connection cables are not damaged.

(20) Check that consumables such as recording paper have not run out.

Safety

(21) Check that a 3-prong AC power cord is used and the prongs are not deformed.

Check that the AC power cord and earth wire are not bent and the core wires are not exposed, and check visually that the AC power cord is a 3-prong type and the prongs are not deformed.

(22, 23) Check that the earth leakage current is within the standard.

Measure in the normal condition and single fault condition, and check that each measurement value does not exceed the allowable value.

Normal condition	0.5 mA
Single fault condition	3.5 mA
Applicable standard	IEC 61010-1:2001, IEC 61010-1:2010 + Amendment 1:2016

(24) Check that the resistance of the protective earth wire is within the standard.

Use an earth resistance meter to check that the protective earth wire of the AC power cord is 0.1 Ω or less.

Alternatively, use a multimeter to check the continuity.

Basic Operations

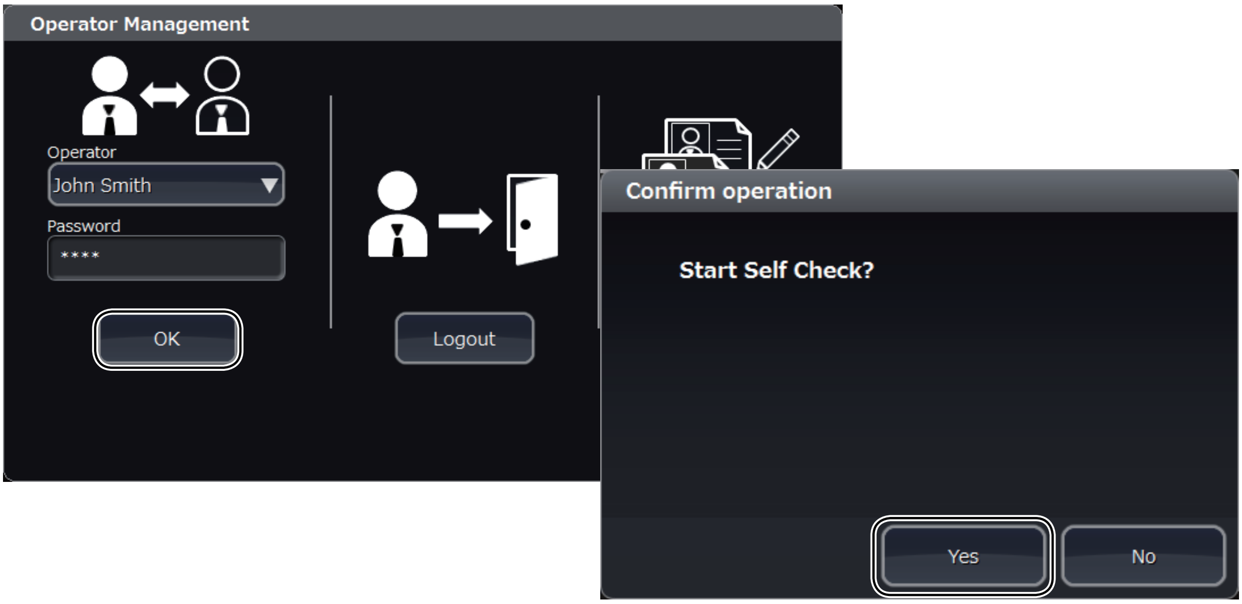
(25) Check that the analyzer starts normally (refer to “Turning On the Analyzer” in Section 5 of the operator’s manual).

Check that when the analyzer power is turned on, the analyzer starts normally and the Alarm window does not appear on the display.

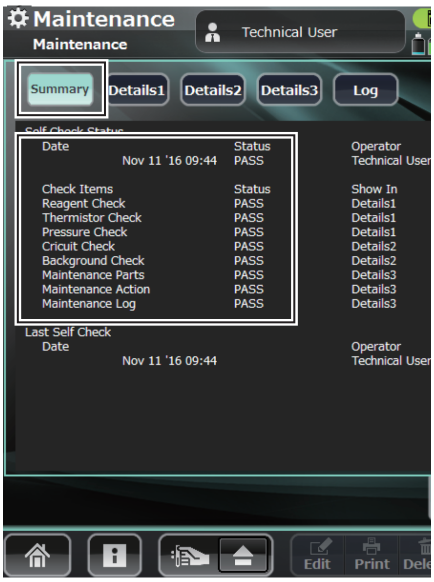
(26) Check that the self check operation is normal (refer to “Running Self Check” (p. 6-12)).

Select [Technical User] on the Operator Management window and touch the [OK] key.

Touch [Yes] on the Confirm Operation window of the self check to run the self check.



Check that the statuses of the [Summary], [Details1] and [Details2] check items on the [Maintenance] > [Self Check] window are all [PASS].



(27) Check that the date and time are correct.

Check that the date and time at the top right of the screen are correct. When incorrect, correct on the [System] > [Date and Time] window.

(28) Check the display.

Check that no locations are missing from the display and that no locations are significantly discolored.

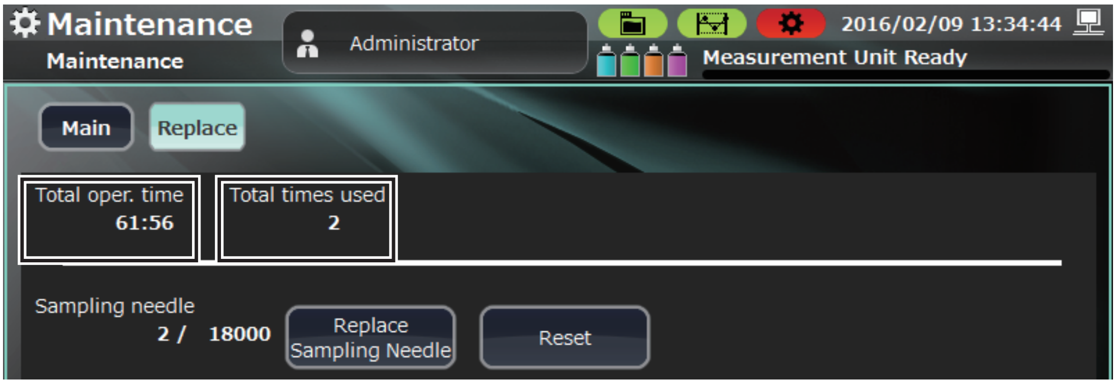
(29) Check that the touch positions of the touch screen are correct (refer to “Changing the Settings of the PC-910W DATA PROCESSING UNIT” (p. 6-38) refer to “Changing the Settings of the PC-911W DATA PROCESSING UNIT” (p. 6-42)).

Check that when the keys on the screen are touched, the key display matches the touch positions of the touch screen. When the touch positions are misaligned, adjust the touch screen.

(30, 31) Check the total operation time and the total times used.

Open [Maintenance] > [User] > [Replace] window.

Write down the values displayed on the window.



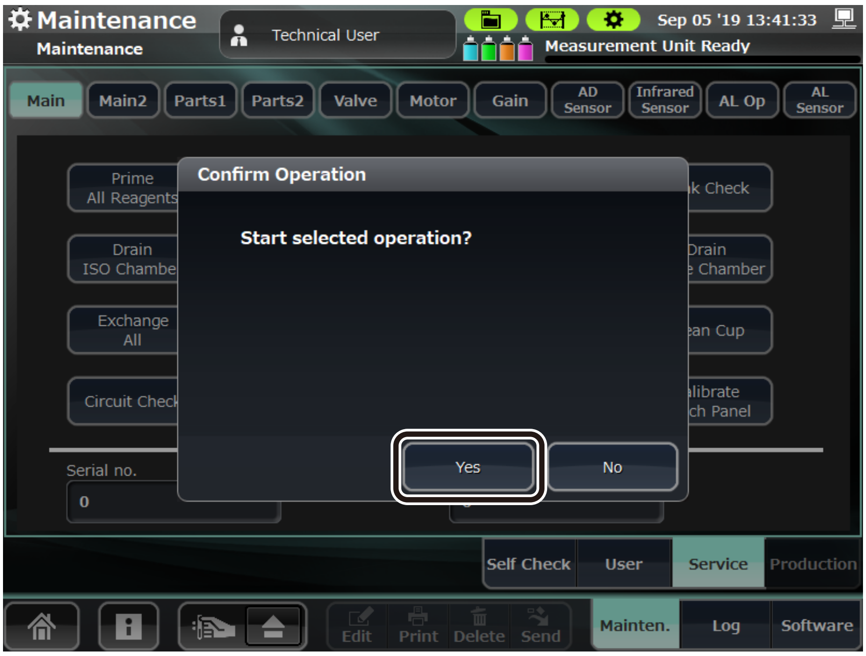
Checking Inside the Analyzer

Procedure for Batch Replacement of Repair Parts (Sampling Needle, Venting Needle, Filter)

Change the sampling needle, venting needle and filter with a batch operation.

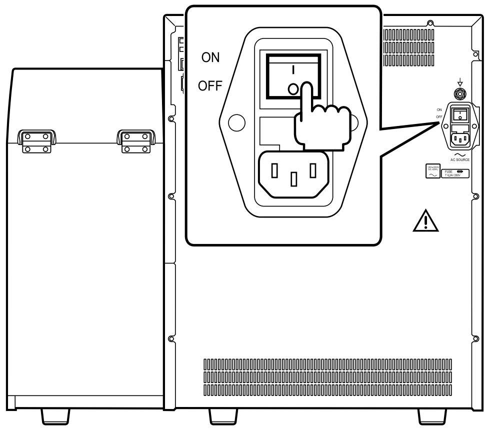
1 Open the Service Maintenance window and touch [Exchange All].

2 Touch [Yes] on the Confirm Operation window.

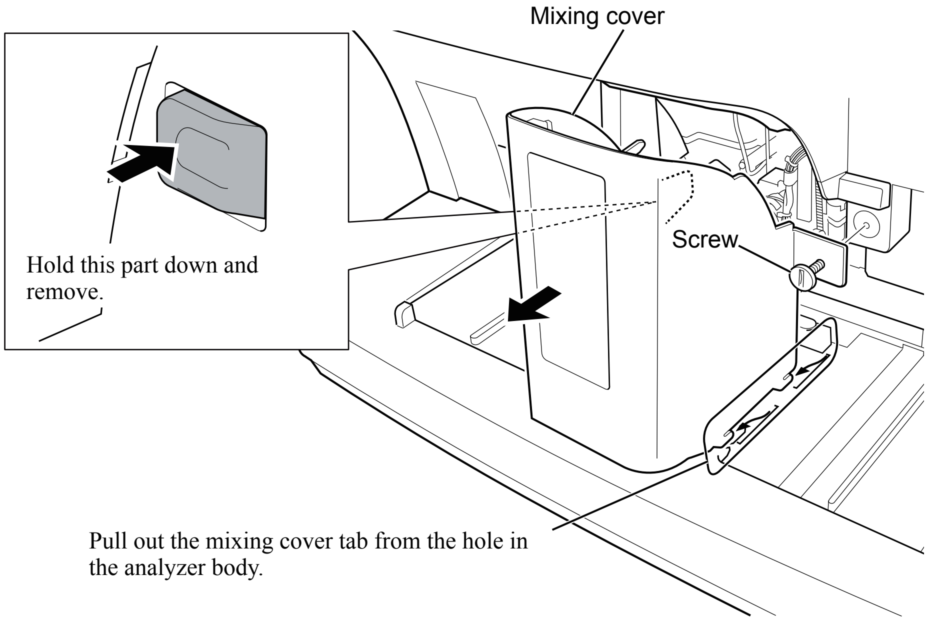


3 The repair parts and related fluid paths are drained and the power is automatically turned off.

4 Turn off the Main power switch on the rear panel of the analyzer (to ○) and disconnect the power cord from the wall AC outlet.

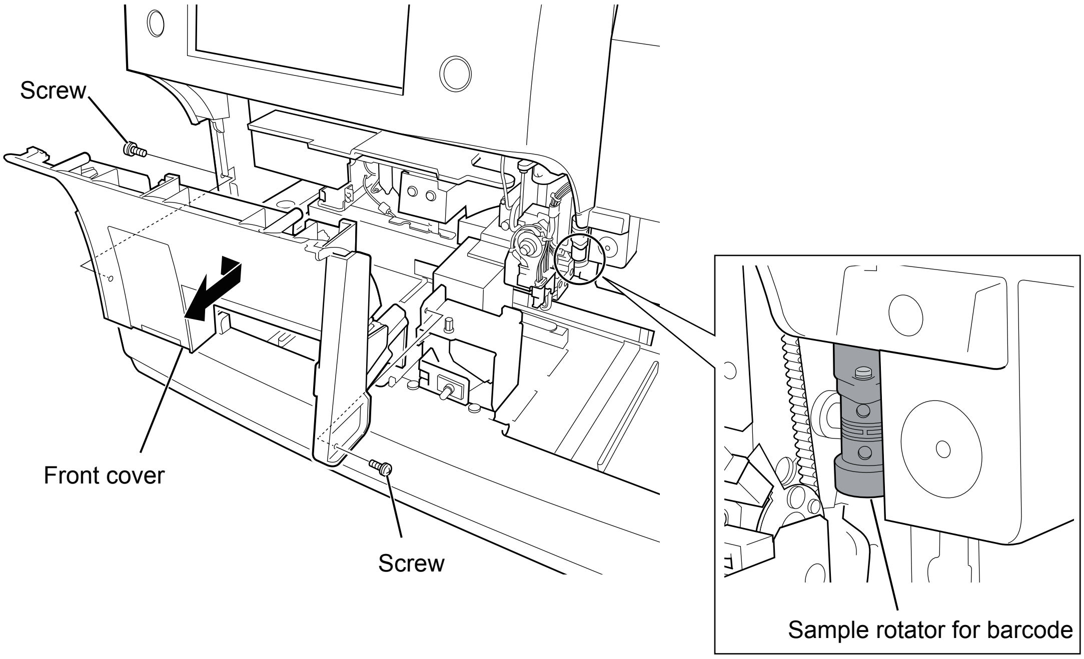


5 Loosen the screw on the front panel to remove the mixing cover.

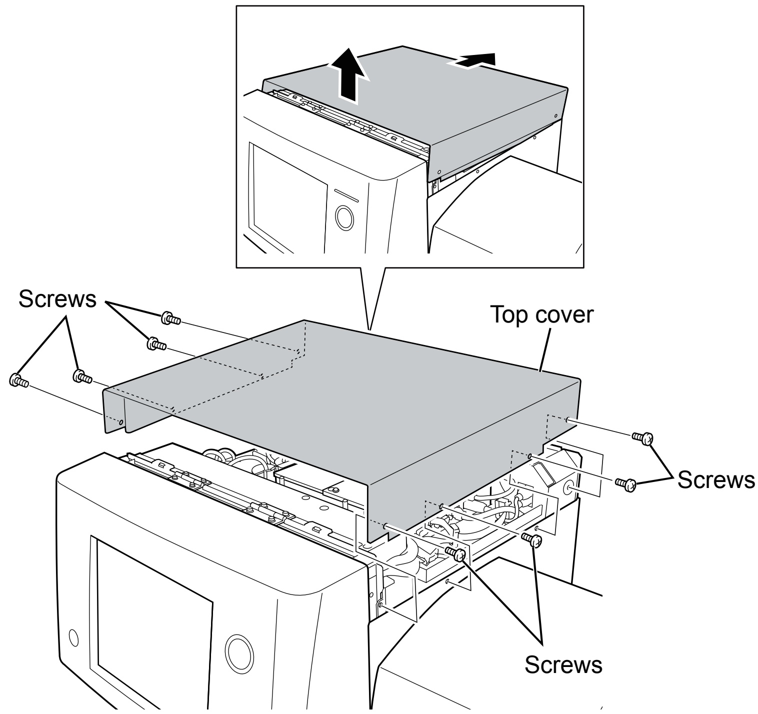


6 Remove the two screws to remove the front cover.

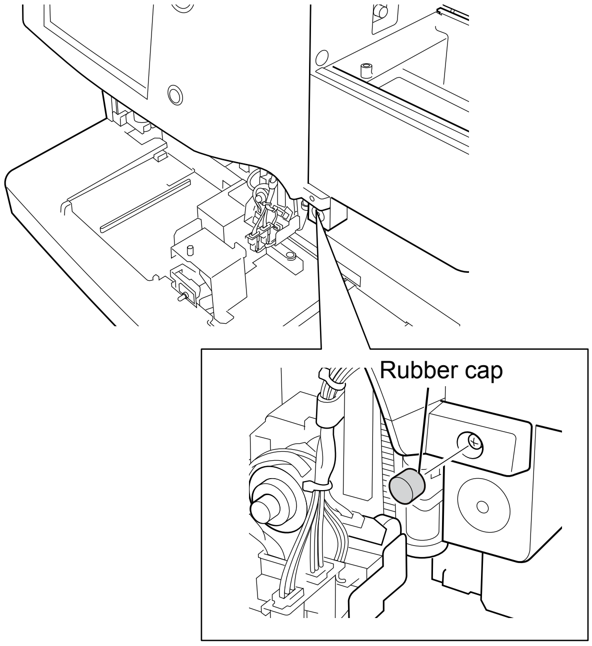
7 Check that the sample rotator for barcode is clean. Clean it when necessary.



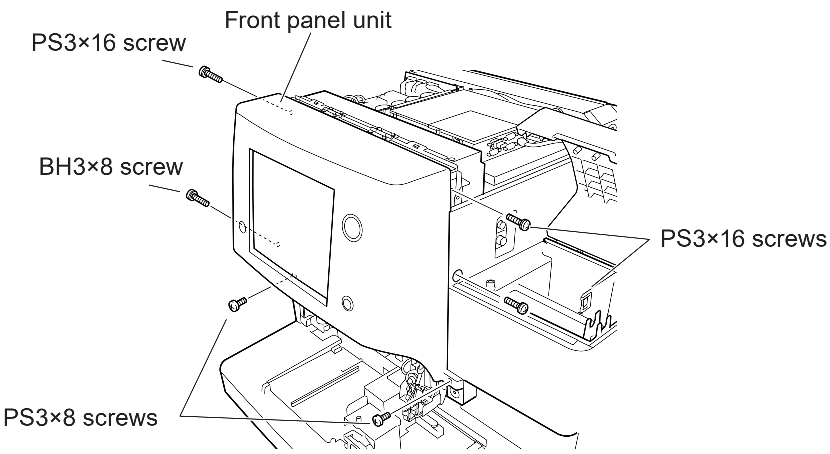
8 Remove the eight screws to remove the top cover.



9 Remove the rubber cap.

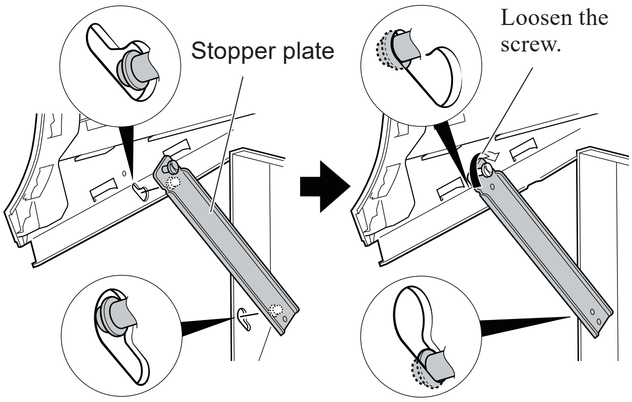


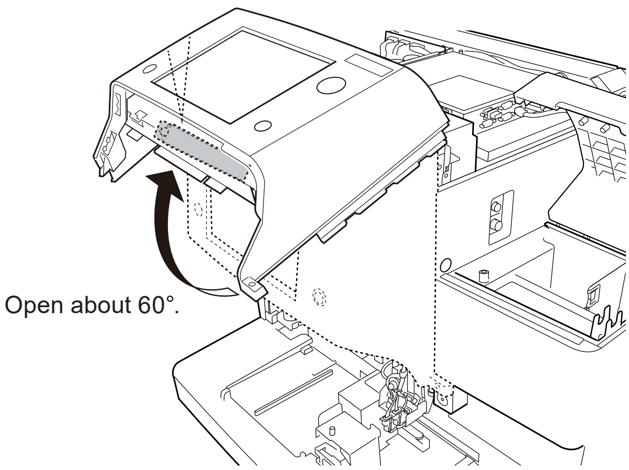
10 Remove the six screws which secure the front panel unit.



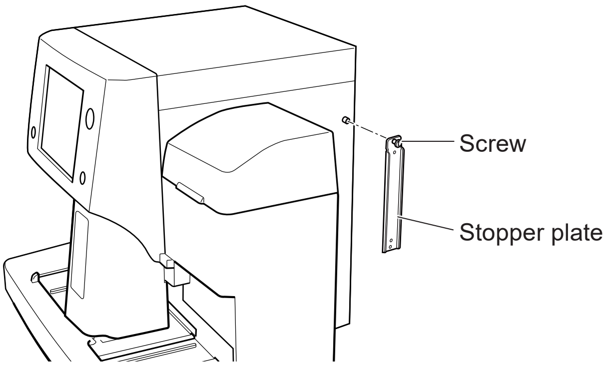
11 Open the front panel unit about 60° and fix it with the provided stopper plate as shown in the figure.

NOTE: Do not open the front panel unit 90° or more.
This may damage the analyzer.



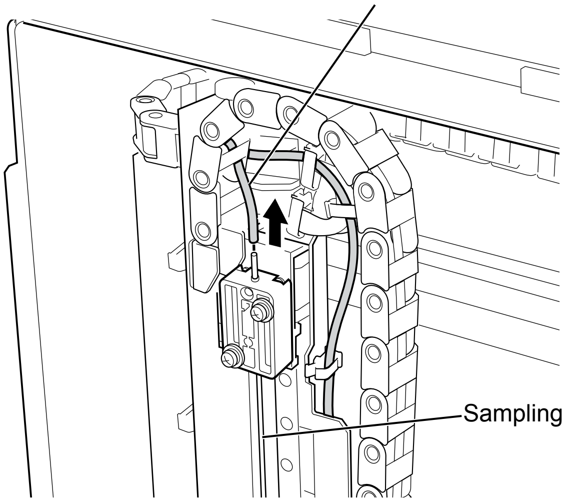


The provided stopper plate is fixed with a screw at the position in the figure.

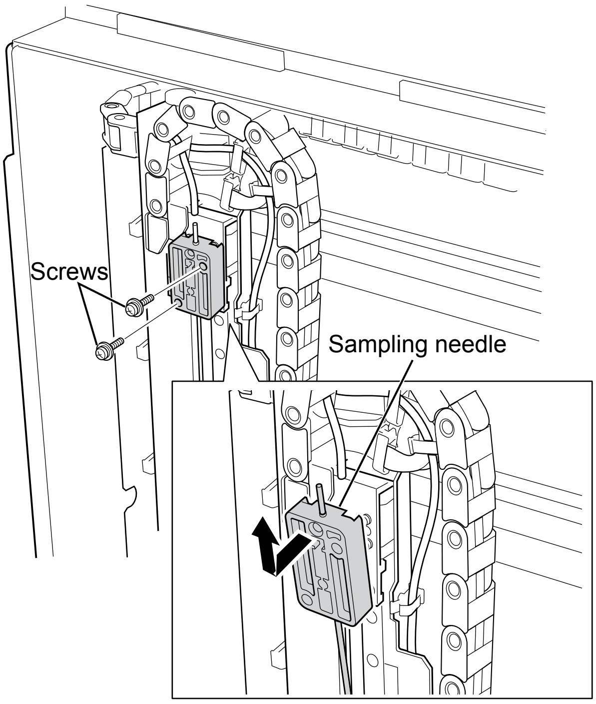


(32) Check and replace the sampling needle.

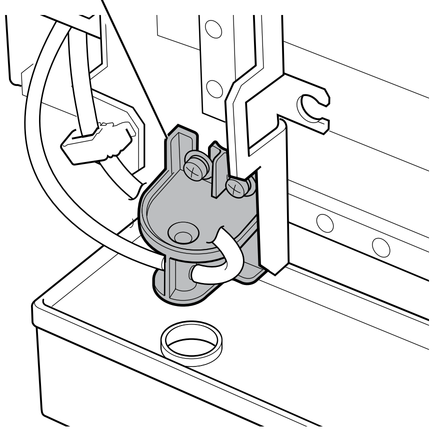
1 From the condition of step **11** in "Procedure for Batch Replacement of Repair Parts (Sampling Needle, Venting Needle, Filter)", remove the tube from the top of the sampling needle.



2 Remove the two screws to remove the sampling needle.



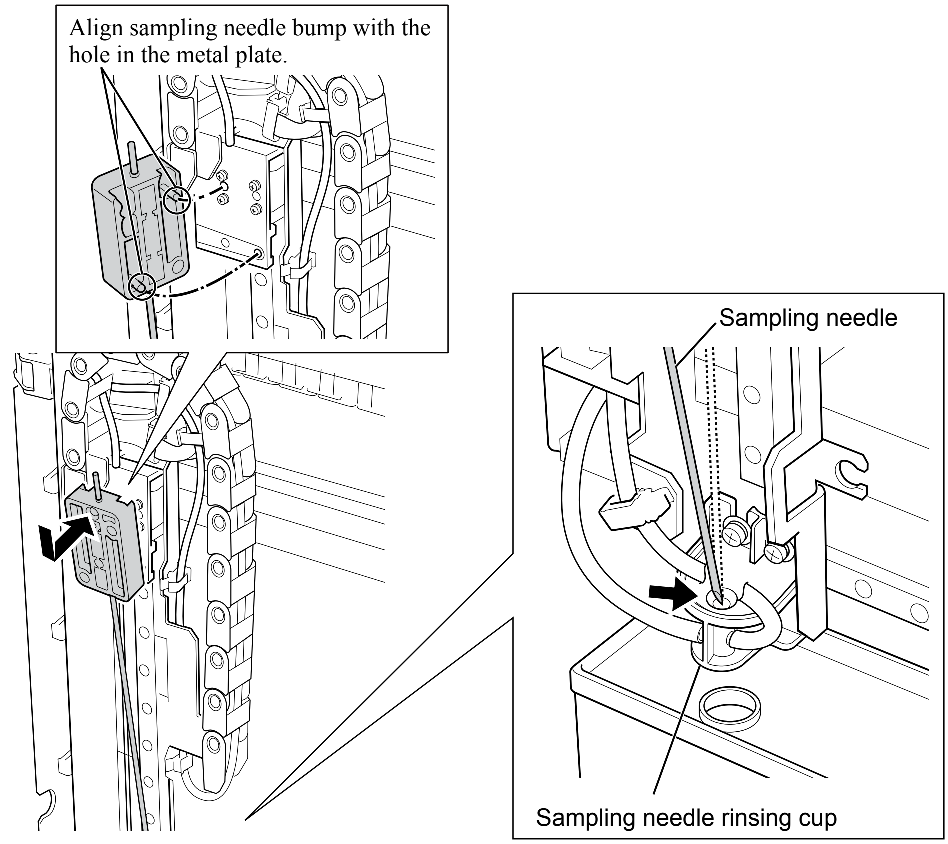
3 Clean the sampling needle rinsing cup.

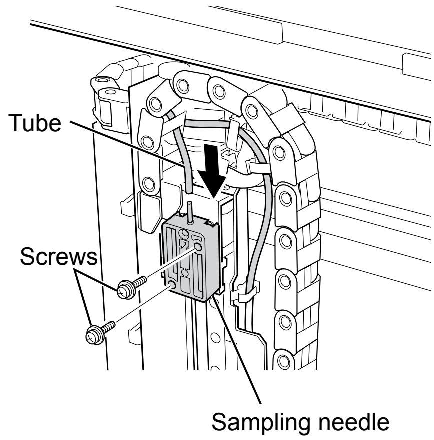


A

4 Insert the tip of the new sampling needle into the sampling needle rinsing cup and then install the sampling needle.

NOTE: Be careful not to damage the tube or the sampling needle rinsing cup when inserting the sampling needle into the rinsing cup.

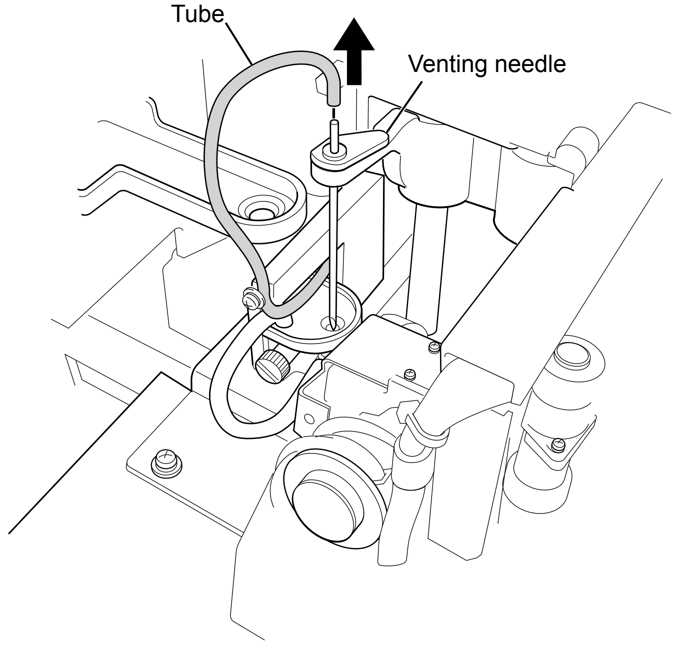




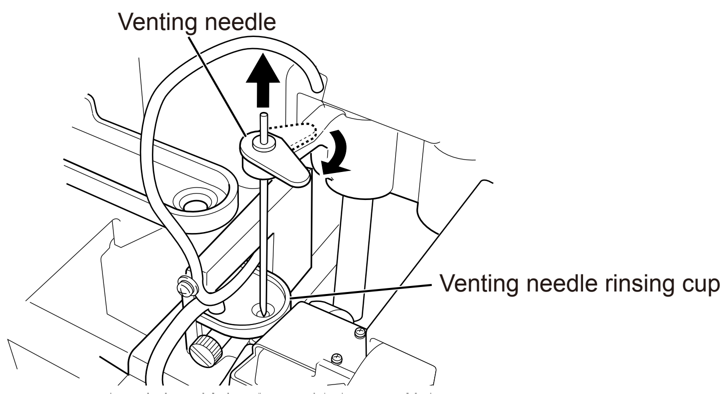
5 Fix the sampling needle with the two screws removed in step **2** and connect the tube removed in step **1** to the top of the sampling nozzle.

(33) Check and replace the venting needle.

1 From the condition of step **11** in "Procedure for Batch Replacement of Repair Parts (Sampling Needle, Venting Needle, Filter)", remove the tube from the top of the venting needle.

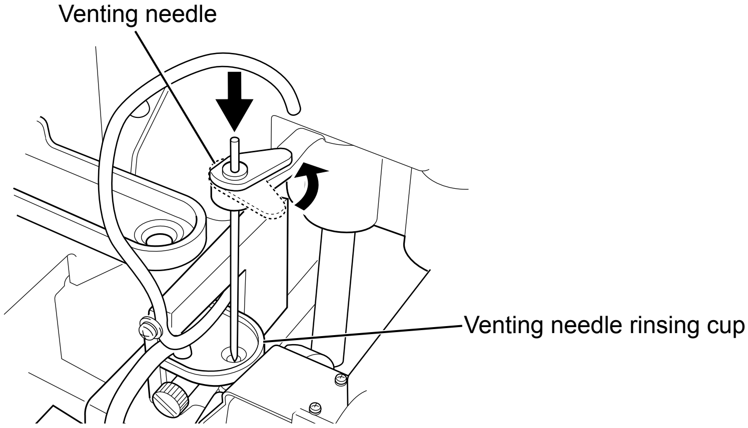


2 Rotate the venting needle to remove it and clean the venting needle rinsing cup.

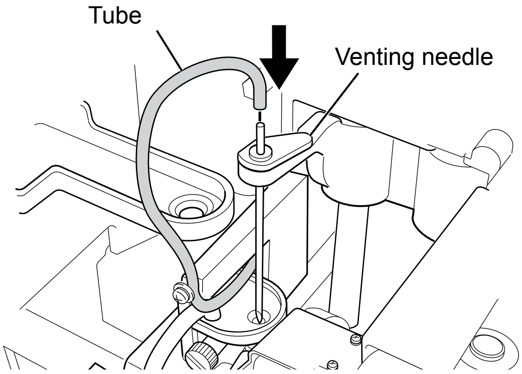


3 Insert the tip of the new venting needle into the venting needle rinsing cup and then rotate the venting needle to fix it in place.

NOTE: Be careful not to damage the tube or the venting needle rinsing cup when inserting the venting needle into the rinsing cup.



4 Connect the tube to the top of the venting needle.



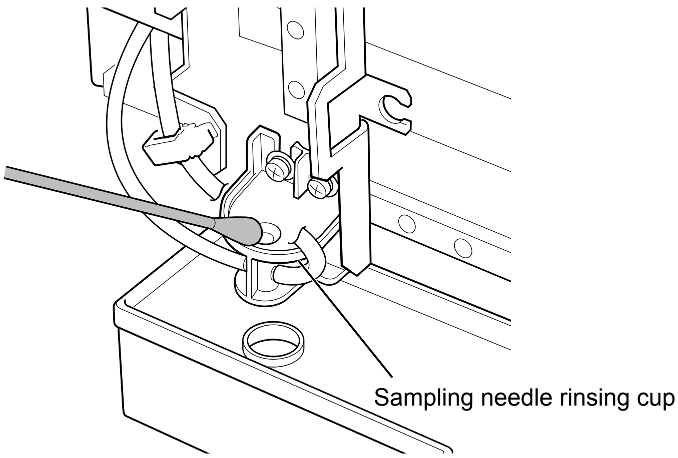
(34) Check the two rinse chassis.

Cleaning Schedule

When replacing the sampling needle

After removing the sampling needle, clean the sampling needle rinsing cup with a cotton swab as shown in the figure.

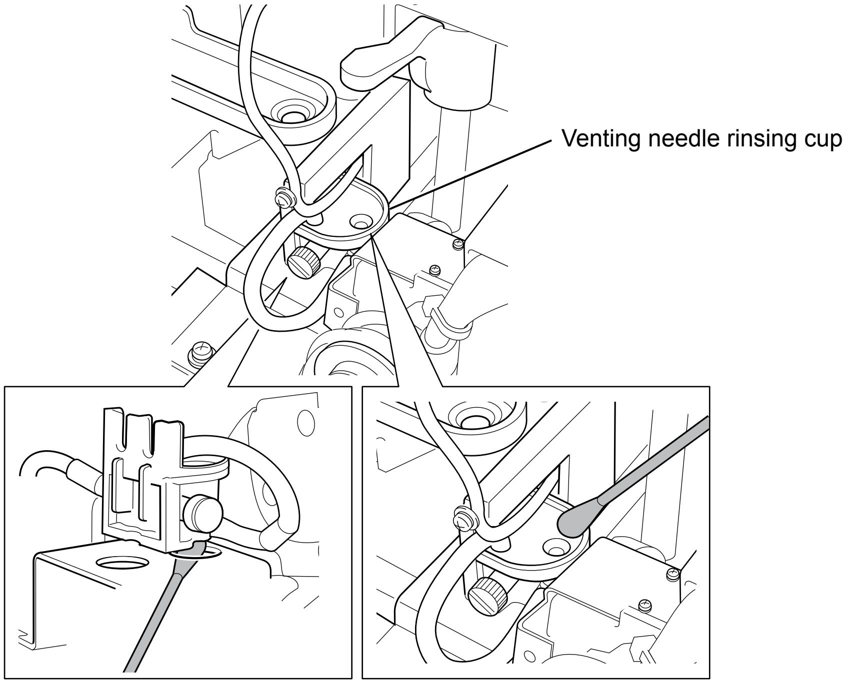
NOTE: Do not use disinfecting agents (disinfecting ethanol or isopropyl alcohol) when cleaning the sampling needle rinsing cup.



Cleaning schedule: When replacing the venting needle

After removing the venting needle, clean the venting needle rinsing cup with a cotton swab as shown in the figure.

NOTE: Do not use disinfecting agents (disinfecting ethanol or isopropyl alcohol) when cleaning the venting needle rinsing cup.



(35) Clean the sample rotator for barcode.

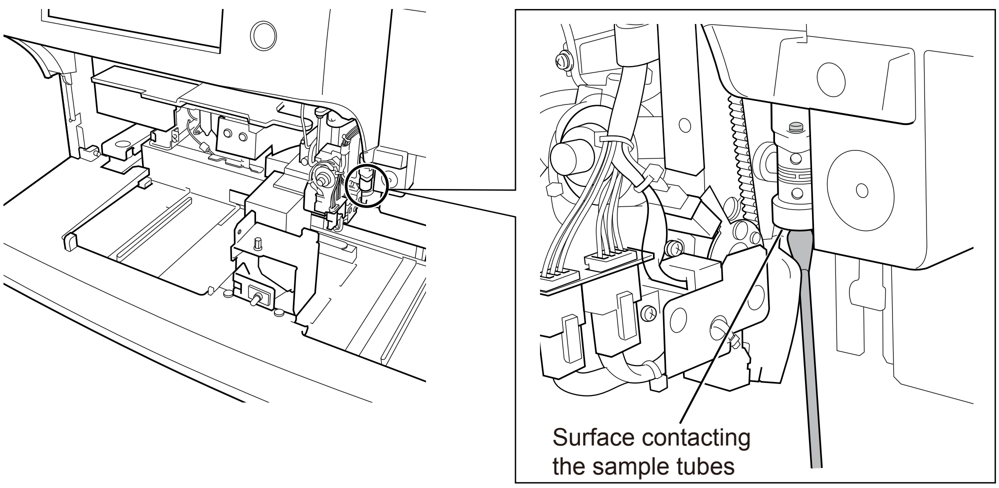
Cleaning Schedule

When the sample rotator for barcode is not clean (when replacing the sampling needle or the venting needle)

Check for dirt when replacing the sampling needle or the venting needle.

Cleaning Method

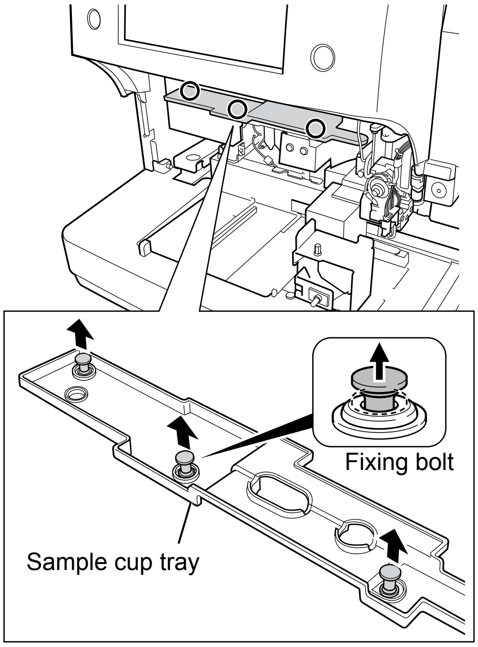
Wipe off the dirt on the surface contacting the sample tubes using a cotton swab moistened with disinfecting ethanol (concentration: 76.9 to 81.4 vol% at 15°C (59°F)) or isopropyl alcohol.



(36) Check and clean the sample cup tray.

Cleaning Method

1. Pull up the three fixing bolts until they click then remove the sample cup tray.

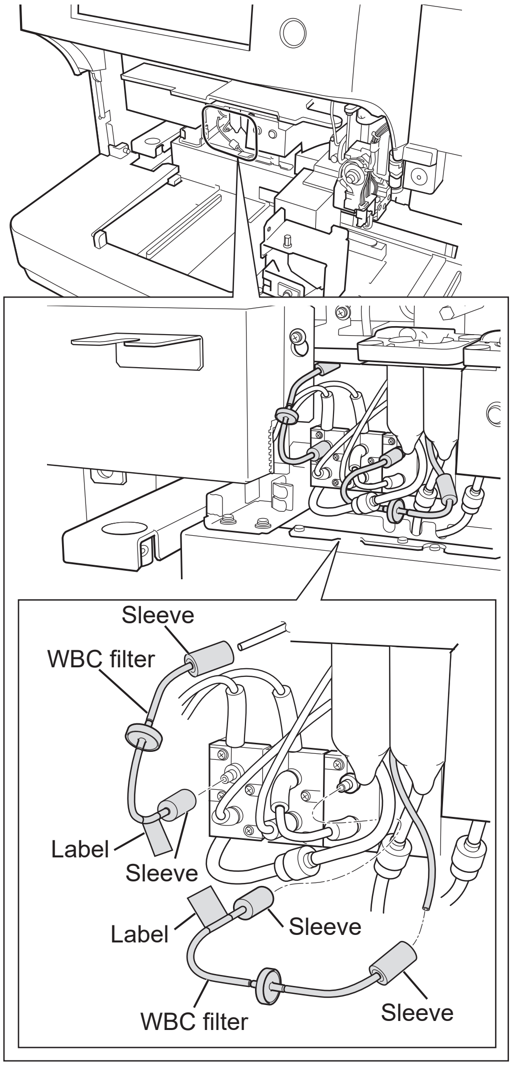


2. Wash with tap water.

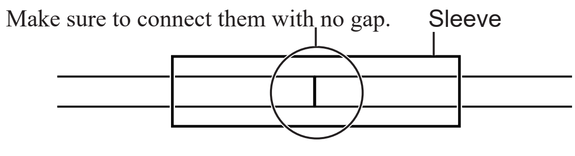
(37) Check and replace the filter.

Replacement Method

1 Remove the 2 WBC filters together with the sleeves and replace the filters with new ones.



NOTE • Connect the new filter firmly to prevent gaps in the sleeves.



• Connect the label side of the WBC filter to the electromagnetic valve. Be careful not to connect the filter to a different electromagnetic valve.

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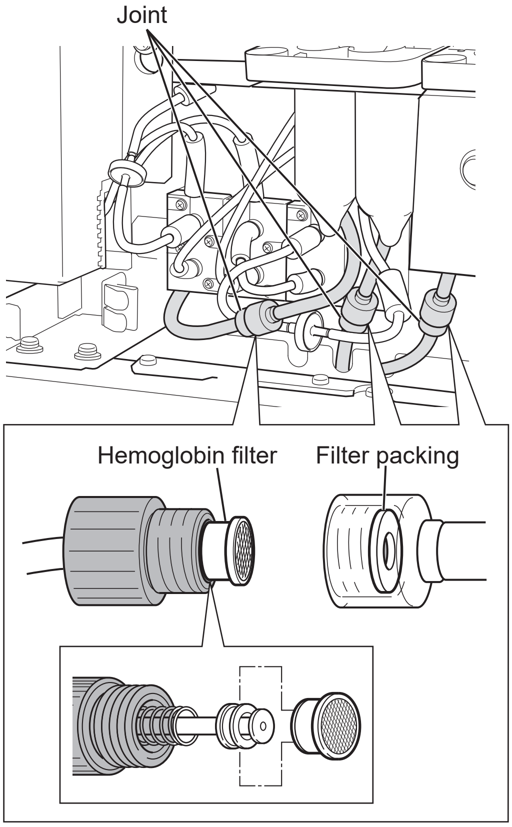
2 Pull out the 3 tubes with the joints where the 3 tubes are connected and rotate the 3 valves of the joints to disconnect the tubes.

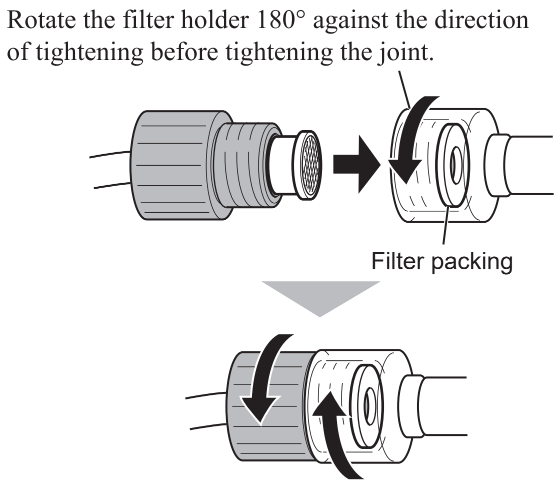
NOTE: Be careful not to bend or kink the tubes.



3 Pull out the 3 hemoglobin filters and replace them with new ones.

When the filter packing is extremely dirty, deformed or scratched, replace it with new filter packing. To replace the filter packing, contact your Nihon Kohden representative.

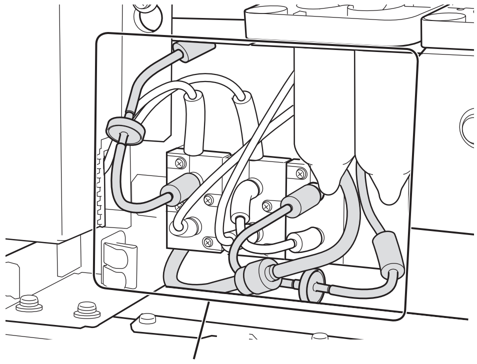
4 Retighten the joints.



NOTE
- When inserting the filter into the filter holder, be careful not to break or bend the internal filter packing.
- Make sure the filter fits into the packing and the joint is securely tightened.
- If there is a leak, check that there are no scratches or cracks around the filter and reattach the joint.

- To prevent the twisting of the tube, rotate the joint on the sample cup side 180° against the direction of tightening and then tighten the joint. Be careful not to bend or kink the tube.

5 Store the tubes in the analyzer and check that the tubes are not bent and kinked.

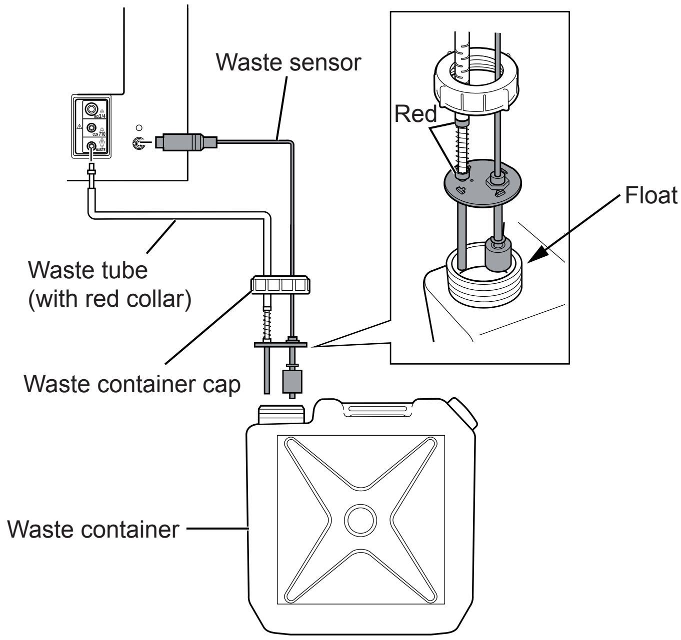


NOTE: Store the tubes in a location which does not interfere with the rack when the rack is moved.

(38) Check the waste container sensor.

Check that the float of the waste container sensor moves smoothly, and check that when the float is pushed up, the message “23030 Waste Bottle Full” appears on the analyzer screen.

After confirming this, touch the “RESTORE” key to start the restore operation.



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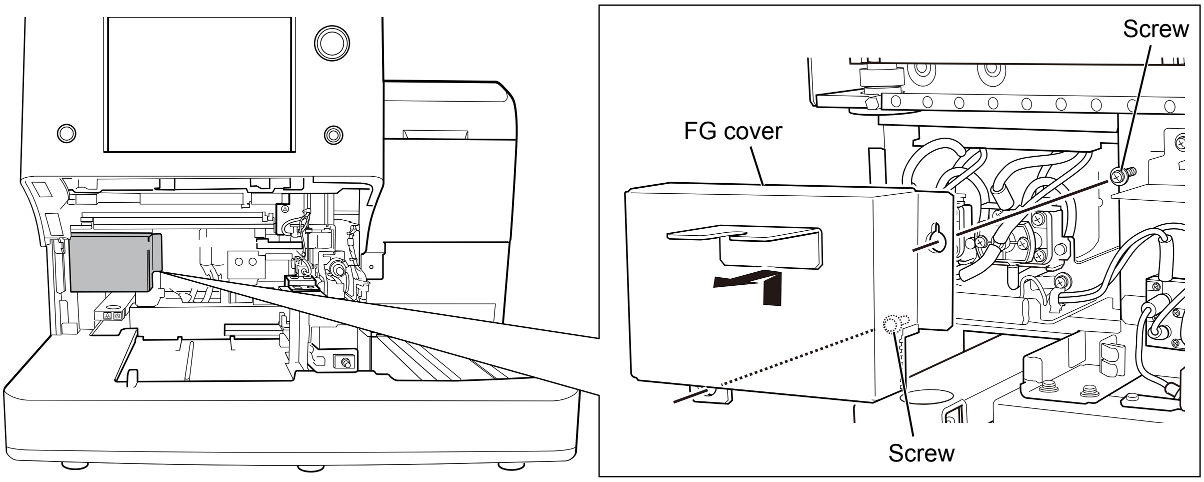
(39) Check the aperture caps.

Check for error logs related to the aperture caps.

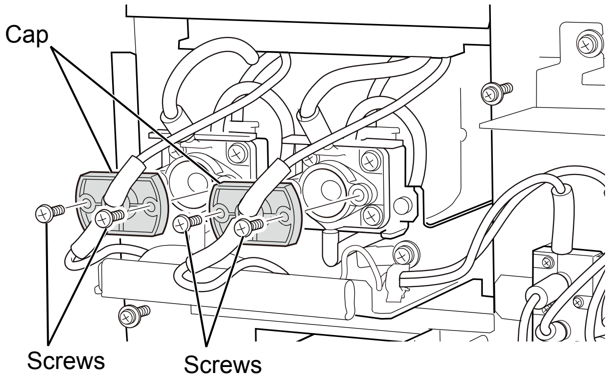
When the error code “21050 WBC Detection Hole Clog” or “21051 RBC Detection Hole Clog” occurs frequently, clean with the following procedure.

Cleaning Method

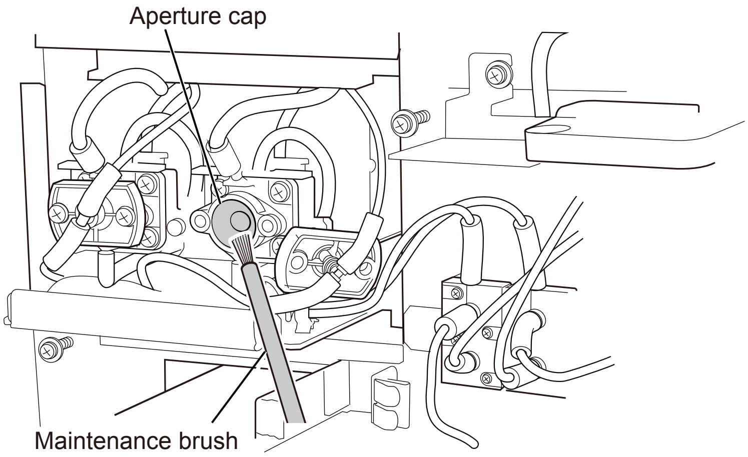
1 Loosen the two screws to remove the FG cover.



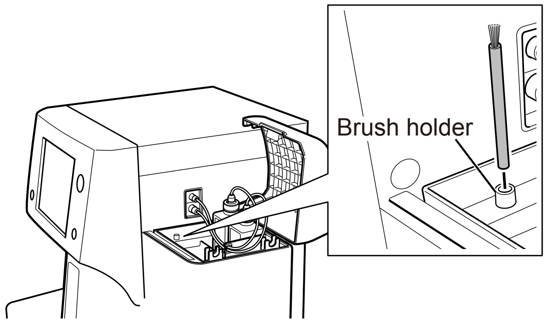
2 Remove the four screws to pull out the left and right caps.



3 Clean the left and right aperture caps by lightly tapping them using the provided maintenance brush dipped in CLEANAC•810.



- The provided maintenance brush is housed in the brush holder in the reagent bottle compartment.



- After cleaning the aperture caps, wash the brush well with tap water, fully dry the tip, and then insert it into the reagent bottle compartment.

4 Install the removed front panel, top cover, front cover and mixing cover.

5 Connect the power cord to the wall AC outlet and turn on the analyzer.

Operator's Manual:
"Turning On the Analyzer" in Section 5

6 Log on as the factory operator. ([Operator Management] > [Factory Operator] > [OK] key.) Touch [No] on the window to skip the self check.

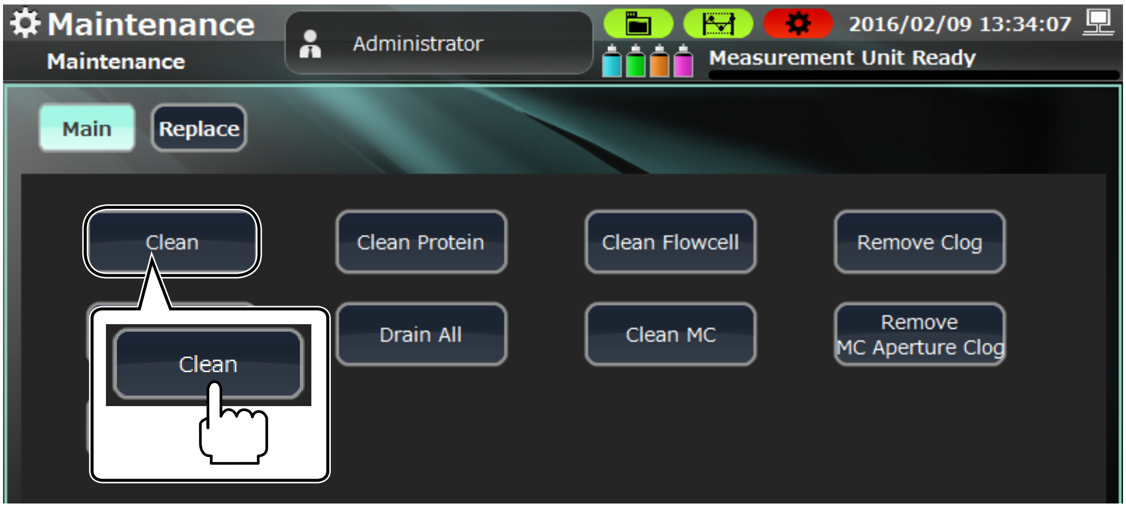
7 Check that the analyzer message "21200 Maintenance part replacement status" appears and touch [RESTORE] on the Maintenance Log window.

8 Run the self check.

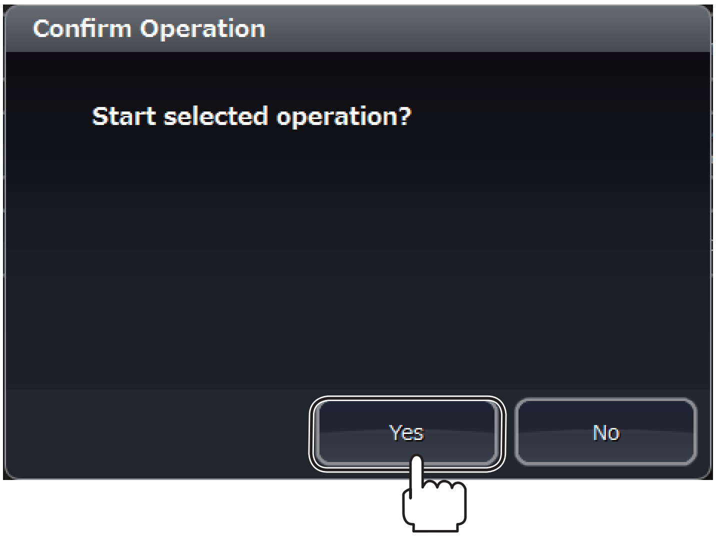
(40) Check the cleaning operation.

Clean the fluid path inside the analyzer with CLEANAC•710 detergent.

1 Open the User Maintenance window and touch [Clean].



2 Touch [Yes] on the Confirm Operation window.

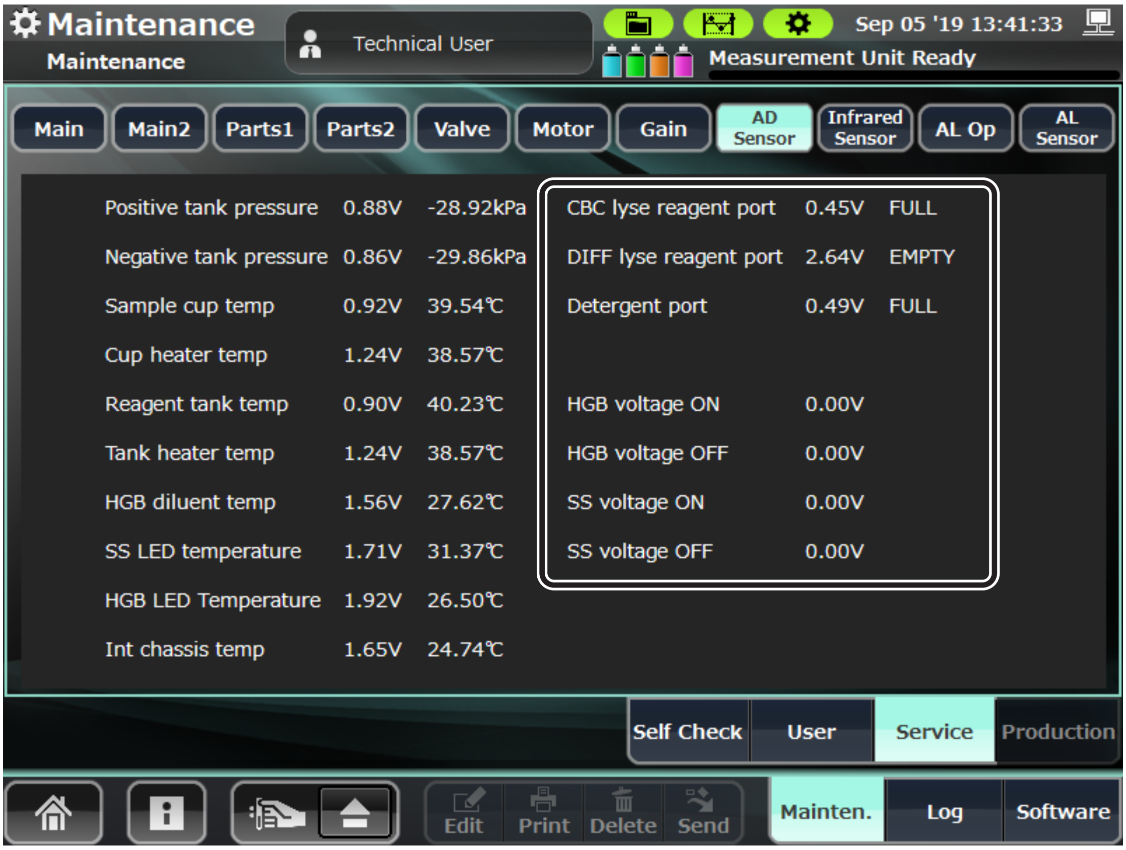


(41) to (47) Check the AD sensor.

Check the voltage with CLEANAC•710, HEMOLYNAC•310 and HEMOLYNAC•510 fluid, HBG voltage ON and OFF, and SS voltage ON and OFF.

1 Open [Maintenance] > [Service] > [Gain] window, check that HGB voltage and SS voltage ON and touch [HGB LED ON] at the lower left of the window to light the HGB LED.

2 Open [Maintenance] > [Service] > [AD Sensor] window, and check and write down the voltage of the CBC lysing reagent port, DIFF lysing reagent port, Detergent port, HGB voltage ON and OFF and SS voltage ON and OFF.



3 Perform adjustment when any voltage is outside the range.

"Adjusting Gain" (p. 6-63)

Item			Expected Value
41	CLEANAC•710	With fluid	0.3 to 0.5 V
42	HEMOLYNAC•310	With fluid	0.3 to 0.5 V
43	HEMOLYNAC•510	With fluid	0.3 to 0.5 V
44	HGB voltage	ON	4.00 ±0.50 V
45		OFF	0.05 to 0.15 V
46	SS voltage	ON	4.00 ±0.50 V
47		OFF	0.05 to 0.15 V

4 Return to the [Gain] window after checking the voltage of AD sensors (41) to (47). Touch [HGB LED OFF] to turn off the HGB LED and stop acquiring the measurement values.

(48) to (61) Check the self check.

Check the cup temperature, cup heater temperature, sample tank temperature, sample tank heater temperature, diluent temperature, HGB LED temperature, SS LED temperature, internal chassis temperature, ISO chamber pressure and waste chamber pressure.

Item			Expected Value
No.	Temperature Items		
48	Cup temperature		37.00 to 43.00°C (98.60 to 109.40°F)
49	Cup heater temp		35.00 to 45.00°C (95.00 to 113.00°F)
50	Reagent tank temp		37.00 to 43.00°C (98.60 to 109.40°F)
51	Tank heater temp		35.00 to 45.00°C (95.00 to 113.00°F)
52	HGB diluent temp		10.00 to 50.00°C (50.00 to 122.00°F)
53	HGB LED Temperature		10.00 to 50.00°C (50.00 to 122.00°F)
54	SS LED temperature		10.00 to 50.00°C (50.00 to 122.00°F)
55	Int chassis temp		10.00 to 50.00°C (50.00 to 122.00°F)
No.	Pressure Items		
56	ISO chamber	Air Pressure	−8.00 to 8.00 kPa
57		Positive Pressure	57.96 to 80.04 kPa
58		Negative Pressure	−35.00 to −25.00 kPa
59	Waste chamber	Air Pressure	−8.00 to 8.00 kPa
60		Positive Pressure	57.96 to 80.04 kPa
61		Negative Pressure	−35.00 to −25.00 kPa

Open the [Maintenance] > [Self Check] > [Details1] window, and check and write down the cup temperature, cup heater temperature, sample tank temperature, sample tank heater temperature, diluent temperature, HGB LED temperature, SS LED temperature, internal chassis temperature, ISO chamber air pressure, positive pressure and negative pressure, and waste chamber air pressure, positive pressure and negative pressure.

Checking the Circuit and Background Items

(62) to (71) Check the circuit

(72) to (76) Check the background

Open the [Maintenance] > [Self Check] > [Details2] window, and check and write down the Circuit Check items and Background Check items.

Circuit Check Item		Expected Value	
62	WBC	73.9 ±5%	(70.2 to 77.5)
63	RBC	56 ±5%	(53 to 59)
64	MCV	39.7 ±5%	(37.7 to 41.7)
65	DIFF	6000 ±5%	(5700 to 6300)
66	WBC Voltage	18.1 V ±0.6%	(17.5 to 18.7 V)
67	RBC Voltage	18.1 V ±0.6%	(17.5 to 18.7 V)
68	HGB ON Voltage	4.00 V ±0.50 V	(3.50 to 4.50 V)
69	HGB OFF Voltage	0.10 V ±0.050 V	(0.05 to 0.15 V)
70	SS ON Voltage	4.00 V ±0.50 V	(3.50 to 4.50 V)
71	SS OFF Voltage	0.10 V ±0.050 V	(0.05 to 0.15 V)

Background Check Item		Expected Value
72	WBC	$2.0\times10^2/\mu L$ or less
73	RBC	$2\times10^4/\mu L$ or less
74	HGB	0.10 g/dL or less
75	PLT	$1.00\times10^4/\mu L$ or less
76	TOC	100 count or less

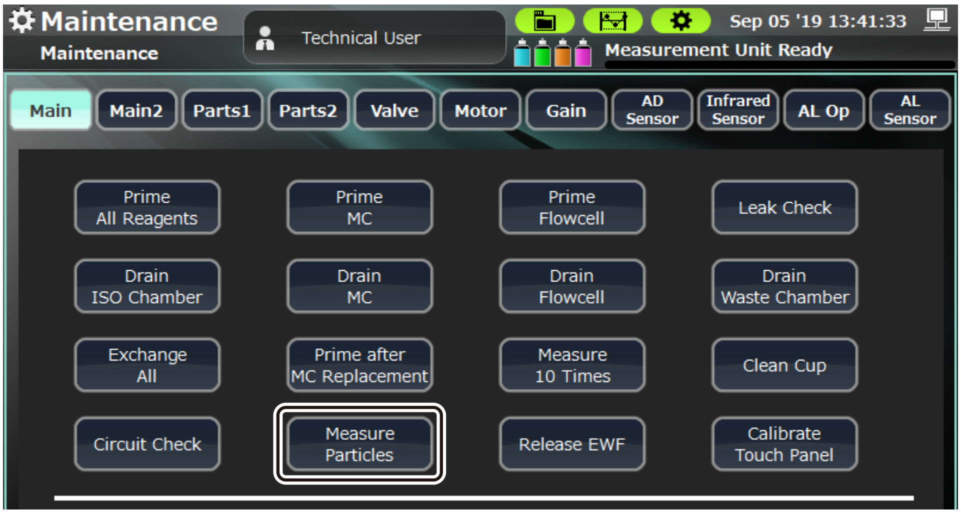
Checking the Particle Distribution

(77) to (79) Check the particle measurement.

1 Touch the [Eject] symbol at the lower left of the window.

2 Move the 7 μm standard particles (T905) to a clean sample tube and set the tube on the open loader.

3 Touch the [Measure Particles] key on the [Maintenance] > [Main] window to start particle measurement.



4 After measurement is completed, return to the Home screen, select sample ID [PARTICLE] on the [Data List] window and check the data. Check and write down the values of FS CV, FL CV and TOC on the [Research] window of the Data window.

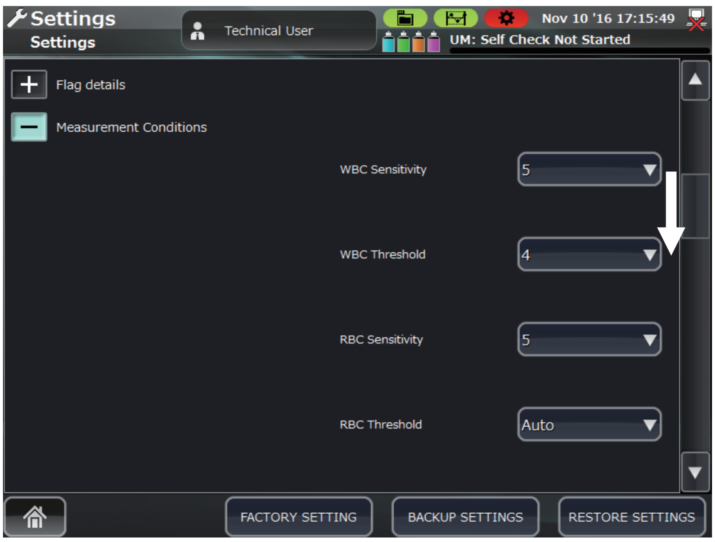
Particle Distribution		Expected Value
77	FS CV	5.0% or less
78	FL CV	5.0% or less
79	TOC	2000 count or more

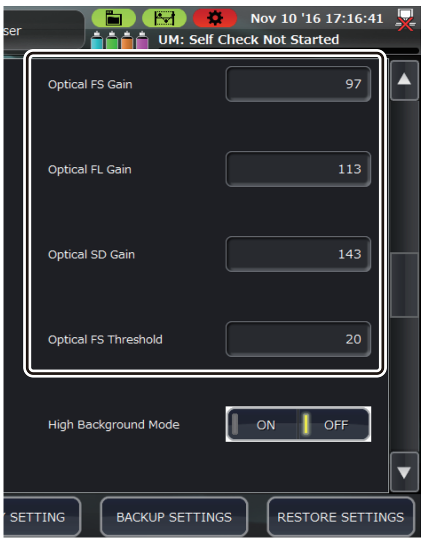
(80) to (95) Current calibration values and gain values

Write down the current normal and pre-dilution settings in (80) to (95).

Check and write down the calibration coefficients for each item displayed on the [QC] > [Calibration] window.

Return to the Home screen, touch [System] > [Measurement Conditions], and check and write down the gain values.





Calibration

(96) to (111) Calibration values and gain values after calibration

1 Touch [CAL] on the QC window. The Calibration window opens.

2 Select a measurement mode (Normal or Pre-dilution) and touch [Calibration Measurement].

Check the measurement method to use and select the calibration mode.

Calibration Mode	Auto Measurement	Manual Measurement		
		Whole Blood	Pre-dilution	WBC High
Normal	✓	✓	–	✓
Pre-dilution	–	–	✓	–

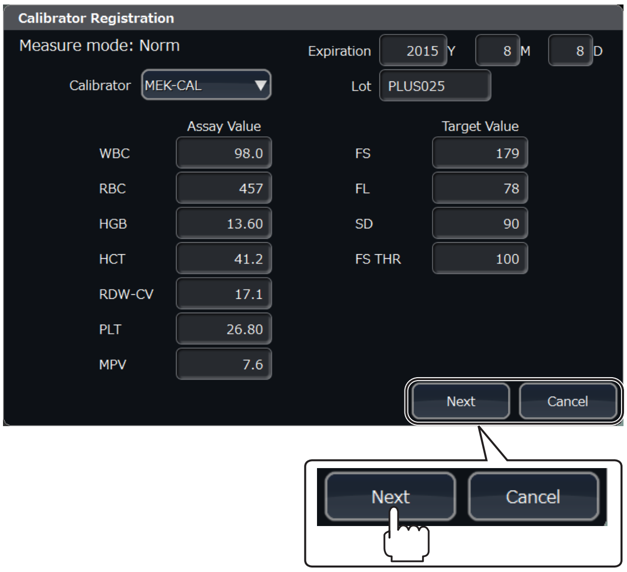
The aspirating position is different for auto and manual measurement (except pre-dilution) but it uses the same nozzle. Use normal mode for calibration.
The reagent needs to be prepared in Pre-dilution measurement. Use pre-dilution mode for calibration.

3 After the Calibrator Registration window appears, scan the QR code on the assay sheet of the calibrator with the barcode reader.

The information of the read calibrator is set and displayed on the window.

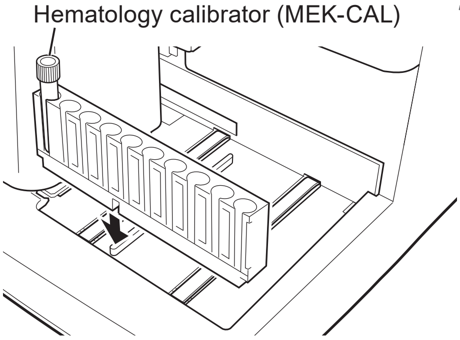
The information can also be entered directly by touching the setting parameter.

4 After checking the information on the window, touch [Next] to open the Auto CAL Mode window.



Normal mode

Hematology calibrator (MEK-CAL)



5 Measure the calibrator.

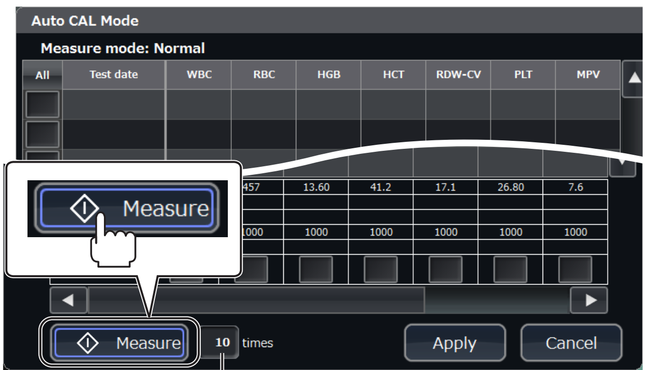
Normal mode:

1) Insert the calibrator into the left end (first position) of the rack.

2) Place the rack with the calibrator in the analyzer, and touch [Measure]. Measure the calibrator 10 times.

Operator's Manual:
"Performing Auto Measurement" in Section 5

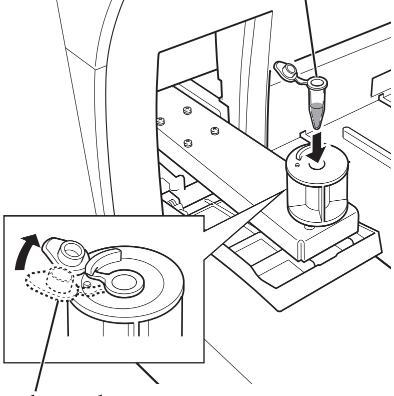
You can measure the calibrator from 1 to 20 times. Enter the number of times to automatically measure the calibrator.



You can measure the calibrator from 1 to 20 times.

Pre-dilution mode

20 µL of the hematology calibrator (MEK-CAL) which were diluted with the same multiplying factor



Secure the cap by inserting the cap under the tab of the adapter.

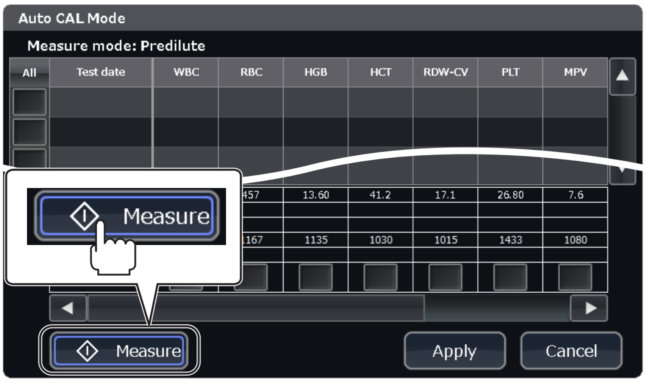
Pre-dilution mode:

1) Refer to steps **4** to **7** in "Performing Pre-dilution Measurement" in Section 5 and prepare 10 samples of 20 µL of MEK-CAL hematology calibrator which were diluted with 120 µL of diluent (ISOTONAC•3).

   Operator's Manual:
   "Performing Pre-dilution Measurement" in Section 5

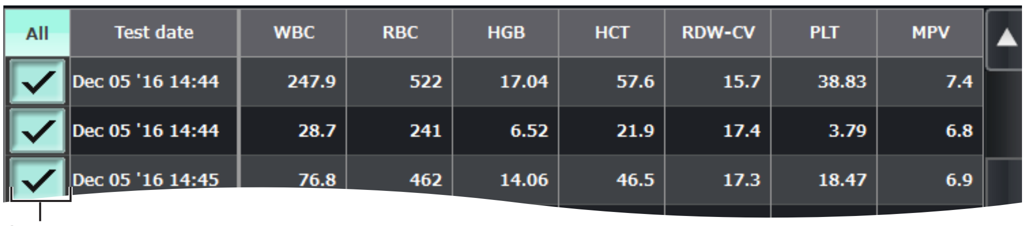
2) Uncap the micro tube, insert it into the adapter of the sample tube holder, and touch [Measure]. Perform manual measurement 10 times.

   Operator's Manual:
   "Performing Manual Measurement" in Section 5



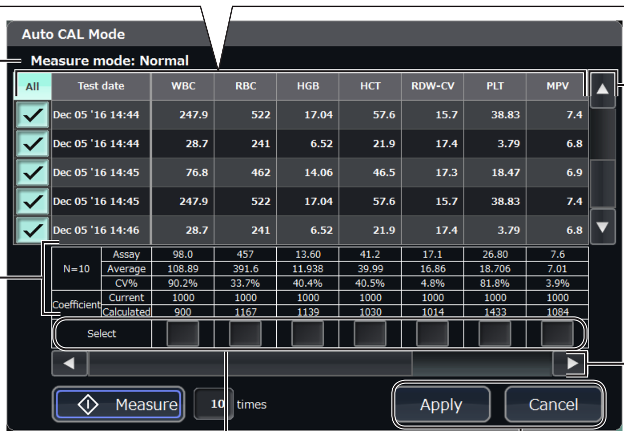
When measurement is complete, the measurement results appear on the screen.

NOTE: When the number of measurement data exceeds 20, the oldest data is overwritten in order to keep the latest 20 data.



Check box
- Touch to select the measurement data to perform statistical calculation. The check icon appears in the box.
- To unselect, touch the selected data again.
- Touch [All] to select or unselect all items.

Measurement mode



Touch [▲], [▼], [◀] or [▶] to scroll the list vertically or horizontally.

Statistical data
Displays the results of the statistical calculation.

Select
Touch to select the parameter to change the calibration coefficient.
The check icon appears in the box.

[Apply]: Applies the revised calibration coefficient to the selected parameters.

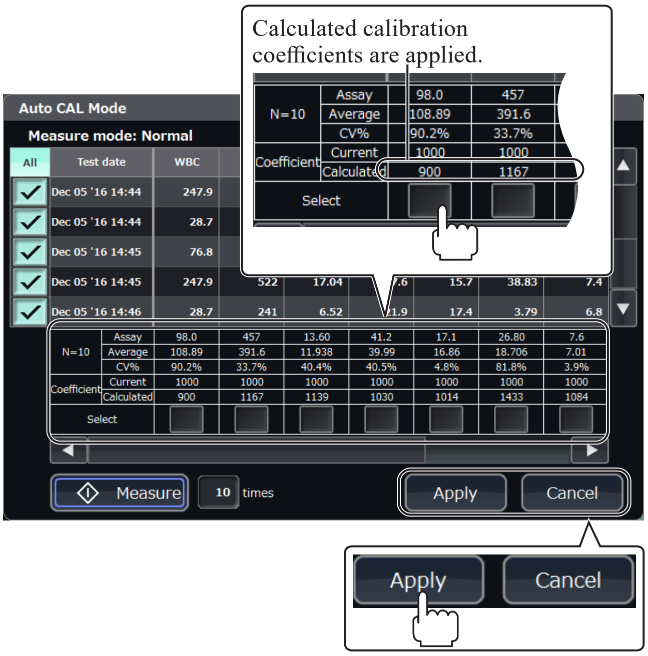
[Cancel]: Discards all data including the measurement data and returns to the Calibration window.

6 Select 10 or more sets of measurement data to do a statistical calculation.

NOTE: If the number of measurement data is less than 10, repeat measurement.

- To unselect, touch the selected data again.
- Touch [All] to select or unselect all items.

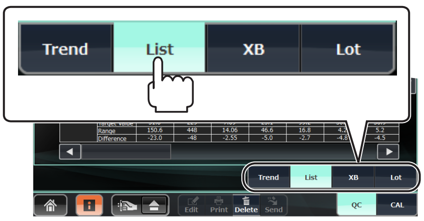
7 Check the data, select the parameter column to change the calibration coefficient, and touch [Apply].



8 Check that the calibration coefficient is correctly applied on the Calibration window.

9 Perform a quality control measurement using a hematology control and check that the result is within the control range.

Operator's Manual:
"Measuring the Hematology Control" in Section 6



On the QC window, touch [List] to open the List window.

The List window displays the measurement data of the hematology control in the list.

The data on the Trend window is linked to that on the List window.

Write down the changed measurement values, calibration coefficients and gain in (96) to (111).

Checking the Accuracy and Precision

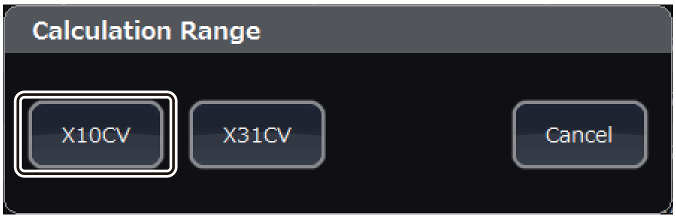
(112) to (135) Average values and CV values of each measured parameter on the [Calculation] window

1 Set the MEK-5DN hematology control in the first position of the sample tube rack and touch the [Measure 10 Times] key on the [Maintenance] > [Service] window.

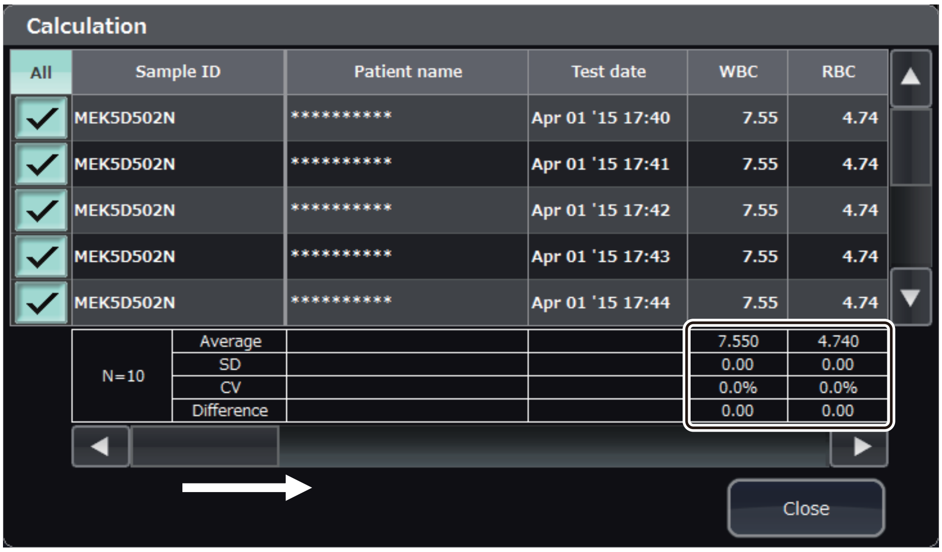
2 The analyzer consecutively measures the hematology control 10 times.

3 Return to the [Home] screen, select the last data measured at this time on the [Data List] window and touch the [Calculation] key.

Touch the [X10CV] key on the [Calculation Range] window.



Check the average values and CV values of each measured parameter on the [Calculation] window and write them down in (112) to (135).



Option Related

(136), (137) External printer

Check that paper feeding is normal.

Check that recording quality is normal.

(138) Communication

Check that data is transferred correctly.

Barcode Reader

(139) Internal barcode reader

Check that barcodes are read correctly.

(140) External barcode reader

Check that barcodes are read correctly.

Others

(141) Check the software version.

Touch the [Software] key at the lower right of the [Maintenance] window to open the Software window.

Check and write down the software version.

Maintenance Check Sheet

Fill out and save this check sheet each time you do maintenance or service.

Date: ____________________________

Customer: ____

Customer Address: ____

Service Personnel: ______________________________ Service Company: ____________________________

Instrument Name: Hematology Analyzer Instrument Model: MEK-9100

Instrument Serial Number: ________________________ Hardware Revision: ___________________________

Software Version: ____

Cleaning Protein

(1) Protein cleaning operation	Yes	No
(2) Cleaning with Sodium Hypochlorite	Yes	No

Reagents

(3) Nihon Kohden recommended diluent, detergent and hemolysing reagent are used.	Yes	No
(4) ISOTONAC•3/4 diluent is not past the expiration date.	Yes	No
(5) CLEANAC•710 detergent is not past the expiration date.	Yes	No
(6) CLEANAC•810 detergent is not past the expiration date.	Yes	No
(7) HEMOLYNAC•310 hemolysing reagent is not past the expiration date.	Yes	No
(8) HEMOLYNAC•510 hemolysing reagent is not past the expiration date.	Yes	No

Appearance

(9) There is no damage in the exterior and the exterior is not dirty or scratched.	Yes	No
(10) There is no fluid leakage.	Yes	No
(11) The waste tray does not contain residue from a fluid leak.	Yes	No
(12) The racks are not dirty.	Yes	No
(13) The rack barcodes are not dirty or peeling.	Yes	No
(14) The adapter is not dirty.	Yes	No
(15) The sample conveyor (autoloader) is not dirty.	Yes	No
(16) The aspiration unit or a switch or key is not cracked or loose.	Yes	No
(17) The labels are not dirty or peeling.	Yes	No
(18) The reagents are connected correctly, and the tubes are not broken, bent or clogged.	Yes	No
(19) The peripheral devices are connected correctly, and the connection cables are not damaged.	Yes	No
(20) Consumables such as recording paper have not run out.	Yes	No

Safety

(21) A 3-prong AC power cord is used and the prongs are not deformed.	Yes	No
(22) Earth leakage current is 0.5 mA or less under normal condition.	Yes (_____ mA)	No
(23) Earth leakage current is 1.0 mA or less under each single fault condition.	Yes (_____ mA)	No
(24) The protective earth wire is checked.	Yes	No

Basic Operations

(25) The analyzer starts normally.	Yes	No
(26) The self check operation is normal.	Yes	No
(27) Date and time settings are checked.	Yes	No
(28) The display is checked.	Yes	No
(29) The touch positions of the touch screen are correct.	Yes	No
(30) Total operation time:	_____ hours	
(31) Total times used:	_____ times	

Inside the Analyzer

(32) The sampling needle is checked and replaced.	Yes	No
(33) The venting needle is checked and replaced.	Yes	No
(34) The two rinse chassis are checked.	Yes	No
(35) The sample rotator for barcode is checked.	Yes	No
(36) The sample cup tray is checked.	Yes	No
(37) The filter is checked and replaced.	Yes	No
(38) The waste container sensor is checked.	Yes	No
(39) The aperture caps are checked.	Yes	No
(40) The cleaning operation is checked.	Yes	No

A

The AD Sensor

(41) CLEANAC•710: _____ V filled with fluid (Acceptable range: 0.3 to 0.5 V)
(42) HEMOLYNAC•310: _____ V filled with fluid (Acceptable range: 0.3 to 0.5 V)
(43) HEMOLYNAC•510: _____ V filled with fluid (Acceptable range: 0.3 to 0.5 V)
(44) HGB voltage ON: _____ V (Acceptable range: 4.00 ±0.50 V)
(45) HGB voltage OFF: _____ V (Acceptable range: 0.05 to 0.15 V)
(46) SS voltage ON: _____ V (Acceptable range: 4.00 ±0.50 V)
(47) SS voltage OFF: _____ V (Acceptable range: 0.05 to 0.15 V)

Self Check Results

(48) Cup temperature: _____°C (°F) (Acceptable range: 37.00 to 43.00°C (98.60 to 109.40°F))
(49) Cup heater temperature: _____°C (°F) (Acceptable range: 35.00 to 45.00°C (95.00 to 113.00°F))
(50) Sample tank temperature: _____°C (°F) (Acceptable range: 37.00 to 43.00°C (98.60 to 109.40°F))
(51) Sample tank heater temperature: _____°C (°F) (Acceptable range: 35.00 to 45.00°C (95.00 to 113.00°F))
(52) Diluent temperature: _____°C (°F) (Acceptable range: 10.00 to 50.00°C (50.00 to 122.00°F))
(53) HGB LED temperature: _____°C (°F) (Acceptable range: 10.00 to 50.00°C (50.00 to 122.00°F))
(54) SS LED temperature: _____°C (°F) (Acceptable range: 10.00 to 50.00°C (50.00 to 122.00°F))
(55) Internal chassis temperature: _____°C (°F) (Acceptable range: 10.00 to 50.00°C (50.00 to 122.00°F))
(56) ISO chamber air pressure: _____ kPa (Acceptable range: –8.00 to +8.00 kPa)
(57) ISO chamber positive pressure: _____ kPa (Acceptable range: 57.96 to 80.04 kPa)
(58) ISO chamber negative pressure: _____ kPa (Acceptable range: –35.00 to–25.00 kPa)
(59) Waste Chamber1 air pressure: _____ kPa (Acceptable range: –8.00 to +8.00 kPa)
(60) Waste Chamber1 positive pressure: _____ kPa (Acceptable range: 57.96 to 80.04 kPa)
(61) Waste Chamber1 negative pressure: _____ kPa (Acceptable range: –35.00 to –25.00 kPa)
(62) WBC: _____ (Acceptable range: 73.9 ±5%) (70.2 to 77.5)
(63) RBC: _____ (Acceptable range: 56 ±5%) (53 to 59)
(64) MCV: _____ (Acceptable range: 39.7 ±5%) (37.7 to 41.7)
(65) DIFF: _____ (Acceptable range: 6000 ±5%) (5700 to 6300)
(66) W-voltage: _____ V (Acceptable range: 18.1 V ±0.6%) (17.5 to 18.7 V)
(67) R-voltage: _____ V (Acceptable range: 18.1 V ±0.6%) (17.5 to 18.7 V)
(68) HGB ON voltage: _____ V (Acceptable range: 4.0 V ±0.5 V) (3.50 to 4.50 V)

(69) HGB OFF voltage: _____ V (Acceptable range: 0.1 V ±0.05 V) (0.05 to 0.15 V)
(70) SS ON voltage: _____ V (Acceptable range: 4.0 V ±0.5 V) (3.50 to 4.50 V)
(71) SS OFF voltage: _____ V (Acceptable range: 0.1 V ±0.05 V) (0.05 to 0.15 V)
(72) WBC: _____ (Acceptable range: 2.0 or less ($\times 10^2/\mu L$))
(73) RBC: _____ (Acceptable range: 2 or less ($\times 10^4/\mu L$))
(74) HGB: _____ (Acceptable range: 0.10 g/dL or less)
(75) PLT: _____ (Acceptable range: 1.00 or less ($\times 10^4/\mu L$))
(76) TOC: _____ (Acceptable range: 100 count or less)

Particle Distribution

(77) FS CV: _____% (Acceptable range: 5.0% or less)
(78) FL CV: _____% (Acceptable range: 5.0% or less)
(79) TOC: _____ (Acceptable range: 2000 count or more)

Current Calibration Coefficients

(80) WBC: _____ (Normal), _____ (Pre-dilution), _____ (WBC High)
(81) RBC: _____ (Normal), _____ (Pre-dilution)
(82) HGB: _____ (Normal), _____ (Pre-dilution), _____ (WBC High)
(83) HCT: _____ (Normal), _____ (Pre-dilution)
(84) RDW-CV: _____ (Normal), _____ (Pre-dilution)
(85) PLT: _____ (Normal), _____ (Pre-dilution)
(86) MPV: _____ (Normal), _____ (Pre-dilution)
(87) NE%: _____ (Normal), _____ (Pre-dilution), _____ (WBC High)
(88) LY%: _____ (Normal), _____ (Pre-dilution), _____ (WBC High)
(89) MO%: _____ (Normal), _____ (Pre-dilution), _____ (WBC High)
(90) EO%: _____ (Normal), _____ (Pre-dilution), _____ (WBC High)
(91) BA%: _____ (Normal), _____ (Pre-dilution), _____ (WBC High)

Current Gains

(92) FS GAIN: _____
(93) FL GAIN: _____
(94) SD GAIN: _____
(95) FS THR.: _____

New Calibration Coefficients

(96) WBC: _____ (Measurement value), _____ (Calibration coefficient)
(97) RBC: _____ (Measurement value), _____ (Calibration coefficient)
(98) HGB: _____ (Measurement value), _____ (Calibration coefficient)
(99) HCT: _____ (Measurement value), _____ (Calibration coefficient)
(100) RDW-CV: _____ (Measurement value), _____ (Calibration coefficient)
(101) PLT: _____ (Measurement value), _____ (Calibration coefficient)
(102) MPV: _____ (Measurement value), _____ (Calibration coefficient)
(103) NE%: _____ (Measurement value), _____ (Calibration coefficient)
(104) LY%: _____ (Measurement value), _____ (Calibration coefficient)
(105) MO%: _____ (Measurement value), _____ (Calibration coefficient)
(106) EO%: _____ (Measurement value), _____ (Calibration coefficient)
(107) BA%: _____ (Measurement value), _____ (Calibration coefficient)

New Gains

(108) FS GAIN: _____ (Measurement value), _____ (Gain value)
(109) FL GAIN: _____ (Measurement value), _____ (Gain value)
(110) SD GAIN: _____ (Measurement value), _____ (Gain value)
(111) FS THR.: _____ (Measurement value), _____ (Gain value)

Accuracy and Precision

Item	Average	CV
(112) WBC		
(113) RBC		
(114) HGB		
(115) HCT		
(116) MCV		
(117) MCH		
(118) MCHC		
(119) RDW-CV		
(120) RDW-SD		
(121) PLT		
(122) PCT		
(123) MPV		
(124) PDW		
(125) P-LCR		
(126) NE		
(127) LY		
(128) MO		
(129) EO		
(130) BA		
(131) NE%		
(132) LY%		
(133) MO%		
(134) EO%		
(135) BA%		

Options

(136) Paper feeding is corrected (when the external printer is connected). Yes No
(137) Recording quality is normal (when the external printer is connected). Yes No
(138) Data is transferred correctly (communication). Yes No
(139) Barcodes are read correctly (internal). Yes No
(140) Barcodes are read correctly (external). Yes No

Software Version

(141) Software version: ___________

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Contact information is accurate as of October 2020. Visit https://www.nihonkohden.com/ for the latest information.

The model and serial number of your device are identified on the rear or bottom of the unit.
Write the model and serial number in the spaces provided below. Whenever you call your representative concerning this device, mention these two pieces of information for quick and accurate service.

Model ______________________ Serial Number ______________________

Your Representative

Note for users in the territory of the EEA and Switzerland:
Any serious incident that has occurred in relation to the device should be reported to the European Representative designated by the manufacturer and the Competent Authority of the Member State of the EEA and Switzerland in which the user and/or patient is established.

MEK-9100_0634-901044G

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1st Edition: 29 Sep 2015
8th Edition: 23 Apr 2021