Service Manual

Celltac ES

Automated Hematology Analyzer

MEK-7300K

0634-900772F

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.

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.

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

5 Adjustment

6 Hazards

7 Maintenance

8 Service Screen

Conventions Used in this Manual and Device

Dangers, Warnings and Cautions

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

Icons in this Manual

Icon	Description
	Gives additional information and suggestions.
	Indicates related pages in this or other manuals which give more details.

Text Conventions in this Manual

Names of hard keys on the analyzer are enclosed in square brackets: [Power]

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: 2007 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.

1 General

Introduction

> ⚠ **CAUTION**
> To maintain the instrument in normal condition, the user must perform the periodic maintenance. Refer to “Maintenance” of the operator’s manual.

This service manual provides useful information to qualified service personnel to understand, troubleshoot, service, maintain and repair the MEK-7300K Hematology Analyzer (referred to as “the instrument” in this service manual).

The maintenance must be periodically performed because the instrument 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 instrument has a problem and there has been no periodic maintenance, the instrument 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 instrument. This is because service personnel needs to understand the operation of the instrument in order to effectively use the information in the service manual.

Service Policy

⚠ CAUTION

Be careful not to directly touch any place where blood is or may spread to.

⚠ CAUTION

Wear rubber gloves to protect yourself from infection before doing maintenance.

Nihon Kohden Corporation’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 performing any maintenance procedure, use tools and equipment for which quality control has been performed.
- When ordering parts or accessories from your nearest Nihon Kohden Corporation’s representative, please quote the NK code number and part name which is 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 Corporation to assure maximum performance from your instrument.

Specifications

Function and Performance

Measured Parameters, Ranges and Reproducibility to Specimen

Specifications except WBC population were determined using hematology control blood (MEK-5DN), counted 10 times consecutively.

Measured Parameters	Measuring Range	Reproducibility to Specimen (CV: Coefficient of Variation)
WBC: White blood cell count	0 to 299 × 10^3/µL	within 2.0%CV
NE%: Neutrophil percent	0 to 99.9%	within 5.0%CV
LY%: Lymphocyte percent	0 to 99.9%	within 5.0%CV
MO%: Monocyte percent	0 to 99.9%	within 12.0%CV
EO%: Eosinophil percent	0 to 99.9%	within 20.0%CV
BA%: Basophil percent	0 to 99.9%	within CV30.0% (>2%) or average value ±1% (0 to 2%)
NE: Neutrophil count	0 to 299 × 10^3/µL	—
LY: Lymphocyte count	0 to 299 × 10^3/µL	
MO: Monocyte count	0 to 299 × 10^3/µL	
EO: Eosinophil count	0 to 299 × 10^3/µL	
BA: Basophil count	0 to 299 × 10^3/µL	
RBC: Red blood cell count	0 to 14.9 × 10^6/µL	within 1.5%CV
HGB: Hemoglobin concentration	0 to 29.9 g/dL	within 1.5%CV
HCT: Hematocrit	0 to 99.9%	—
MCV: Mean cell volume	20 to 199 fL	within 1.0%CV
MCH: Mean cell hemoglobin	10 to 50 pg	—
MCHC: Mean cell hemoglobin concentration	10 to 50 g/dL	
RDW-CV: Red blood cell distribution width	0 to 50%	
PLT: Platelet count	0 to 1490 × 10^3/µL	within 4.0%CV
PCT: Platelet crit	0 to 2.9%	—
MPV: Mean platelet volume	0 to 20.0 fL	
PDW: Platelet distribution width	0 to 50%	

Detection Method

Blood cell count:	Electrical resistance detection
Hemoglobin:	Surfactant method (colorimetric method)
Hematocrit:	Histogram calculation
RBC distribution width:	Calculated from RBC, HGB and HCT
WBC population:	Light scatter by laser
Platelet crit:	Histogram calculation
Mean platelet volume:	Calculated from PLT and PCT
RBC distribution width:	Histogram calculation
Platelet distribution width:	Histogram calculation

Standardization Analysis Method

WBC:	ICSH1988	ICSH: The assignment of values to fresh blood used for calibrating automated blood cell counters. Clin Lab Haematol, 10:203-212, 1988
RBC:	ICSH1988	ICSH: The assignment of values to fresh blood used for calibrating automated blood cell counters. Clin Lab Haematol, 10:203-212, 1988
HGB:	CLSI H15-A3:	H15-A3: Reference and Selected Procedures for the Quantitative Determination of Hemoglobin in Blood; Approved Standard – Third Edition (2000)
HCT:	CLSI H7-A3:	H7-A3: Procedure for Determining Packed Cell Volume by the Microhematocrit Method; Approved Standard – Third Edition (2000)
PLT:	ICSH/WHO 2000:	Recommended methods for the visual determination of white cell count and platelets count. WHO/DIL/00.3, 2000

Dilution Ratio

- Venous blood

Sample volume:	55 µL (for 23 parameters)/30 µL (for WBC, RBC, HGB, HCT, MCV, MCH, MCHC, and PLT)
WBC/HGB:	200:1
RBC/PLT:	40,000:1

- Pre-dilution blood

Sample volume:	10 µL	20 µL
WBC/HGB:	1200:1	600:1
RBC/PLT:	240,000:1	120,000:1

- Capillary mode

Sample volume:	10 µL
WBC/HGB:	600:1
RBC/PLT:	120,000:1

Counting Time

Open mode:	63 s/sample (from measurement start to data display)
Closed mode:	75 s/sample (from measurement start to data display)

Display

Display:	10.4 inch, LCD with backlight and touch screen keys
Resolution:	800 × 600 dots
Screen size:	approx. 211.2 × 158.4 mm
Display contents:	Numerical data, scattergrams, histograms, measuring conditions, alarm message and other messages, touch screen keys

Data Storage

Numerical data for all counted parameters for up to 400 samples and histograms and scattergrams for up to 50 samples

Operating Environmental Conditions

Temperature:	15 to 30ºC (59 to 86°F)
Humidity:	30 to 85% (noncondensing)
Atmospheric pressure:	700 to 1060 hPa
Altitude:	less than 3000 m

Transport and Storage Environmental Conditions

Temperature:	–20 to +60ºC (–4 to +140°F)
Humidity:	10 to 95% (noncondensing)
Atmospheric pressure:	700 to 1060 hPa

Power Requirements

Power requirements:	100 to 240 V ± 10% AC, 50/60 Hz
Power consumption:	200 VA

Dimensions and Weight

Dimensions:	382 W × 465 D × 532 H (mm)
Net weight:	approx. 35 kg

Electromagnetic Compatibility

IEC 61326-1:2005
IEC 61326-1:2012
IEC 61326-2-6:2005
IEC 61326-2-6:2012
CISPR11:2003, Group 1, Class B
CISPR11:2009+Amendment 1:2010
EN 61326-1:2006
EN 61326-1:2013
EN 61326-2-6:2006
EN 61326-2-6:2013
EN 55011:2002, Group 1, Class B
EN 55011:2009+Amendment 1:2010

The power supply short interruption test is performed through a transformer which has at least three times the power capacity of the instrument.

Safety Standards

IEC 61010-1 2nd Edition:2001
IEC 61010-1:2010+Amendment 1:2016
IEC 61010-2-081:2001
IEC 61010-2-081:2001+Amendment 1:2003
IEC 61010-2-081:2019
IEC 61010-2-101:2002
IEC 61010-2-101:2018
EN 61010-1 2nd Edition:2001
EN 61010-1:2010+Amendment 1:2019+Amending Corrigendum:2019
EN 61010-2-081:2001
EN 61010-2-081:2015
EN 61010-2-101:2002
EN 61010-2-101:2017

Laser: IEC 60825-1:2014
EN 60825-1:2014

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 a 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

EQUIPMENT types (classification):
Indoor stationary EQUIPMENT

Pollution Degree: 2 EQUIPMENT

Requirements for marking of IN VITRO DIAGNOSTIC instruments:
EN1658:1996

Bar Code Specifications

Bar Code Format

The following formats with or without check digits are acceptable:

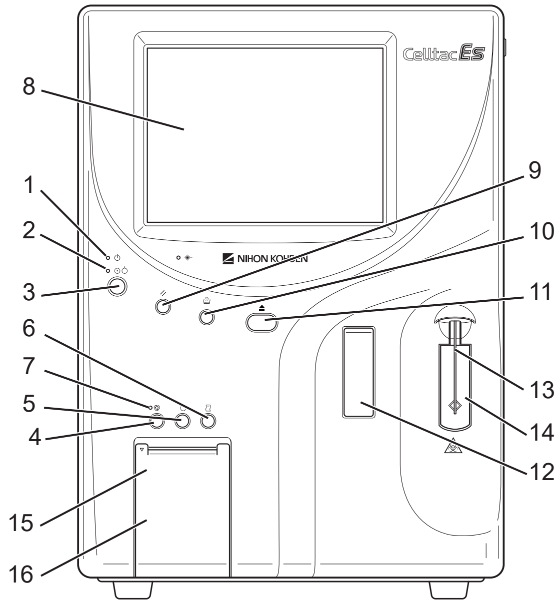
- Industrial 2 of 5
- ITF
- JAN/EAN/UPC
- NW-7
- CODE 39
- CODE 93
- CODE 128

Bar Code Label Specifications

Refer to “Bar Codes” in Section 12 for complete information on bar code label formats, check digits and specifications.

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] key on the front panel are turned on.

3 Power key

Turns the analyzer power on or off when the [Main power] switch on the rear panel is turned on. When the power is turned on, priming and self-check are automatically performed and the Ready screen appears.

4 Auto print key

Switches the printing mode between automatic and manual for the printer.

5 Feed key

Feeds paper of the printer while held down.

6 Print key

Prints displayed data on the printer.

7 Auto print mode lamp

Lights when automatic printing mode is selected.

8 LCD display

Displays various messages, measured data and touch screen keys.

9 Reset key

Stops operation when pressed during operation. Returns to the Ready screen when pressed while changing settings. Use this key only when an error occurs.

10 Clean key

Cleans the fluid path, aperture and manometer with detergent. Automatically primes after cleaning the fluid path. Press this key when clogging occurs, the manometer becomes dirty or bubbles occur in the manometer.

11 Eject key

For closed mode only. Opens the tube holder to set the sample tube.

12 Tube holder

For closed mode only. Holds a sealed vacuum blood collecting tube. Press the [Eject] key to open. After measurement, the holder automatically opens.

13 Sampling nozzle

For open mode only. Aspirates the sample. Dispenses the diluent when in the pre-dilution blood mode.

14 Count switch

For open mode only. Aspirates the sample and starts counting.

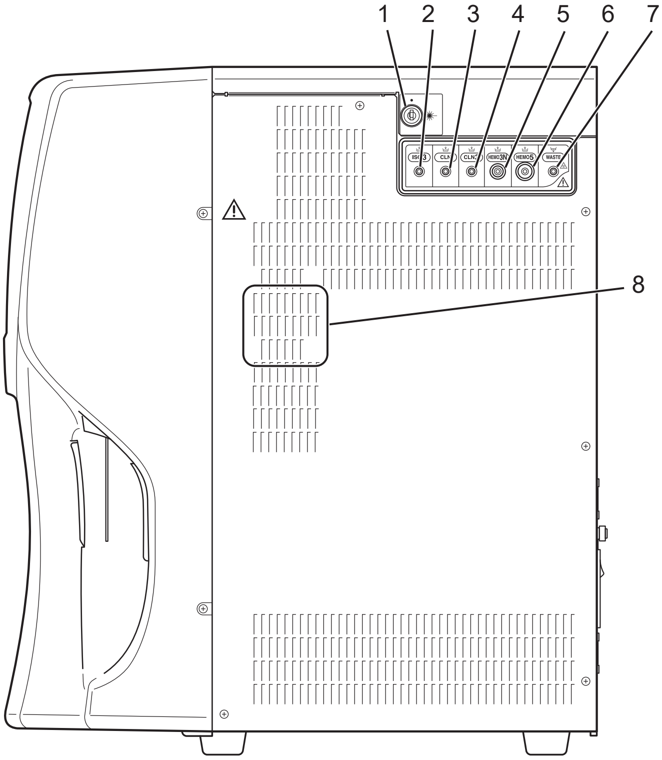
15 Printer unit (WA-730VK)

Thermal array printer. Prints out measured data and sample ID number (optional).

16 Printer door

For the recording paper of the WA-730VK printer unit. To open, pull the upper left corner (optional).

Right Side Panel



1 Laser switch

Turns the laser on or off with the laser key for WBC 5 part differential measurement.

2 ISO3
Diluent inlet

Inlet for the ISOTONAC•3 diluent.

3 CLN
Detergent inlet

Inlet for the CLEANAC detergent.

4 CLN3
Detergent inlet

Inlet for the CLEANAC•3 detergent.

5 HEMO3N
Lysing reagent inlet

Inlet for the Hemolynac•3N lysing reagent.

6 HEMO5
Lysing reagent inlet

Inlet for the Hemolynac•5 lysing reagent.

7 WASTE
Waste outlet

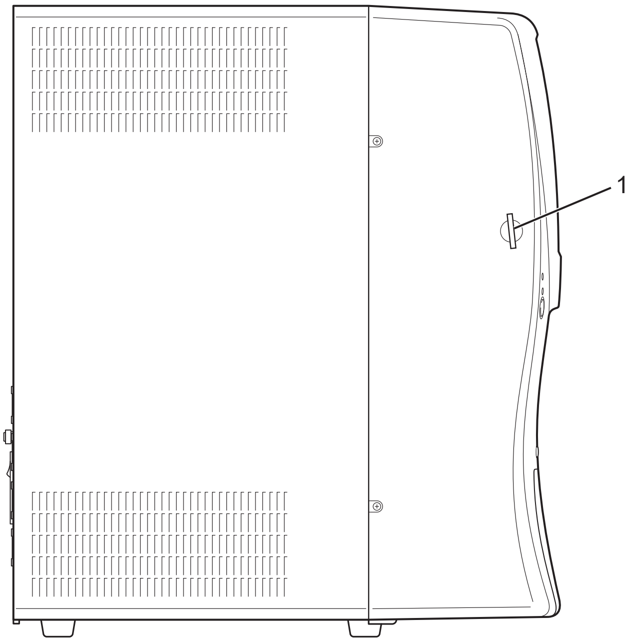
Outlet for waste such as used lyse, detergent and aspirated samples.

8 Vent hole for fan

Vent hole for the fan.

NOTE: Do not block the hole. It affects the measurement capability.

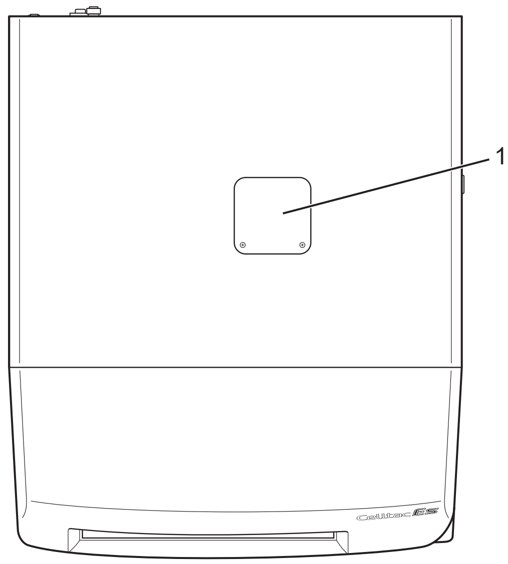
Left Side Panel



1 SD card slot

Insert an SD memory card.

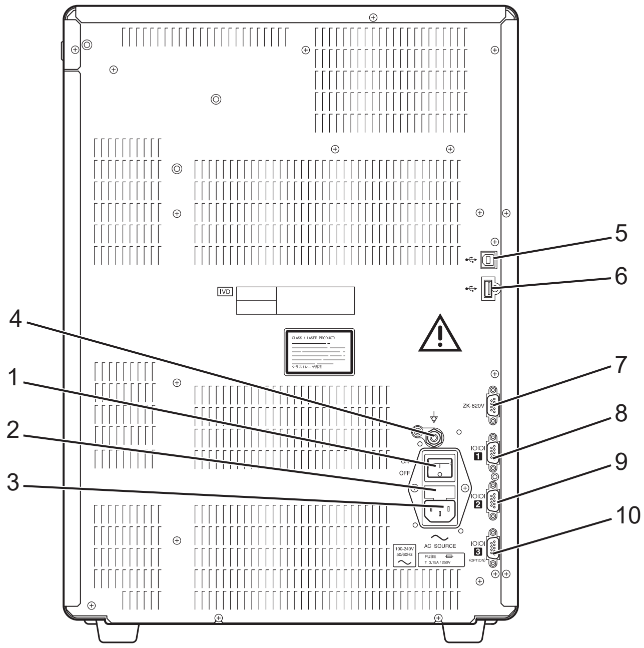
Top Panel



1 Flow cell cover

For adjusting the flow cell position.

Rear Panel



1 Main power switch

Supplies the power to the analyzer when it is turned on. Under normal conditions keep this switch turned on.

2 Fuse holder

Contains the time lag fuse. To replace the fuse, contact your Nihon Kohden representative.

3 Power socket

Connects the AC power cord to supply AC power to the analyzer.

4 Equipotential ground terminal

Connects the ground lead to the equipotential ground terminal on the wall for earth grounding.

5 USB socket (device)

Connects a personal computer to send and receive data.[1]

6 USB socket (host)

Connects a barcode reader (Keyence BL-N60UB or equivalent).

7 ZK-820V Bar code reader socket

Connects to an optional ZK-820V hand-held bar code reader and supplies power to the bar code reader when connected.
Power supply voltage: 5 V DC (pin 9: 5 V, pin 5: GND)
Rated current: 200 mA

8 Serial port 1

Connects to the optional WA-731V/461V card printer or PC.

9 Serial port 2

Connects to the optional WA-731V/461V card printer or PC.

10 Option port

Connects to the external instrument.

[1] To connect to a personal computer, the QP-822V data management software is required.

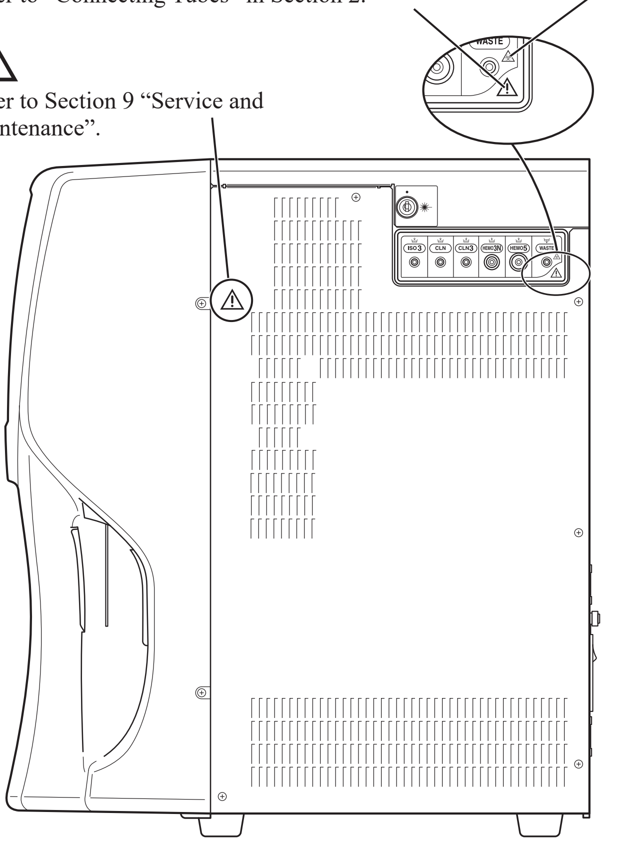
Caution Labels on the Analyzer

On the Analyzer

Refer to “Connecting Tubes” in Section 2.

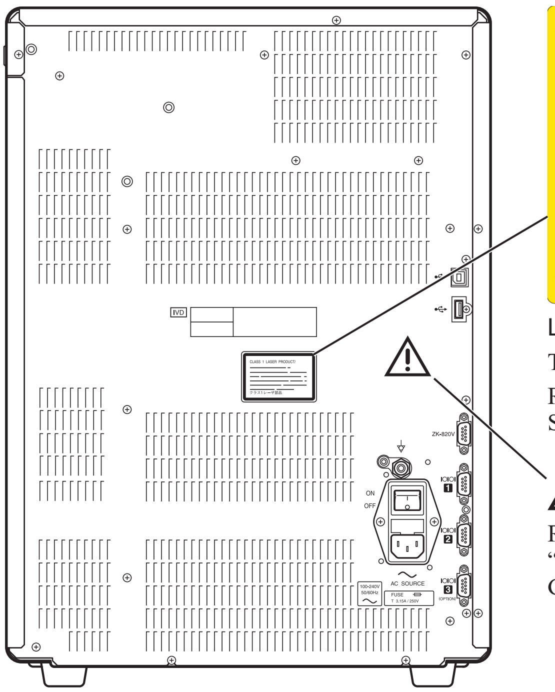
Refer to Section 9 “Service and Maintenance”.

Refer to “Waste Disposal Requirements” in Section 2.



⚠ WARNING

Potential Biohazard. Consider all clinical specimens, reagents, controls, surfaces, or components that contain or have contacted blood, serum, or other bodily fluid as potentially infectious. Wear gloves, lab coats, and safety glasses, and follow other biosafety practices as specified in the OSHA Bloodborne Pathogen Rule (29 CFR Part 1910.1030)1 or other equivalent biosafety procedures.



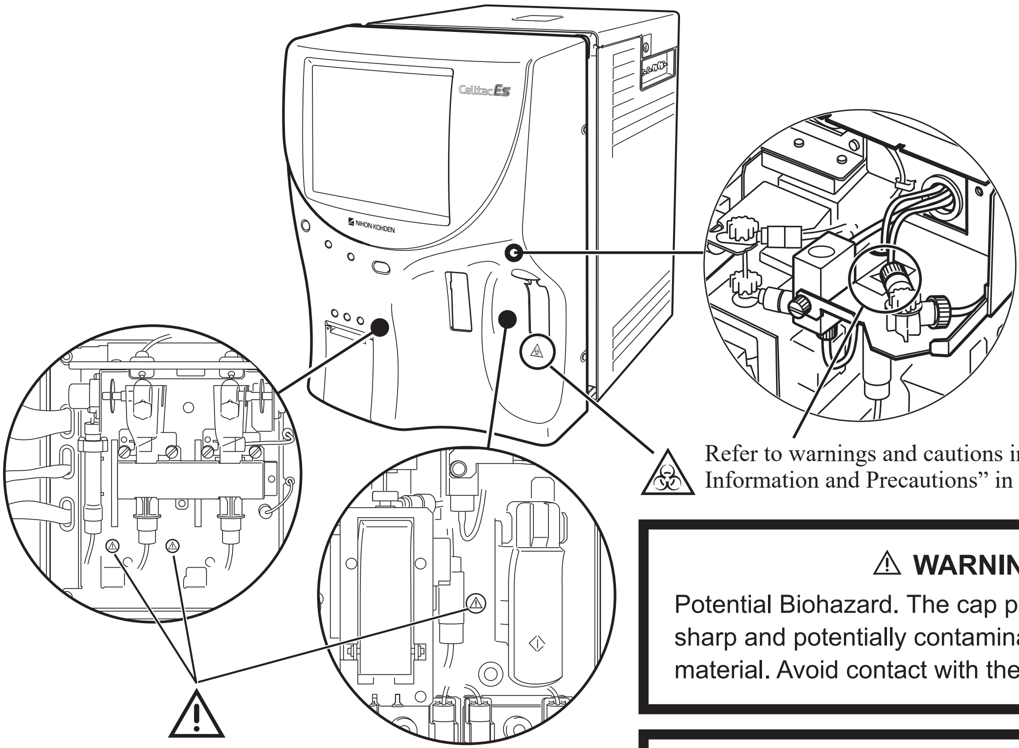
CLASS 1 LASER PRODUCT/
Lasergerät der Klasse 1/
Produit laser de classe 1/Láser de clase 1/Prodotto laser di classe 1/
Produto laser da classe 1/Klasse 1-laserprodukt/Klass 1 laserprodukt/
Προϊόν λέιζερ κλάσης 1
1 类激光产品
クラス 1 レーザ製品
IEC 60825-1 : 2014 6124-912641(00)

Laser class label

The analyzer is a class 1 laser product.

Refer to “Turning the Laser Switch On” in Section 2.

Refer to warnings and cautions in “Connecting the Power Cord and Grounding the Analyzer” in Section 2.



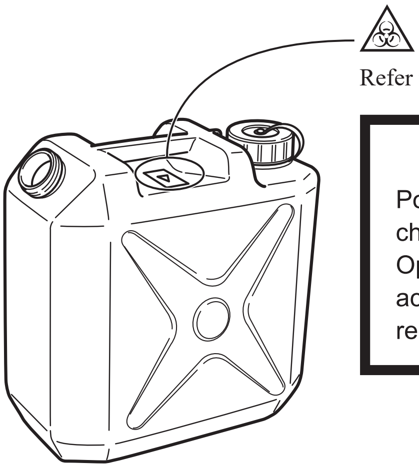
Refer to warnings and cautions in “Hazard Information and Precautions” in Section 8.

> ⚠ **WARNING**
>
> Potential Biohazard. The cap pierce nozzle is sharp and potentially contaminated with infectious material. Avoid contact with the tip of the probe.

NOTE
- Replace the filters periodically.
- When attaching the filter joint assembly, be careful not to bend or damage the filter packing at the bottom of the measurement bath.
- When there is a leakage, check that there is no scratch or damage to the circumference of the filter.

> ⚠ **WARNING**
>
> Potential Biohazard. Consider all clinical specimens, reagents, controls, surfaces, or components that contain or have contacted blood, serum, or other bodily fluid as potentially infectious. Wear gloves, lab coats, and safety glasses, and follow other biosafety practices as specified in the OSHA Bloodborne Pathogen Rule (29 CFR Part 1910.1030)1 or other equivalent biosafety procedures.

On the Waste Container (Option)



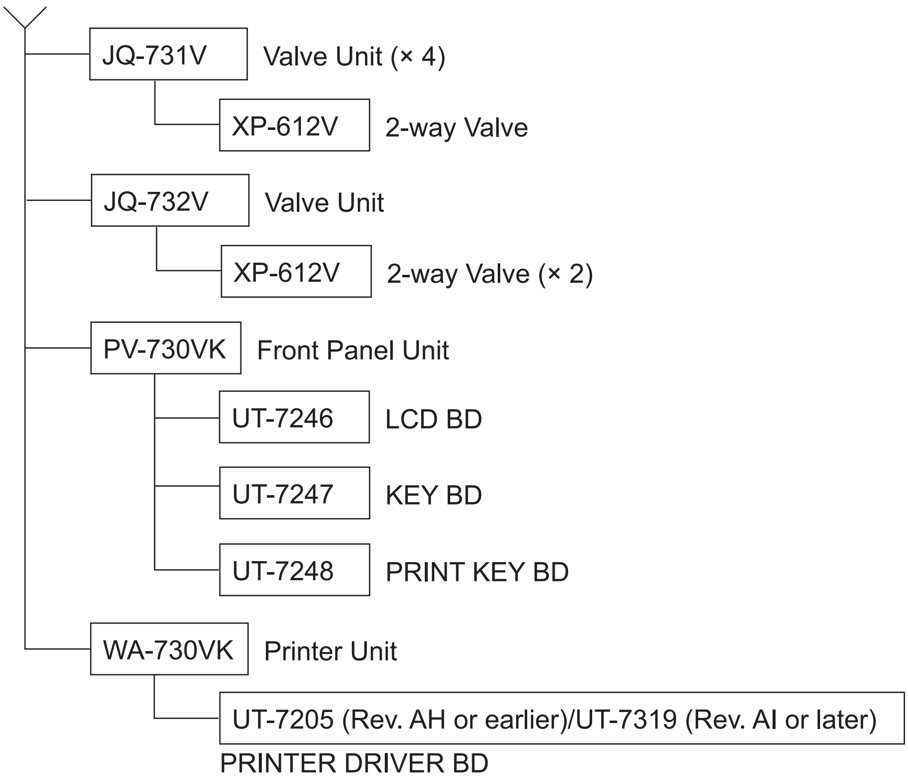
Refer to “Waste Disposal Requirements” in Section 2.

> ⚠ **WARNING**
>
> Potential Biohazard. Observe all biosafety and chemical hazard precautions for waste disposal. Operators are responsible for disposing of waste in accordance with local, state, and federal regulations.

Composition

- **MEK-7300K**
  - UT-7241 (Rev. AI or earlier)/UT-7320 (Rev. AJ or later) MAIN BD
  - UT-7242 POWER BD
  - UT-7243 (Rev. AI or earlier)/UT-7321 (Rev. AJ or later) DRIVER BD
  - UT-7244 ANALOG BD
  - UT-7238 VALVE CONNECTION BD1
  - UT-7240 VALVE CONNECTION BD3
  - MC-730V CBC Measuring Unit
    - UT-7201 HGB AMP BD
    - UT-7202 HGB LED BD
    - UT-7249-01 MEASURING BD (RBC)
    - UT-7249-01 MEASURING BD (WBC)
    - UT-7250 CONNECTION BD
    - XP-602V 2-way Valve (× 2)
    - XP-612V 2-way Valve (× 7)
  - MJ-730V Flowcyto Piping Unit
    - XP-513V 3-way Valve
    - XP-612V 2-way Valve (× 21)

- MO-820V2 LASER OPTICAL UNIT
  - UT-7172 MO PREAMP BD
    - UT-7173 MO FS PREAMP BD
    - UT-7174 MO FL PREAMP BD
    - UT-7175 MO SD PREAMP BD
  - UT-7176 MO LD DRIVER BD
- MP-640V Pump Unit
- MP-640V Pump Unit
- MP-730V Mixed Pump Unit
  - UT-7200 MIXED PUMP BD
  - XP-513V 3-way Valve
- MP-731V Triple Pump Unit
  - UT-7239 VALVE CONNECTION BD2
  - XP-503V 3-way Valve (× 2)
- MS-730V Sampler Unit
  - UT-7234 SAMPLER JUNCTION BD
  - UT-7235 SAMPLER SENSOR BD
- MS-731V Cap Pierce Unit
- JQ-730V Inlet/outlet Unit
  - UT-7236 LIQUID SENSOR BD
  - XP-612V 2-way Valve (× 4)



Change Information

UT-7241/UT-7320 MAIN BD and UT-7243/UT-7321 DRIVER BD

The designs of the MAIN BD and DRIVER BD have been changed. There is no compatibility between the old and new boards. The models of the boards (service parts) used for replacement are different according to the Rev. number of the analyzer.

Board	MEK-7300K Rev. No	Service Part
		Model
MAIN BD	Rev. AA to Rev. AI	UT-7241
	Rev. AJ or later	UT-7320
DRIVER BD	Rev. AA to Rev. AI	UT-7243
	Rev. AJ or later	UT-7321

When Replacing the UT-7243 DRIVER BD

When replacing a UT-7243 DRIVER BD that has a serial number of 04497 or earlier with a UT-7243 DRIVER BD that has a serial number of 04498 or later, replace the UT-7241 MAIN BD at the same time with a UT-7241 MAIN BD that has a serial number of 04518 or later.

When replacing only the UT-7241 MAIN BD, the UT-7243 DRIVER BD does not have to be replaced.

UT-7205/UT-7319 PRINTER DRIVER BD

The design of the PRINTER DRIVER BD have been changed. There is no compatibility between the old and new boards. The models of the boards (service parts) used for replacement are different according to the Rev. number of the analyzer.

Board	MEK-7300K Rev. No	Service Part Model
PRINTER DRIVER BD	Rev. AA to Rev. AH	UT-7205
	Rev. AI or later	UT-7319

NOTE: If the old UT-7205 PRINTER DRIVER BD has to be replaced with the new UT-7319 PRINTER DRIVER BD, update the analyzer software version to 02-17 or later.

When Replacing the WA-730VK Printer Unit

The service part of the WA-730VK printer unit includes a new UT-7319 PRINTER DRIVER BD. When replacing the WA-730VK printer unit in a hematology analyzer with Rev. AA to AH, update the analyzer software version to 02-17 or later when the PRINTER DRIVER BD in the printer unit is an old UT-0725 PRINTER DRIVER BD.

Refer to “UT-7205/UT-7319 PRINTER DRIVER BD” in this section.

Upgrading the Software

Use the QS-017WK upgrade software to upgrade the software of the MEK-7300K automated hematology analyzer. Consult your Nihon Kohden representative.

2 Troubleshooting and Error Code

Check Flowchart

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.

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

Check	NO
Check measurement environment • Reagent • Temperature • Sample	Check measurement environment and sample handling
YES ↓	
Check alarm at power on • No diluent • No detergent • No lysing reagent • Initial error • Prime error	Check unit failure from alarms
YES ↓	
Measure particles • CV values of TOC, FS and FL are within the standard (FS≤7%, FL≤7%)	• Check particle CV • Adjust flow cell position
YES ↓	
Measure background noise • Data is within the standard • No alarm occurs	• Check background noise • Background error • Check the damaged unit from alarm and error
YES ↓	
Measure MEK-5D hematology control • No alarm occurs • Reproducibility is fine • PLT • HGB • Parameters related to WBC and PLT • HGT and MCV • Data is correct (within the assay value limits)	• Check the damaged unit from alarm and error • Check accuracy
YES ↓	

Measure MEK-5D hematology control
- Classification reproducibility is fine
- Scattergram is normal

NO →
- Poor reproducibility
- Check the scattergram

YES ↓

Measure human blood
- Scattergram is normal
- No flag occurs

NO → Check the scattergram

YES ↓

Finish

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 30ºC (59 to 86ºF)
Humidity:	30 to 85%
Atmospheric pressure:	70 to 106 kPa

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 12 hours pass 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.
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 more than 24 hours, 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 flow path and causes analyzer failure such as clogging or high background.

Special Samples

Be careful about “Interference Substances” as described in Section 5 of the operator’s manual. They may affect the measurement value.

Leak

First, you must find the leak. Find the leak from the flow or crystals of liquid. Leak may occur in the following places except for the valve itself and connection joint.

1 Waste tube

2 WBC measurement bath

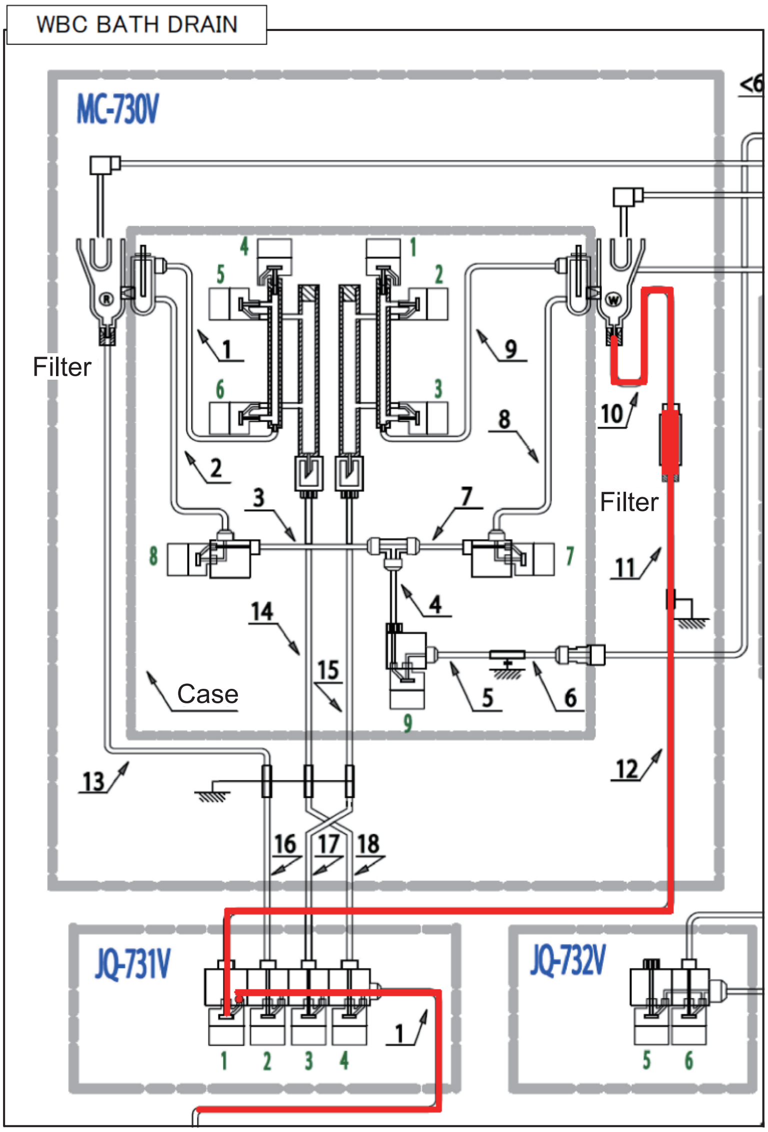
3 RBC measurement bath

4 Rinse chassis for open mode

5 Rinse chassis for closed mode

1 Waste tube

- When the leak occurs from the waste tube or waste port, a clog may occur between the waste container and tube. If the analyzer is used continuously, waste leaks continuously and infection may occur. Remove the cause.
- Check that the tube is not removed, bent or pressed under the analyzer.



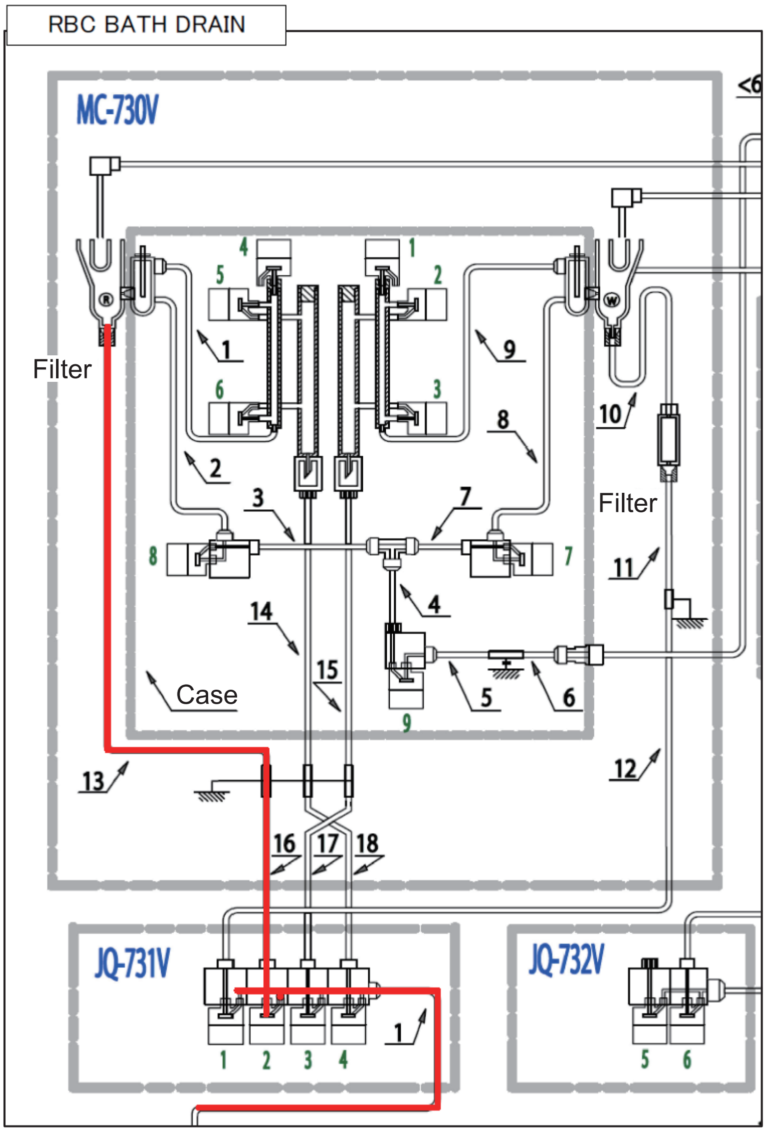
2 When the leak occurs in the WBC measurement bath, check the following.

- No clog form crystals or blood clot.
- The filter of the air trap which is connected to the WBC measurement bath is not clogged.
- The filter packing of the air trap is not deteriorated.
- The drain tube is not pressed or bent.
- The left MP-640V rotary pump rotates correctly.
- The 2-way valves 1 to 4 of the JQ-731V valve unit operate correctly (check on the maintenance screen).

3 When the leak occurs in the RBC measurement bath, check the following.

- No clog form crystals or blood clot.
- The filter packing of the RBC measurement bath is not deteriorated.
- The drain tube is not pressed or bent.
- The left MP-640V rotary pump rotates correctly.

- The 2-way valves 1 to 4 of the JQ-731V valve unit operate correctly (check on the maintenance screen).



4 **When the leak occurs from the rinse chassis for open mode, check the following.**

- The drain tube is not pressed or bent.
- The O-ring of the rinse chassis is not deteriorated.
- The right MP-640V rotary pump rotates normally.
- The 2-way valves 22, 23, 24 of the JQ-730V inlet/outlet unit operate normally (check on the maintenance screen).

5 **When the leak occurs from the rinse chassis for closed mode, check the following.**

- The drain tube is not pressed or bent.
- The right MP-640V rotary pump rotates normally.
- The 2-way valves 22, 23 and 24 of the JQ-730V inlet/outlet unit operate normally (check on the maintenance screen).
- The 2-way valves 5 and 6 of the JQ-732V valve unit operate normally (check on the maintenance screen).

Error Codes

If there are problems on the analyzer and correct measurement cannot be performed, the analyzer displays a system error on the screen and stops operation. When the Reset key is pressed, the analyzer restarts. If a serious problem such as bent sampling nozzle occurs, restart may cause secondary problems such as overflow of the reagents. Check the error code at the system error, condition of the sensor, unit, nozzle, sampling nozzle and measurement and sub bath by opening the front panel. Then perform troubleshooting.

Following is a list of the error codes and the probable trouble spot.

E001: Blood Pump Initial Error	E082: Lyse Pump Movement Error
E003: Blood Pump Movement Error	E101: Right Rotary Pump Initial Error
E021: Sampler Initial Error	E102: Left Rotary Pump Initial Error
E022: Vertical Sampler Movement Error	E122: Check Settings
E023: Horizontal Sampler Movement Error	E124: CBC Circuit Error
E041: WBC Subbus Initial Error	E125: 5Diff Circuit Error
E042: WBC Subbus Movement Error	E127: Watch Dog Timer Error
E051: RBC Subbus Initial Error	E128: Mix Chamber Warmer Control Error
E052: RBC Subbus Movement Error	E131: Sheath High Pressure Error
E061: Iso Pump Initial Error	E132: Sheath Pressure Sensor Error
E062: Iso Pump Movement Error	E133: COMMUNICATION ERROR
E071: Sample Pump Initial Error	E141: Cap Pierce Initial Error
E072: Sample Pump Movement Error	E142: Cap Pierce Movement Error
E081: Lyse Pump Initial Error	E145: Tube Holder Movement Error

E001: Blood Pump Initial Error

Phenomenon

The diluter syringe of the MP-730V mixed pump unit is initialized at power on and operation starts but the move to the default position is not detected.

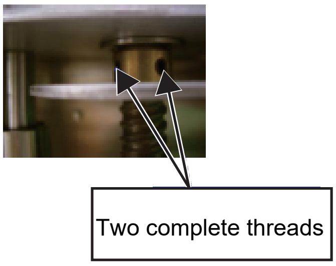
Detection sensor

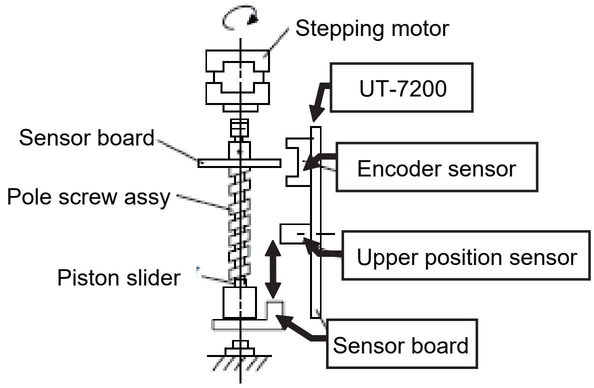
Upper position sensor (U014) of the MIXED PUMP BD (UT-7200) on the MP-730V.

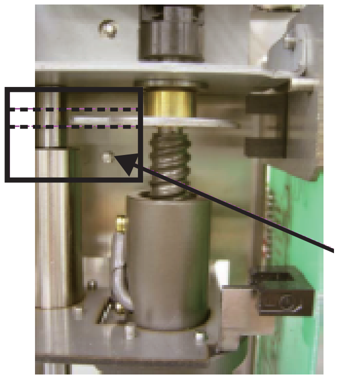
Detection method

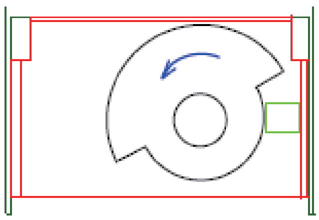
The sensor board is not detected 15 seconds after moving the motor of the MP-730V upward.

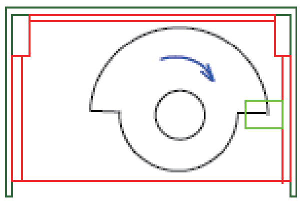
The MP-730V has two cylinders (diluter and sheath pump) and they operate separately. The upper position of the diluter cylinder is detected by the sensor board which moves with the motor. When it reaches the slit part, it cuts the sensor light. The moving distance of the diluter cylinder is detected by the sensor disk as it passes the slit of the encoder sensor.








ENCODE and ORIGIN LEDs light


ENCODE LED is off

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or break of the cable → Disconnect and connect the connector. Check continuity of the cable.
- Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

- Poor contact or break of the cable → Disconnect and connect the connector. Check continuity of the cable.
- Sensor signal receive IC failure. → Replace the UT-7200 MIXED PUMP BD.

E061: Iso Pump Initial Error

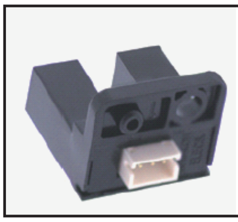
Phenomenon

The sheath syringe of the mixed pump unit is initialized at power on and operation starts but the move to the default position is not detected.

Detection sensor

Upper position sensor of the sheath pump

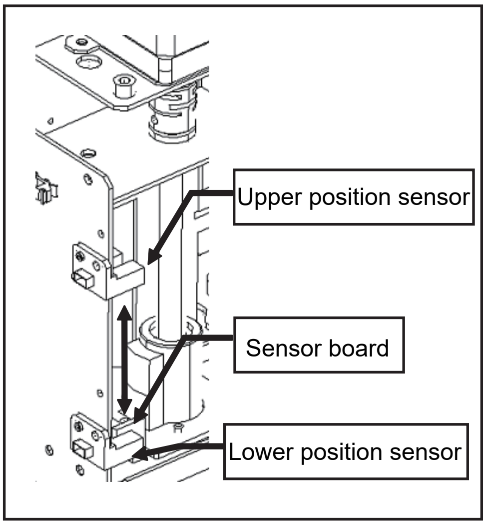
Name: KI1234-AALF photosensor (Code No. 676769A)



Pin position
1 +5V
2 Sensor signal
3 GND

Detection method

The upper position sensor does not detect the sensor board 15 seconds after the motor of the sheath pump drives to up.



The MP-730V has two cylinder (diluter and sheath pump) and they operate separately. The upper position sensor detects the upper drive for initialization of the sheath pump cylinder. The drive is detected by the sensor board which moves with the motor reaches the slit of the sensor and cuts the sensor light.

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or break of the cable → Disconnect and connect the connector. Check continuity of the cable.
- Failure of the drive IC of the motor → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

• Poor contact or cable break	→	Disconnect and connect the connector. Check cable continuity.
• Sensor failure.	→	Replace the sensor.
• Sensor signal receive IC failure. DRIVER BD.	→	Replace the UT-7243/UT-7321

E062: Iso Pump Movement Error

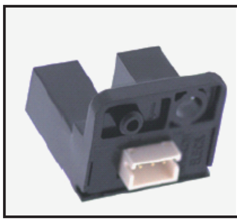
Phenomenon

The sheath pump syringe operates but the movement is not detected.

Detection sensor

Sheath pump upper position sensor and lower position sensor

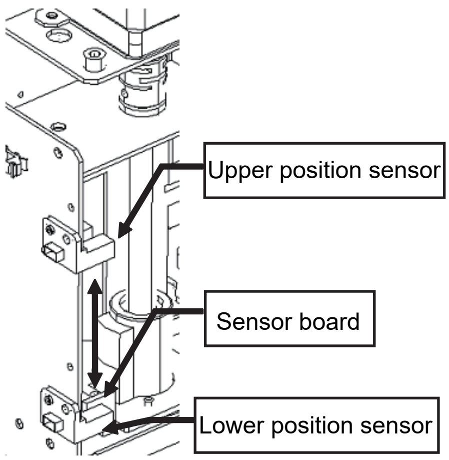
Name: KI1234-AALF photosensor (Code No. 676769A)



Pin position
1 +5V
2 Sensor signal
3 GND

Detection method

The upper position sensor does not detect the pass of the sensor board even 15 seconds after the motor of the sheath pump operates from the upper position.



MP-730V has two cylinders (diluter and sheath pump) and they operate separately. The upper and lower position sensor detect the up and down drive of the sheath pump cylinder of the MP-730V. The drive is detected by the sensor board which moves with the motor. When it reaches the slit of the sensor, it cuts the sensor light.

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or break of the cable → Disconnect and connect the connector. Check continuity of the cable.
- Failure of the drive IC of the motor → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

- Poor contact or break of the cable → Disconnect and connect the connector. Check cable continuity.
- Sensor signal receive IC failure → Replace the UT-7200 MIXED PUMP BD.

E021: Sample Initial Error

Phenomenon

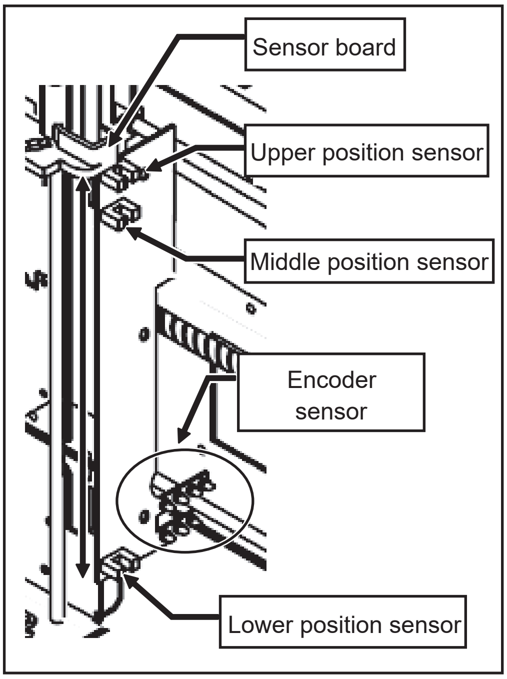
The move to the default position is not detected when the nozzle part of the sampler unit is initialized at power on and operation starts.

Detection sensor

PD0101 upper position sensor on the SAMPLER SENSOR BD

Detection method

The upper position sensor does not detect the sensor board 15 seconds after the Y axis motor drives to upward.



MP-730V moves the sampling nozzle with the two motors (X axis and Y axis). Y axis position is detected by the sensor board which moves with the motor until it reaches the slit of the sensor on the UT-7235 SAMPLER SENSOR BD and cuts the sensor light. The X axis position is detected by the sensor board which moves with the motor until it reaches the slit of the sensor on the UT-7235 SAMPLER SENSOR BD. The light of sensor 1 to 3 passes through the holes on the sensor board.

Cause

1. When the motor does not rotate
   - The drive part is caught. → Remove the cause of catch.
   - Poor contact or break of the cable → Disconnect and connect the connector. Check continuity of the cable. Flexible cable is deteriorated.
   - Failure of the drive IC of the motor → Replace the UT-7243/UT-7321 DRIVER BD.
   - Motor failure. → Replace the unit.
2. When the motor rotates but the sensor cannot detect it
   - Poor contact or cable break → Disconnect and connect the connector. Check continuity of the cable. Replace the cable.
   - Sensor signal receive IC failure → Replace the UT-7234 SAMPLER JUNCTION BD or UT-7243/UT-7321 DRIVER BD.

E022: Vertical Sampler Movement Error

Phenomenon

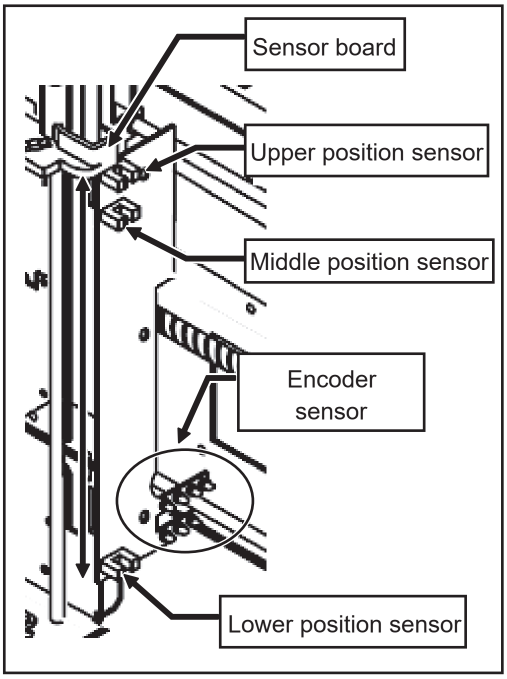
The move to the default position is not detected even when the nozzle part of the sampler unit moves up and down.

Detection sensor

PD0101 upper position sensor, PD0102 middle position sensor and PD0103 lower position sensor on the UT-7235 SAMPLER SENSOR BD

Detection method

The upper, middle and lower position sensors of the UT-7235 do not detect the sensor board 15 seconds after the Y axis motor drives. Or the pass of the sensor board is not detected.



MP-730V moves the sampling nozzle to the default position with the two motors (X axis and Y axis). The Y axis position is detected by the sensor board which moves with the motor until it reaches the slit of the sensor on the UT-7235 SAMPLER SENSOR BD and cuts the sensor light.

Cause

1. When the motor does not rotate
   - The drive part is caught. → Remove the cause of catch.
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
   - Motor failure → Replace the unit.
2. When the motor rotates but the sensor cannot detect it
   - Poor contact or cable break → Disconnect and connect the connector. Check continuity of the cable. Replace the cable
   - Sensor signal receive IC failure → Replace the UT-7234 SAMPLER JUNCTION BD or UT-7243/UT-7321 DRIVER BD.

E023: Horizontal Sampler Movement Error

Phenomenon

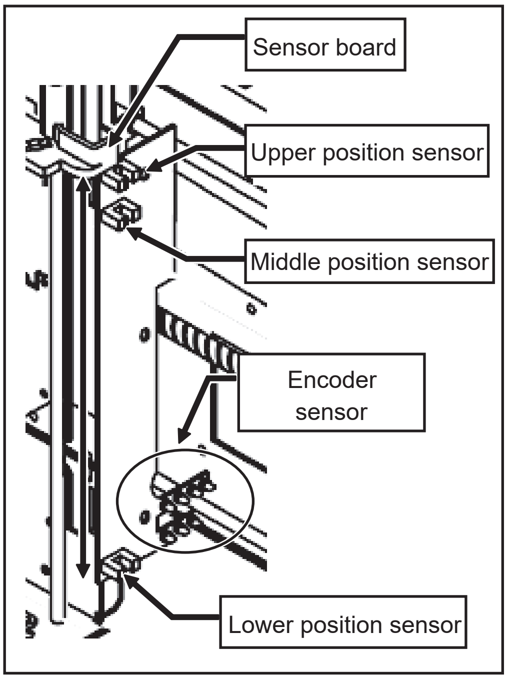
The move to the default position is not detected even when the nozzle part of the sampler unit moves right and left.

Detection sensor

PD0103 to PD0106 position sensor on the UT-7235 SAMPLER SENSOR BD

Detection method

The sensor of the UT-7235 does not detect the slit on the sensor board 15 seconds after the X axis motor drives or the detected position code is not correct.



MS-730V moves the sampling nozzle to the default position with the two motors (X axis and Y axis). The X axis position is detected by the sensor board which moves with the motor until it reaches the slit of the sensor on the UT-7235 SAMPLER SENSOR BD and the light of sensor 1 to 3 passes through the holes on the sensor board.

Cause

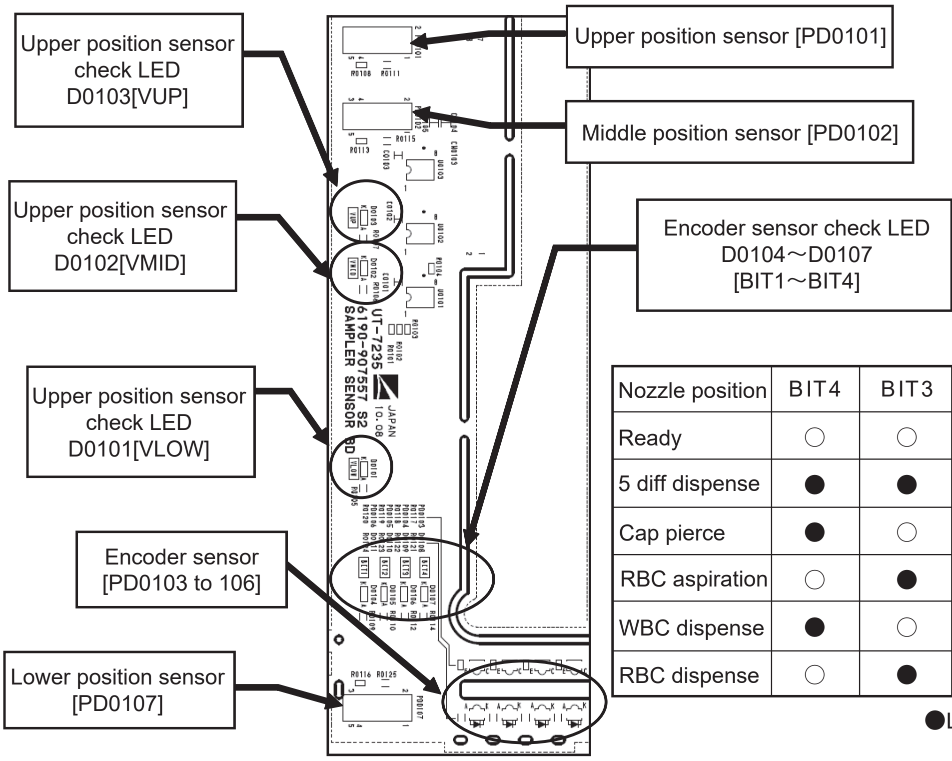
1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Filure of the drive IC of the motor → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect it

- Poor contact or cable break → Disconnect and connect the connector. Check continuity of the cable. Replace the cable.
- Sensor signal receive IC failure → Replace the UT-7234 SAMPLER JUNCTION BD or UT-7243/UT-7321 DRIVER BD.

The relation of the sampler unit and LED for checking the sensor



Nozzle position	BIT4	BIT3	BIT2	BIT1
Ready	○	○	○	○
5 diff dispense	●	●	○	○
Cap pierce	●	○	●	○
RBC aspiration	○	●	●	○
WBC dispense	●	○	○	○
RBC dispense	○	●	○	○

●Lights off ○Lights

E041: WBC Subbus Initial Error

Phenomenon

The move to the default position is not detected even when the WBC sub bath is initialized at power on or operation starts.

Detection sensor

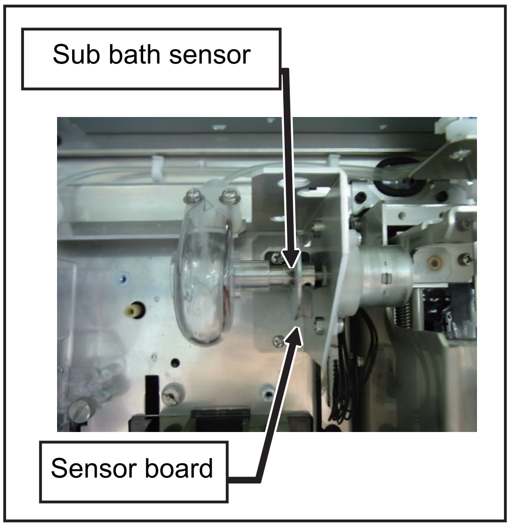
WBC sub bath sensor

Name: KI1234-AALF photosensor (676769A)

Pin position
1 +5V
2 Sensor signal
3 GND

Detection method

The sub bath sensor does not detect the slit of the sensor board 15 seconds after the motor drives.



The drive of the sub bath is detected by the each WBC and RBC sub bath sensor. The drive is detected by the disk slit on the sensor board which moves with the motor until it reaches the detection part of the sensor and passes the sensor light.

Cause

1. When the motor does not rotate
   - The drive part is caught. → Remove the cause of catch.
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
   - Motor failure or the connector is deteriorated. → Replace the unit.
2. When the motor rotates but the sensor cannot detect
   - Poor contact or cable break → Disconnect and connect the connector. Check continuity of the cable. Replace the cable.
   - Sensor failure → Replace the sensor.
   - Sensor signal receive IC failure. → Replace the UT-7243/UT-7321 DRIVER BD.

E051: RBC Subbus Initial Error

Phenomenon

The move to the default position is not detected even when the RBC sub bath is initialized at power on or operation starts.

Detection sensor

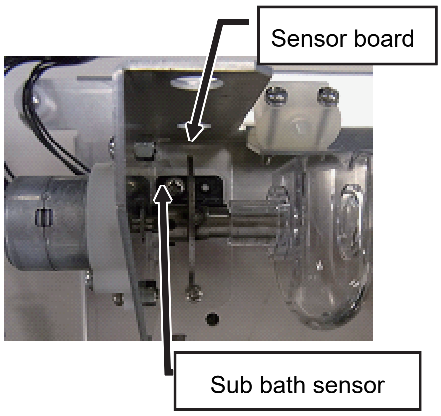
RBC sub bath sensor

Name: KI1234-AALF photosensor (676769A)

Pin position
1 +5V
2 Sensor signal
3 GND

Detection method

The sub bath sensor does not detect the slit of the sensor board 15 seconds after the motor drives.



The drive of the sub bath is detected by the each WBC and RBC sub bath sensor. The drive is detected by the disk slit on the sensor board which moves with the motor until it reaches the detection part of the sensor and passes the sensor light.

Cause

1. When the motor does not rotate
   - The drive part is caught. → Remove the cause of catch.
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
   - Motor failure or the connector is deteriorated. → Replace the unit.
2. When the motor rotates but the sensor cannot detect
   - Poor contact or cable break → Disconnect and connect the connector. Check continuity of the cable. Replace the cable.
   - Sensor failure → Replace the sensor.
   - Sensor signal receive IC failure. → Replace the UT-7243/UT-7321 DRIVER BD.

E071: Sample Pump Initial Error

Phenomenon

The move to the default position is not detected even when the sample pump syringe of the triple pump unit is initialized at power on or operation starts.

Detection sensor

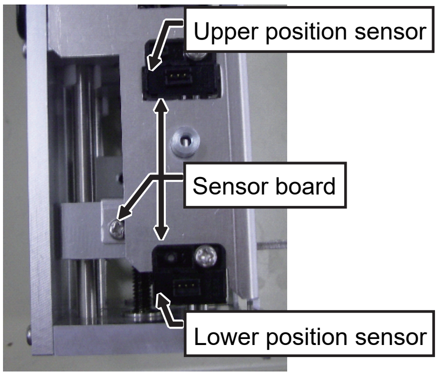
Upper position sensor of the sample pump

Name: KI1234-AALF photosensor (Code No. 676769A)

Pin position
1 +5V
2 Sensor signal
3 GND

Detection method

The upper position sensor does not detect the sensor board 15 seconds after the motor of the sample pump moves to up.



The upper and lower position sensors detect the sample pump cylinder of the MP-731V up and down drive (the sensors are different from the sensors of the lysing reagent cylinder pump). The drive is detected by the sensor board which moves with the motor until it reaches the slit of the sensor and cuts the sensor light.

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Failure of the drive IC of the motor → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Sensor failure → Replace the sensor.
- Sensor signal receive IC failure → Replace the UT-7243/UT-7321 DRIVER BD.

E072: Sample Pump Movement Error

Phenomenon

The move to the default position is not detected when the sample pump syringe drives.

Detection sensor

Sample pump upper and lower position sensor

Detection method

The upper position sensor does not detect the pass of the sensor board 15 seconds after the motor of the sample pump drives from the upper position. Or the encoder sensor does not turn on or off for the predetermined number of times.

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Sensor failure → Replace the sensor.
- Sensor signal receive IC failure → Replace the UT-7200 MIXED PUMP BD.

E081: Lyse Pump Initial Error

Phenomenon

The move to the default position is not detected when the lysing reagent pump syringe of the triple pump unit is initialized at power on and operation starts.

Detection sensor

Upper position sensor of the lysing reagent pump

Detection method

The upper position sensor does not detect the sensor board 15 seconds after the motor of the lysing reagent pump drives to up.

The motor sensor is common for the two lysing reagent pump syringes.

Cause

1. When the motor does not rotate
   - The drive part is caught. → Remove the cause of catch.
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
   - Motor failure → Replace the unit.
2. When the motor rotates but the sensor cannot detect
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Sensor failure → Replace the sensor.
   - Sensor signal receive IC failure. → Replace the UT-7243/UT-7321 DRIVER BD.

E082: Lyse Pump Movement Error

Phenomenon

The move to the default position is not detected when the lysing reagent pump syringe operates.

Detection sensor

Lysing reagent pump upper and lower position sensor

Detection method

The upper position sensor does not detect the pass of the sensor board 15 seconds after the motor of the lysing reagent pump drives from the upper position. Or the encoder sensor does not turn on or off for the predetermined number of times.

Cause

1. When the motor does not function
   - The drive part is caught. → Remove the cause of catch.
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
   - Motor failure → Replace the unit.

2 When the motor functions but the sensor cannot detect

- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Sensor failure → Replace the sensor.
- Sensor signal receive IC failure → Replace the UT-7200 MIXED PUMP BD.

E101: Right Rotary Pump Initial Error

Phenomenon

The sensor does not detect that the rotary pump unit returns to the default position when the rotor rotates at power on and operation starts.

Detection sensor

Rotary pump sensor

Detection method

The sensor does not detect the slit of the sensor board even when the motor of the rotary pump drives.

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

- Poor contact or break of the cable → Disconnect and connect the connector. Check continuity of the cable. Replace the cable.
- Sensor failure → Replace the sensor.
- Sensor signal receive IC failure. → Replace the UT-7243/UT-7321 DRIVER BD.

E102: Left Rotary Pump Initial Error

Phenomenon

The sensor does not detect that the rotary pump unit returns to the default position when the rotor rotates at power on and operation starts.

Detection sensor

Rotary pump sensor

Detection method

The sensor does not detect the slit of the sensor board even when the motor of the rotary pump drives.

Cause

1 When the motor does not rotate

• The drive part is caught.	→	Remove the cause of catch.
• Poor contact or break of the cable	→	Disconnect and connect the connector. Check continuity of the cable.
• Drive IC of the motor failure	→	Replace the UT-7243/UT-7321 DRIVER BD.
• Motor failure or deterioration	→	Replace the unit.

2 When the motor rotates but the sensor cannot detect

• Poor contact or cable break	→	Disconnect and connect the connector. Check continuity of the cable. Replace the cable.
• Sensor failure	→	Replace the sensor.
• Sensor signal receive IC failure	→	Replace the UT-7243/UT-7321 DRIVER BD.

E133: COMMUNICATION ERROR

Phenomenon

An error is detected in the serial communication via FPGA between the UT-7243/UT-7321 DRIVER BD and UT-7241/UT-7320 MAIN BD.

Detection method

Auto detection with interrupt controller on the CPU

Cause

• Poor contact or cable break	→	Disconnect and connect the connector. Check cable continuity.
• DRIVER BD failure DRIVER BD.	→	Replace the UT-7243/UT-7321
• MAIN BD failure MAIN BD.	→	Replace the UT-7241/UT-7320

E141: Cap Pierce Initial Error

Phenomenon

The move to the default position is not detected when the cap pierce unit is initialized at power on and operation starts.

Detection sensor

Upper position sensor

Detection method

The upper position sensor does not detect the sensor board 15 seconds after the motor of the MS-731V drives to upward.

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

- Poor contact or cable break → Disconnect and connect the connector. Check continuity of the cable. Replace the cable.
- Sensor failure → Replace the sensor.
- Sensor signal receive IC failure → Replace the UT-7243/UT-7321 DRIVER BD.

E142: Cap Pierce Movement Error

Phenomenon

The moves to the default position is not detected when the sampling needle moves up and down at measurement.

Detection sensor

Upper and lower position sensor

Detection method

- The pass of the sensor board from the lower position sensor is not detected 15 seconds after the motor of the MS-731V drives to upward. Or the upper position sensor does not detect the sensor board.
- The pass of the sensor board from the upper position sensor is not detected 15 seconds after the motor of the MS-731V drives to downward. Or the lower position sensor does not detect the sensor board.

Cause

1 When the motor does not rotate

- The drive part is caught. → Remove the cause of catch.
- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Drive IC of the motor failure → Replace the UT-7243/UT-7321 DRIVER BD.
- Motor failure → Replace the unit.

2 When the motor rotates but the sensor cannot detect

- Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
- Sensor failure → Replace the sensor.
- Sensor signal receive IC failure → Replace the UT-7243/UT-7321 DRIVER BD.

E145: Tube Holder Movement Error

Phenomenon

The tube holder open is not detected when opening the tube holder at pressing the eject button or after measurement.

NOTE: Pressing the eject button when holding the tube holder or the holder is caught because the front panel is not closed correctly causes an “E145: TUBE HOLDER OPERATION ERROR” error and the analyzer must be restarted. Before pressing the eject button, check the holder condition.

Detection sensor

Holder sensor

Detection method

The holder sensor does not detect the pass of the sensor board one second after driving the solenoid of the MS-731V and opening the holder.

Cause

1. When the holder does not open
   - The drive part is caught. → Remove the cause of catch.
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Solenoid drive IC failure → Replace the UT-7243/UT-7321 DRIVER BD.
   - Solenoid failure → Replace the unit.
2. When the holder opens but the sensor cannot detect
   - Poor contact or cable break → Disconnect and connect the connector. Check cable continuity.
   - Sensor failure → Replace the sensor.
   - Sensor signal receive IC failure → Replace the UT-7243/UT-7321 DRIVER BD.

Fault Diagnosis from Alarm

Alarm

When a problem which affects the measurement result occurs during measurement, the analyzer displays alarms on the screen. When the Recovery button which is displayed with alarms is pressed, the analyzer performs the optimum operation (such as cleaning or refilling the reagents). Also check the error code and sensor and unit condition. Open the front panel and check the condition of nozzle, sampling nozzle, measurement bath and sub bath before troubleshooting.

There are two types of alarms. One is displayed to the right of the measurement value and another is displayed as messages. The former alarm indicates that the result must not be used to the diagnosis because the analyzer has problems or some phenomenon affects the result even though the sample can be measured. The later alarm can be classified as no reagent, manometer, CBC measurement, HGB and flow cell alarms. These alarms indicate that the measurement is not finished.

Following is the list of error code and the troubled place which is assumed from the each error code.

Alarms to the right of the value

! (to the right of the HGB measured value)	HGB voltage rise (voltage adjustment error)
! (to the right of the MCHC measured value)	RBC index error (error in preparing the pre-diluted samples)
! (to the right of the WBC measured value)	WBC counting error (poor hemolyzation)
C (to the right of the WBC or PLT measured value)	Platelet coagulated
? (to the right of the WBC, RBC or PLT measured value)	Abnormal sample (the sample is out of measuring range)
? (to the right of the HGB measured value)	HGB voltage reduction, WBC measurement bath is dirty
? (to the right of the NE, NE%, LY or LY% measured value)	Room temperature rise
? (to the right of the NE, NE%, LY, LY%, MO, MO%, EO, EO%, BA or BA% measured value)	Optical count error
? (to the right of the NE, NE%, LY, LY%, MO or MO% measured value)	Room temperature fall
* (to the right of the HGB measured value)	HGB circuit error or interference substances incorporation

No reagent alarms

A001:No isotonac•3!
A005:No cleanac!
A006:No cleanac•3!
A007:No hemolynac•3N!
A008:No hemolynac•5!

Manometer alarms

A009:WBC priming error	A073:WBC lower manometer dirty
A010:RBC priming error	A074:RBC upper manometer dirty
A071:WBC upper manometer dirty	A075:RBC middle manometer dirty
A072:WBC middle manometer dirty	A076:RBC lower manometer dirty

CBC measurement alarms

A021:WBC fluid level 1	A042:RBC fluid level 2
A022:WBC fluid level 2	A043:RBC fluid level 3
A023:WBC fluid level 3	A044:RBC bubble 1
A024:WBC bubble 1	A045:RBC bubble 2
A025:WBC bubble 2	A046:RBC bubble 3
A026:WBC bubble 3	A047:RBC bubble 4
A027:WBC bubble 4	A049:RBC clogged
A029:WBC clogged	A050:RBC sample error
A030:WBC sample error	A051:RBC hardware noise
A031:WBC hardware noise	A052:PLT software noise
A032:WBC software noise	A053:RBC software noise
A041:RBC fluid level 1	

HGB alarms

A061:HGB voltage low
A062:HGB voltage high
A063:HGB circuit error
A064:HGB temp low
A065:HGB temp high
A066:LED temp low
A067:LED temp high
A068:HGB initialize error

Flow cell alarms

A081:Laser key off
A082:Optical count error
A091:Room temp high
A092:Room temp low

Alarms to the Right of the Value

! (to the right of the HGB measured value) HGB voltage rise

General

! is displayed when the HGB measurement voltage is more than 4.5 V. Normally, HGB voltage is adjusted to 3.0 V with the WBC bath filled with diluent. The voltage is highest with the diluent. The cause may be poor adjustment or sensor failure.

Cause

- Poor adjustment of the HGB sensor voltage → Adjust the HGB sensor (refer to the unit adjustment)

• Poor cable connection	→	Check the cable connection and conduction.
• HGB sensor failure (UT-7201 failure)	→	Replace the UT-7201.
• UT-7244 ANALOG BD failure	→	Replace the UT-7244.

! (to the right of the MCHC measured value) RBC index error

General

The MCHC is calculated by HGB/HCT and indicates the concentration average of the HGB in the one RBC. Normally MCHC is 33.3. If the MCHC is totally different from this value, it means that the HGB and HCT ratio of the analyzer is not correct. If the MCHC is ≤28.0 or ≥38.0, “!” appears to the right of the MCHC value and an RBC index error appears.

Cause and countermeasure

- The filter under the RBC measurement bath is clogged and RBC bath is diluted because of poor drainage.
  - → Replace the filter and filter packing.
  - → Check the piping tube from under the measurement bath.
  - → Check the 2-way valve operation on the maintenance screen (refer to the maintenance screen).
- The filter under the WBC air trap is clogged and the WBC bath is diluted because of poor drainage.
  - → Replace the filter and filter packing. Check the tube.
  - → Check the 2-way valve operation on the maintenance screen (refer to the maintenance screen).
- The HGB is faultily high because the defined amount of lysing reagent does not enter into the WBC measurement bath.
  - → Check the MP-731V operation.
  - → Check the 2-way valve operation (refer to the maintenance screen).
  - → Check for clog in the tube which delivers diluent to the WBC measurement bath.
- A lysing reagent other than HEMOLYNAC•3N is connected.
  - → Drain the analyzer, replace the lysing reagent with HEMOLYNAC•3N and clean the analyzer.
- The dilution rate of the diluter is unstable.
  - → Check the MP-730V operation.
  - → Check that there is no leak in the plumbing between the MP-730V and sampling nozzle.
  - → Replace the diluter block.
- HGB and HCT calibration coefficient is not correct (calibration error).
  - → Calibrate the analyzer correctly (refer to calibration section).
- HCT is faultily high because of noise in the RBC measurement.
  - → Check the background (refer to background section).

! (to the right of the WBC measured value) — Poor hemolyzation

General

WBC is detected by two thresholds.

- Threshold Low: Unhemolysed blood (RBC ghost) RBC count + WBC count
- Threshold High: WBC count

When the difference between the threshold high count and threshold low count is large, the sample is measured again. If the difference is still large after three measurements, the poor hemolyzation alarm occurs because many unhemolyzed RBC hemolytic ghosts are detected and they may affect the WBC count.

Cause and countermeasure

- The blood is not hemolyzed enough.
  → Measure the blood in high or pre-dilution mode.
- The lysing reagent does not react enough because the diluter temperature is low.
  → Measure the sample in the correct operating environment.
- Not enough lysing reagent in the WBC measurement bath.
  → Check the MP-731V operation.
  → Check the 2-way valve operation (refer to the maintenance screen).
  → Check for clog in the tube which delivers lysing reagent to the WBC measurement bath.
- Noise interferes during WBC measurement.
  → Check the background (refer to the background section).
- The lysing reagent is expired.
  → Replace the reagent with new HEMOLYNAC•3N and refill the reagent.
- A lysing reagent other than HEMOLYNAC•3N is connected.
  → Replace the reagent with HEMOLYNAC•3N and clean the analyzer.

C (to the right of the WBC or PLT measured value) — Platelet coagulated

General

The platelets stick together, the apparent number of PLT decreases and aggregated platelets may be counted as WBC.

Cause and countermeasure

- The blood reacted with EDTA and EDTA spurious platelet aggregation is caused.
- Heparin was used as an anticoagulant.
  → Use EDTA and collect blood again.
- After blood collection, the blood and anticoagulant are not mixed enough.
  → Collect the blood again and thoroughly mix the blood with anticoagulant.
- Not enough lysing reagent in the WBC measurement bath.
  → Check the MP-731V operation.
  → Check the 2-way valve operation (refer to the maintenance screen).
  → Check for clog in the tube which delivers lysing reagent to the WBC measurement bath.
- Noise interferes during WBC measurement.

→ Check the background (refer to the background section).

- The lysing reagent is expired.

  → Replace the reagent with new HEMOLYNAC•3N and refill the reagent.

- A lysing reagent other than HEMOLYNAC•3N is connected.

  → Replace the reagent with HEMOLYNAC•3N and clean the analyzer.

? (to the right of the WBC, RBC or PLT measured value) abnormal sample

General

This alarm is displayed when the electrode voltage is more than 32.0 V. Normally the WBC electrode voltage is about 18 V and the RBC electrode voltage is about 24 V. When the temperature is low, the electrical resistance of the diluent increases and the electrode voltage rises. If tap water is used instead of diluent, the tap water does not pass electrical current because tap water does not contain salt so the electrode voltage is very high.

Cause and countermeasure

- The temperature of the diluent is low (especially in winter, even if the room is in the operating temperature (15 to 30°C), it takes time for the diluent temperature to rise)

  → Use the diluent in the specified operation environment.

- Tap water is used instead of diluent.

  → Use specified reagent and clean the analyzer.

- The electrode is detached from the measurement bath.

  → Reattach the electrode.

- Aperture failure

  → Replace the aperture.

- UT-7249-01 MEASURING BD failure

  → Replace the UT-7249-01.

? (to the right of the HGB measured value) HGB voltage reduction

General

This alarm is displayed when the HGB sensor voltage is less than 1.6 V. The HGB sensor voltage is adjusted to 3.0 V when the WBC measurement bath is filled with diluent. When the WBC measurement bath is dirty with blood protein, the sensor voltage decreases. The reduced sensor voltage affects the HGB reproducibility.

Cause and countermeasure

- The WBC measurement bath is dirty.

  → Perform strong cleaning.

- Strong cleaning has not performed for a long time.

  → Perform strong cleaning.

- Lysing reagent other than HEMOLYNAC•3N is used.

  → Replace the lysing reagent with HEMOLYNAC•3N and clean the analyzer.

- The LED light is blocked by dirt and crystals in the HGB measurement optical path.

  → Clean the measurement bath by soaking it in CLEANAC•3.

- The LED light is blocked by the electrode in the HGB measurement optical path.

  → Do not block the sensor light with the electrode.

- HGB sensor voltage adjustment error

  → Adjust the HGT sensor (refer to unit adjustment).

- HGB LED failure

  → Replace the UT-7202.

- UT-7201 HGB AMP BD and/or UT-7202 HGB LED BD failure

  → Replace the UT-7201 and/or UT-7202.

? (to the right of the NE, NE%, LY or LY% measured value) room temperature rise

General

This alarm is displayed when the temperature sensor detects that the room temperature is higher than the specified operating temperature. If the room temperature is higher than the operating temperature, the lysing reagent response changes. This affects WBC 5 part differential measurement especially NE% and LY% and ? is displayed to the right of the NE%, NE, LY% and LY measurement value.

Cause and countermeasure

- The room temperature is above the specified operating temperature.

  → Use the analyzer in the specified operating environment.

- Poor cable connection.

  → Disconnect and reconnect the temperature sensor connector of the UT-7238 VALVE CONNECTION BD 1.

  → Check the cable conduction.

- Temperature sensor failure

  → Replace the temperature sensor.

? (to the right of the WBC 5 part differential value) optical count error

General

This alarm is displayed when there is a big difference between the measurement result by the WBC electrical resistance method and optical measurement result by the flow cell.

Cause and countermeasure

- The filter under the sample cup is clogged.

  → Check and replace the filter and filter packing.

- The sample flow in the flow cell is unstable.

  → Clean and back wash the flow cell.

- The optical sensitivity adjustment is incorrect.

  → Measure particle and perform rough optical adjustment.

- The flow cell position is misaligned.

  → Adjust the flow cell position (refer to flow cell adjustment).

- The sample cannot be set to the manifold.

  → Check for clog in the PharMed tube and replace it.

→ Check for leak of the mix chamber and replace it.

→ Check the 2-way valve operation on the maintenance screen (refer to the maintenance screen).

- There is leak and/or clog in the flow path and liquid transfer is abnormal.

  → Check for leak and 2-way valve operation and replace the valve.

- The sample pump of the MP-731V failure

  → Check the MP-731V operation and replace it.

  → Check the 2-way valve operation on the maintenance screen (refer to the maintenance screen).

- The sheath pump of the MP-730V failure

  → Check the MP-730V operation and replace it.

  → Check the 2-way valve operation on the maintenance screen (refer to the maintenance screen).

- Blood with microcytic lymphocytes is measured.

  → This is not a failure. Check the stained sample with a microscope.

? (to the right of the NE, NE%, LY, LY%, MO or MO% measured value) room temperature fall

General

This alarm is displayed when the temperature sensor detects that the room temperature is lower than the specified operating temperature. If the room temperature is lower than the operating environment, the lysing reagent response changes. This affects WBC 5 part differential measurement especially NE%, LY% and MO% and ? is displayed to the right of the NE%, NE, LY%, LY, MO% and MO measurement value.

Cause and countermeasure

- The room temperature is below the specified operating temperature.

  → Use the analyzer in the specified operating environment.

- Poor cable connection.

  → Disconnect and reconnect the temperature sensor connector of the UT-7238 VALVE CONNECTION BD 1.

  → Check the cable conduction.

- Temperature sensor failure

  → Replace the temperature sensor.

* (to the right of the HGB measured value) HGB circuit error

General

This alarm is displayed when the HGB sensor voltage is 0.5 V or more even when the LED for the HGB sensor is turned off. When the HGB sensor LED is turned off, only the dark current flows into the sensor and the current of 0.5 V or more is not detected.

Cause and countermeasure

- The HGB cover is removed and ambient light enters.

  → Attach the HGB cover.

- Poor cable connection.
  → Disconnect and reconnect the cable. Check the cable conduction.
- The UT-7201 HGB sensor failure.
  → Replace the UT-7201.

No Reagent Alarms

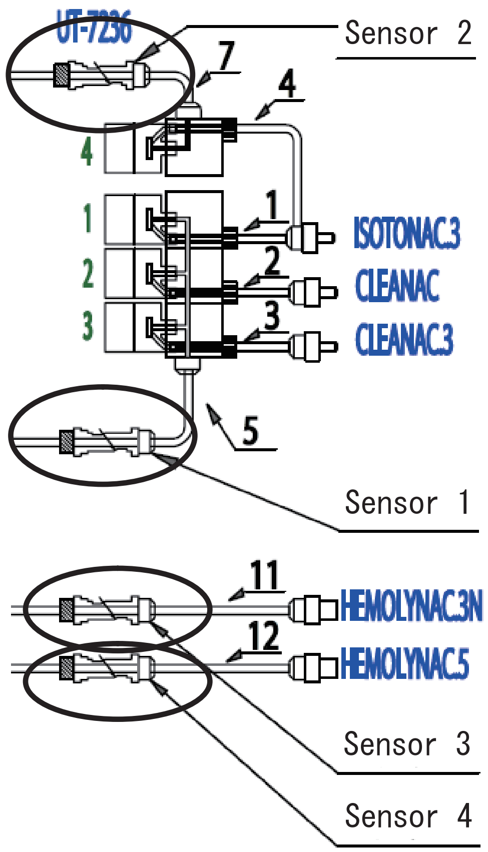
A001: No isotonac•3!

A005: No cleanac!

A006: No cleanac•3!

A007: No hemolynac•3N!

A008: No hemolynac•5!



Five types of reagents are connected to the inlet and outlet units. Four optical sensors judge the reagent connection.

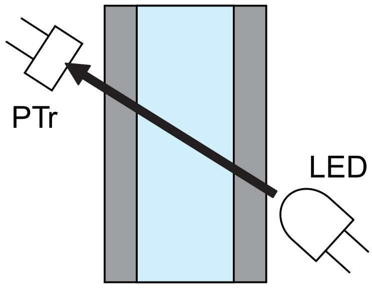
Sensor 1: detergent (CLEANAC, CLEANAC•3) and diluent (ISOTONAC•3)

Sensor 2: diluent (ISOTONAC•3)

Sensor 3: lysing reagent (HEMOLYNAC•3N)

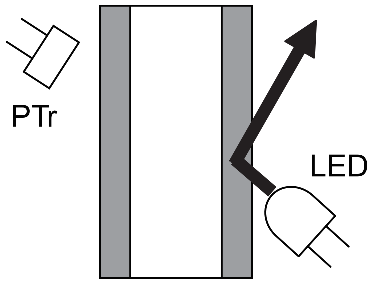
Sensor 4: lysing reagent (HEMOLYNAC•5)

When the sensor voltage is more than 2.5 V, the analyzer judges that the sensor is in air. When the voltage is less than 2.5 V, the analyzer judges that the sensor is in liquid. To make a 1.0 V margin, the sensor voltage must be adjusted to judge that in liquid is 1.5 V or less and not in liquid is 3.5 V or more.



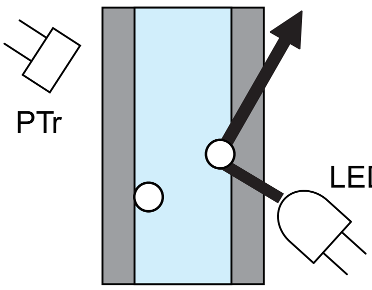
When filled with liquid

- The liquid sensor detects the liquid level by using the light refraction.
- When there is liquid, the refraction index of the plastic of quantitative part and the liquid is almost the same. The LED light goes straight and reaches the light receiving element (PTr).
- When there is no liquid, the LED light is reflected and does not reach the light receiving element (PTr) because the refraction index of air and plastic is different.



When there is no liquid

- When there are small bubbles in the light path of the liquid sensor, a no reagent alarm may occur frequently because the LED light is reflected and does not reach the light receiving element (PTr).
- The small bubbles stay in the sensor even when liquid flows and cannot be removed by repeated cleaning.



When there are bubbles

- If bubbles get in the sensor, remove the tube and pass air. This removes the bubbles easily.
- Remove the diluent tube and press the Clean key while holding the Reset key. The analyzer aspirates air instead of diluent and the air passes through the liquid sensor. After the operation, reattach the diluent tube and press the Clean key while holding the Reset key to fill the diluent.

A001: No isotonac•3!

General

This alarm is displayed when the liquid sensor for ISOTONAC•3 of the JQ-730V detects air when aspirating diluent. The UT-7236 LIQUID SENSOR BD of the JQ-730V has a sensor for diluent only and a sensor for diluent and detergent. The A: 001 NO DILUENT alarm occurs when one of the sensors detects air.

Cause and countermeasure

- The tube floats in the diluent tank.

  → Check the tube connection, leak and flotation between the tank and analyzer.
- Bubbles in the liquid sensor.

  → Remove the bubbles (refer to “when there is liquid” in no reagent alarm).
- Leak in the flow path between the diluent port and sensor.

  → Check for leak of the tube joint.

  → Check for leak of the 2-way valves.
- Liquid sensor voltage adjustment failure (UT-7236)

  → Adjust the liquid sensor voltage (refer to unit adjustment).

A005: No cleanac!

General

This alarm is displayed when the sensor for diluent and detergent of the JQ-730V detects air while aspirating CLEANAC. The UT-7236 LIQUID SENSOR BD detects the liquid and sends the information to the UT-7241/UT-7320 MAIN BD.

Cause and countermeasure

- Bubbles in the liquid sensor.

  → Remove the bubbles (refer to “when there is liquid” in no reagent alarm).
- The tube floats in the CLEANAC tank.

  → Check the tube connection, leak and flotation between the tank and analyzer.
- Leak in the flow path between the CLEANAC port and sensor.

  → Check for leak of the tube joint.

  → Check for leak of the 2-way valves.
- Liquid sensor voltage adjustment failure (UT-7236)

  → Adjust the liquid sensor voltage (refer to unit adjustment).

When the A: 005 NO CLEANAC alarm occurs and A: 001 NO DILUENT and A: 006 NO CLEANAC•3 alarms do not occur, there is a problem in the flow path between the CLEANAC tank and 2-way valve for change.

A006: No cleanac•3!

General

The alarm is displayed when the sensor for diluent and detergent of the JQ-730V detects air while aspirating CLEANAC•3. The UT-7236 LIQUID SENSOR BD detects the liquid and sends the information to the UT-7241/UT-7320 MAIN BD.

Cause and countermeasure

- Bubbles in the liquid sensor.
  → Remove the bubbles (refer to “when there is liquid” in no reagent alarm).
- The tube floats in the CLEANAC•3 tank.
  → Check the tube connection, leak and flotation between the tank and analyzer.
- Leak in the flow path between the CLEANAC•3 port and sensor.
  → Check for leak of the tube joint.
  → Check for leak of the 2-way valves.
- Liquid sensor voltage adjustment failure (UT-7236)
  → Adjust the liquid sensor voltage (refer to unit adjustment).

When the A: 006 NO CLEANAC•3 alarm occurs and A: 001 NO DILUENT and A: 005 NO CLEANAC alarms do not occur, there is a problem in the flow path between the CLEANAC•3 tank and 2-way valve for change.

A007: No hemolynac•3N!

General

This alarm is displayed when the sensor for HEMOLYNAC•3N of the JQ-730V detects air while aspirating HEMOLYNAC•3N. The UT-7236 LIQUID SENSOR BD detects the liquid and sends the information to the UT-7241/UT-7320 MAIN BD.

Cause and countermeasure

- Bubbles are attached to the liquid sensor.
  → Remove the bubbles (refer to “when there is liquid” in no reagent alarm).
- The tube floats in the HEMOLYNAC•3N tank.
  → Check the tube connection, leak and flotation between the tank and analyzer.
- Leak in the flow path between the HEMOLYNAC•3N port and sensor.
  → Check for deformation of the flange of the hemolynac tube.
  → Check for leak of the tube joint.
  → Check for leak of the 2-way valves.
- Liquid sensor voltage adjustment failure (UT-7236)
  → Adjust the liquid sensor voltage (refer to unit adjustment).
- The sensor block is discolored or cracked.
  → Replace the sensor block, adjust the voltage or replace the UT-7236.

A008: No hemolynac•5!

General

This alarm is displayed when the sensor for HEMOLYNAC•5 of the JQ-730V detects the air while aspirating HEMOLYNAC•5. The UT-7236 LIQUID SENSOR BD detects the liquid and sends the information to the UT-7241/UT-7320 MAIN BD.

Cause and countermeasure

- Bubbles in the liquid sensor.
  → Remove the bubbles (refer to “when there is liquid” in no reagent alarm).
- The tube floats in the HEMOLYNAC•5 tank.
  → Check the tube connection, leak and flotation between the tank and analyzer.
- Leak in the flow path between the HEMOLYNAC•5 port and sensor.
  → Check for deformation of the flange of the hemolynac tube.
  → Check for leak of the tube joint.
  → Check for leak of the 2-way valves.
- Liquid sensor voltage adjustment failure (UT-7236)
  → Adjust the liquid sensor voltage (refer to unit adjustment).
- The sensor block is discolored or cracked.
  → Replace the sensor block, adjust the voltage or replace the UT-7236.

Manometer Alarms

A009:WBC priming error

A010:RBC priming error

A071:WBC upper manometer dirty

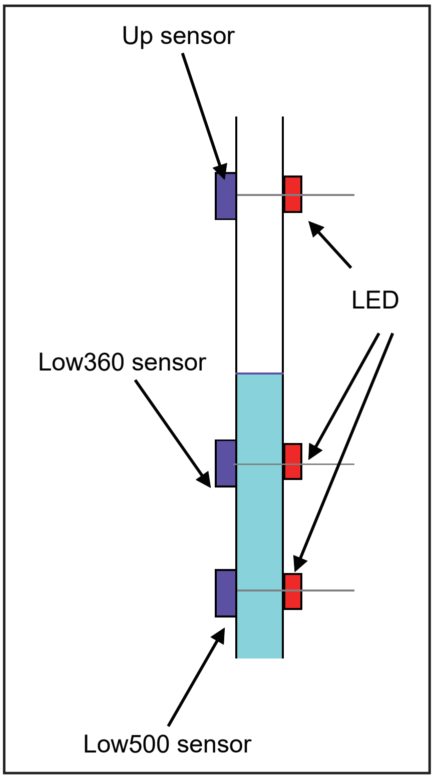
A072:WBC middle manometer dirty

A073:WBC lower manometer dirty

A074:RBC upper manometer dirty

A075:RBC middle manometer dirty

A076:RBC lower manometer dirty



- The part which aspirates the diluted blood sample from the aperture and measures the volume is called “manometer”. The manometer is a transparent plastic tube which has upper, middle and lower optical sensors that detect the liquid level in the manometer.
- When the sensor voltage is more than 2.5 V, the analyzer judges that the sensor is in air. When the voltage is less than 2.5 V, the analyzer judges that the sensor is in liquid. To get 1.0 V of margin, the sensor voltage must be adjusted to judge that in liquid is 1.5 V or less and out of liquid is 3.5 V or more.
- Thus even if there is liquid and the sensor voltage is 1.51 V, the analyzer does not malfunction. But if the manometer sensor voltage is 2.25. to 2.75 V, the manometer may misjudge the situation so that the “MANO ERROR” alarm occurs.

A071:WBC upper manometer dirty

A072:WBC middle manometer dirty

A073:WBC lower manometer dirty

A074:RBC upper manometer dirty

A075:RBC middle manometer dirty

A076:RBC lower manometer dirty

General

The “MANO ERROR” alarm is displayed when loading each sensor voltage of the manometer during measurement and the voltage of the manometer is less than 2.25 to 2.75 V.

Cause and countermeasure

- The manometer is dirty with blood protein.
  → Perform strong cleaning.
- Strong cleaning has not been performed for a long time.
  → Perform strong cleaning.
- The hypochlorous acid of the CLEANAC 3 is evaporated.
  → Replace the CLEANAC 3 with new one and perform strong cleaning.
- The voltage of the manometer sensor is not adjusted correctly.
  → Adjust the liquid sensor voltage (refer to “Adjusting the Units” in Section 5).
- Manometer sensor failure
  → Replace the UT-7249-01 MEASURING BD.

CBC Measurement Alarms

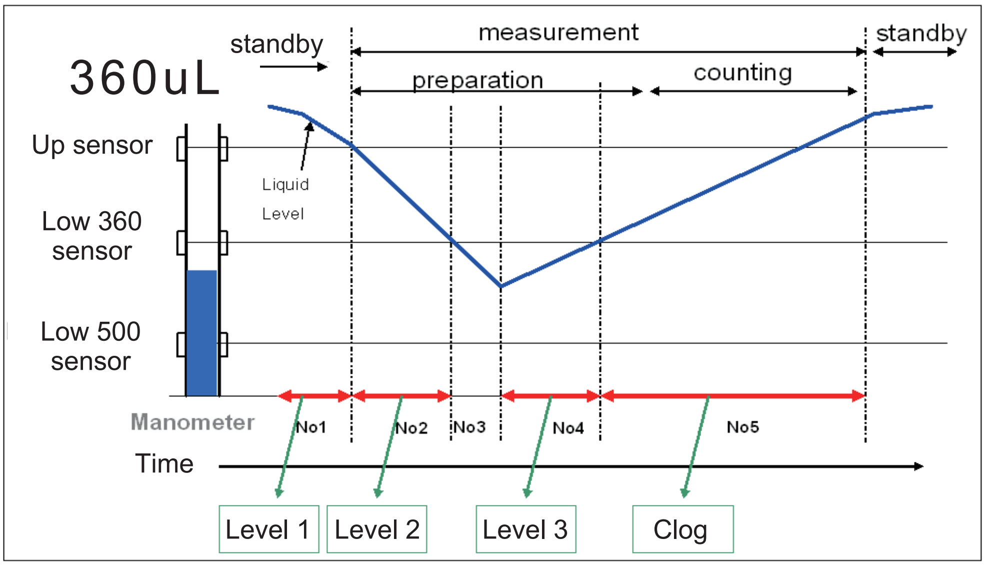
General

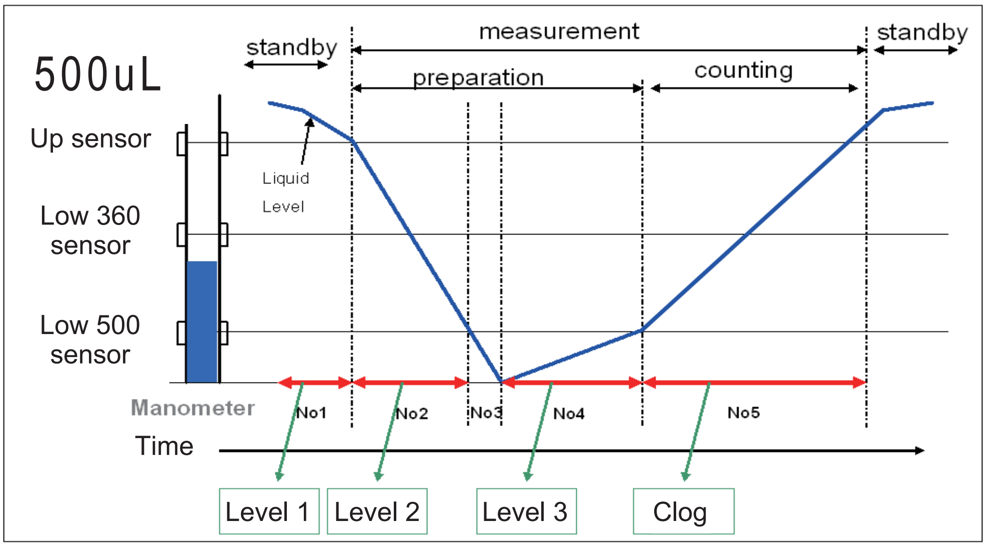
When a LEVEL or CLOG alarm occurs, the aperture might not have aspirated a sample correctly. A LEVEL alarm is detected before counting the pulse and a CLOG alarm is detected when counting the pulse. A LEVEL and CLOG alarm is judged by the timing when the fluid level reaches the sensor in the manometer during measurement. This alarm occurs when the timing is different from the standard.

A021:WBC fluid level 1	A041:RBC fluid level 1
A022:WBC fluid level 2	A042:RBC fluid level 2
A023:WBC fluid level 3	A043:RBC fluid level 3
A024:WBC bubble 1	A044:RBC bubble 1
A025:WBC bubble 2	A045:RBC bubble 2
A026:WBC bubble 3	A046:RBC bubble 3
A027:WBC bubble 4	A047:RBC bubble 4
A029:WBC clogged	A049:RBC clogged
A030:WBC sample error	A050:RBC sample error
A031:WBC hardware noise	A051:RBC hardware noise
A032:WBC software noise	A052:PLT software noise
	A053:RBC software noise

First, MEK-7300 is different from the previous models. It has two lower position sensors to measure 360 µL or 500 µL quantity.

The measurement and alarm process is the same as the previous models. Normally, the determined quantity is 360 L. If the measurement value is low, the analyzer increases the quantity and measures the sample again (advanced count function).



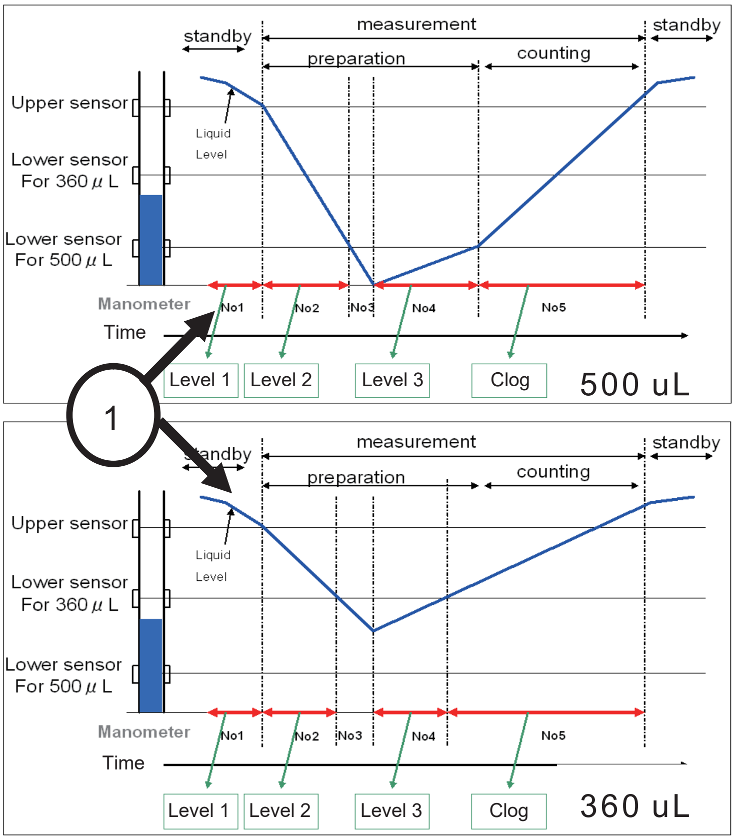


A021: WBC fluid level 1

A041: RBC fluid level 1

General

These alarms occur when the fluid level does not fall when the manometer decreases the fluid (1 in the illustration) after measurement starts.



Detection method

When the quantity is 500 or 360 μL, the upper sensor of the manometer does not detect fluid level within 8 seconds.

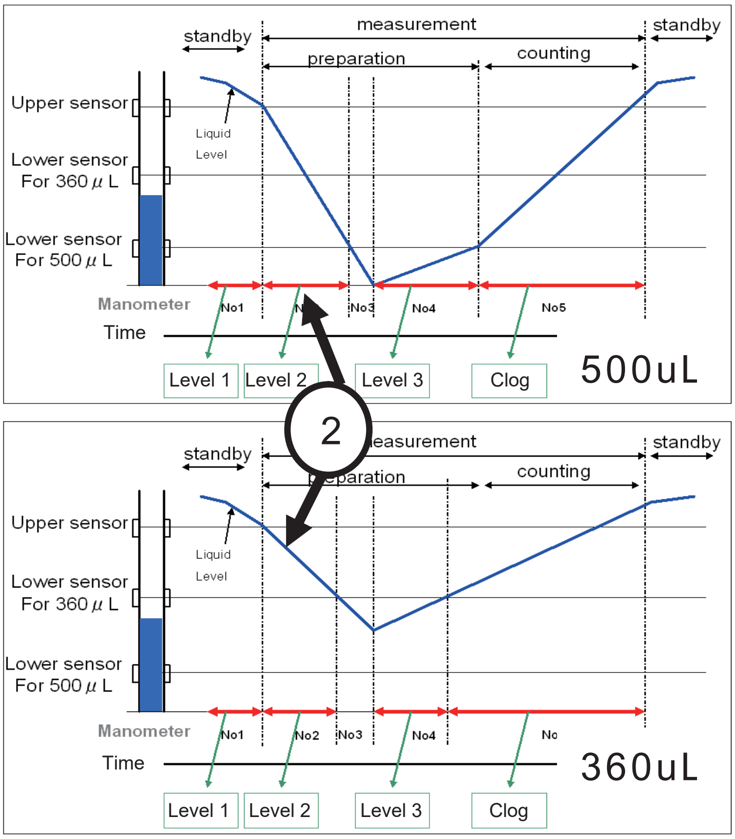
Cause and countermeasure

- Valve operation failure
- The voltage of the lower sensor of the manometer is not adjusted correctly or there is sensor failure
- Air leak in the fluid path of the MC unit.

A022: WBC fluid level 2
A042: RBC fluid level 2

General

These alarms occur when the fluid level does not fall when the manometer decreases the fluid (2 in the illustration).



Detection method

When the manometer decreases the fluid level after measurement starts, level 1 is passed but the fluid level is not detected within the following times:

When the quantity is 360 μL, middle position sensor of the manometer:
8 seconds

When the quantity is 500 μL, lower position sensor of the manometer:
11.2 seconds

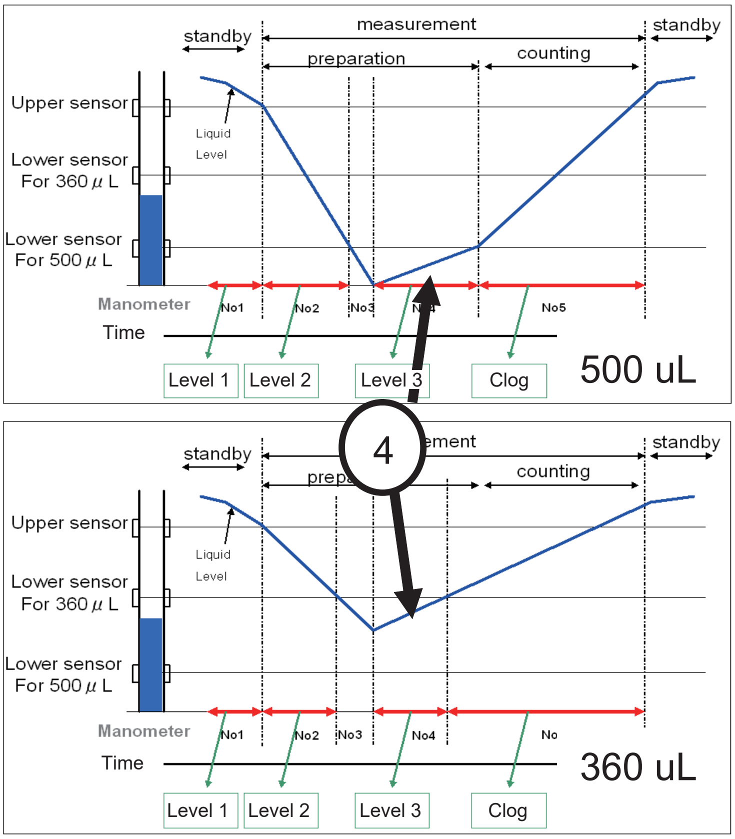
Cause and countermeasure

- Valve operation failure
- The voltage of the lower sensor of the manometer is not adjusted correctly or there is sensor failure
- Air leak in the fluid path of the MC unit

A023: WBC fluid level 3
A043: RBC fluid level 3

General

These alarms occur when the fluid level does not rise when the manometer increases the fluid (4 in the illustration).



Detection method

After starting a measurement, level 1 and 2 are passed and the manometer decreases and increases the fluid, but the fluid level is not detected within the following times:

When the quantity is 360 µL, middle position sensor of the manometer:
11.0 seconds

When the quantity is 500 µL, lower position sensor of the manometer:
11.0 seconds

Cause and countermeasure

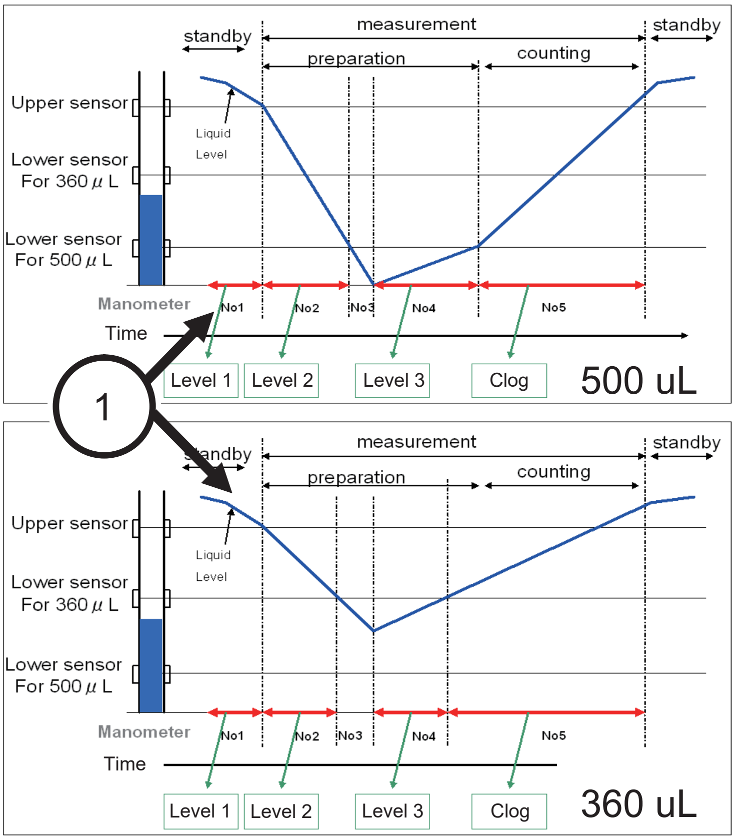
- It is not the sensor voltage failure because level 1 and 2 were passed.
- The aperture is clogged completely and cannot aspirate the sample.

  → Perform strong cleaning.
- Valve operation failure
- Air leak in the fluid path of the MC unit.

A024: WBC bubble 1
A044: RBC bubble 1

General

When the manometer increases the fluid, the fluid fills the manometer normally but the sensor detects the air.



Detection method

This alarm appears when the upper or lower position sensor of the manometer detects bubbles when the manometer decreases the fluid after starting measurement.

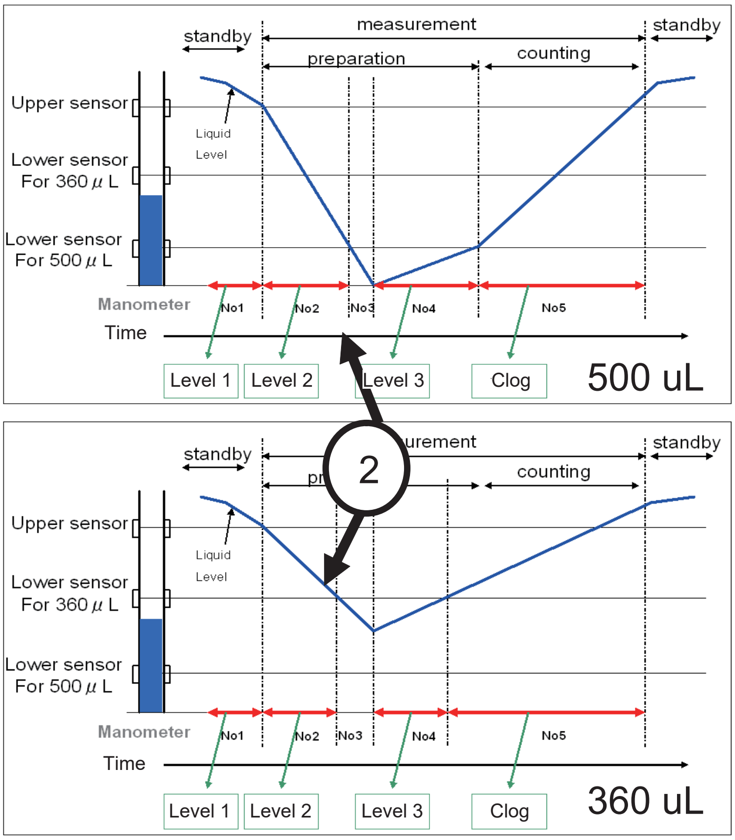
Cause and countermeasure

- The manometer is dirty and there are bubbles.
- Valve operation failure
- Air leak in the fluid path of the MC unit.

A025: WBC bubble 2
A045: RBC bubble 2

General

The alarm appears when the upper sensor of the manometer detects fluid not air after the manometer starts decreasing the fluid, and the upper sensor of the manometer detects the fluid level.



Detection method

This alarm appears when the upper sensor detects the fluid level before the lower sensor of the manometer detects the fluid level (illustration 2) after a measurement starts, the manometer decreases fluid and the upper sensor of the manometer detects the fluid level.

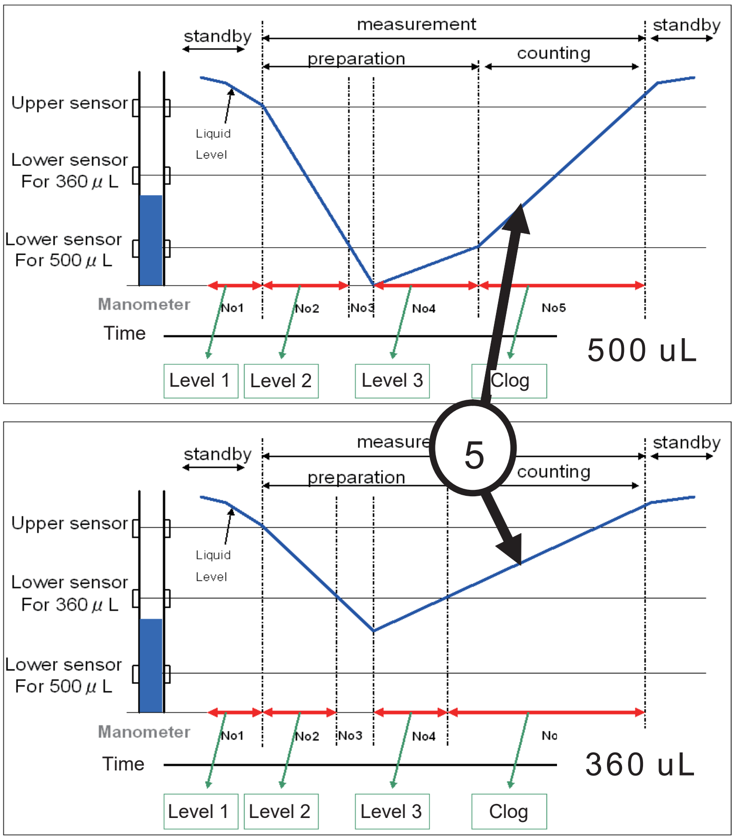
Cause and countermeasure

- Valve operation failure
- Air leak in the fluid path of the MC unit.

A026: WBC bubble 3
A046: RBC bubble 3

General

This alarm appears when the upper sensor of the manometer detects fluid not air after the manometer starts decreasing the fluid and the upper sensor of the manometer detects the fluid level.



Detection method

This alarm appears when the upper sensor detects the fluid level before the lower sensor of the manometer detects the fluid level (illustration 5) after a measurement starts, the manometer decreases fluid and upper sensor of the manometer detects the fluid level.

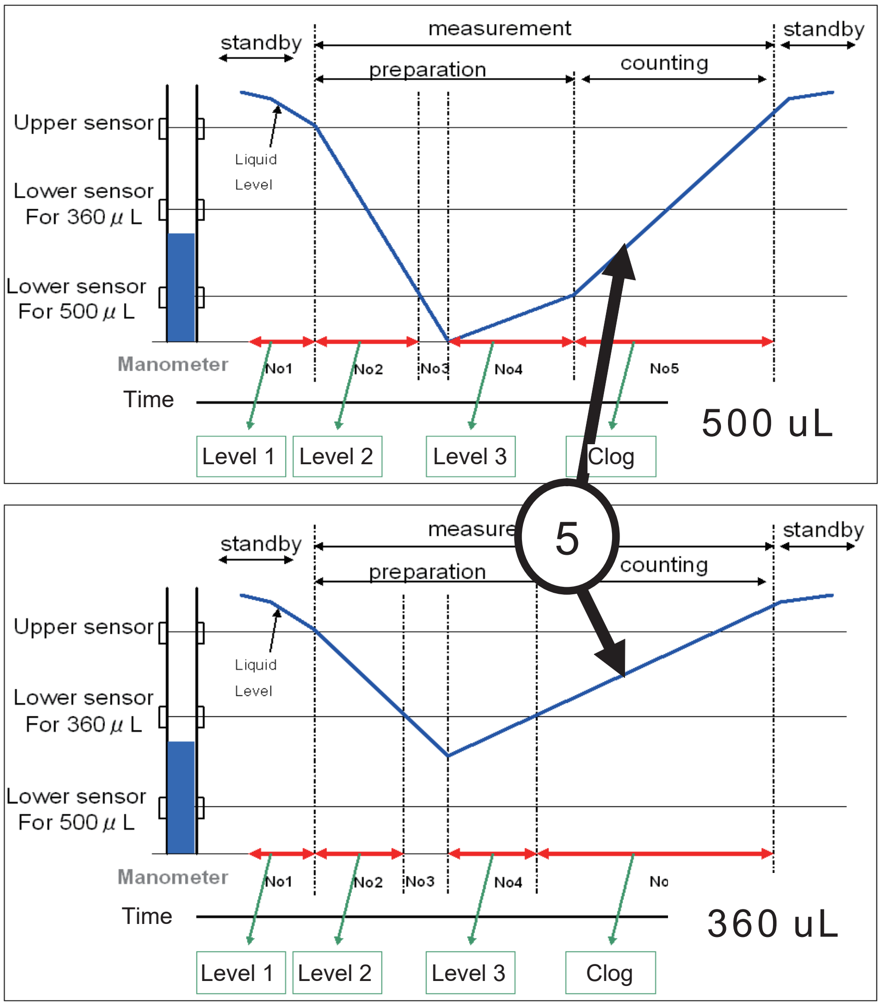
Cause and countermeasure

- Valve operation failure
- Air leak in the fluid path of the MC unit.

A026: WBC bubble 3
A046: RBC bubble 3

General

This alarm appears when the lower sensor detects bubbles. Normally, the lower sensor is filled with fluid when the manometer starts increasing the fluid and the pulse is being measured.



Detection method

This alarm appears when the lower sensor detects bubbles before the upper sensor of the manometer detects the fluid level (5 of the illustration) after a measurement starts, the manometer increases the fluid and the lower sensor of the manometer detects the fluid level.

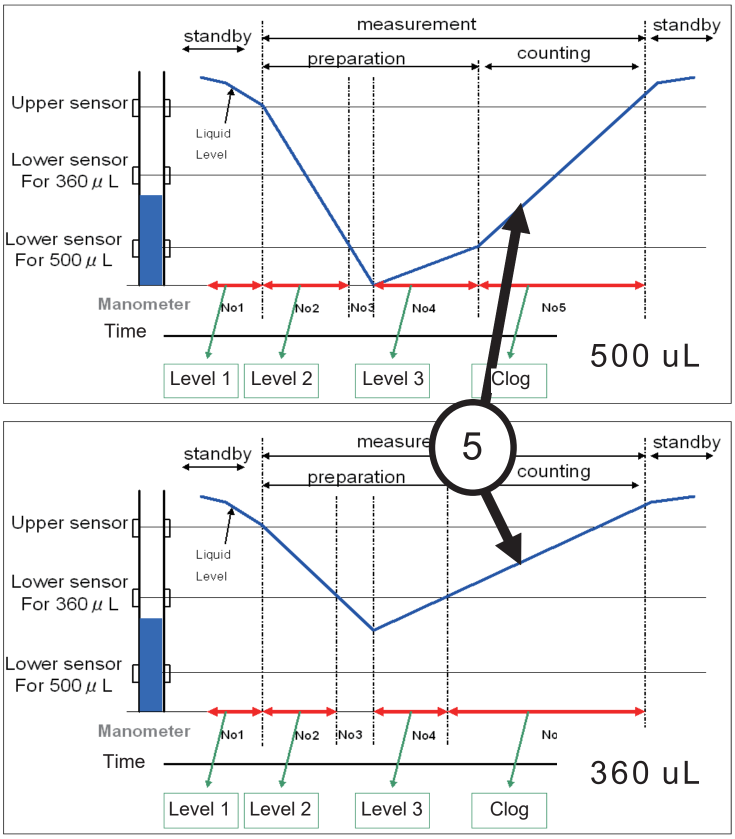
Cause and countermeasure

- Valve operation failure
- Air leak in the fluid path of the MC unit.

A027: WBC bubble 4
A047: RBC bubble 4

General

The alarm appears when the measurement time of the blood cell pulse is too fast due to bubbles or leak.



Detection method

This alarm appears when the time from the pulse count starts to upper sensor of the manometer detects the fluid level and the measurement finishes is shorter than the following.

When the quantity is 500 μL: 14.5 seconds

When the quantity is 360 μL: 11.50 seconds

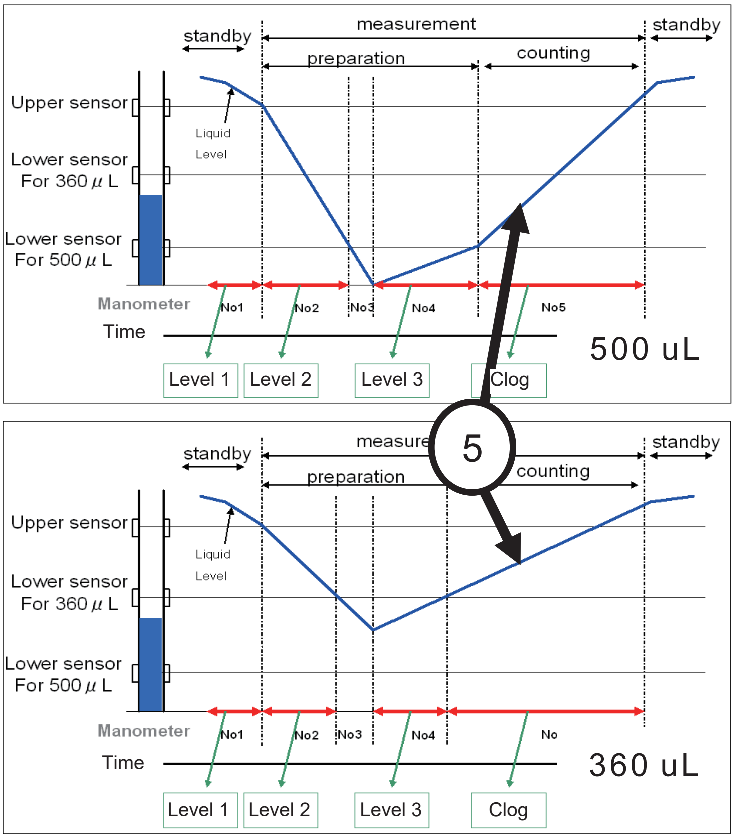
Cause and countermeasure

- Valve operation failure
- Air leak in the fluid path of the MC unit.

A029: WBC clogged
A049: RBC clogged

General

These alarms appear when the blood cell pulse measurement takes too much time because the aperture may be clogged.



Detection method

The alarm appears when the time from starting a measurement, the manometer increases the fluid and the lower sensor is turned on to the upper sensor is turned on (5 of the illustration) is longer than the following.

When the quantity is 500 µL,	normal mode:	21.25 seconds
	high altitude mode:	28.38 seconds
When the quantity is 360 µL:	normal mode:	15.30 seconds
	high altitude mode:	20.43 seconds

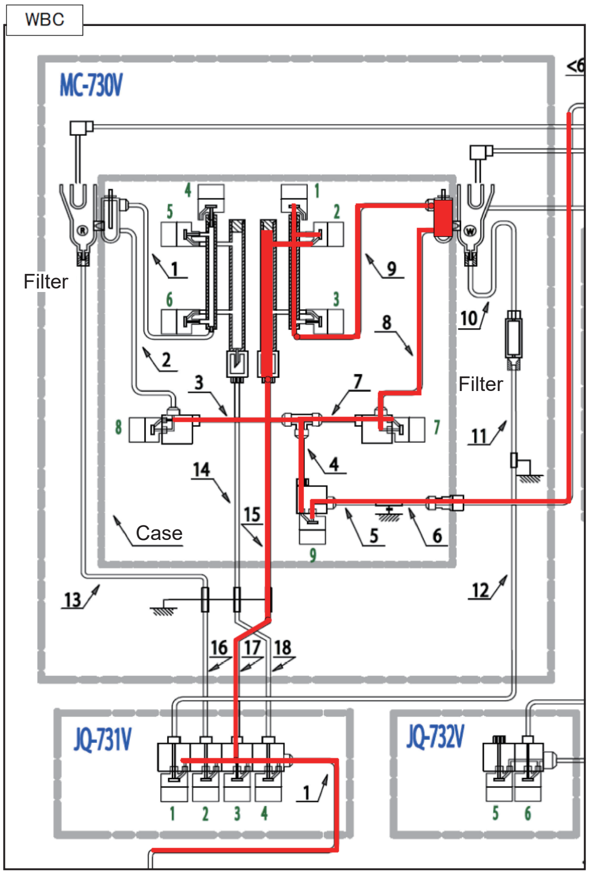
Cause and countermeasure

The aperture is clogged completely.

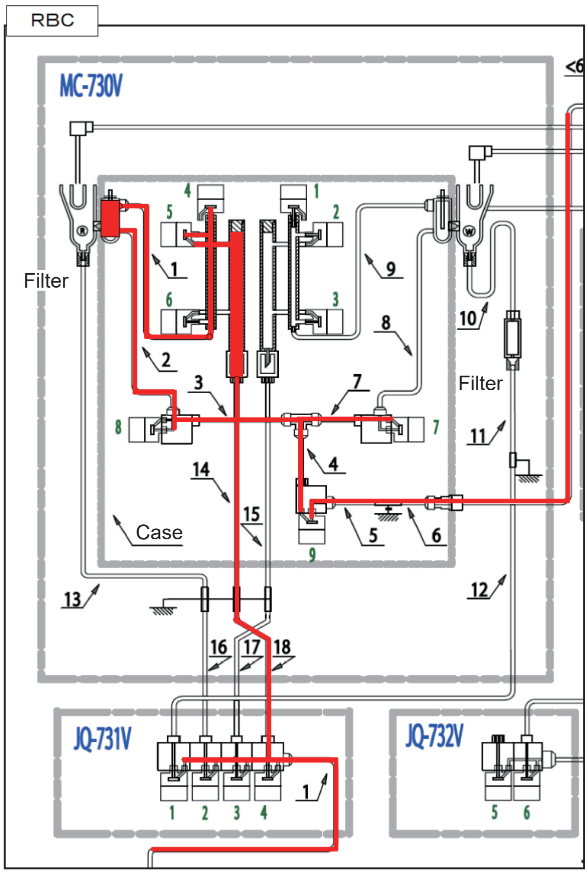
Valve operation failure

Air leak in the fluid path of the MC unit.

Fluid path to be checked when WBC LEVEL 1 to 3, CLOG or BUBBLE 1 to 4 alarm occurs



Fluid path to be checked when RBC LEVEL 1 to 3, CLOG or BUBBLE 1 to 4 alarm occurs



A030: WBC sample error

A050: RBC sample error

General

These alarms appear when the electrode voltage is over 32.0 V. Normally, the electrode voltage of WBC is about 18 V and the electrode voltage of RBC is 24 V but when the temperature becomes low, the electrical resistance of the diluent and electrode voltage increases. If tap water is used instead of diluent, the electrode voltage is very high because tap water does not contain salt and does not pass current.

Cause and countermeasure

- The temperature of the diluent is low. (This occurs frequently in winter. Even if the room temperature is within the specified operating temperature (15 to 30°C), it takes time to increase the temperature of the fluid.
- Tap water is used instead of diluent.
- The electrode is off.
- Aperture failure
- UT-7249-01 MEASURING BD failure

A031: WBC hardware noise

A051: RBC hardware noise

General

These alarms appear when electrical fluctuation of the baseline (ground noise) is detected when the blood cells of WBC or RBC is measured.

Cause and countermeasure

- A 2-prong power cord is used.
- An instrument which has too much noise such as a refrigerator or centrifuge is on the same AC outlet.
- The analyzer is not grounded.
- The electrode is off.
- Aperture failure
- UT-7249-01 MEASURING BD failure
- UT-7244 ANALOG BD failure

A032: WBC software noise

A052: PLT software noise

A053: RBC software noise

General

These alarms appear when there is a large fluctuation of WBC, RBC or PLT blood cell measurement pulses in one second because noise may interfere.

Cause and countermeasure

- A 2-prong power cord is used.
- An instrument which has too much noise such as a refrigerator or centrifuge is on the same AC outlet.
- The analyzer is not grounded.
- The electrode is off.
- Aperture failure

- UT-7249-01 MEASURING BD failure
- UT-7244 ANALOG BD failure

HGB Measurement Alarms

A061:HGB voltage low

A062:HGB voltage high

A063:HGB circuit error

A064:HGB temp low

A065:HGB temp high

A066:LED temp low

A067:LED temp high

A068:HGB initialize error

A061: HGB voltage low

General

This alarm appears when the HGB sensor voltage is 1.5 V or less. "?" appears to the right of the HGB measurement value. The HGB sensor voltage is adjusted to 3.0 V when the WBC measurement bath is filled with diluent. The sensor voltage decreases when the WBC measurement bath gets dirty with blood protein. The low sensor voltage affects the HGB reproducibility.

Cause and countermeasure

- The WBC measurement bath is dirty.
- Strong cleaning has not been performed for a long time.
- A lysing reagent other than Hemolynac3N is used.
- Dust or crystals in the HGB measurement light path and LED light is blocked.
- The HGB sensor voltage is not adjusted correctly.
- HGB LED failure
- UT-7201 HGB AMP BD or UT-7202 HGB LED BD failure

A062: HGB voltage high

General

This alarm appears when the HGB sensor voltage is 4.5 V or more. "!" appears to the right of the HGB measurement value. Normally, the HGB sensor voltage is adjusted to 3.0 V when the WBC bath is filled with diluent. The voltage is highest with diluent. The voltage might not be adjusted correctly or the sensor may have a failure.

Cause and countermeasure

- HGB sensor voltage is not adjusted correctly.
- UT-7201 HGB sensor failure

A063: HGB circuit error

General

This alarm appears when the HGB sensor voltage is 0.5 V or more even when the HGB sensor LED is turned off. Normally, only the dirk current flows into the sensor when the sensor LED is turned off and 0.5 V or more voltage is not detected.

Cause and countermeasure

- The HGB cover is detached and ambient light enters.
  → Close the cover to block the ambient light.
- UT-7201 HGB sensor failure
  → Replace the board.

A064: HGB temp low

General

This alarm appears when the temperature of the HGB temperature sensor on the diluter sampling nozzle is less than 10°C when measuring a sample.

Cause and countermeasure

- The analyzer is used outside the specified operating environment.
  → Use the analyzer in the specified operating environment.
- Damaged or failure of the temperature sensor.
  → Disconnect and connect the connector and check the status on the sensor monitor.
- Failure of the IC that receives temperature sensor signal of UT-7238 VALVE CONNECTION BD 1
  → Replace the board.

A065: HGB temp high

General

This alarm appears when the temperature of HGB temperature sensor on the diluter sampling nozzle is 50°C or more when measuring a sample.

Cause and countermeasure

- The analyzer is used outside the specified operating environment.
  → Use the analyzer in the specified operating environment.
- Damaged or failure of the temperature sensor.
  → Disconnect and connect the connector and check the status on the sensor monitor.
- Failure of the IC that receives temperature sensor signal of UT-7238 VALVE CONNECTION BD 1.
  → Replace the board.

A066: LED temp low

General

This alarm appears when the temperature of the HGB temperature sensor is less than 10°C when measuring a sample.

Cause and countermeasure

- The analyzer is used outside the specified operating environment.
  → Use the analyzer in the specified operating environment.
- Damaged or failure of the temperature sensor.
  → Disconnect and connect the connector and check the status on the sensor monitor.

- UT-7201 HGB AMP BD failure.
  → Replace the board.

A067: LED temp high

General

This alarm appears when the temperature of the HGB temperature sensor is 50°C or more when measuring a sample.

Cause and countermeasure

- The analyzer is used outside the specified operating environment.
  → Use the analyzer in the specified operating environment.
- Damaged or failure of the temperature sensor.
  → Disconnect and connect the connector and check the status on the sensor monitor.
- UT-7201 HGB AMP BD failure.
  → Replace the board.

A068: HGB initialize error

General

The analyzer measures the diluent without a blood sample of HGB (blank measurement) when the power is turned on, the analyzer is primed or every 10 measurements cleaning. When the power is turned on while holding the reset switch, the analyzer is not primed and HGB blank measurement is not performed.

Cause

The analyzer was turned on while holding down the reset key.

Countermeasure

- Turn on the analyzer normally (5 minutes).
- Refill the diluent (8 minutes) or refill all reagents (9 minutes).
- Perform cleaning (16 minutes).
- Measure samples until cleaning is performed after 10 measurements.
- Press the HGB BLANK MEAS key on “MC UNITE CHECK” of the maintenance window.

WBC 5 Part Differential Alarms

A081:Laser key off

A082:Optical count error

A091:Room temp high

A092:Room temp low

A081: Laser key off

General

Measurement starts and the signal to turn the laser ON to MO-820V2 but feedback of ON signal does not return. The laser is not irradiated to the flowcell, if one of the three inter lock switch is turned off for safety.

Cause and countermeasure

- The laser key is OFF or the cable is disconnected.
- The laser switch of the JQ-730V is OFF or the cable is disconnected.
- The cover of the MO-820V2 is detached.
- The JQ-730V or MO-820V2 is not connected.
- UT-7236 LIQUID SENSOR BD of JQ-730V failure.
- UT-7176 MO LD DRIVER BD of MO-820V2 failure.

A082: Optical count error

General

This alarm appears when the measurement result from WBC electrical resistance method is greatly different from optical measurement result by the flowcell.

Cause and countermeasure

- The flowcell position is not adjusted. → Adjust the flowcell.
- The optical adjustment is not correct. → Perform fine adjustment with MEK-CAL.
- The flow of the sample is not stable. → Clean the flowcell and check the damaged part with the hydraulic system diagram.
- There is a leak or clog in the flow path and fluid does not flow normally. → Refer to the troubleshooting.
- Sample pump of the MP-731V failure → Repair or replace the MP-731V.
- Sheath pump of the MP-730V failure → Repair or replace the MP-730V.
- Too many ghosts on the scattergram → Check the operating environment.
- There are many microcytic lymphocytes in the measured blood. → This is not a failure.

A091: Room temp high

General

This alarm appears when the temperature sensor detects a higher temperature than the specified operating temperature. If the temperature exceeds the specified operating environment, the response of the lysing reagent changes. It affects WBC 5 part differentiation, especially NE% and LY% and “?” appears to the right of the NE%, NE, LY% and LY.

Detection sensor and method

The room temperature sensor and warmer temperature sensor detect the temperature when measuring a sample. This alarm appears when one of the sensors detects 36°C or more or the room temperature is 30°C or more and the warmer temperature is 34°C or more.

Cause and countermeasure

- The room temperature exceeds the specified operating temperature
→ Use the analyzer in the specified operating temperature.
- Temperature sensor failure → Replace the sensor.
- Board failure → Replace the UT-7238 VALVE JUNCTION BD.

A092: Room temp low

General

This alarm appears when the temperature sensor detects a lower temperature than the specified operating temperature. If the temperature exceeds the specified operating environment, the response of the lysing reagent changes. It affects WBC 5 part differentiation, especially NE% and LY% and “?” appears to the right of the NE%, NE, LY% and LY.

Detection sensor and method

The room temperature sensor and warmer temperature sensor detect the temperature when measuring a sample. This alarm appears when one of the sensors detects 15°C or less.

Cause and countermeasure

- The room temperature exceeds the specified operating temperature.

  → Use the analyzer in the specified operating temperature.
- Temperature sensor failure

  → Replace the sensor.
- Board failure

  → Replace the UT-7238 VALVE JUNCTION BD.

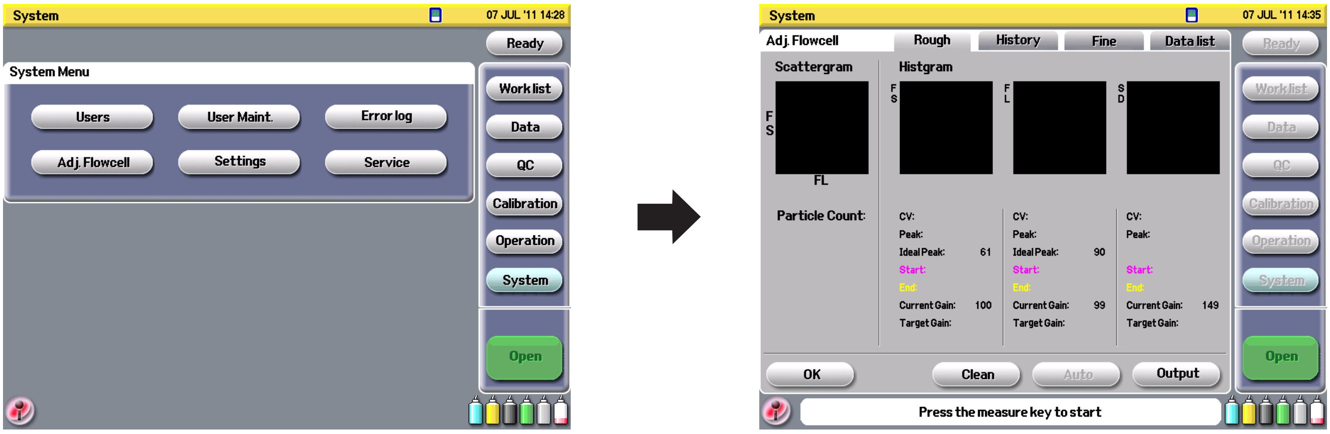
Particle CV Check

Measuring the Particle Distribution Width

A flag of WBC 5 part differentiation frequently occurs in the measurement result and the scattergram is not displayed correctly or the optical count error always occurs because of the laser light might not be irradiated to the blood sample in the flowcell. You have to measure the particle distribution width with YZ-0194 7µm polymer microsphere suspensions to check this.

Measuring Particles

Press the System → Adj. Flowcell key to display the Adj. Flowcell (Rough) window.



Press the Count switch to aspirate and measure the 7µm polymer microsphere suspensions. After measurement, CV and peak of FS (forward-scattered light small angle component) and FL (forward-scattered light large angle component) histogram appear. Check that these values are in the following range.

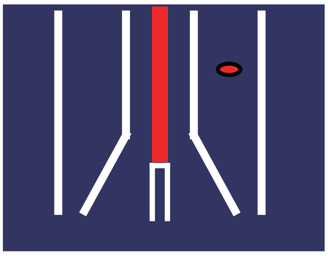
FS: CV 7.0% or less, Peak 60±3

FL: CV 7.0% or less, Peak 91±3

If the CV value of FS and FL is not in the above range, press the Clean key on the lower middle of the screen to clean the flowcell and remove dust and bubbles in the flowcell then check if the CV is improved. If the CV of particle measurement is more than 7.0% after cleaning, adjust the flowcell position. Refer to “Adjusting the Flowcell Position” later in this section.

Poor Particle Reproducibility

1 The scattergram and histogram do not appear. TOC is 0.

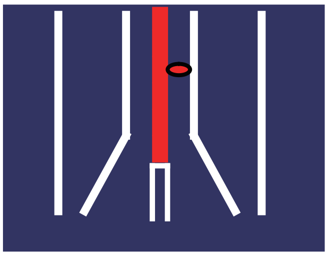


When a sample is measured, the optical count is 0, the laser is completely out of the flowcell path or the laser is not irradiated.

Trouble	Cause	Action
The laser is not irradiated.[1]	• The laser key is turned off. • Emergency laser switch is turned off. • The connector of the MO-820V2 is disconnected. • The inter lock switch of the UT-7176 LD DRIVER BD is in failure. • MO-820V2 failure • UT-7244 ANALOG BD failure	• Turn on the laser key. • Turn on the emergency laser switch. • Connect the MO-820V2 connector. • Replace the MO-820V2. • Replace the MO-820V2. • Replace the UT-7244 ANALOG BD.
The sheath fluid does not flow in the flowcell.	• The flowcell is clogged. • MP-730V does not move. • There is a leak on the flow path of the MJ-730V.	• Clean the flowcell. • Replace the MP-730V. • Check the joint, valve and tube.
The flowcell position is not correct.	The flowcell is not adjusted correctly.	Adjust the flowcell position.
A waveform is not loaded	• The optical threshold setting is incorrect. • UT-7244 ANALOG BD failure	• Set the optical threshold to 10. • Replace the UT-7244 ANALOG BD.

[1] The laser is only irradiated during measurement. While the laser is irradiated, the laser check LED of the front panel lights. You can always irradiate the laser by displaying the particle measurement screen.

2 When the scattergram and histogram appear but the TOC is low (200 or less).

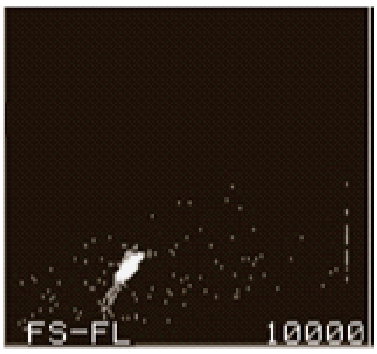


When a sample is measured, the optical count is 200 or less. The laser is irradiated into the flowcell path but it is out of the sample flow.

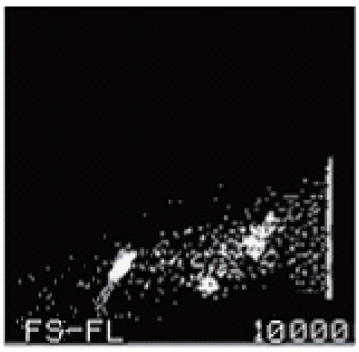
Trouble	Cause	Action
The YZ-0194 7µm polymer microsphere suspensions are coagulated.[1]	The 7µm polymer microsphere suspensions are not stored properly.	• Replace the 7µm polymer microsphere suspensions with new ones. • Place the 7µm polymer microsphere suspensions in an ultrasound bath.
The sample does not flow into the flowcell.	• The Pharmed tube right under the flowcell is clogged. • MP-731V failure • MP-730V failure • MJ-730V failure • UT-7243/UT-7321 DRIVER BD failure	• Replace the Pharmed tube right under the flowcell. • Replace the MP-731V. • Replace the MP-730V. • Refer to “Board/Unit Description” in Section 4. • Replace the UT-7243/UT-7321 DRIVER BD.
The sample is not set into the manifold part.	• The flowcell is clogged. • The MP-730V does not move. • There is a leak in the flow path of the MJ-730V.	• Clean the flowcell. • Replace the MP-730V. • Check the joint, valve and tube.
The sample flow is unstable.	• Bubbles or dust in the flowcell. • Leak in the flow path of the MJ-730V. • MP-731V failure • MP-730V failure	• Clean the flowcell. • Check the joint, valve and tube. • Replace the MP-731V. • Replace the MP-730V.
The flowcell position is not correct.	The flowcell position is not adjusted correctly.	Adjust the flowcell position.
A waveform is not loaded.	The optical sensitivity and threshold settings are incorrect.	Set the FS threshold to 127 (maximum) and threshold to 10.
The sheath liquid does not flow through the flowcell.	• The flowcell is clogged. • The MP-730V does not move. • Leak in the flow path of the MJ-730V.	• Clean the flowcell. • Replace the MP-730V. • Check the joint, valve and tube.

[1] If the YZ-0194 7µm polymer microsphere suspensions are stored incorrectly, the particles coagulate as follows and the flowcell position cannot be checked correctly. In this case, place the particles to breakup the coagulation.

Normal particles



Coagulated particles



3 When the CV is improper (CV of FS or FL is 7.0% or more).

Trouble	Cause	Action
The YZ-0194 7µm polymer microsphere suspensions are coagulated.	The 7µm polymer microsphere suspensions were not stored properly.	• Replace the 7µm polymer microsphere suspensions with a new one. • Place the 7µm polymer microsphere suspensions in an ultrasound bath.
The sample flow is unstable.	• Bubbles or dust in the flowcell. • Leak in the flow path of the MJ-730V. • MP-731V failure • MP-730V failure	• Clean the flowcell. • Check the joint, valve and tube. • Replace the MP-731V. • Replace the MP-730V.
The flowcell position is not correct.	The flowcell position is not adjusted correctly.	Adjust the flowcell position.
The scattered light is unstable.	• The outside of the flowcell is dirty. • The flowcell is broken. • MO-820V2 failure	Replace the MO-820V2.

Adjusting the Flowcell Position

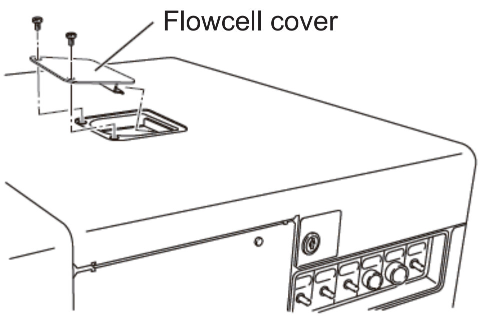
Clean the flowcell before adjusting it. The flowcell is adjusted to the optimum position at the factory. The position hardly moves. When the CV of particle measurement is outside the standard range, there may be dust or bubble in the flowcell. It is unlikely that the flowcell position is changed. Especially, when the reagents are not filled in the analyzer such as right after installation, clean the flowcell to remove the air (bubbles) and dust in the flowcell by the Cleanac with the surfactant.

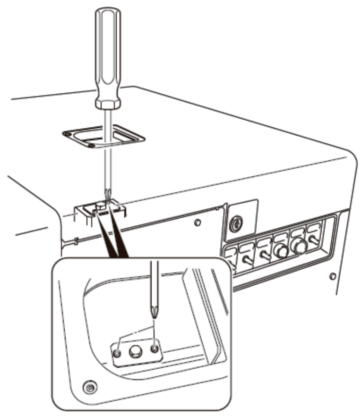
If the CV of particles is incorrect after cleaning the flowcell, adjust the flowcell to the proper position by the following procedure.

1. Remove the two flowcell cover fixing screws on the top cover and the flowcell cover.

2. Loosen but do not remove the two screws that fix the flowcell position adjust screw by turning the Phillips head screw driver counterclockwise.

   NOTE: Do not remove the screws.

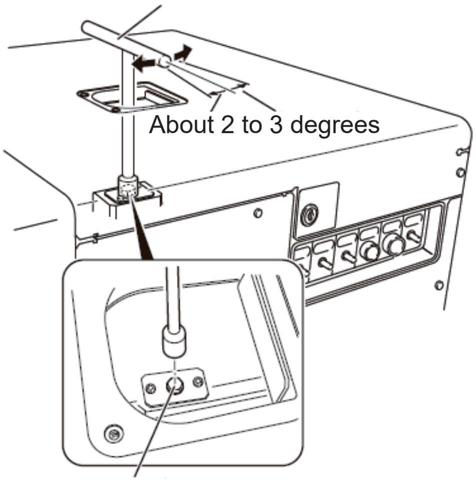




3. Insert the T box wrench (standard accessory) into the flowcell position adjust screw.

4. Measure the 7µm polymer microsphere suspensions.

5 When the particle count starts, turn the T box wrench about 2 to 3 degrees to the right or left.



6 Press the Clear key and check the distribution of the particle scattergram and histogram. When the Clear key is pressed, the Count is reset and starts from 0. The scattergram is also cleared and you can check the adjustment condition. If the Clear key is not pressed, the scattergram is not cleared and you cannot check the condition.

7 Compare the scattergram distribution of the particles before and after turning the T box wrench. If the distribution is smaller (the width of the FS and FL histogram is thinner) after turning the wrench, turn the wrench 2 to 3 degrees in the same direction. If the distribution is wider, turn the wrench to the opposite direction.

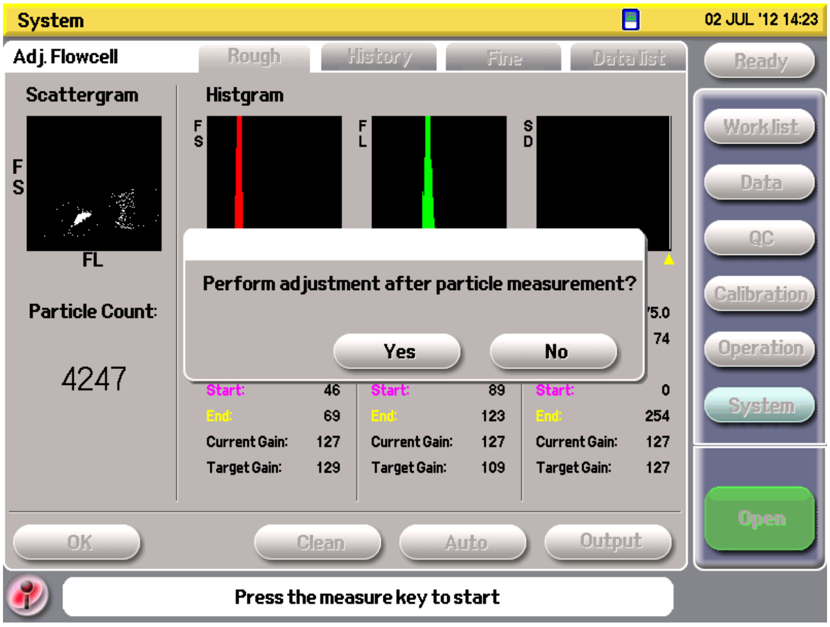
8 Press the Clear key and check the distribution as described in step 6.

9 Repeat steps 7 and 8 until the scattergram distribution of the particles becomes smallest.

10 Remove the T box wrench from the position adjust screw.

11 Tighten the two screws that fix the flowcell position adjust screw with the Phillips head screw driver (turn clockwise).

12 Measure 7µm polymer microsphere suspensions and check the CV and peak value. If the CV of FS and FL is 7.0% or less, hook the MO blind plate to the analyzer and fix it in place with the screws.



13 When the particles are measured and the OK key is pressed on the Adj. Flowcell screen, a confirmation message appears. Press the OK key to perform post-cleaning of particle measurement (about 6 minutes).

Countermeasure against the Trouble at the Particle Measurement (Backwash)

When the CV of FS and FL is about 20% or more after measuring particles, the CV does not change after turning the flowcell adjustment screw and flowcell cleaning does not affect the value, dust may have entered the flowcell and it cannot be removed by flowcell cleaning. In this case, disconnecting the joint from the flowcell, connecting a syringe filled with detergent (Cleanac) and flowing the detergent into the flowcell in the opposite direction to remove the dust (backwash).

Backwash procedure

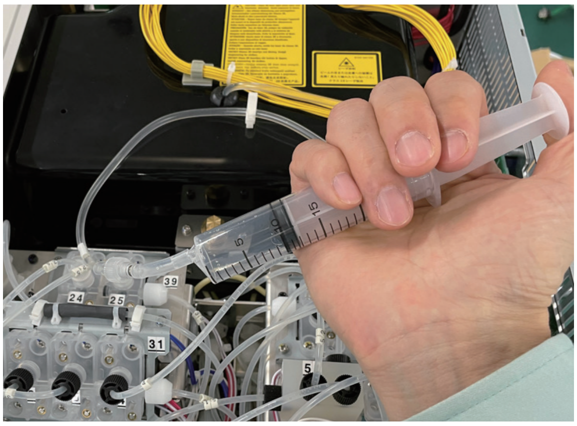
1 Fill a syringe with about 10 cc of Cleanac (green detergent).

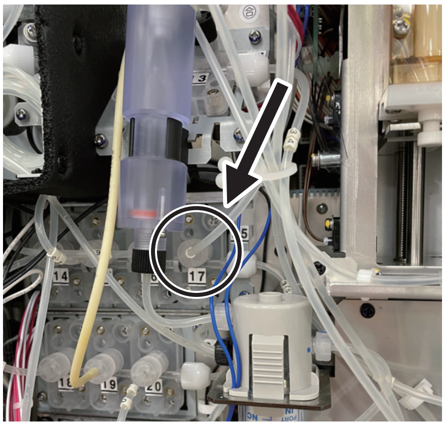
2 Disconnect the joint from the end of the flowcell and connect the syringe filled with detergent.

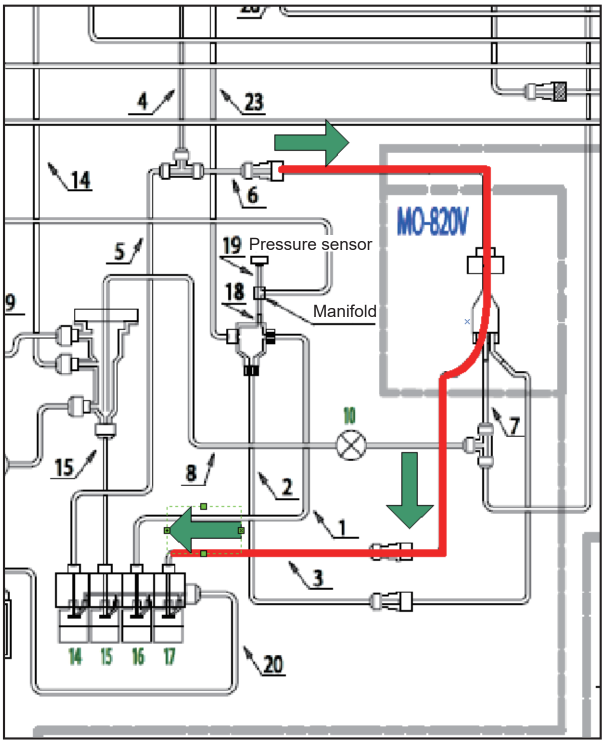
3 Disconnect the valve joint (17) which is connected to the entrance flow path with the sheath under the flowcell and put the tube into an empty cup.

4 Press the syringe to flow detergent from the end of the flowcell several times.

5 Re-connect the joint and press the Clean key to clean the analyzer.







Background Check

Measure only the diluent in both closed and open mode measurement to check the noise effect.

Set an empty vacuum sample tube to the tube holder and start measurement in closed mode.

Press the Count switch to measure only the diluent in open mode. The detergent and hematology control do not need to be aspirated.

If the measurement values are near the following values, there is no problem.

WBC: 2 (×102/µL)

RBC: 5 (×104/µL)

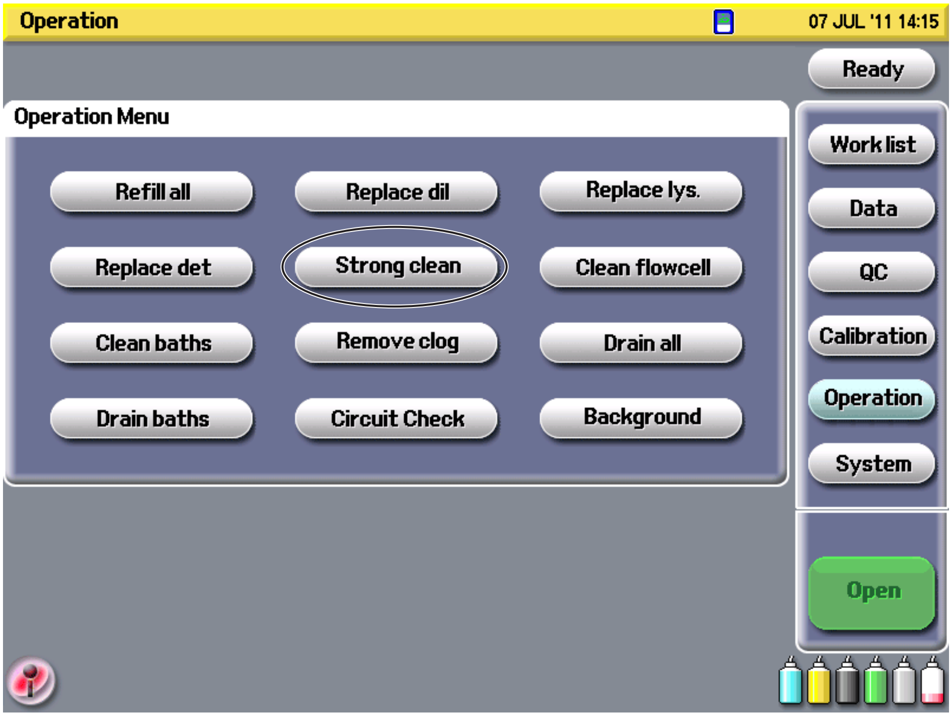
HGB: 0.1 (g/dL)

PLT: 1.0 (×104/µL)

TOC: 100 count

Perform cleaning and measure the background for any items. If the value is still out of range, perform strong cleaning, measure the background and check the value again.

Ready → Operation → Strong cleaning



If the background does not decrease, check the following possible causes.

Trouble	Cause		Action
Whole background does not decrease.	Reagent is dirty.	Diluent is dirty.	Replace the diluent.
		Diluent tube is dirty.	Replace the diluent tube.
		Diluent bottle is dirty.	Clean the diluent bottle.
	Inside the analyzer is dirty.	Flow path is dirty.	Press the Clean key.
			Perform strong cleaning.
	Noise interference	Noise from the power source.	Change the AC outlet.
		Noise from an external instrument.	Ground the analyzer.
			Keep away from the external instrument.
	The temperature exceeds the specified operating temperature of the reagents.	There may be bubbles or deposits because of the temperature.	Use the reagents within the specified operating environment.
WBC background does not decrease.	Inside the analyzer is dirty.	Sub bath or measurement bath are dirty.	Clean or replace the sub bath or measurement bath.
		Sampling nozzle is dirty.	Clean the sampling nozzle.
		Aperture is dirty.	Clean or replace the aperture.
		Diluter part of MP-730V is dirty.	Replace the cylinder block.
	Reagent is dirty.	Hemolynac•3N is dirty.	Use new Hemolynac•3N.
		Hemolynac•5 is connected instead of Hemolynac•3N by mistake.	Perform Drain all, clean the analyzer with distilled water, drain the analyzer again, connect the reagents correctly and perform strong cleaning.
	Analyzer failure	Electrodes come off.	Connect the electrodes of the measurement bath correctly.
		Aperture is damaged or broken.	Replace the aperture.
		MC-730V is broken.	Replace the MC-730V.
		Sampling nozzle is clogged and bubbles appear in the sample.	Replace the sampling nozzle.
		MP-730V is damaged and bubbles appear in the sample.	Replace the MP-730V.
		UT-7244 ANALOG BD failure.	Replace the UT-7244 ANALOG BD.
		UT-7249-01 MEASURING BD failure.	Replace the UT-7249-01 MEASURING BD.
RBC and PLT background does not decrease.	Analyzer failure	Sampling nozzle is dirty.	Clean the sampling nozzle.
		Aperture is dirty.	Clean or replace the aperture.
		Diluter part of the MP-730V is dirty.	Replace the cylinder block.
		Electrodes come off.	Connect the electrodes of the measurement bath correctly.
		Aperture is damaged or broken.	Replace the aperture.
		MC-730V is broken.	Replace the MC-730V.
		Sampling nozzle is clogged and bubbles appear in the sample.	Replace the sampling nozzle.
		MP-730V is damaged and bubbles appear in the sample.	Replace the MP-730V.
		UT-7244 ANALOG BD failure.	Replace the UT-7244 ANALOG BD.
		UT-7249-01 MEASURING BD failure.	Replace the UT-7249-01 MEASURING BD.

Trouble	Cause		Action
HGB background does not decrease.	Inside the analyzer is dirty.	Sub bath or measurement bath are dirty.	Clean the sub bath or measurement bath.
			Replace the sub bath or measurement bath.
	Analyzer failure.	MC-730V is broken.	Replace the MC-730V.
		Sampling nozzle is clogged and bubbles appear in the sample.	Replace the sampling nozzle.
		MP-730V is damaged and bubbles appear in the sample.	Replace the MP-730V.
		UT-7244 ANALOG BD failure.	Replace the UT-7244 ANALOG BD.
		UT-7249-01 MEASURING BD failure.	Replace the UT-7249-01 MEASURING BD.
TOC background does not decrease.	Inside the analyzer is dirty.	Flowcell is dirty.	Press the Clean flowcell key.
		Sample cup is dirty.	Clean the sample cup.
		Filter under the sample cup is clogged with a foreign substance.	Replace the filter.
	Bubbles in the tube	Pharmed tube is clogged.	Remove the clog or replace the Pharmed tube.
		There is a leak in the flow path.	Fix the valve joint of the MJ-730V.
		Mix chamber is cracked.	Replace the mix chamber of MJ-730V.
	Analyzer failure	Mix chamber is cracked.	Replace the mix chamber of MJ-730V.
		MO-820V2 is broken.	Replace the MO-820V2.
		UT-7244 ANALOG BD/MASTER BD is broken.	Replace the UT-7244 ANALOG BD/ MASTER BD.
		UT-7242 POWER BD is broken.	Replace the UT-7242 POWER BD.

Reproducibility Check

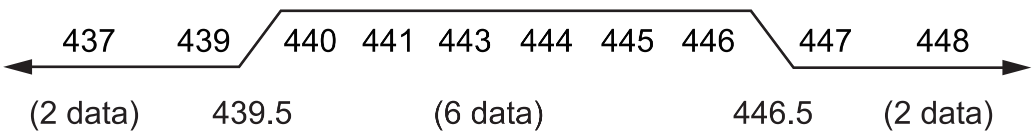
Check the reproducibility by the CV value of the data that is obtained by measuring the same MEK-5DN hematology control or human blood 10 times. If the CV value exceeds the standard, the analyzer does not operate correctly. Find the cause and take proper action by referring to “Reproducibility Failure” later in this section.

Reading Data

The reproducibility of the data is judged by the “CV value” that is obtained by dividing the standard deviation with the average. The larger the CV value, the larger the variation is (the reproducibility is bad).

Item	Measurement Example (Mean)	Measurement Example (CV)	Reproducibility Standard
WBC	68	1.3	2.0
NE%	—	—	5.0
LY%	—	—	5.0
MO%	—	—	12.0
EO%	—	—	20.0
BA%	—	—	30.0
RBC	443	0.8	1.5
HGB	13.0	0.7	1.5
MCV	91.0	0.4	1.0
PLT	24.2	3.2	4.0

For example, the average is 443 and the CV value is 0.8 for RBC of above list. 0.8% of 443 is 3.5, 443 ± 3.5 is 439.5 to 446.5. When the CV value is 0.8% mean RBC measured data is within 439.5 to 446.5 six times out of ten.

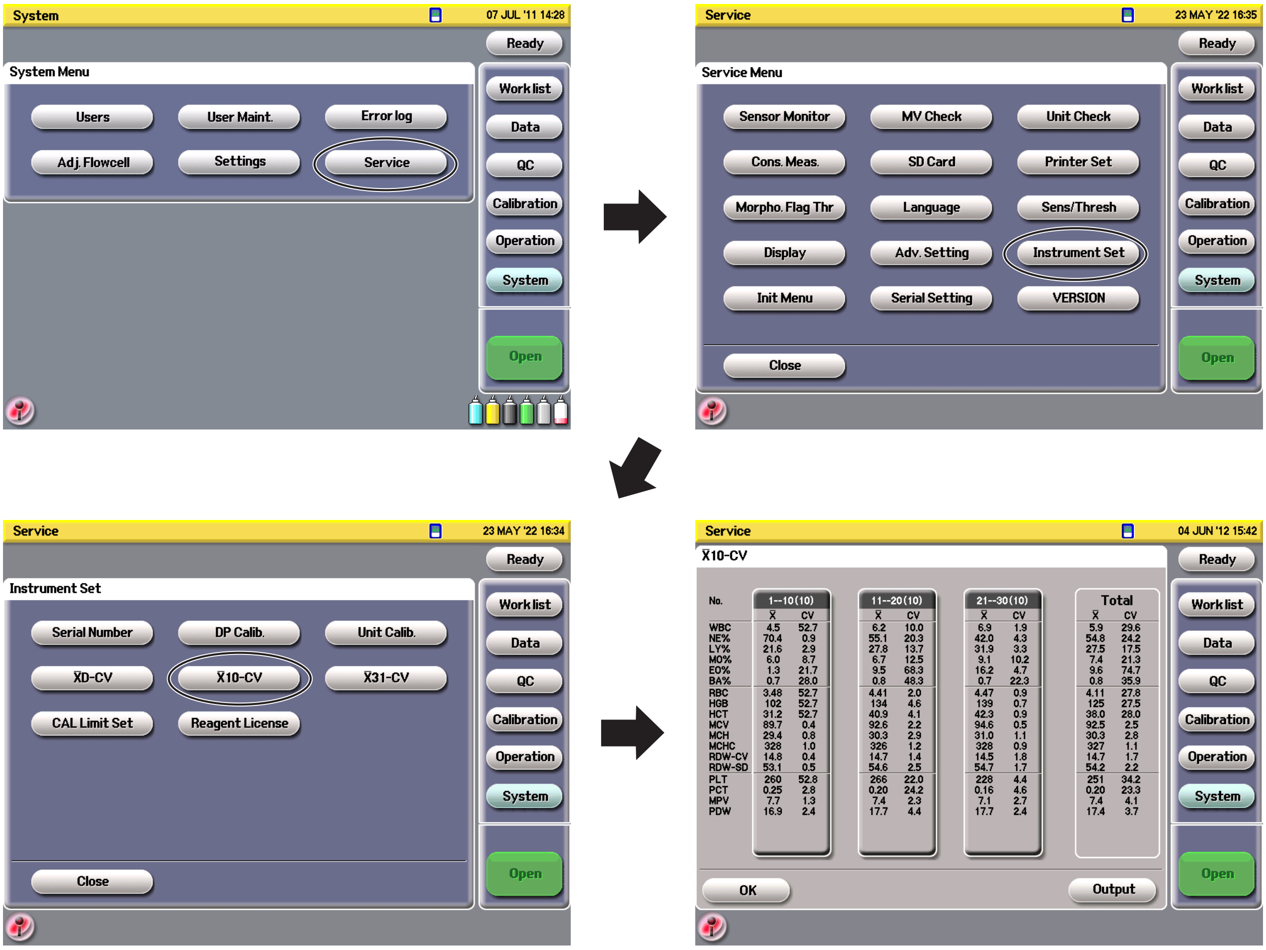


Reference: CV value of a sample which has small countable number of values (low concentration sample)

The analyzer counts the blood cells which pass the hole and about 50,000 blood cells are counted for 15 seconds in one RBC measurement. The reproducibility of the analyzer is decided by this counted number statistically. The higher number is good and lower number is bad. If the low concentration sample is counted, the number decreases and the variation is large. For example, in the PLT standard, the CV value when about 300,000 cells are counted is 4.0% or less. If the blood cells are 100,000 or less, the CV value exceeds 4.0%. This principle is the same on any hematology analyzer.

Checking the Reproducibility

- Set the measurement mode to “Control” and select MEK-5DN.
- Measure the MEK-5DN hematology control 10 times.
- Display the X10-CV screen from the Instrument Set window of the Maintenance window. The average and CV value of 10 measurements is displayed.



- Check that the reproducibility CV% for each item is within the standard values.

Item Name	Reproducibility (CV%)
Number of white blood cells (WBC)	CV 2.0% or less
Neutrophil percent ratio (NE%)	CV 5.0% or less
Lymphocyte percent ratio (LY%)	CV 5.0% or less
Monocyte percent ratio (MO%)	CV 12.0% or less
Eosinophil percent ration (EO%)	CV 20.0% or less
Basophil percent ratio (BA%)	CV 30.0% or less (> 2%) Difference from the standard value: within ±1% (0 to 2 %)
Number of red blood cells (RBC)	CV 1.5% or less
Hemoglobin concentration (HGB)	CV 1.5% or less
Mean red blood cell volume (MCV)	CV 1.0% or less
Number of platelet (PLT)	CV 4.0% or less

Reproducibility Failure

If the reproducibility is poor after “Checking the Reproducibility”, refer to the following section to find the cause and take proper action.

When the WBC Data is Abnormal

The causes are largely classified as follows.

1 Dirty measurement part or flow path

2 Lysing reagent is altered

3 Sample is not agitated enough

4 Analyzer failure

1 Measurement part or flow path is dirty

Cause	Action
WBC measurement bath is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from Operations. • Remove and clean the WBC measurement bath. Refer to “Checking and Cleaning Measurement Baths, Sub Baths and MC Tray” in Section 9 of the operator’s manual. • Replace the WBC measurement bath.
WBC sub bath is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from Operations. • Remove and clean the WBC sub bath. Refer to “Checking and Cleaning Measurement Baths, Sub Baths and MC Tray” in Section 9 of the operator’s manual. • Replace the WBC sub bath.
WBC aperture is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from Operations. • Remove and clean the WBC aperture. Refer to “Cleaning Apertures” in Section 9 of the operator’s manual. • Replace the WBC aperture.
Drain path of the WBC measurement bath is dirty.	• Replace the filter under the air trap. • Clean the air trap.
Rinse chassis is dirty.	Clean the rinse chassis. Refer to “Checking, Cleaning and Replacing the Rinse Unit, Sampling Nozzles, Cap Pierce Nozzle and Sample Cup” in Section 9 of the operator’s manual.

2 Lysing reagent is altered

Cause	Action
Temperature exceeds the specified operating environment (15 to 30°C).	Use the analyzer in the specified operating environment. When the temperature is low, use a heater.
Hemolynac•5 is connected as the lysing reagent by mistake.	Perform Drain all, clean the analyzer with distilled water, drain the analyzer, connect the reagent correctly and perform strong cleaning.
Hemolynac•3 is connected as the lysing reagent by mistake.	Perform Drain all, clean the analyzer with distilled water, drain the analyzer, connect the reagent correctly and perform strong cleaning.

3 Sample is not agitated enough

Cause	Action
Sample is not agitated enough when measured.	Teach the operator to agitate the sample enough.
Sample is not agitated enough when collected.	Teach the operator to agitate the sample enough.

4 Analyzer failure

Cause	Action
Specified quantity of lysing reagent is not delivered.	• Hemolynac•3 tube assy does not touch the bottom of the bottle. • Replace the Hemolynac•3 tube assy. • Replace the MP-731V triple pump unit.
Circuit failure. When checking the circuit by pressing “Operation” → “Circuit Check” from the Ready screen, the WBC exceeds 80 ±5%.	• Replace the MC-730V. • Replace the UT-7244 ANALOG BD.
WBC measurement sample failure.	• Replace the MP-731V triple pump unit. • Replace the MS-730V sampler unit. • Replace the MS-731V cap pierce unit.

When the WBC 5 Part Differentiation Data is Abnormal

When the reproducibility of the WBC 5 part differentiation is poor, the causes are largely classified as follows.

1 High background

Cause	Action
Diluent is dirty.	Replace the diluent.
Unspecified reagents are used.	Use the specified reagents.
Flow path is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning.
Noise from the power source.	Change the AC outlet.
Noise from external instruments.	• Ground the analyzer. • Keep the analyzer away from the external instruments.
The temperature exceeds the operating environment of the reagents.	Use the reagent within the specified operating environment.
MO-820V2 failure	Replace the MO-820V2.
UT-7244 ANALOG BD failure.	Replace the UT-7244 ANALOG BD.
Hemolynac3N is connected to the Hemolynac5 port.	• Clean the connection tube. • Perform Drain all, clean the analyzer with distilled water, drain the analyzer again and perform strong cleaning.

2 Abnormal scattergram or incorrect optical adjustment

Cause	Action
No scattergram	Refer to “Particle Reproducibility Failure”.
There are each white blood cell distributions but they do not come together.	
Each white blood cell distributions come together but do not in the areas that is divided by the classification line.	

3 Sample is thin

Cause	Action
Pinch valve is clogged.	Check and replace the pinch valve tube.
Drain tube is bent.	Check and replace the drain tube
MJ-730V failure	• Check if there is a leak in the mix chamber. • Check if there is a leak from joints. • Check the valve operation on the “MV CHECK” of the maintenance window. • Replace the MJ-730V.
MP-730V failure.	Replace the MP-730V.
MP-731V failure.	Replace the MP-731V.
There is a leak in flow path.	Repair the flow path.

4 Characteristics of the sample

Cause	Action
MEK-3D is measured.	Measure MEK-5DN.
MEK-5D hematology control is deteriorated.	Use a new MEK-5DN.
A hematology control is measured in the human blood mode.	Measure the control in the quality control or control mode.
A sample which passed 12 hours or more after collection is measured.	Use a normal sample within 12 hours of collection.
WBC value is low or classification value of the sample is outside the standard.	Use human blood which is within the following range. WBC 40 to 400 × $10^2/\mu L$ NE 40 to 70 (%) LY 20 to 45 (%) MO 2 to 10 (%) EO 2 to 10 (%) BA 0 to 3 (%)

5 Too many RBC ghosts (insoluble blood)

Cause	Action
The temperature exceeds the operating environment (15 to 30°C).	Use the analyzer in the operating environment.
Pinch valve is clogged.	Check and replace the pinch valve tube.
Lysing reagent is not put correctly.	• The lysing reagent tube does not touch the bottom of the Hemolynac•5 and lysing reagent is not aspirated enough. • Check the MP-730V operation or replace it. • MP-730V piping is clogged.
Hemolynac•3N is connected as lysing reagent by mistake.	Perform Drain all, clean the analyzer with distilled water, drain the analyzer again, connect the reagents correctly and perform strong cleaning.
Lysing reagent is diluted with water.	Perform Drain all, clean the analyzer with distilled water, drain the analyzer again, connect the reagents correctly and perform strong cleaning.

When the HGB Data is Abnormal

When the reproducibility of the HGB is poor, the causes are largely classified as follows.

1. Dirty measurement part or flow path
2. Lysing reagent is altered
3. Sample is not agitated enough
4. Failure inside the analyzer

1 Dirty measurement part or flow path

Cause	Action
WBC sub bath is dirty.	Clean the sub bath by soaking it in Cleanac•3.
WBC measurement bath is dirty.	Clean the measurement bath by soaking it in Cleanac•3.
Obstacle in the HGB measurement light path.	• Keep the electrode of the measurement bath away from the HGB measurement light path. • Check for crystals in the HGB measurement light path of the HGB block.

2 Lysing reagent is altered

Cause	Action
Temperature exceeds the operating environment (15 to 30°C).	Use the analyzer in the specified operating environment. When the temperature is low, use a heater.
Hemolynac•5 is connected as the lysing reagent by mistake.	Perform Drain all, clean the analyzer with distilled water, drain the analyzer, connect the reagent correctly and perform strong cleaning.
Hemolynac•3 is connected as the lysing reagent by mistake.	Perform Drain all, clean the analyzer with distilled water, drain the analyzer, connect the reagent correctly and perform strong cleaning.

3 Sample is not agitated enough

Cause	Action
Sample is not agitated enough when measured.	• If the sample is not agitated enough and RBC thick part is aspirated, RBC, HCT and HGB become a falsely high value. When the thin part is aspirated, RBC, HCT and HGB become a falsely low values. • Teach the operator to agitate the sample enough. Refer to “Measurement” in Section 5 of the operator’s manual.

4 Inside the analyzer failure

Cause	Action
Standard quantity of lysing reagent is not delivered.	• Check that the Hemolynac•3 tube touches the bottom of the tank. • Replace the Hemolynac•3 tube assy. • Replace the MP-731V triple pump unit.
HGB measurement bath is dirty.	• Replace the MP-731V triple pump unit. • Replace the MS-730V sampler unit.
HGB sensor output failure. HGB LED ON voltage is outside the 1.5 to 4.5 V with the Sensor Monitor screen.	• Adjust the hemoglobin unit adjustment VR so that the HGB LED voltage is 3.0 ±0.5 V. • If the voltage cannot be adjusted, replace the MC-730V or UT-7244 ANALOG BD.

When the RBC Data is Abnormal

When the reproducibility of the RBC is poor, the causes are largely classified as follows.

1 Dirty Measurement part or flow path

2 Sample is not agitated enough

3 Analyzer failure

1 Dirty measurement part or flow path

Cause	Action
RBC measurement bath is dirty	• Press the Clean key to clean the analyzer. • Perform strong cleaning from the Operation window. • Remove and clean the RBC measurement bath. Refer to “Checking and Cleaning Measurement Baths, Sub Baths and MC Tray” in Section 9 of the operator’s manual. • Replace the RBC measurement bath.
RBC sub bath is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from the Operation window. • Remove and clean the RBC sub bath. Refer to “Checking and Cleaning Measurement Baths, Sub Baths and MC Tray” in Section 9 of the operator’s manual. • Replace the RBC sub bath.
RBC aperture is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from the Operation window. • Remove and clean the RBC aperture. Refer to “Cleaning Aperture” in Section 9 of the operator’s manual. • Replace the RBC aperture.
RBC measurement bath draining path is dirty.	Replace the filter under the RBC measurement bath.
Rinse chassis is dirty.	Clean the rinse chassis. Refer to “Checking, Cleaning and Replacing the Rinse Unit, Sampling Nozzles, Cap Pierce Nozzle and Sample Cup” in Section 9 of the operator’s manual.

2 Sample is not agitated enough

Cause	Action
Sample is not agitated enough when measured.	• If the sample is not agitated enough and RBC thick part is aspirated, RBC, HCT and HGB become a falsely high value. When the thin part is aspirated, RBC, HCT and HGB become a falsely low values. • Teach the operator to agitate the sample enough. Refer to “Measurement” in Section 5 of the operator’s manual.
Sample is not agitated enough when collected.	Teach the operator to agitate the sample enough. Refer to “Measurement” in Section 5 of the operator’s manual.

3 Analyzer failure

Cause	Action
When checking the circuit by pressing “Operation” → “Circuit Check” from the Ready screen, the RBC exceeds 160 ±5%.	• Replace the MC-730V. • Replace the UT-7244 ANALOG BD.
RBC measurement sample failure.	• Replace the MP-731V triple pump unit. • Replace the MS-730V sampler unit.

When the PLT Data is Abnormal

When the reproducibility of the PLT is poor, the causes are largely classified as follows.

1 High background

The PLT measurement has the highest sensitivity among blood cells and the background must be the standard value (PLT: 1.0, 104/μL or less) before checking the reproducibility. Check that the background is within the standard value and judge the reproducibility.

2 Sample is not agitated enough

3 Analyzer setting is incorrect

4 Failure of a dilution part in the analyzer

5 Failure of a measurement part in the analyzer

1 High background

Refer to “Background Check” in this section.

2 Sample is not agitated enough

Cause	Action
Sample is not agitated enough when measured.	Teach the operator to agitate the sample enough. Refer to “Measurement” in Section 5 of the operator’s manual.

3 Incorrect analyzer setting

Cause	Action
Sensitivity and threshold setting is not proper.	Check that RBC sensitivity is set to 5, RBC threshold is set to AUTO and PLT threshold is set to 5.

4 Failure of a dilution part in the analyzer

Cause	Action
MS-730V sampler unit failure.	Replace the MS-730V sampler unit.
MP-730V triple pump unit failure.	Replace the MP-730V triple pump unit.

5 Failure of a measurement part in the analyzer

Cause	Action
Aperture is dirty.	Clean the aperture. Refer to “Cleaning Aperture” in Section 9 of the operator’s manual.
Aperture is broken.	Replace the aperture.
When checking the circuit by pressing “Operation” → “Circuit Check” from the Ready screen, the PLT exceeds 16.0 ±5%.	• Replace the UT-7147 SLVE CBC BD. • Replace the MC-730V CBC measuring unit. • Replace the UT-7242 POWER BD.
MC-730V CBC measuring unit failure.	Replace the MC-730V CBC measuring unit.

When the HCT and MCV Data is Abnormal

When the reproducibility of the HCT and MCV is poor, the causes are largely classified as follows.

1 Dirty measurement part

2 Incorrect analyzer setting

3 Analyzer failure

1 Dirty measurement part

Cause	Action
RBC measurement bath is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from the Operation window. • Remove and clean the RBC measurement bath. Refer to “Checking and Cleaning Measurement Baths, Sub Baths and MC Tray” in Section 9 of the operator’s manual. • Replace the RBC measurement bath.
RBC sub bath is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from the Operation window. • Remove and clean the RBC sub bath. Refer to “Checking and Cleaning Measurement Baths, Sub Baths and MC Tray” in Section 9 of the operator’s manual. • Replace the RBC sub bath.
RBC aperture is dirty.	• Press the Clean key to clean the analyzer. • Perform strong cleaning from the Operation window. • Remove and clean the RBC aperture. Refer to “Cleaning Aperture” in Section 9 of the operator’s manual. • Replace the RBC aperture.

Cause	Action
RBC measurement bath draining path is dirty.	Replace the filter under the RBC measurement bath.
Rinse chassis is dirty.	Clean the rinse chassis. Refer to “Checking, Cleaning and Replacing the Rinse Unit, Sampling Nozzles, Cap Pierce Nozzle and Sample Cup” in Section 9 of the operator’s manual.

2 Incorrect analyzer setting

Cause	Action
Sensitivity and threshold setting is not proper.	Check that RBC sensitivity is set to 5, RBC threshold is set to AUTO and PLT threshold is set to 5.

3 Analyzer failure

Cause	Action
Aperture is broken.	Replace the aperture.
When checking the circuit by pressing “Operation” → “Circuit Check” from the Ready screen, the MCV exceeds 118 ±5%.	• Replace the MC-730V. • Replace the UT-7244 ANALOG BD.
RBC measurement sample failure.	• Replace the MP-731V triple pump unit. • Replace the MS-730V sampler unit.

Checking the Accuracy

Judge the accuracy by checking that the average of data in “Checking Reproducibility” is within the expected range on the assay sheet. If the average exceeds the expected value or is on the borderline, calibrate the analyzer. Refer to Section 6 “Calibration Procedures” of the operator’s manual.

Checking the Scattergram with Fresh Blood

NOTE: Always wear rubber gloves to protect yourself from infection when handling and measuring blood samples.

Measure a sample of normal human blood within 8 hours after collection. Check that the following clinically important flags do not appear.

When CBC Flags Appear Frequently

Leukocytosis, leukopenia, erythrocytosis, macrocytosis , microcytosis, anemia, hypochromia, anisocytosis, thrombocytosis, thrombopenia

If the above flags which indicates increase or decrease of the blood cells frequently appear despite the reproducibility has no problem, these flags are detected when the CBC measurement value is high or low and the followings may be the cause.

Trouble	Cause	Action
Adjustment and calibration of the analyzer are incorrect.	CBC calibration failure.	Calibrate the analyzer. Refer to “Checking the Accuracy”.
Operating environment is improper.	Specified reagents are not used.	Use the specified reagents.
	Operating temperature is not 15 to 30°C.	Use the analyzer in the specified operating environment.

Poor hemolyzation, PLT clumps, abnormal MCHC, PLT-RBC interference

If the above flags which indicates increase or decrease of the blood cells frequently appear despite the reproducibility has no problem, the followings may be the cause.

- Poor hemolyzation, PLT clumps, abnormal MCHC

  Refer to “Alarm to the Right of the Value” in this section.

- PLT-RBC interference

Cause	Action
Background is high.	Refer to “Checking Background” in this section.
Sensitivity and threshold setting is not proper.	Check that RBC sensitivity is set to 5, RBC threshold is set to AUTO and PLT threshold is set to 5.

When WBC 5 Part Differentiation Flags Appear Frequently

Blasts, immature granulocyte, left shift, atypical lymphocytes, small nucleated cell, Ly-Mo interference, Ne-Eo interference.

If the above WBC 5 part differentiation flags appear frequently, the causes are largely classified as follows.

1. Rough optical adjustment trouble
2. Fine optical adjustment trouble
3. When increasing or decreasing flags of the WBC 5 part differentiation appear frequently.

4 When abnormal cell flags of the WBC 5 part differentiation appear frequently.

Rough Optical Adjustment Trouble

Refer to “Particle CV Check” in this section.

Fine Optical Adjustment Trouble

- When each WBC distribution of scattergram come together but they are not in the area divided by the classification line.

Trouble	Cause	Action
Optical sensitivity is not proper.	Optical fine adjustment with MEK-CAL is not proper.	Perform the fine optical adjustment with MEK-CAL.

- When there are each WBC distributions of the scattergram but they do not come together.

Trouble	Cause	Action
Reagent failure.	Specified reagents are not used.	Use the specified reagents.
Characteristics of a sample.	Characteristics of a sample.	This is not a failure.
	Many WBC	This is not a failure.
	12 hours elapsed after collecting the sample.	This is not a failure.
	MEK-5D is measured.	This is not a failure.
CV of the scattergram is improper.	Adjustment with 7μm polymer microsphere suspensions are improper.	Adjust the analyzer with the 7μm polymer microsphere suspensions.
Sample and lysing reagent are not mixed properly.	Pharmed tubes are clogged.	Replace the two Pharmed tubes.
	MP-731V failure.	Replace the MP-731V.
	There is a leak or clog on the flow path.	Check the joint and valve of the MJ-730V.

- When there is no scattergram.

Trouble	Cause	Action
Laser is not emitted.	Laser key is turned off.	Turn on the laser key.
	Emergency quenching switch is turned off.	Turn on the emergency quenching switch.
	Connector of the MO-820V2 is disconnected.	Connect the connector of the MO-820V2.
	MO-820V2 failure.	Replace the MO-820V2.
	UT-7244 ANALOG BD failure.	Replace the UT-7244 ANALOG BD.
Flowcell position is not correct.	Flowcell position is not adjusted properly.	Adjust the flowcell position.
Sample does not flow to the flowcell.	Pharmed tubes are clogged.	Replace the two Pharmed tubes.
	MP-731V failure.	Replace the MP-731V.
	MP-730V failure.	Replace the MP-730V.
	MJ-730V failure.	Check the joint and valve of the MJ-730V.
	UT-7243/UT-7321 DRIVER BD failure.	Replace the UT-7243/UT-7321 DRIVER BD.
Waveform is not displayed.	Optical threshold setting is incorrect.	Set the optical threshold to 10.
	UT-7244 ANALOG BD failure.	Replace the UT-7244 ANALOG BD.

When Increasing or Decreasing Flags of the WBC 5 Part Differentiation Appear Frequently

When the following flags appear frequently from the WBC 5 part differentiation flags.

- Neutrophilia
- Neutropenia
- Lymphocytosis
- Lymphopenia
- Monocytosis
- Eosinophilia
- Basophilia

The followings may be the reason, other than “Fine Optical Adjustment Trouble”.

Trouble	Cause	Action
Measurement method is incorrect.	• Human blood is measured in the control mode. • Human blood is measured in the QC screen.	Measure the sample in the human blood mode.
Optical sensitivity is incorrect.	Optical fine adjustment with MEK-CAL is incorrect.	Perform the optical fine adjustment with MEK-CAL. Refer to “Performing an Optical Adjustment” in Section 5.
Calibration coefficient is changed.	• Operation error. • Normally, calibration coefficient of LY%, MO%, EO% and BA% are 1,000.	Check the reason why the user changes the coefficient. Return the coefficient to 1,000 once and measure the MEK-5DN.

When Abnormal Cell Flags of the WBC 5 Part Differentiation Appear Frequently

When the following flags appear frequently from the WBC 5 part differentiation flags.

- Blasts
- Immature granulocyte
- Left shift
- Atypical lymphocytes

The followings may be the reason.

Trouble	Cause	Action
Measurement method is incorrect.	• Human blood is measured in the control mode. • Human blood is measured in the QC screen.	Measure the sample in the human blood mode.
Optical sensitivity is incorrect.	Optical fine adjustment with MEK-CAL is incorrect.	Perform the optical fine adjustment with MEK-CAL. Refer to “Performing an Optical Adjustment” in Section 5.
Calibration coefficient is changed.	• Operation error. • Normally, calibration coefficient of LY%, MO%, EO% and BA% are 1,000.	Check the reason why the user changes the coefficient. Return the coefficient to 1,000 once and measure the MEK-5DN.

When Abnormal Cell Flags of the WBC 5 Part Differentiation Appear Frequently

When the following flags appear frequently from the WBC 5 part differentiation flags.

- Blasts
- Immature granulocyte
- Left shift
- Atypical lymphocytes

The followings may be the reason.

- When the blasts and immature granulocyte appear frequently.

Trouble	Cause	Action
Characteristics of a sample.	Characteristics of a sample.	This is not a failure.
	12 hours elapsed after collecting the sample.	This is not a failure.
FS sensitivity is high and much scatter appears in the blasts and immature granulocyte detection area.	Optical fine adjustment is incorrect.	Perform optical fine adjustment.
CV of the scattergram is improper.	7μm polymer microsphere suspensions adjustment failure.	Adjust the analyzer with the 7μm polymer microsphere suspensions.

- When the left shift appears frequently

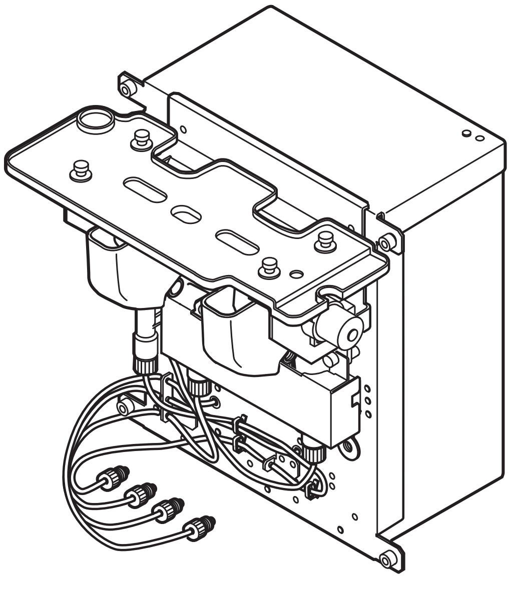
Trouble	Cause	Action
Characteristics of a sample.	Characteristics of a sample.	This is not a failure.
	12 hours elapsed after collecting the sample.	This is not a failure.
FL sensitivity is incorrect and crosstalk between MO and NE occurs.	Optical fine adjustment is incorrect.	Perform optical fine adjustment.
CV of the scattergram is improper.	7μm polymer microsphere suspensions adjustment failure.	Adjust the analyzer with the 7μm polymer microsphere suspensions.

- When the atypical lymphocytes appears frequently

Trouble	Cause	Action
Characteristics of a sample.	Characteristics of a sample.	This is not a failure.
	12 hours elapsed after collecting the sample.	This is not a failure.
FL sensitivity is low and crosstalk between LY and MO occurs.	Optical fine adjustment is incorrect.	Perform optical fine adjustment.
FL sensitivity is high and crosstalk between LY and ghost occurs.	Optical fine adjustment is incorrect.	Perform optical fine adjustment.
CV of the scattergram is improper.	7μm polymer microsphere suspensions adjustment failure.	Adjust the analyzer with the 7μm polymer microsphere suspensions.
Too many ghosts.	Operating temperature exceeds 15 to 30°C.	Use the analyzer in the operating environment.

3 Board/Unit Description

MC-730V CBC Measuring Unit



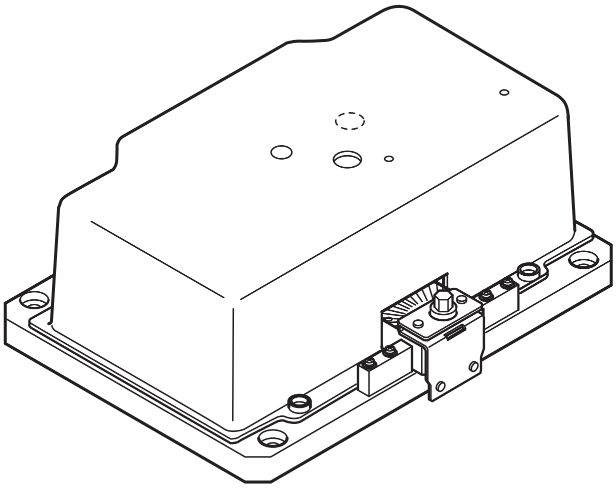
Function

- The CBC measuring unit is a main unit that measures the HGB and CBC components such as WBC, RBC and PLT.
- The unit catches the resistance change when blood cells pass the aperture cap by voltage conversion and measures the aspirated sample from the aperture cap.
- The unit measures the change in absorbance of the diluted or hemolyzed blood sample and takes out the HGB sensor voltage from the hemoglobin concentration.
- The unit switches the internal fluid path by the control signal from the UT-7241/UT-7320 MAIN BD.
- The unit turns the measurement bath and transmits the measurement bath position sensor signal to the MAIN BD by the control signal from the UT-7242 DRIVER BD.

Composition

1. WBC measurement bath
2. RBC measurement bath
3. Sub bath
4. Aperture cap
5. Electrode room
6. Air trap
7. Manometer
8. Tray
9. HGB block
10. PRE AMP BD (WBC)
11. PRE AMP BD (RBC)
12. CONNECTION BD
13. 2-way valve

MO-820V2 Laser Optical Unit



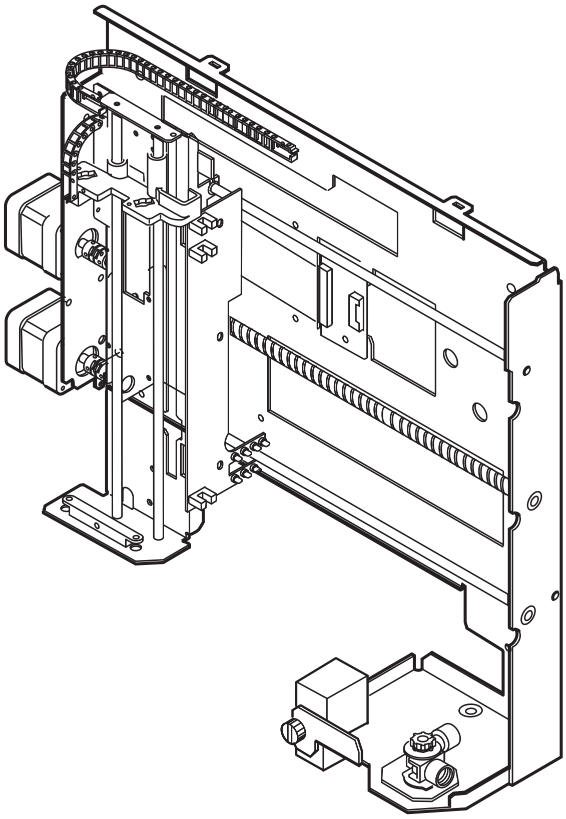
Function

- The laser optical unit is a main unit that measures the WBC 5 part differential.
- The unit detects the laser scattered light by flow cytometry and converts the light to electrical signals.
- The unit consists of optical components such as the laser diode and flow cell.

Composition

1. Flow cell
2. Semiconductor laser
3. LASER DRIVER BD (UT-7176)
4. Inter lock switch
5. FS PREAMP BD (UT-7173)
6. FL PREAMP BD (UT-7174)
7. SD PREAMP BD (UT-7175)

MS-730V Sampler Unit



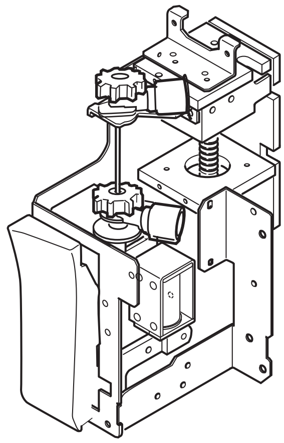
Function

- The sampler unit moves the sampling nozzle to the aspirate and dispense position.
- The unit dispenses the diluted sample to the measurement baths with the diluter unit.
- The unit rotates the motor and moves the sampling tube to the predefined position by the control signal from the UT-7243/UT-7321 DRIVER BD. Also the unit transmits the position information of the sample tube to the UT-7241/UT-7320 MAIN BD with the sensor on the UT-7235 SAMPLER SENSOR BD.

Composition

1. Sampling nozzle (WBC and RBC each 1 nozzle)
2. Motor (X axis)
3. Motor (Y axis)
4. SAMPLER SENSOR BD (UT-7235)
5. SAMPLER JUNCTION BD (UT-7234)
6. Rinse chassis
7. Sample cup

MS-731V Cap Pierce Unit



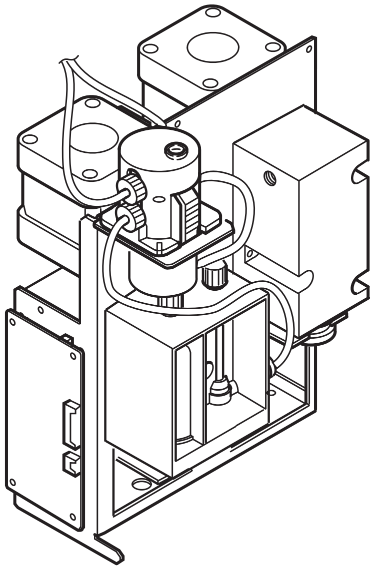
Function

- The cappierce unit enables measurement without removing the cap of the vacuum sample tube so that the operator does not touch blood.
- The cappierce unit has the sampling needle which pierces the rubber cap of the vacuum sample tube and relieves the pressure in the vacuum sample tube.
- The sampling nozzle for blood sampling has a double tube structure and passes inside the sampling needle. The nozzle also has a rinse function to rinse inside the sampling needle.
- The unit rotates the motor and moves the sampling needle up and down by the control signal from the UT-7241/UT-7320 MAIN BD through the UT-7243/ UT-7321 DRIVER BD and UT-7238 VALVE CONNECTION BD.
- The unit detects the presence or absence of the sampling tube and opening and closing of the holder with the detection sensor to the UT-7241/UT-7320 MAIN BD through the UT-7243/UT-7321 DRIVER BD and UT-7238 VALVE CONNECTION BD.

Composition

1. Sampling needle
2. Vacuum sample tube holder
3. Rinse chassis
4. Sensor for detecting the upper position of the sampling needle
5. Sensor for detecting the lower position of the sampling needle
6. Sensor for detecting the opening and closing of the holder
7. Sensor for detecting the presence or absence of the vacuum sample tube
8. Solenoid for opening and closing
9. Motor

MP-730V Mixed Pump Unit



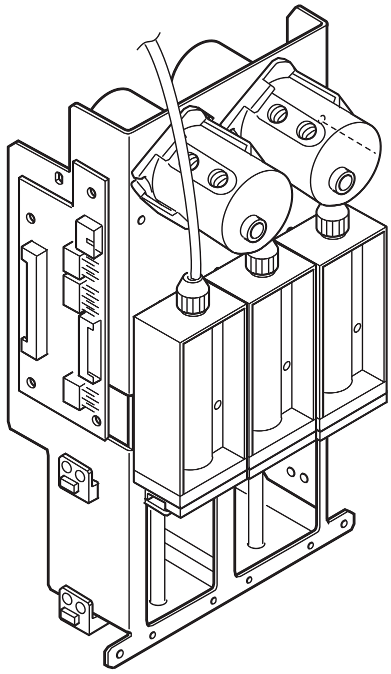
Function

- The diluter part aspirates and dilutes a sample by the constant concentration.
- The sheath pump part dispenses a constant amount and speed of diluent.
- The unit rotates the motor and moves the piston up and down by the control signal from the UT-7243/UT-7321 DRIVER BD.
- The unit aspirates and dispenses a sample and reagents by switching the fluid path inside the 3-way valve in synchronization with the move of the piston.
- The unit transmits the position information of the piston to the UT-7241/UT-7320 MAIN BD through UT-7243/UT-7321 DRIVER BD by each position sensor.

Composition

1. MIXED PUMP BD (UT-7200)
2. Diluter cylinder
3. Sheath pump cylinder
4. Sheath pump sensor (upper part)
5. Sheath pump sensor (lower part)
6. 3-way valve (XP-513V)
7. Diluter motor
8. Sheath pump motor

MP-731V Triple Pump Unit



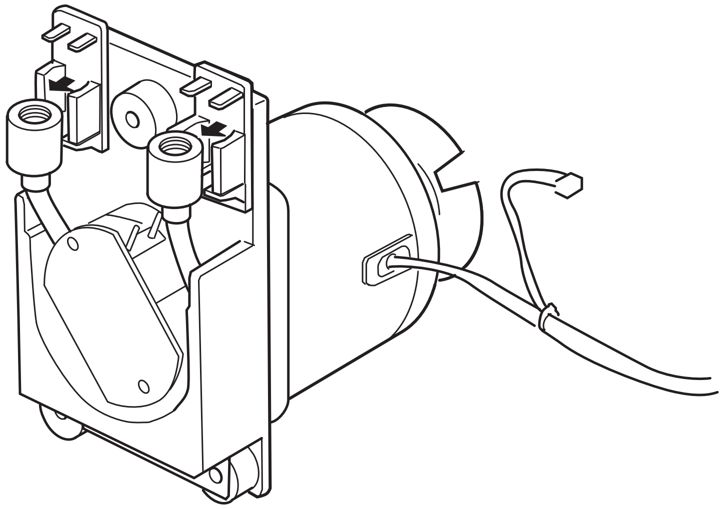
Function

- The unit aspirates, measures and dispenses diluent for WBC 5-part differential measurement, delivers a sample for WBC 5-part differential measurement and dispenses diluent for rinse.
- The unit aspirates, measures and dispenses Hemolynac•3N and Hemolynac•5 lysing reagent.
- The unit rotates the motor and moves the piston up and down by the control signal from the UT-7241/UT-7320 MAIN BD through UT-7243/UT-7321 DRIVER BD.
- The unit aspirates and dispenses the lysing reagent by switching the fluid path inside the 3-way valve in synchronization with the move of the piston.
- The unit transmits the position information of the piston to the UT-7241/UT-7320 MAIN BD through UT-7243/UT-7321 DRIVER BD by each position sensor.

Composition

1. Cylinder block for sample pump
2. Cylinder clock for Hemolynac•3N
3. Cylinder clock for Hemolynac•5
4. XP-513V 3-way valve for Hemolynac•3N
5. XP-513V 3-way valve for Hemolynac•3N
6. VALVE CONNECTION BD2 (UT-7239)
7. Sensor for detecting upper position
8. Sensor for detecting lower position
9. Motor for sample pump
10. Motor for lysing reagent pump

MP-640V Pump Unit



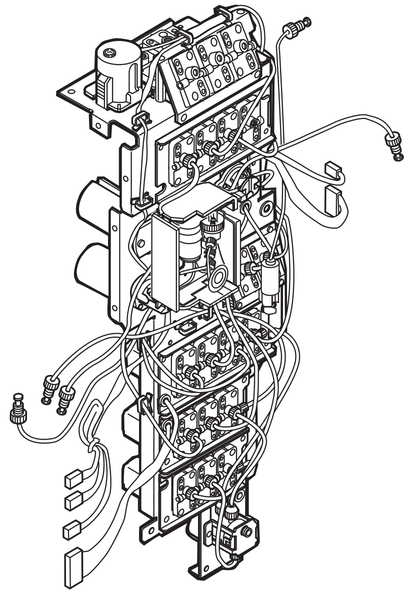
Function

- The unit produces pressure for aspirating a sample and draining.
- MEK-7300K has two pump units. One is for blood cell count and another is for WBC 5-part differential measurement.
- The unit rotates the motor. The rotor on the motor axis strokes the pump tube and drains inside the measurement baths and instrument after measurement. The unit also supplies reagents inside the instrument and produces constant pressure when measuring a sample.
- The unit transmits the rotor information to the UT-7241/UT-7320 MAIN BD through UT-7243/UT-7321 DRIVER BD by the sensor.

Composition

1. Pump tube
2. Pump rotor
3. Motor
4. Sensor (outside the unit)

MJ-730V Flowcyto Piping Unit



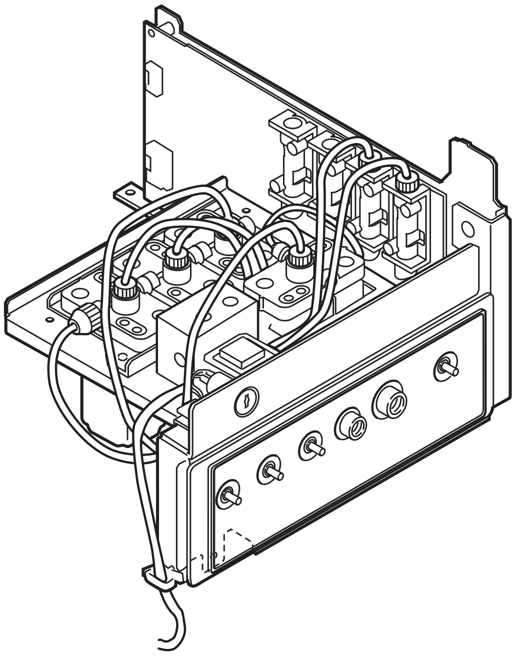
Function

- The flowcyto piping unit is connected to other units with piping tubes and transmits and distributes the reagents.
- The unit has the fluid path for WBC 5-part differential measurement, starts the lysing reagent and sample and sends the lysed sample to the measurement part.
- The unit has the warmer of the diluent for WBC 5-part differential measurement and controls the temperature.
- The unit controls 21 2-way valves and switches the fluid path between each unit by the control signal from the MAIN BD through the DRIVER BD, VALVE CONNECTION BD1 and 2.
- The unit controls the warmer and adjusts the temperature of diluent for WBC 5-part differential measurement and lysing reagent by the control signal from the MAIN BD through the DRIVER BD, VALVE CONNECTION BD1 and 2.
- The unit changes the preset temperature of the warmer by the temperature setting switch on the MAIN BD.

Composition

1. Mixing chamber of the WBC 5-part differential measurement sample
2. Manifold for aspirating a lysed sample
3. Chamber for stabilizing the sheath pressure
4. Warmer for diluent for WBC 5-part differential measurement and lysing reagent
5. Chamber for waste
6. Pinch valve and piping tubes between the other units and 2-way valves for switching the fluid path.

JQ-730V Inlet/Outlet Unit



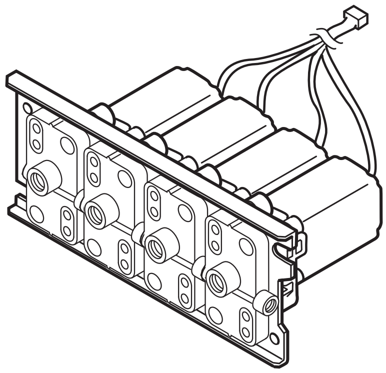
Function

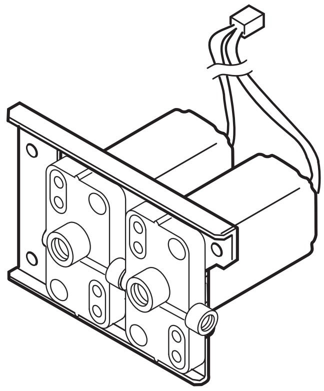
- The unit supplies and drains the diluent, detergent, lysing reagent and waste from the tubes connected to the reagent port.
- The unit detects the reagent with the liquid sensor on the UT-7236 LIQUID SENSOR BD and transmits the signals to the UT-7241/UT-7320 MAIN BD.
- The unit detects the sheath pressure with the puressure sensor on the LIQUID SENSOR BD and transmits the signals to the UT-7241/UT-7320 MAIN BD.
- The unit turns on or off the laser oscillation of the laser optical unit by laser switch and key.
- The unit switches diluent, Cleanac detergent and Cleanac•3 detergent by moving the 2-way valves by the control signal from the UT-7241/UT-7320 MAIN BD through the UT-7243/UT-7321 DRIVER BD and UT-7239 VALVE CONNECTION BD2.

Composition

1. LIQUID SENSOR BD (UT-7235)
2. Liquid sensor block
3. Pressure sensor
4. Laser switch
5. Laser key
6. 2-way valve

JQ-731V/732V Valve Unit





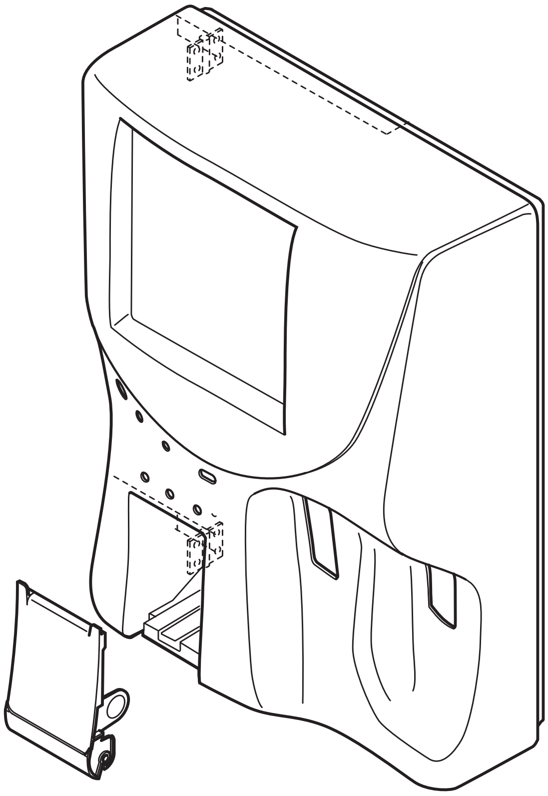
Function

- The unit binds several 2-way valves for easy replacement.
- The unit opens and closes the fluid path by moving the 2-way valves by the control signal from the UT-7241/UT-7320 MAIN BD through the UT-7243/UT-7321 DRIVER BD and UT-7240 VALVE CONNECTION BD3.

Composition

1. 2-way valves

PV-730VK Front Panel Unit



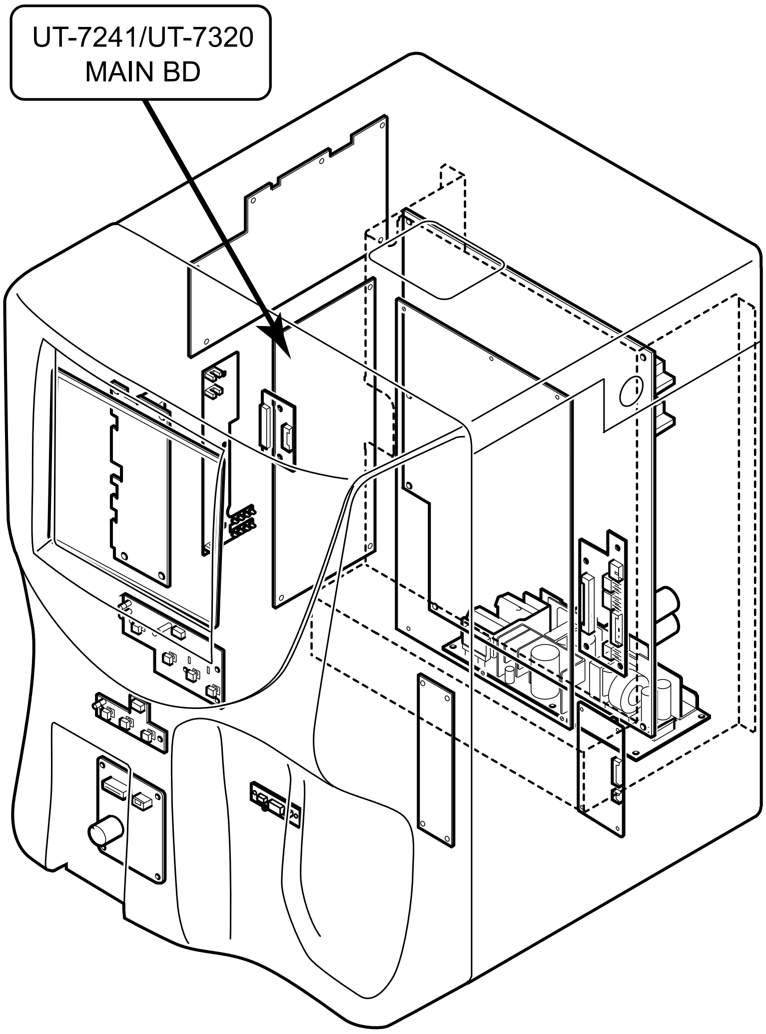
Function

- The unit has the key switches and touch panel to operate the instrument and the color LCD displays measurement data (numeric value and histogram data) and messages.
- The instrument condition can be checked with the main power, power and auto print mode LED.
- The measurement data can be printed (option).
- The unit displays LCD, prints measurement data, lights LED and generates beeps by the control signal from the UT-7241/UT-7320 MAIN BD through the UT-7246 LCD BD.
- The unit transmits the input signal from the touch panel and each switch to the UT-7241/UT-7320 MAIN BD.

Composition

1. LCD
2. Touch panel
3. Inverter (PV-730VK Rev. AA only)
4. LCD BD (UT-7246)
5. KEY BD (UT-7247)
6. PRINTER KEY BD (UT-7248)
7. SD card slot

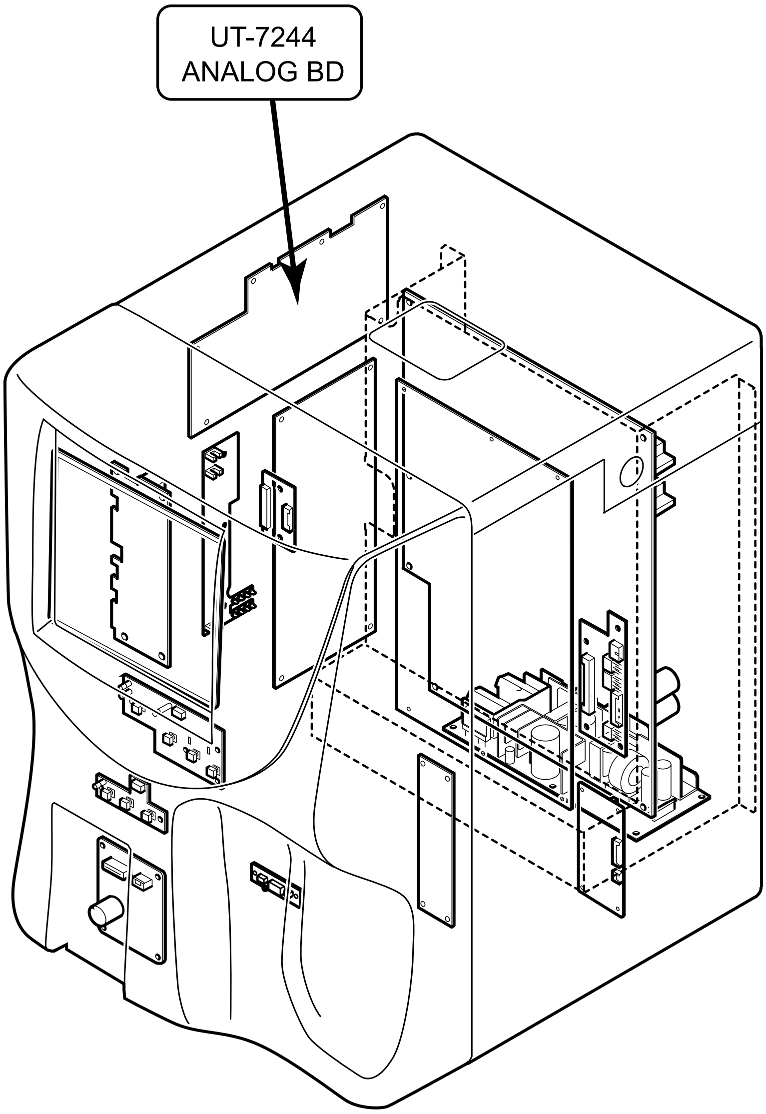
UT-7241/UT-7320 MAIN BD



Function

- The MAIN BD controls the analyzer.
- The board controls the actuators, display, each measurement signal and signals from/to the external instrument by the software program which is installed in the flash ROM.
- The board has the backup battery and saves the settings and data.

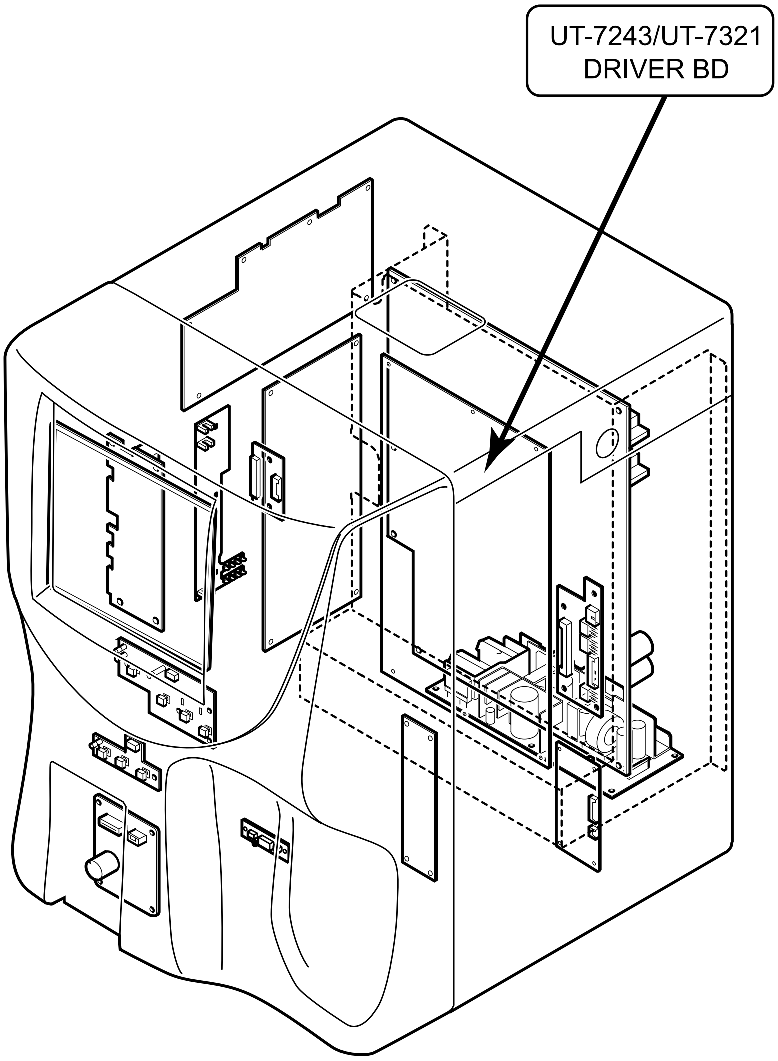
UT-7244 ANALOG BD



Function

- The board performs analog measurement.
- The board processes the analog data (CBC data or optical data).
- The board converts the analog data from the MC-730V CBC measuring unit and MO-820V2 LASER OPTICAL UNIT to the digital data and sends the data to the UT-7241/UT-7320 MAIN BD.

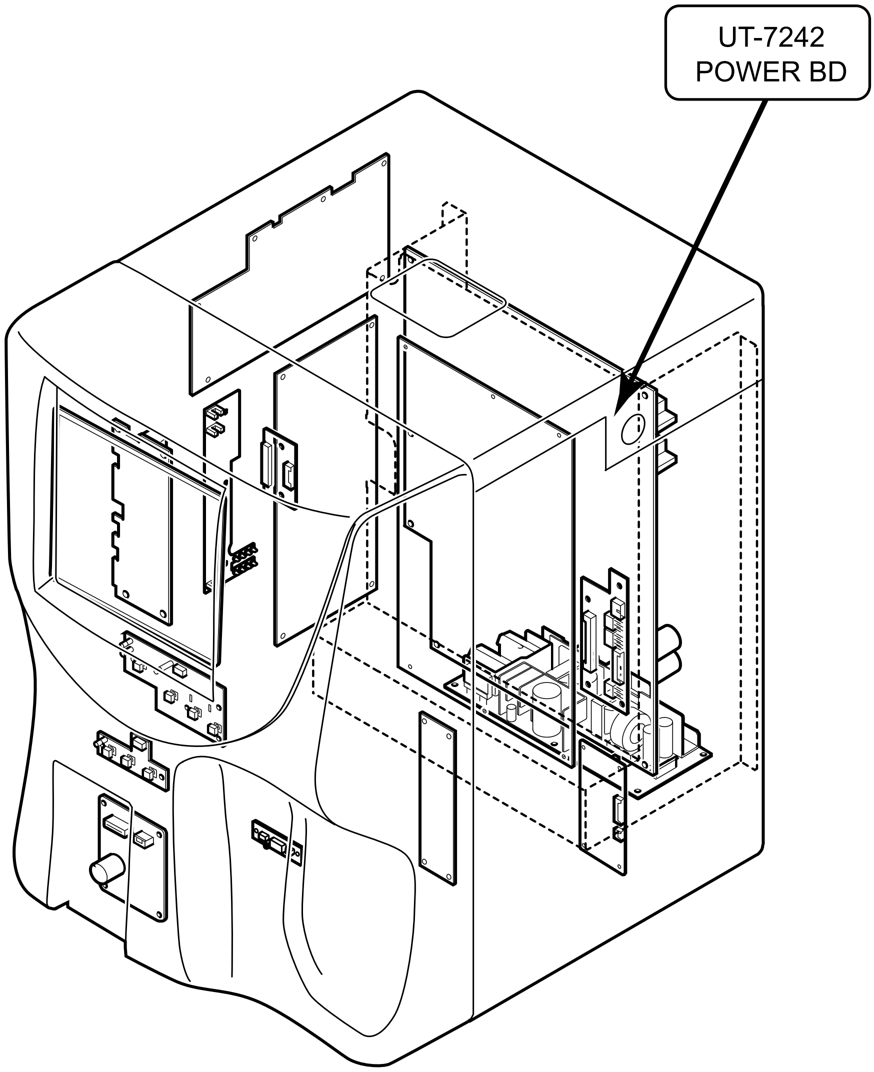
UT-7243/UT-7321 DRIVER BD



Function

- The board controls the actuator.
- The board controls the 2-way valves under FPGA on this board, and motor by the control command from the UT-7241/UT-7320 MAIN BD.
- The board transmits the sensor signal of the each unit to the MAIN BD.

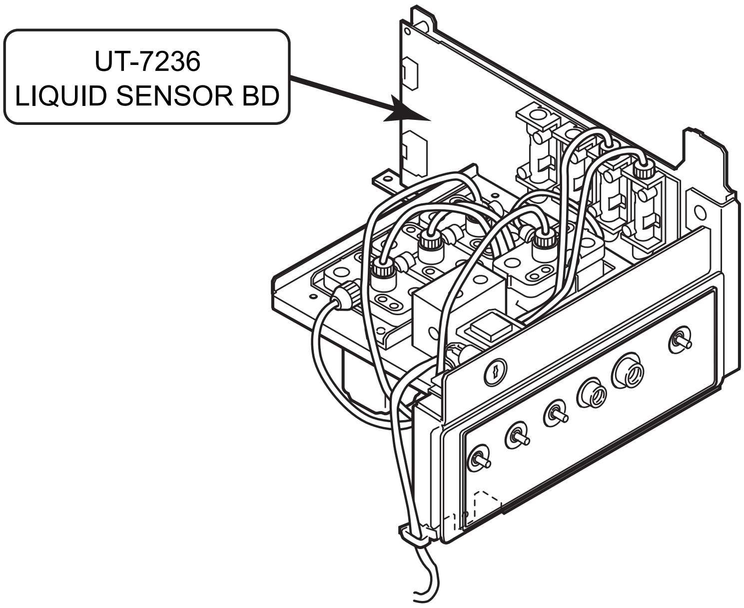
UT-7242 POWER BD



Function

- The board generates each voltage.
- The board converts DC +24 V input from the switching power to the necessary voltage (+3.3 V, +5 V, +12 V, ±15 V, 24 V, –36 V).
- The board generates high-voltage AC power for removing clogs.
- The board controls the start and stop of the power supply by the control command from the UT-7241/UT-7320 MAIN BD.

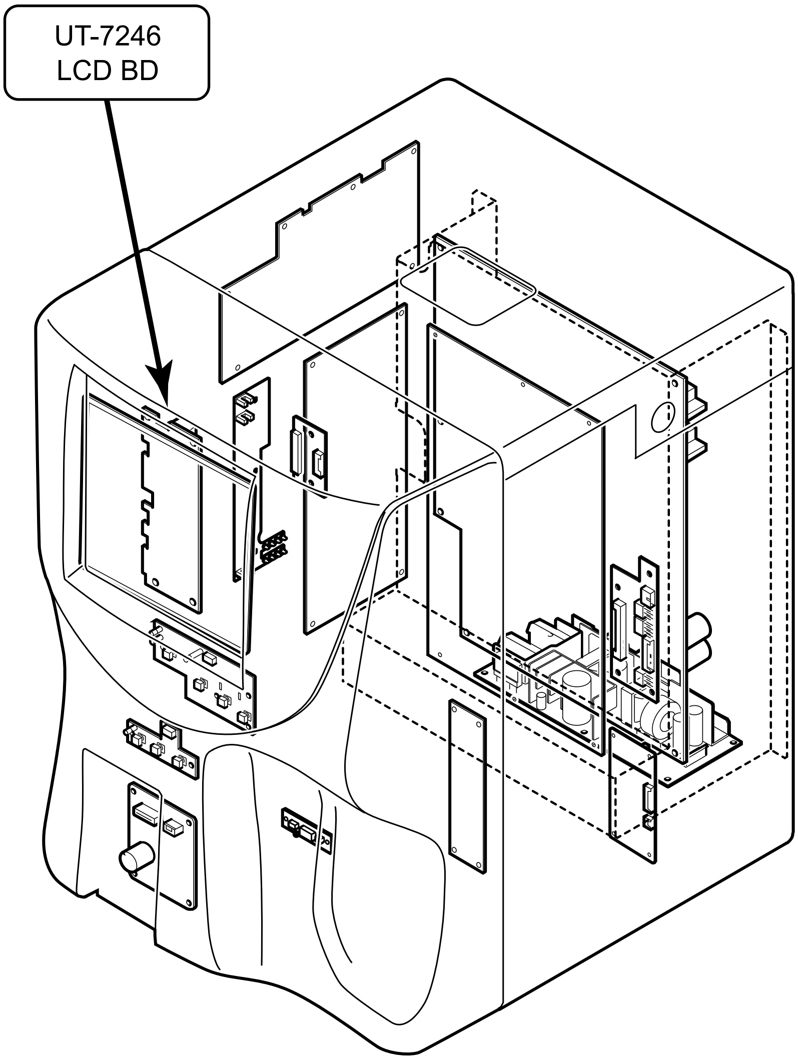
UT-7236 LIQUID SENSOR BD



Function

- The board detects whether or not a liquid enters into the analyzer, pressure in the fluid path and laser key on or off information.
- The board detects whether or not the diluent, two types of lysing reagent and detergent enter into the analyzer with each opposed sensor and transmits the information to the UT-7241/UT-7320 MAIN BD.
- The board detects, amplifies and transmits the pressure in the fluid path with the pressure sensor to the UT-7241/UT-7320 MAIN BD.
- The board creates the conduction pathway of the two external laser keys and transmits the signal to the UT-7241/UT-7320 MAIN BD.

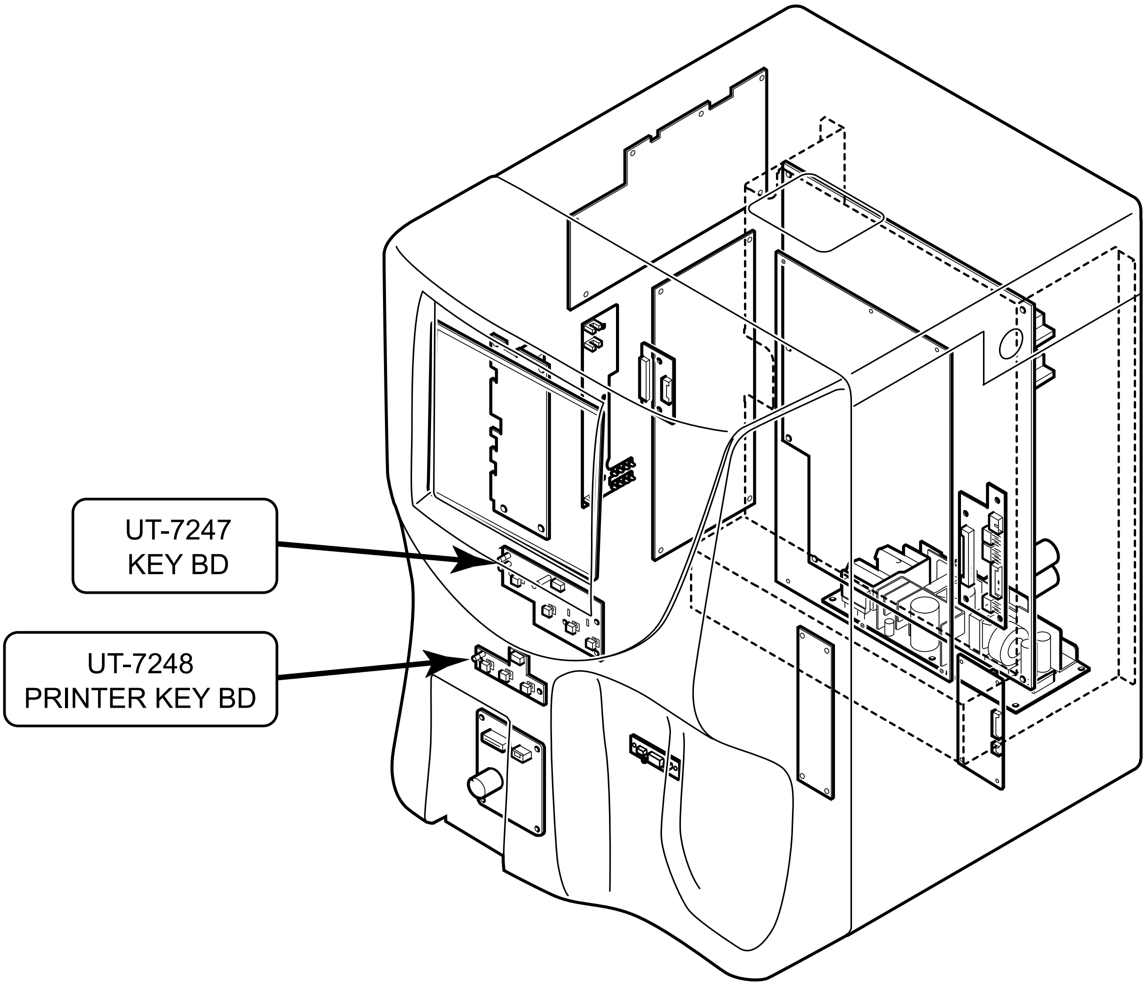
UT-7246 LCD BD



Function

- The board is attached to the front panel and controls the SD card, buzzer, interface to the LCD and touch panel.
- The board relays the control of the SD card and buzzer and signal to the LCD and transmits touch panel information to the UT-7241/UT-7320 MAIN BD.
- The board turns the power supply to the LCD on or off by the control from the MAIN BD, and supply power voltage (+12 V) to the inverter for LCD backlight.

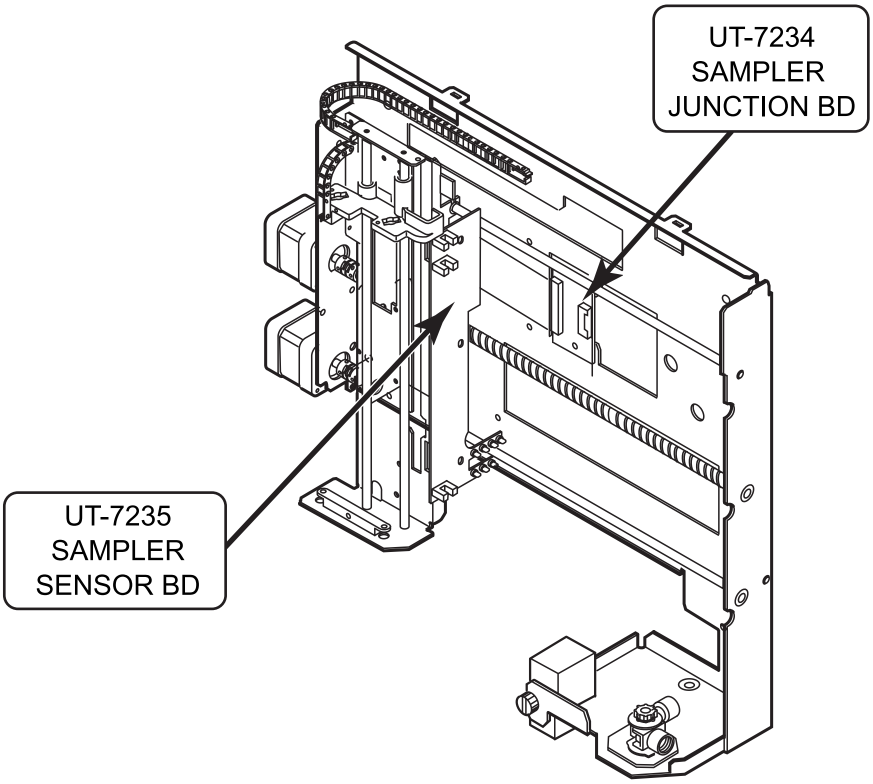
UT-7247 KEY BD and UT-7248 PRINTER KEY BD



Function

- The board transmits the pressing information of the switch on the board to the UT-7241/UT-7320 MAIN BD.
- The board has an LED to indicate the condition.

UT-7234 SAMPLER JUNCTION BD



Function

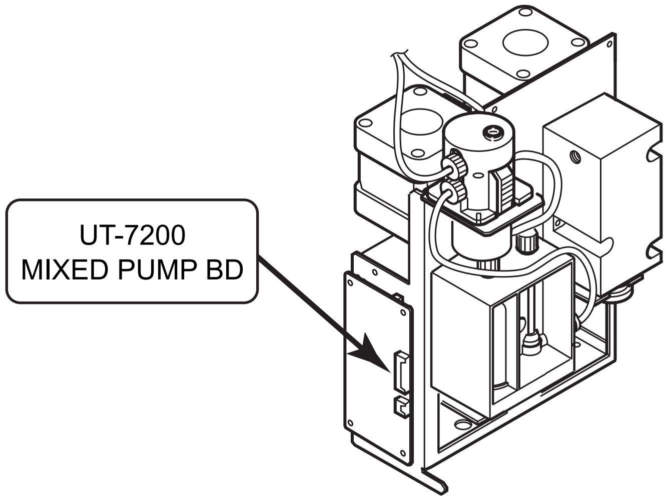
- The board transmits the sensor signal of the UT-7235 SAMPLER SENSOR BD to the UT-7241/UT-7320 MAIN BD.

UT-7235 SAMPLER SENSOR BD

Function

- The board has the sensor to decide the sampler nozzle position.
- The 3 photo interrupters detect up and down movement of the sampler nozzle and the 4 opposite sensors detect the cutout on the sampler unit. The board transmits the position information of the right and left movement of the sampler nozzle to the UT-7241/UT-7320 MAIN BD.
- The LED on each sensor indicates the sensor condition.

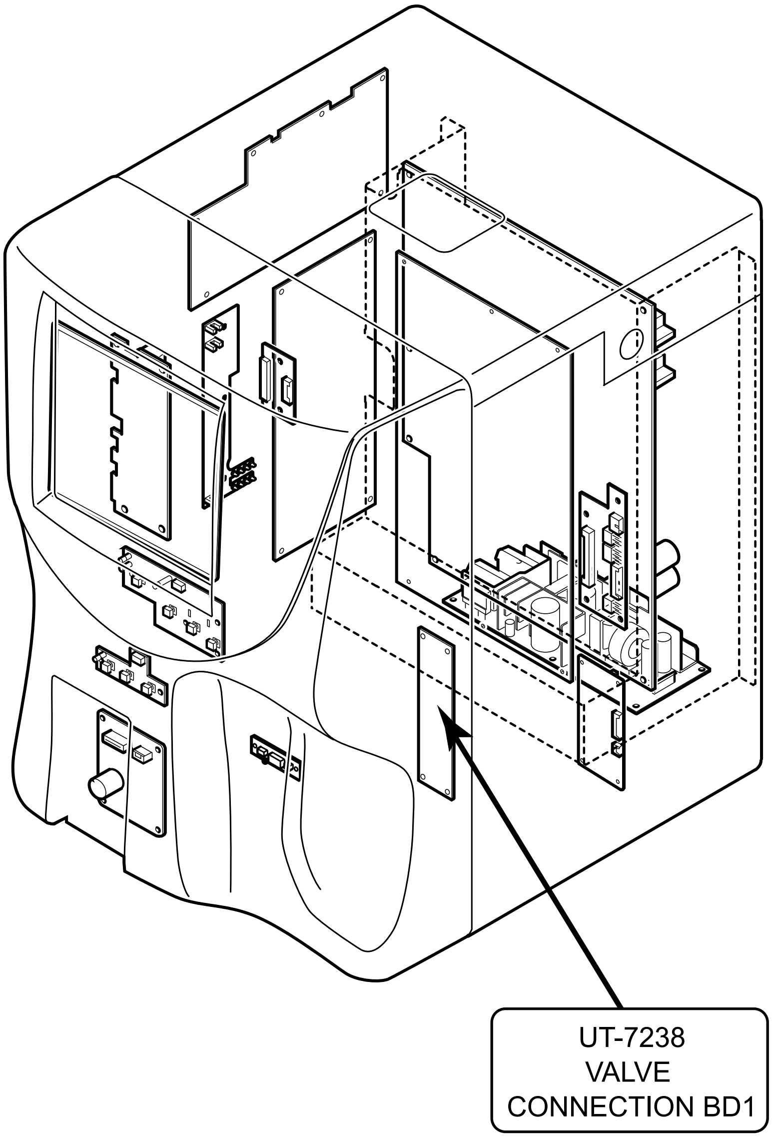
UT-7200 MIXED PUMP BD



Function

- The board has the diluter piston sensor of the mixed pump unit and transmits the signal to the UT-7243/UT-7321 DRIVER BD.

UT-7238 VALVE CONNECTION BD1

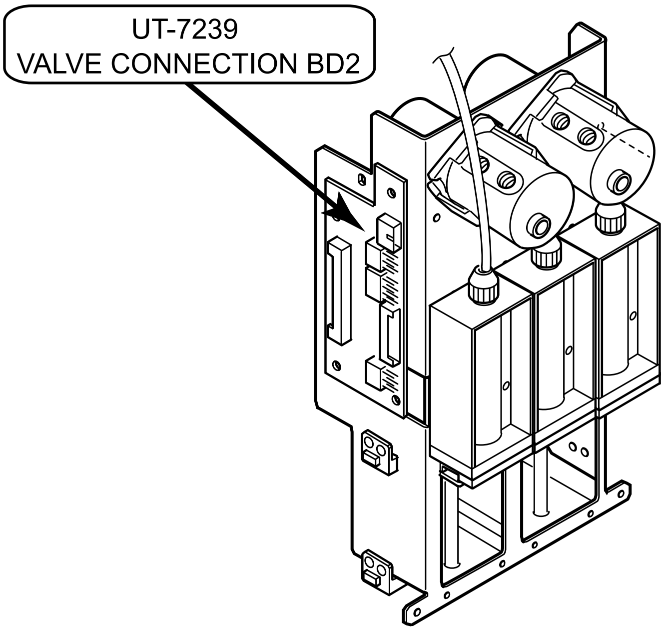


Function

The board relays the UT-7243/UT-7321 DRIVER BD and following modules.

- MP-640V
- MS-731V
- Thermistor for correcting the hemoglobin temperature
- Analyzer internal temperature thermistor
- Heater temperature thermistor
- Heater
- Measurement SW
- Part of the 2-way valves in the MJ-730V

UT-7239 VALVE CONNECTION BD2

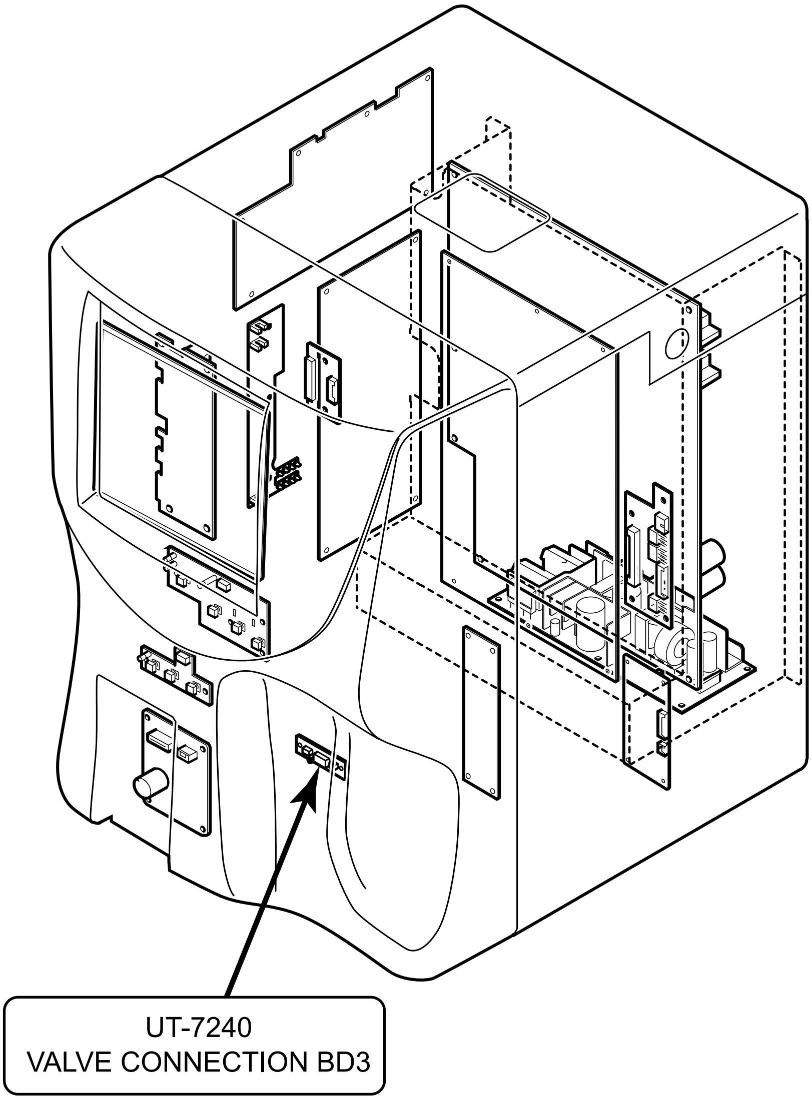


Function

The board relays the UT-7243/UT-7321 DRIVER BD and following modules.

- 2-way valves in the JQ-730V
- Thermistor for correcting the hemoglobin temperature
- 3-way valves in the MP-730V
- Part of the 2-way and 3-way valves in the MJ-730V
- Pinch valve of the MJ-730V

UT-7240 VALVE CONNECTION BD3



Function

The board relays the UT-7243/UT-7321 DRIVER BD and following units.

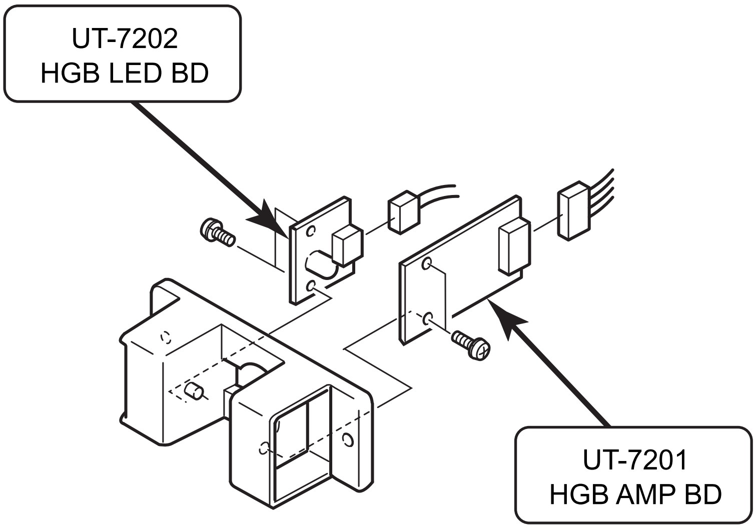
- 2-way valves of the JQ-731V
- 2-way valves of the JQ-732V

UT-7201 HGB AMP BD

Function

The board is on the MC-730V CBC measuring unit and transmits the HGB absorbance signal to the UT-7244 ANALOG BD through the UT-7250 CONNECTION BD.

UT-7202 HGB LED BD



Function

The board is on the MC-730V CBC measuring unit and lights the LED for HGB absorbance measurement.

4 Disassembly and Assembly

The procedures in this section tell how to remove, replace and install major components in the instrument.

Before You Begin

Removing, replacing and installing major components should be done by qualified service personnel.

Warnings and Cautions

⚠ WARNING
To avoid the possibility of injury to yourself or damage to the instrument, do not install or remove any component or change switch settings while the power is on and wait 10 minutes after the power is off before installing or removing any component from the instrument.

⚠ WARNING
To avoid accidental discharge of static electricity which could damage the instrument components, use a wrist ground strap when installing or removing any component of the instrument.

⚠ WARNING
When replacing any parts or units in the instrument, do not touch any part of the instrument where blood is or may be.

⚠ WARNING
Wear rubber gloves to prevent infection by blood.

⚠ CAUTION
Before connecting or disconnecting any cables, turn off the instrument and unplug the AC power cord from the instrument.

⚠ CAUTION
Fuses cut off the power when an abnormality occurs in the instrument. Eliminate the malfunction before replacing the fuse. Use the correct fuse only. The fuse rating is shown on the holder.

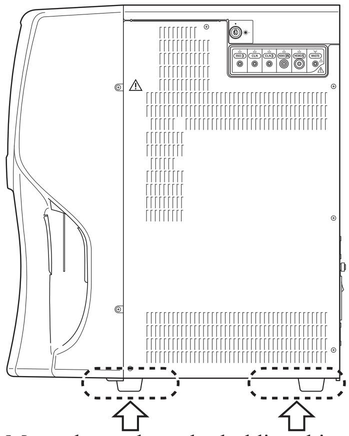
⚠ CAUTION
Removal and replacement of any component in the instrument should be done by qualified service personnel.

⚠ CAUTION
Use only parts recommended by Nihon Kohden to assure maximum performance from your instrument.

Carrying the Analyzer

The analyzer must be carried carefully by holding the left and right of the bottom panel.

> ⚠ **CAUTION**
> Use more than one person to move or install the hematology analyzer. Otherwise, it may cause back strain or injury from dropping the hematology analyzer.



Move the analyzer by holding this part.

Cutting Off the Power Supply to the Analyzer

To cut off the power supply to the analyzer, disconnect the power cord of the analyzer from the wall AC outlet.

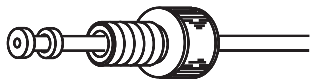
When installing the analyzer, position the analyzer so that it is easy to disconnect the power cord from the wall AC outlet.

Required Tools

- Anti-static bench mat
- Wrist ground strap
- Phillips screwdriver (insulated type)
- Flat-blade screwdriver (insulated type)
- Tweezers

Caution and Notes Related to Valve Joint, Black Screw and Tube Joint in the Instrument

Valve joint

> ⚠ **CAUTION**
>
> When connecting the valve joint to the electromagnetic valve, turn the valve joint clockwise, using moderate force until the valve joint comes to a stop. Do not use extreme force to tighten the valve joint further because this will damage the tip of the valve joint. If the valve joint is loosely connected, it will leak.
>
> 

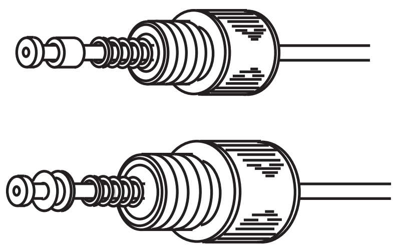
Black screw

NOTE: Black screws are used to fasten the individual units to the chassis of the instrument to enable the quick removal and replacement of these units. However, to fasten the pump unit to the chassis, normal screws are used.

Spring type tube joint

NOTE

- Spring type tube joints are used in the instrument to prevent overtightening of the joints, and to prevent loosening of the joints after the joints are tightened.

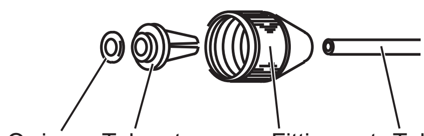


- There are 2 types of spring tube joints, white (inlet side) and black (outlet side). Each tube joint and its corresponding port in the instrument are marked with the same color or number to ensure matching.

No spring type tube joint

NOTE: The no spring type tube joint consists of the O-ring, tube stopper and fitting nut. To disconnect the tube from this joint, turn the fitting nut counterclockwise to loosen the joint and pull the tube toward you.

To reconnect the tube to this joint, insert the tube into the fitting nut and turn the fitting nut clockwise to fasten it.



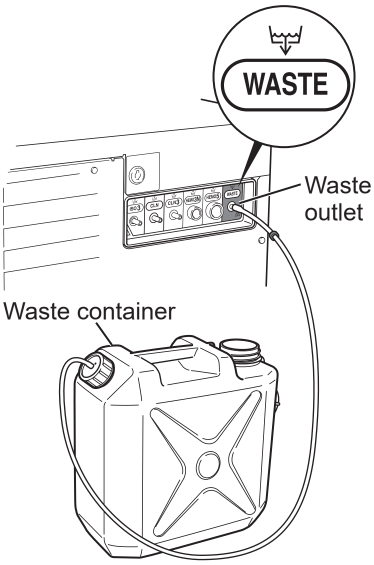
Draining the Hematology Analyzer

To avoid any trouble, drain all fluid from the hematology analyzer. Some of the units described in this section require the following procedure.

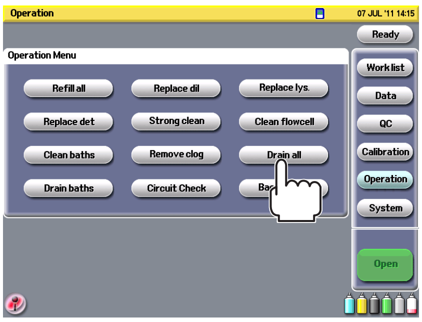
1 Press the Strong clean key on the Operation screen to perform strong cleaning.

2 Remove the diluent tube from the ISO3 diluent inlet, the hemolysing reagent tube from the HEMO3N and HEMO5 inlets, the detergent tube from the CLN inlet and the cleanac tube 8 from the CLN3 inlet on the right side panel.

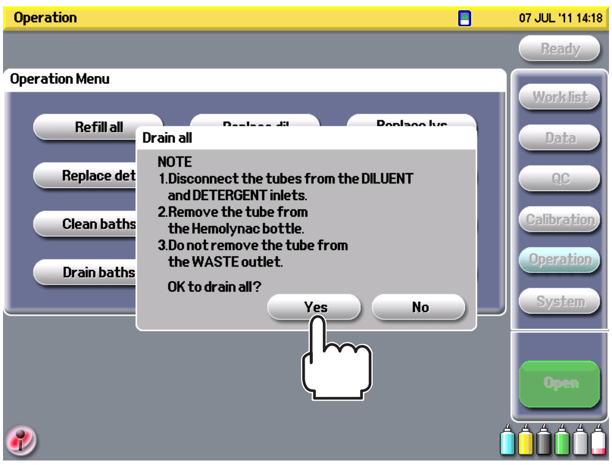
NOTE: Do not remove the waste tube from the waste outlet.

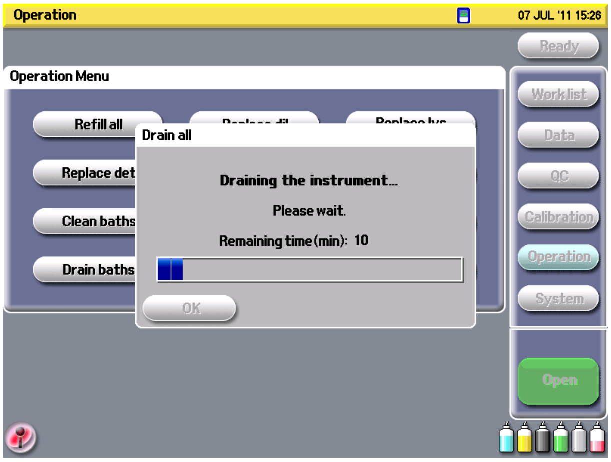


3 Press the “Drain all” key on the Operation window. A confirmation message appears.



4 Press the Yes key to drain the reagents. A “Draining the instrument” message appears and the remaining time is displayed during draining.





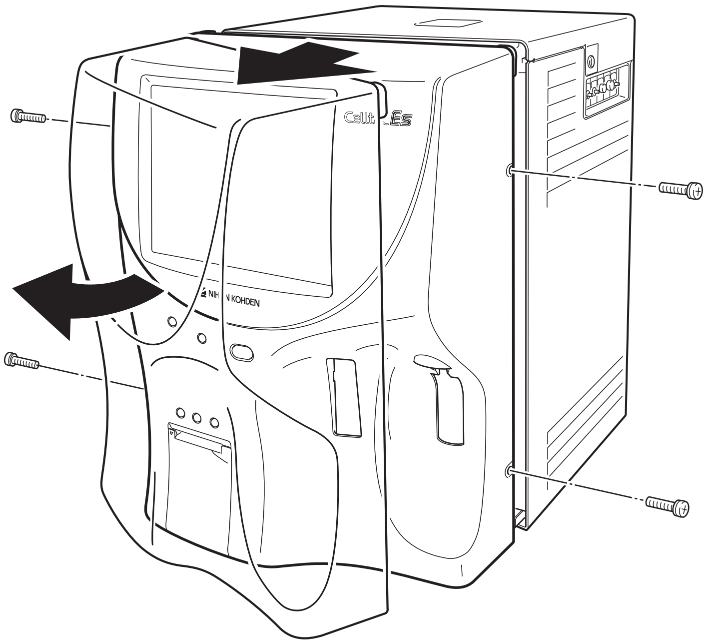
5 After the draining is finished, press the main power switch on the rear panel to turn the power off. The power lamp and main power lamp go off.

> ⚠ **WARNING**
>
> For safety, before disassembling the hematology analyzer, wait approx. 10 minutes after turning off the main power switch.

Opening the Front Cover

1 Remove the four BH4 × 16 screws which secure the front cover to the hematology analyzer chassis.

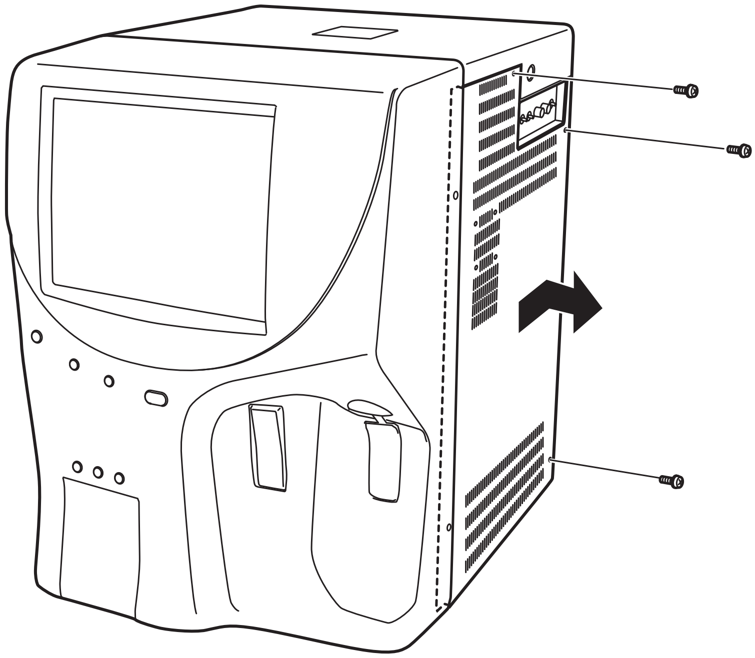
2 Slightly pull the front cover toward you and open it as shown below.



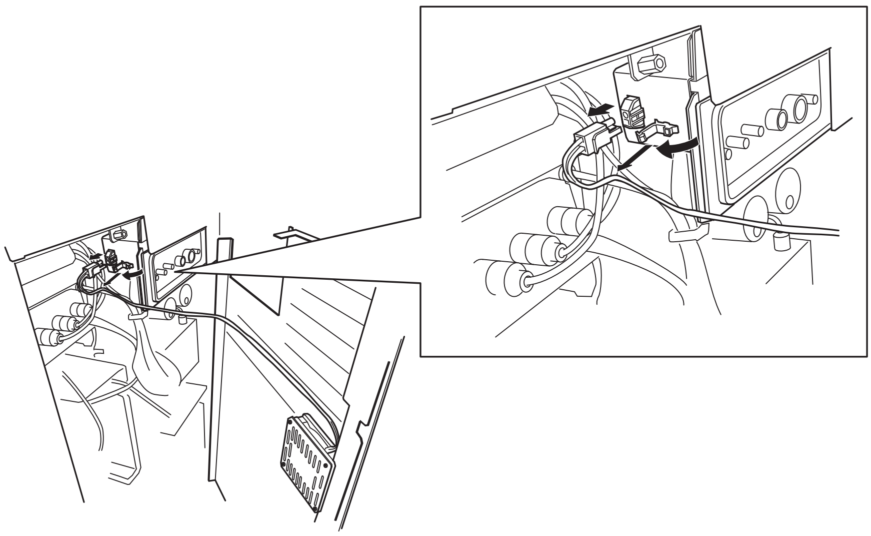
Removing the Side Cover

1 Remove the three BH3 × 8 screws with TLW3 which secure the side cover.

2 Remove the side cover by opening it in the direction of the arrow.

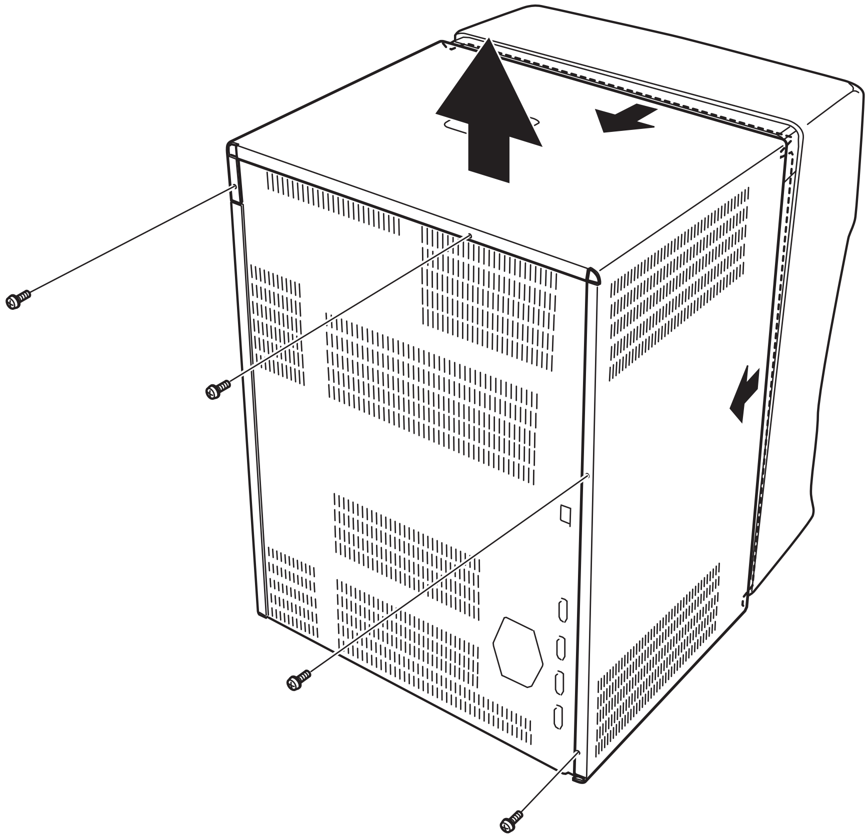


3 Disconnect the fan cable from the cable connector.



Removing the Top Cover

1. Remove the side cover according to the procedure described in “Removing the Side Cover”.
2. Remove the 4 screws which secure the top cover to the hematology analyzer chassis on the rear panel.
3. Slide the top cover to the rear and remove it from the chassis.



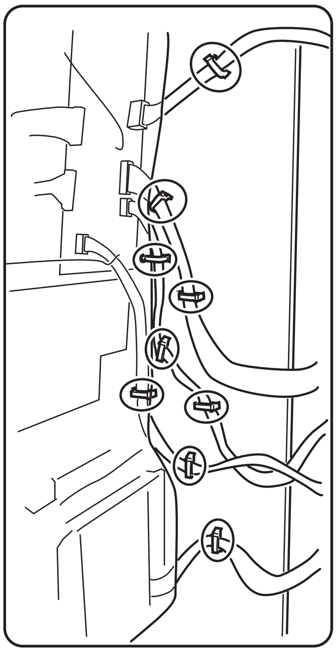
Removing the PV-730VK Front Panel Unit

NOTE: The PRINTER DRIVER BD has been changed from UT-7205 to UT-7319. The old and new boards are not compatible.

When replacing the WA-730VK printer unit in a hematology analyzer with Rev. AA to AH, update the analyzer software version to 02-17 or later when the PRINTER DRIVER BD in the printer unit is an old UT-0725 PRINTER DRIVER BD.

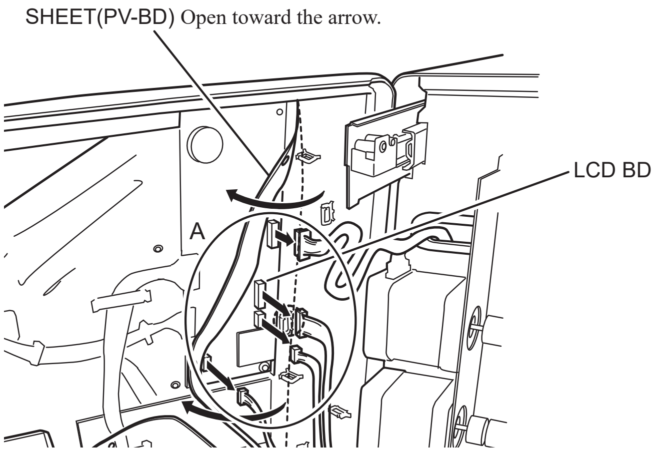
Refer to “When replacing the WA-730VK Printer Unit” in Section 1.

1 Open the front cover according to the procedure described in “Opening the Front Cover”.



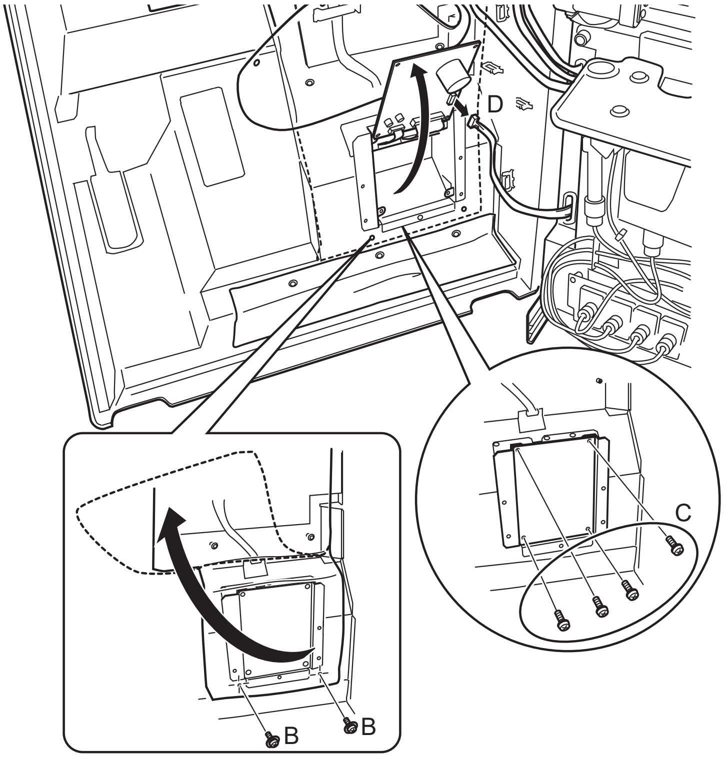
2 Release the nine locking wire saddles which secure the cables connected to the front panel.

3 Open the SHEET (PV-BD) drip-proof cover in the direction of the arrow and disconnect the four cable connectors A which are connected to the the LCD BD.

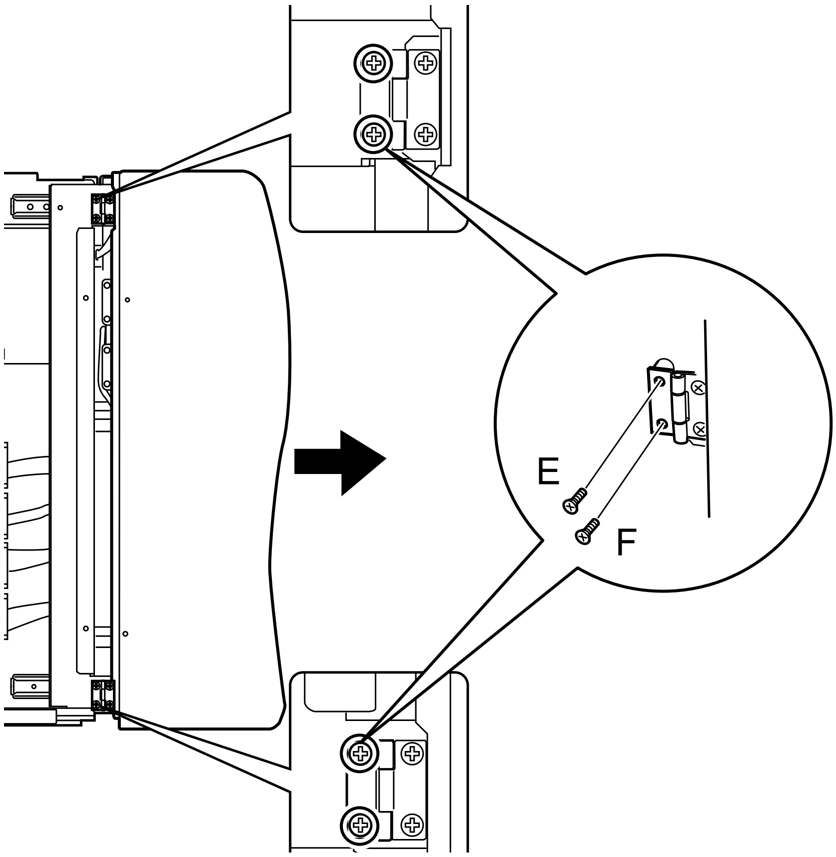


4 Remove the two PS3 × 6 screws B which secure the SHEET (PV-BD) drip-proof cover and open the cover which covers the printer.

5 Remove the four PS3 × 8 screws C which secure the PRINTER DRIVER BD, lift up the PRINTER DRIVER BD toward the direction of the arrow and disconnect the cable connector D which is connected to the PRINTER DRIVER BD.



6 Remove the upper two F3 × 8 screws E and lower two F3 × 6 screws F on the front panel hinge parts and remove the front panel toward the direction of arrow.



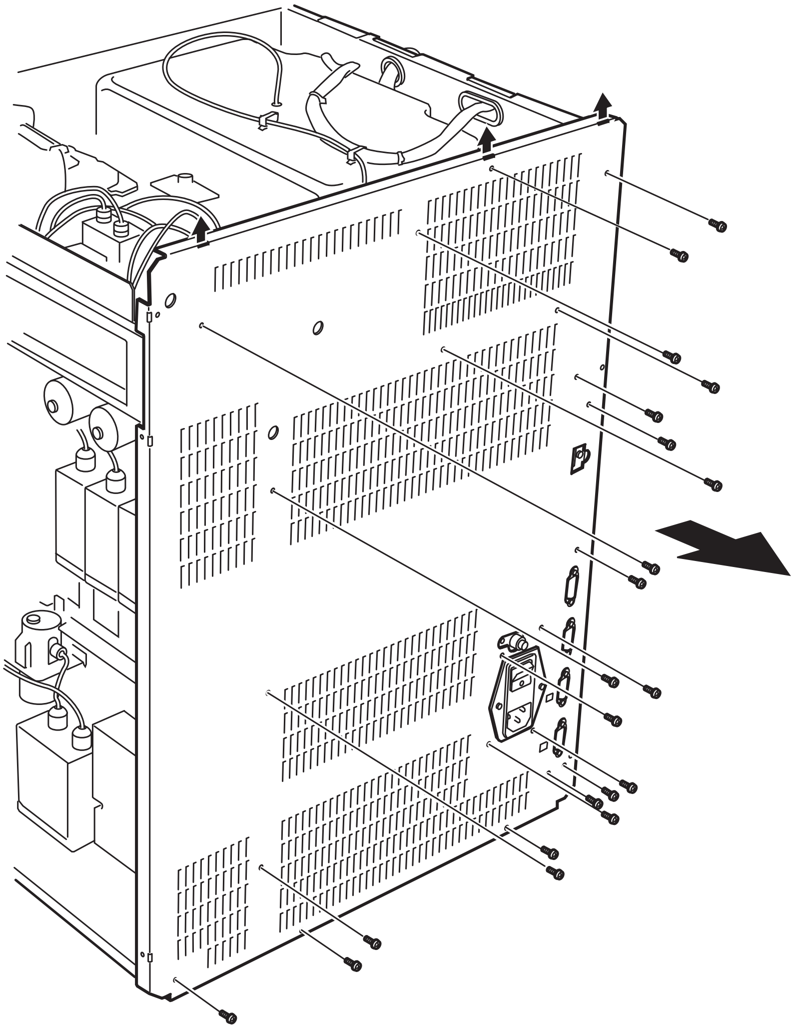
Removing the Rear Cover

1 Remove the side cover according to the procedure described in “Removing the Side Cover”.

2 Remove the top cover according to the procedure described in “Removing the Top Cover”.

3 Remove the 20 BH3 × 8 screws with TLW which secure the rear cover to the hematology analyzer chassis.

4 Pull the rear cover toward the direction of arrow and remove it.



Removing the MC-730V CBC Measuring Unit

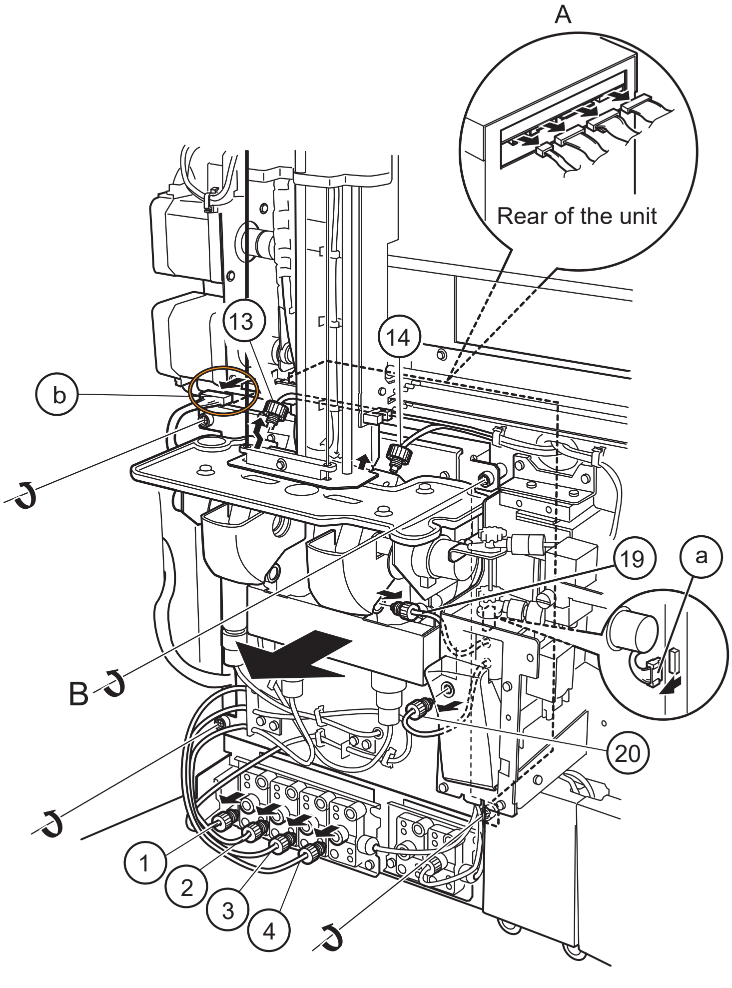
1 Remove the front panel unit according to the procedure described in "Removing the PV-730VK Front Panel Unit".

2 Remove the eight tube joint (1 to 4, 13, 14, 19 and 20) and disconnect the two cable connectors (a and b) as shown in the illustration.

3 Loosen the four screws which secure the CBC measuring unit until the screws are removed from the main chassis.

4 Pull the CBC measuring unit toward the direction of arrow.

5 Disconnect the four cable connectors from the rear of the unit (refer to A).



The numbers in the illustration are the tube joint numbers.

6 To assemble the hematology analyzer, reverse the above procedure.

NOTE: When attaching the CBC measuring unit, the screw B is a set screw. Attach this screw first.

Removing the MS-730V Sampler Unit

1 Remove the side cover according to the procedure described in “Removing the Side Cover”.

2 Remove the front panel unit according to the procedure described in “Removing the PV-730VK Front Panel Unit”.

3 Remove the top cover according to the procedure described in “Removing the Top Cover”.

4 Remove the MC-730V CBC measuring unit according to the procedure described in “Removing the MC-730V CBC Measuring Unit”.

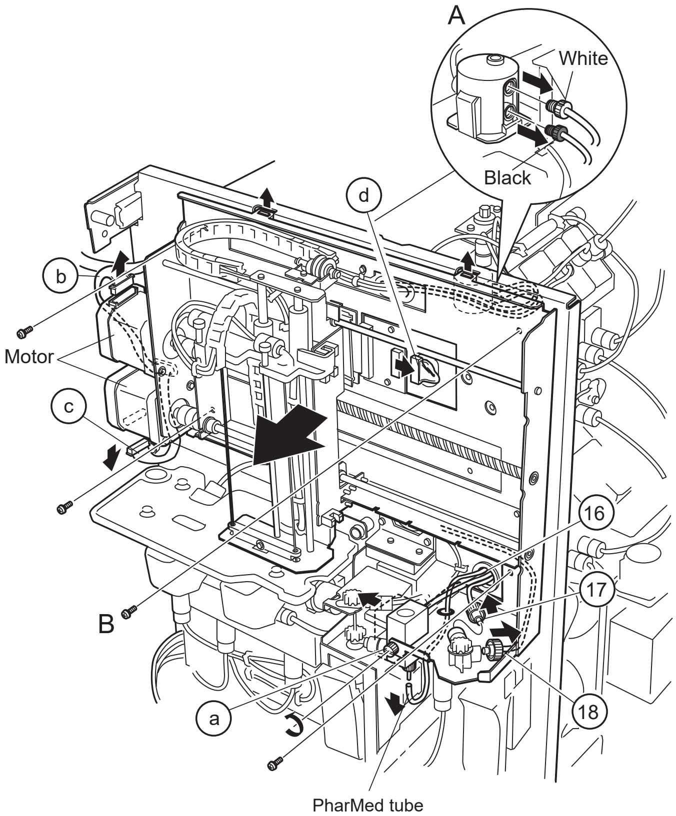
5 Remove the two tube joint (17 and 18) on the rinse chassis.

6 Loosen the screw “a” and remove the 5 diff sample cup and PharMed tube.

7 Remove the two tube joints which are connected to the 2-way valve of the MJ-730V (refer to illustration A).

8 Disconnect cable connectors “b” and “c” which are connected to the motor and cable connector “d” which is connected to the SAMPLER JUNCTION BD.

9 Remove the four screws which secure the sampler unit and remove the sampler unit.



The number in the illustration is the tube joint number.

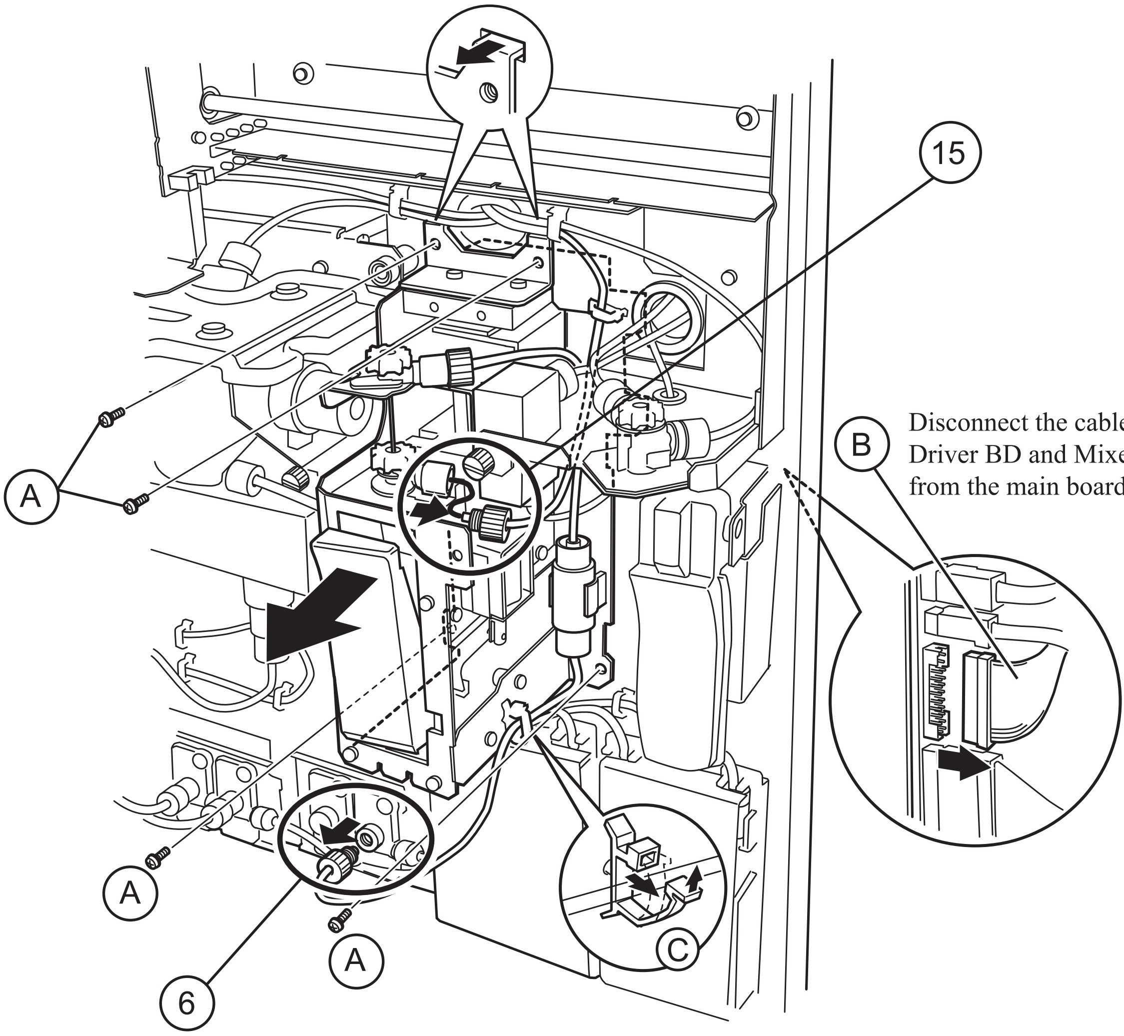
10 To assemble the hematology analyzer, reverse the above procedure.

NOTE: When attaching the sampler unit, attach the screw B first.

Replacing the MS-731V Cap Pierce Unit

1. Remove the front panel unit according to the procedure described in "Removing the PV-730VK Front Panel Unit".
2. Remove the side cover according to the procedure described in "Removing the Side Cover".
3. Remove the locking wire tube joint 6 and 15.
4. Remove the four PSW3 × 8 screws (black) A which secure the cap pierce unit and pull the unit toward the direction of arrow.
5. Disconnect the cable connector B which is connected to the cap pierce unit from the main board.

Remove the bracket which is hooked to the chassis.



Removing the MO-820V2 Laser Optical Unit

1 Remove the front panel unit according to the procedure described in "Removing the PV-730VK Front Panel Unit".

2 Remove the side cover according to the procedure described in "Removing the Side Cover".

3 Remove the top cover according to the procedure described in "Removing the Top Cover".

4 Disconnect the cable connector A which is connected to the laser optical unit from the ANALOG BD.

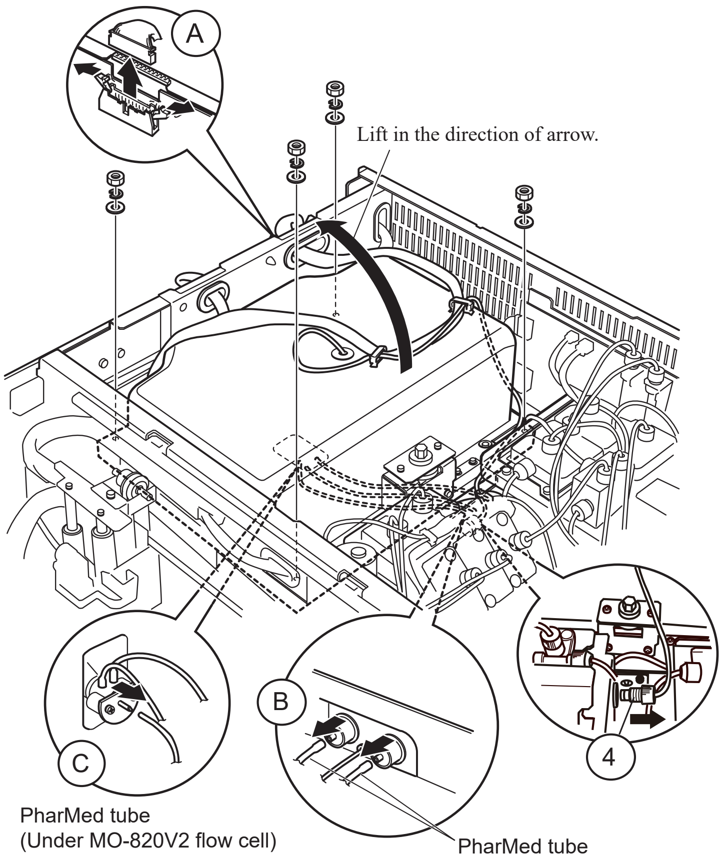
5 Disconnect the tube joint and PharMed tube as shown in the illustration.

6 Remove the four nuts which secure the laser optical unit.

7 Lift up the laser optical unit toward the direction of arrow and remove the PharMed tube on the bottom.

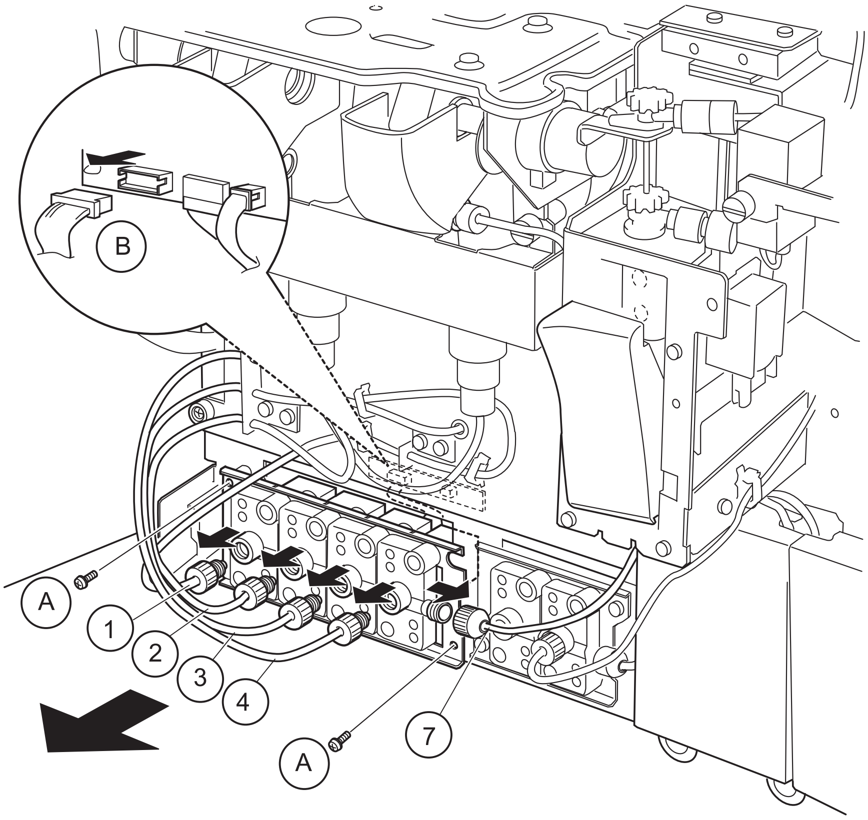
8 Remove the laser optical unit.

NOTE: The laser optical unit has the raised parts on the bottom. So put the unit on the dedicated stand and do not put a load on the parts.



Removing the JQ-731V Valve Unit

1. Remove the front panel unit according to the procedure described in “Removing the PV-730VK Front Panel Unit”.
2. Remove the tube joint 1, 2, 3, 4 and 7.
3. Remove the two PS3 × 6 screws (black) A and pull out the valve unit.
4. Disconnect the cable connector B of the valve unit from the JUNCTION BD.



The numbers in the illustration are the tube joint numbers.

Removing the JQ-732V Valve Unit

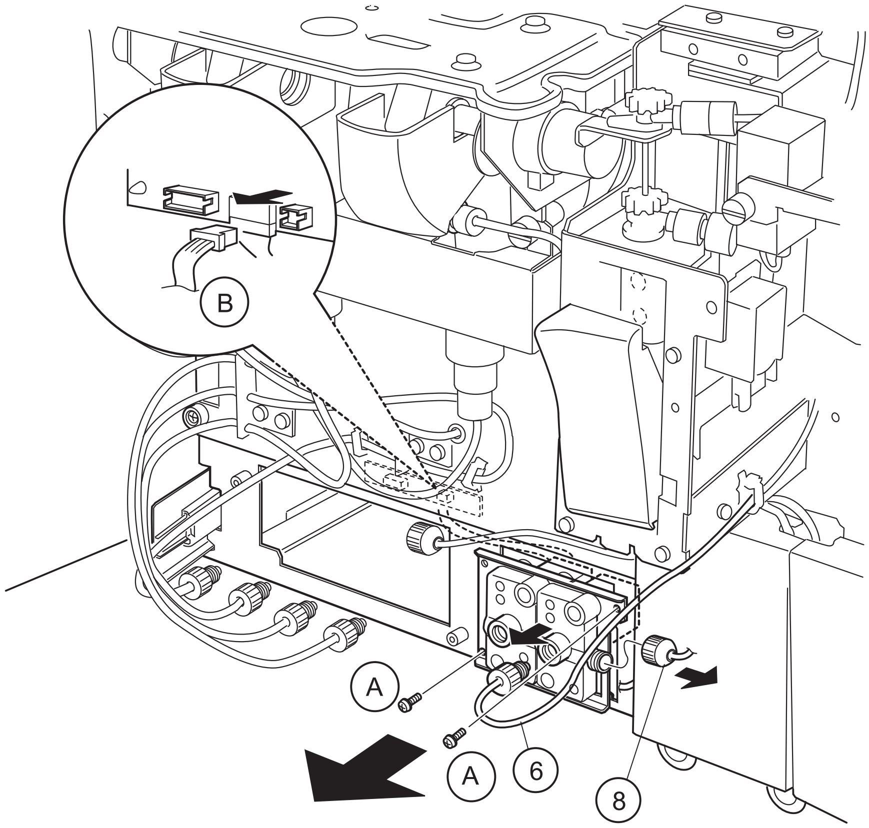
1 Remove the front panel unit according to the procedure described in “Removing the PV-730VK Front Panel Unit”.

2 Remove the JQ-732V valve unit according to the procedure described in “Removing the JQ-732V Valve Unit”.

3 Remove the tube joints 6 and 8.

4 Remove the two PS3 × 6 screws (black) A and pull out the valve unit.

5 Disconnect the cable connector B of the valve unit from the JUNCTION BD.

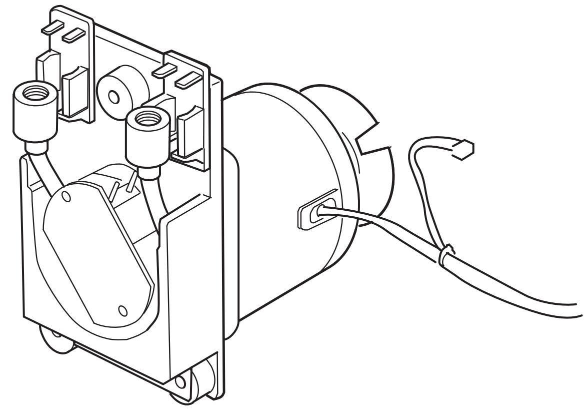


Removing the MP-640V Rotary Pump Unit

1. Remove the front panel unit according to the procedure described in "Removing the PV-730VK Front Panel Unit".

2. Remove the side cover according to the procedure described in "Removing the Side Cover".

   When removing the CBC side rotary pump unit, the right unit must be removed first.

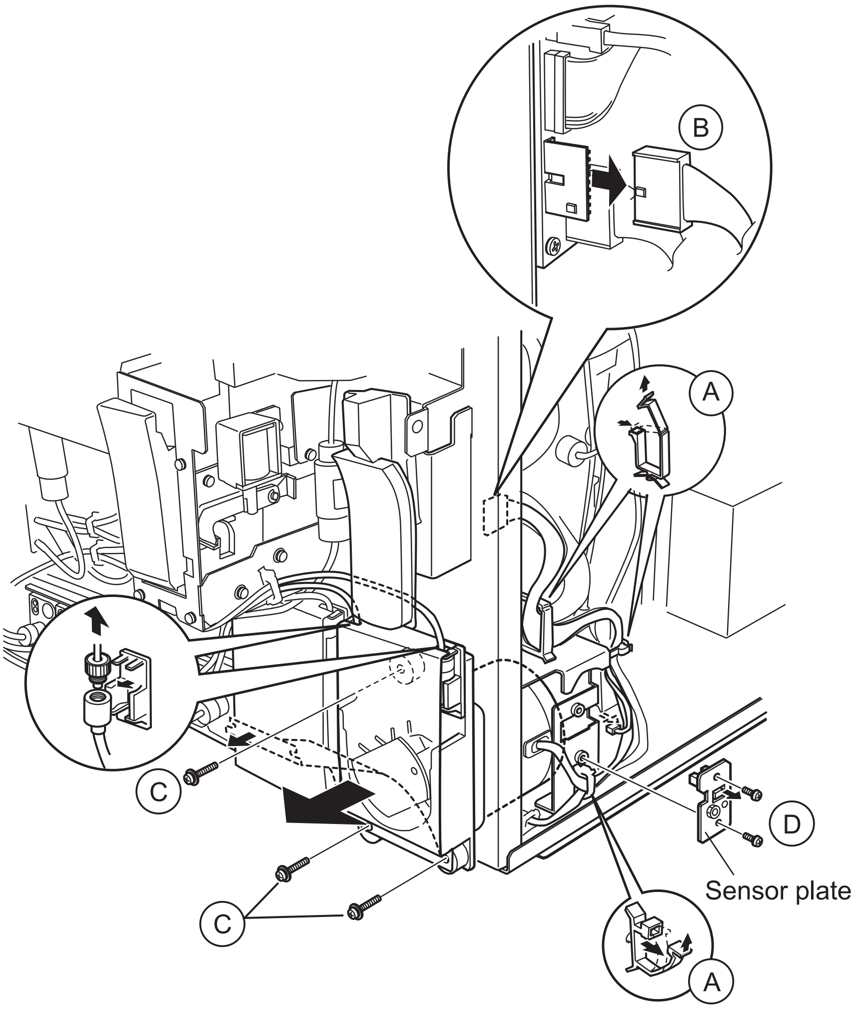


Removing the Left CBC Unit

1 Remove the two tube joints which are connected to the pump tube.

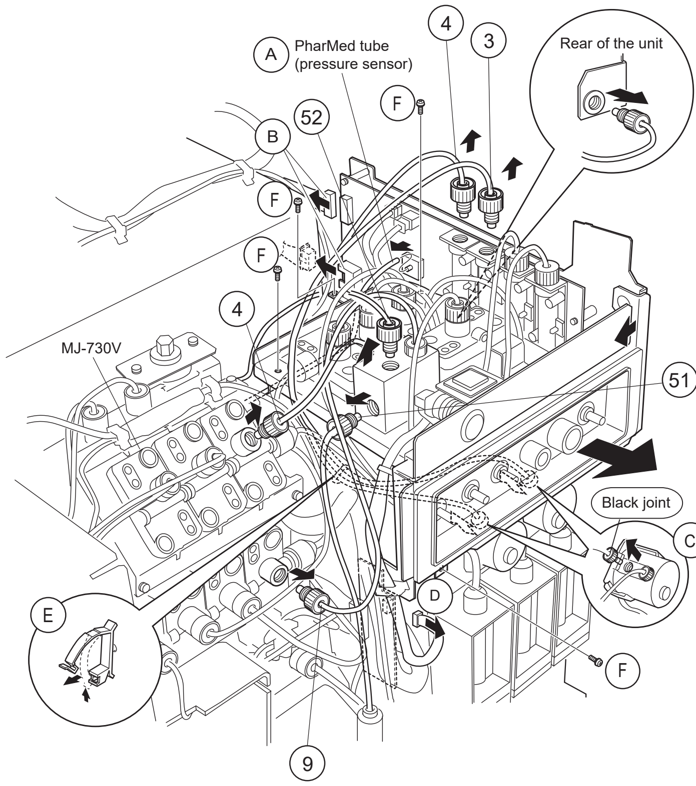
2 Disconnect the cable connector A of the rotary pump unit from the CONNECTION BD.

3 Remove the three screws which secure the rotary pump unit and pull out the rotary pump unit. Do not damage the rotary sensor on the rear.



Removing the JQ-730V Inlet/Outlet Unit

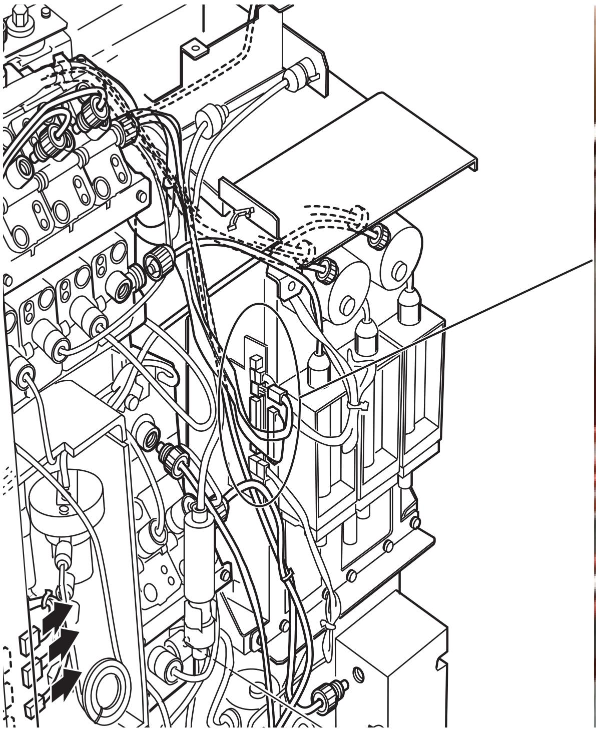
1. Remove the front panel according to the procedure described in “Removing the Front Panel”.
2. Remove the side cover according to the procedure described in “Removing the Side Cover”.
3. Remove the top cover according to the procedure described in “Removing the Top Cover”.
4. Remove the rear cover according to the procedure described in “Removing the Rear Cover”.
5. Disconnect the four tube joints (3, 4, 51 and 52) from the inlet/outlet unit and a tube joint (no number) from the rear of the unit. Remove the two tube joints (4 and 9) from the MJ-730V flow cyto piping unit.
6. Disconnect the PharMed tube A and two cable connectors B which are connected to the UT-7235 SAMPLER SENSOR BD.
7. Remove the two black joints C which are connected to the two 3-way valves of the MP-730V mixed pump unit.
8. Disconnect the cable D from the Driver BD and release the cable clamp E.
9. Remove the four PS3 × 8 screws F which secure the JQ-730V inlet/outlet unit and remove the unit.

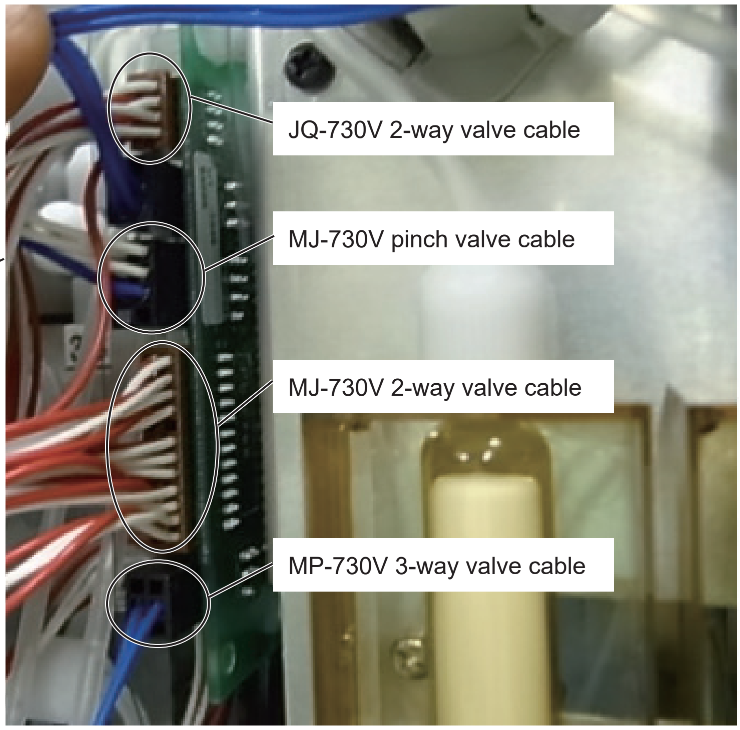


Removing the MP-731V Triple Pump Unit

1 Remove the side cover according to the procedure described in “Removing the Side Cover”.

2 Disconnect the four connectors from the UT-7239 VALVE CONNECTION BD2 as shown in the picture.

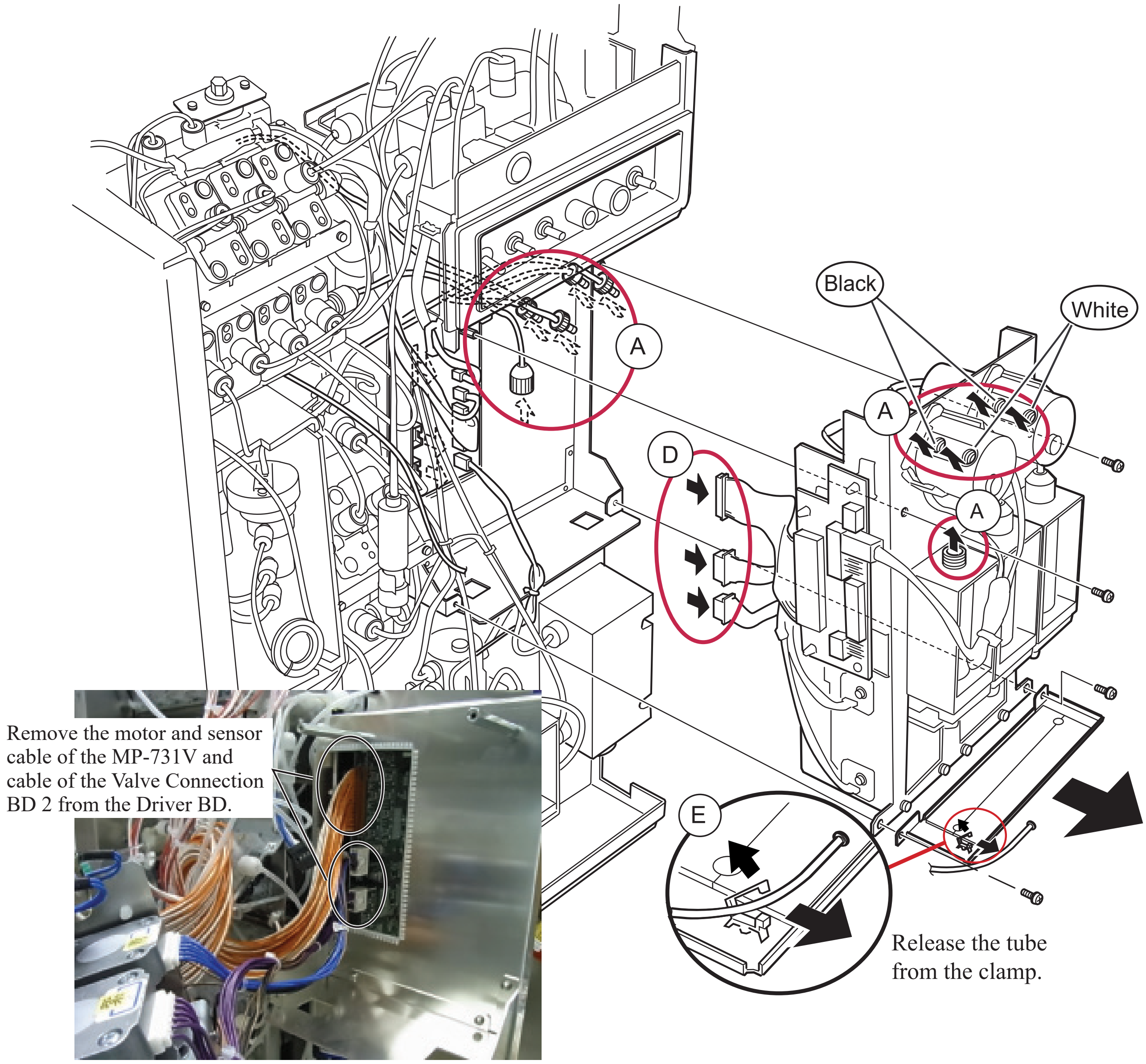




3 Remove the four tube joints A (two white and two black) from the 3-way valve A of the MP-731V triple pump unit and remove the tube joint B from the D of the MP-731V triple pump unit.

4 Remove the four PS3 × 8 screws C (black) which secures the triple pump unit and pull the unit toward the direction of the arrow.

5 Disconnect the three connectors D from the DRIVER BD, release the tube from the clamp E and remove the MP-731V triple pump unit.


Black
White
A
A
A
D
E
Remove the motor and sensor cable of the MP-731V and cable of the Valve Connection BD 2 from the Driver BD.
Release the tube from the clamp.

Removing the MP-730V Mixed Pump Unit

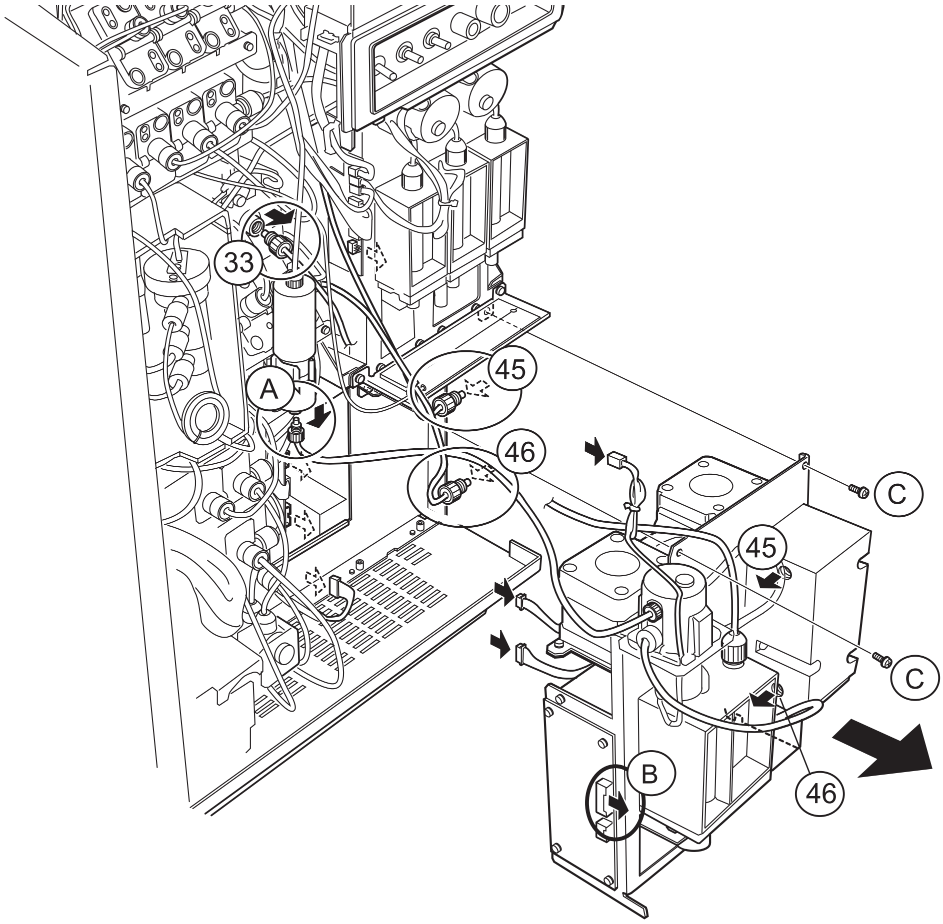
1 Remove the side cover according to the procedure described in “Removing the Side Cover”.

2 Remove the four tube joints (33, 45, 46 and A) as shown in the illustration.

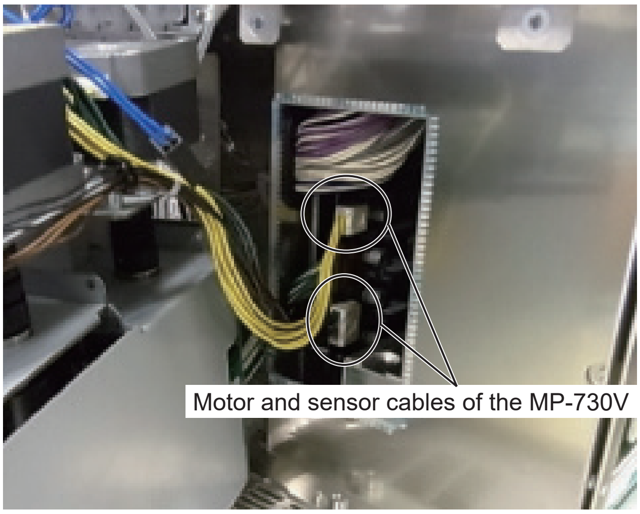
3 Remove the cable connector B from the MP-730V MIXED PUMP BD.

4 Remove the two PS3 × 8 screws (black) which secure the mixed pump unit and pull the mixed pump unit.

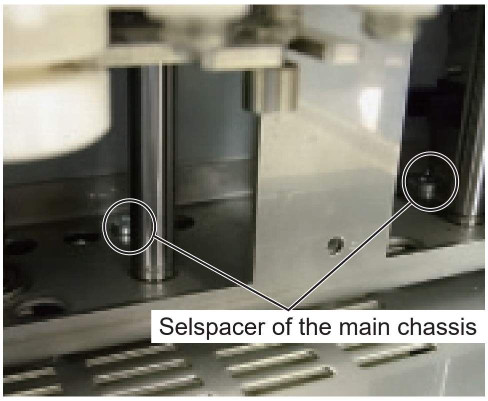
The numbers in the illustration indicate the numbers of the tube joints.



5 Disconnect the two cable connectors from the DRIVER BD and remove the mixed pump unit.



When attaching the unit, attach the MP-730V to the selspacer of the main chassis and fix it with the screw.



Removing the MJ-730V Flow Cell Piping Unit

1. Remove the front cover according to the procedure described in “Removing the Front Cover”.

2. Remove the side cover according to the procedure described in “Removing the Side Cover”.

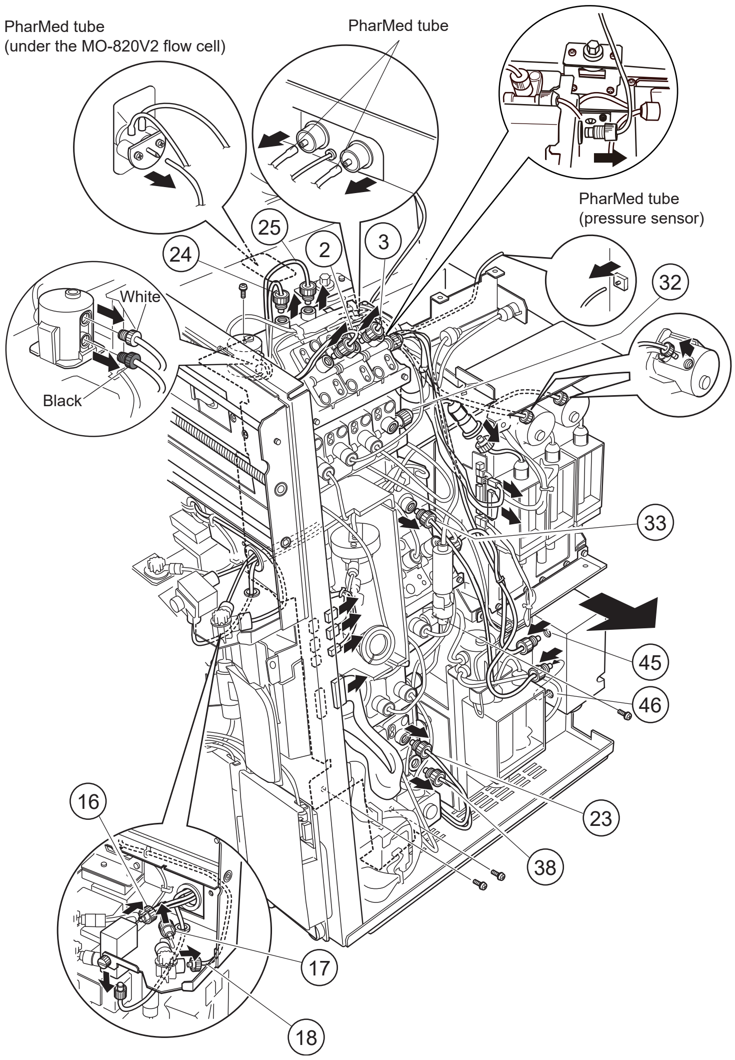
3. Remove the top cover according to the procedure described in “Removing the Top Cover”.

4. Remove the two tube joints from the 2-way valves and eight tube joints (2, 3, 23, 24, 25, 32, 33 and 38) from the MS-730V sampler unit.

5. Remove the four tube joints (two 45 and two 46) from the 3-way valves of the MP-731V triple pump unit.

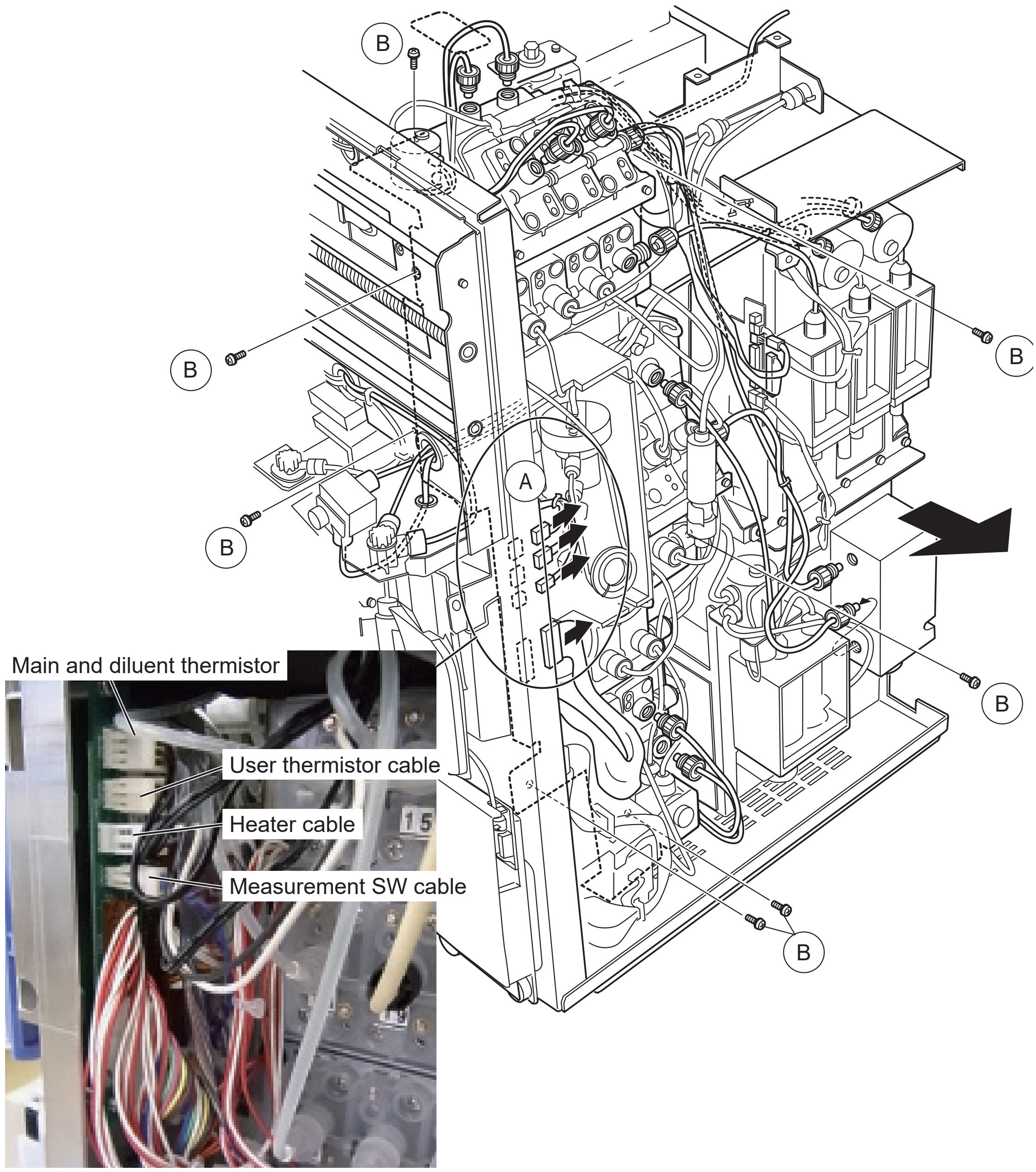
6. Remove the two tube joints from the 2-way valves of the MS-730V, the two tube joints (45 and 46) from the MS-731V cap pierce unit, and the three tube joints (16, 17 and 18) from the MJ-730V flow cell piping unit.

7. Remove the four PharMed tube A.



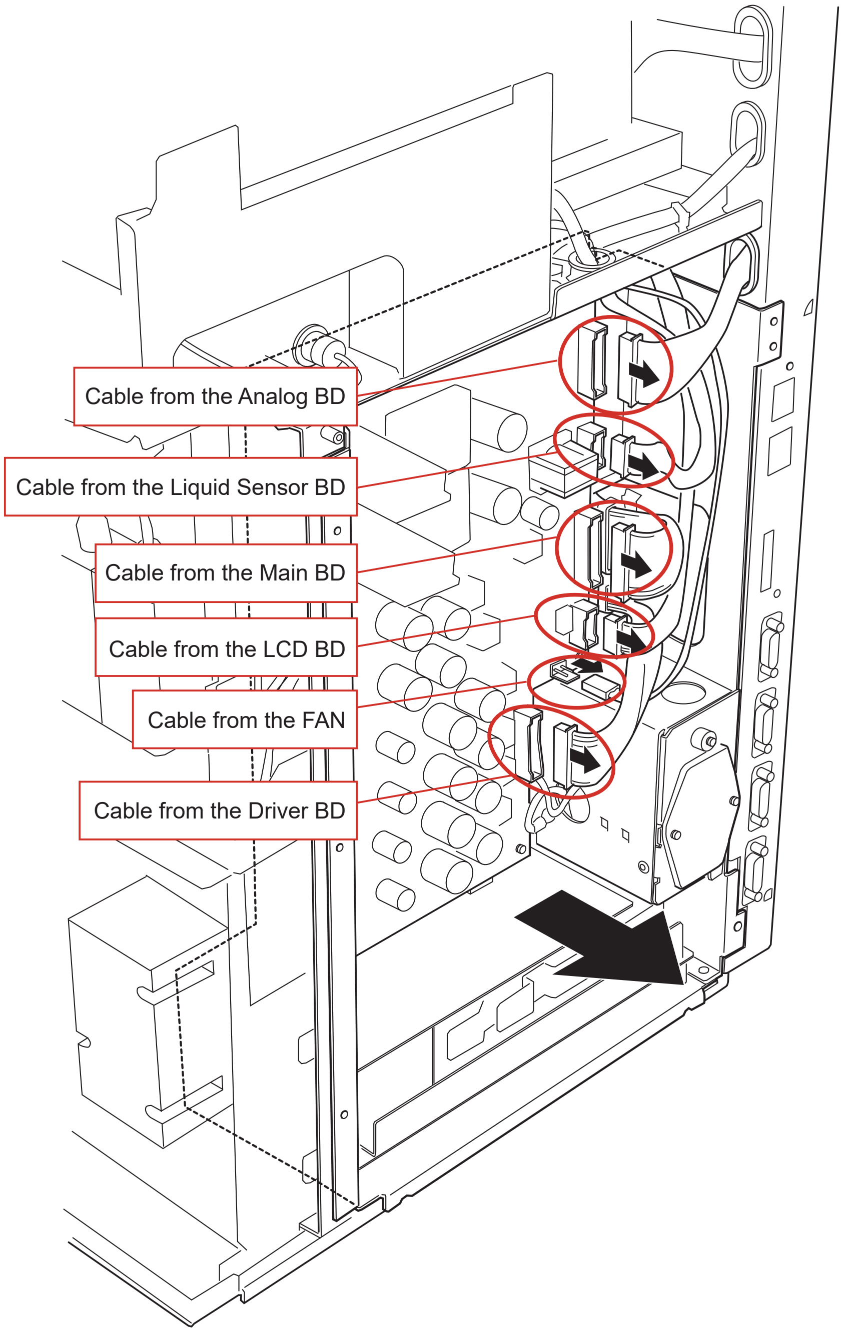
8. Disconnect the four cable connectors of the flow cell piping unit from the VALVE CONNECTION BD 1 and 2.

9 Remove the seven screws which secure the flow cell piping unit and pull the unit out.



Removing the Power Supply Part

1. Remove the side cover according to the procedure described in “Removing the Side Cover”.
2. Remove the top cover according to the procedure described in “Removing the Top Cover”.
3. Remove the rear cover according to the procedure described in “Removing the Rear Cover”.
4. Disconnect the six cable connectors which are connected to the POWER BD and pull the power supply part with the SC chassis toward the direction of the arrow.

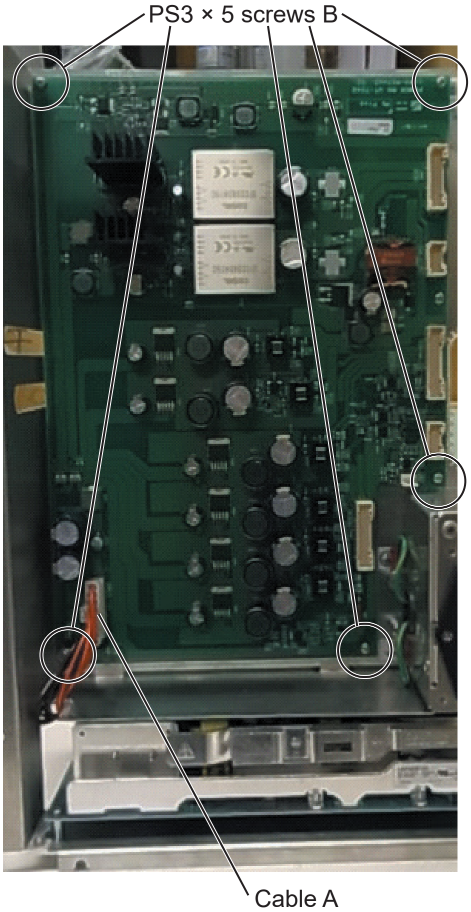


Removing the UT-7242 POWER BD

1 Pull out the power supply part by sliding it according to the procedure described in “Removing the Power Supply Part”.

2 Disconnect the VHR-8N (W120) cable A (black and red) from the power supply part.

3 Remove the five PS3 × 5 screws B and remove the POWER BD from the SC chassis ASSY.



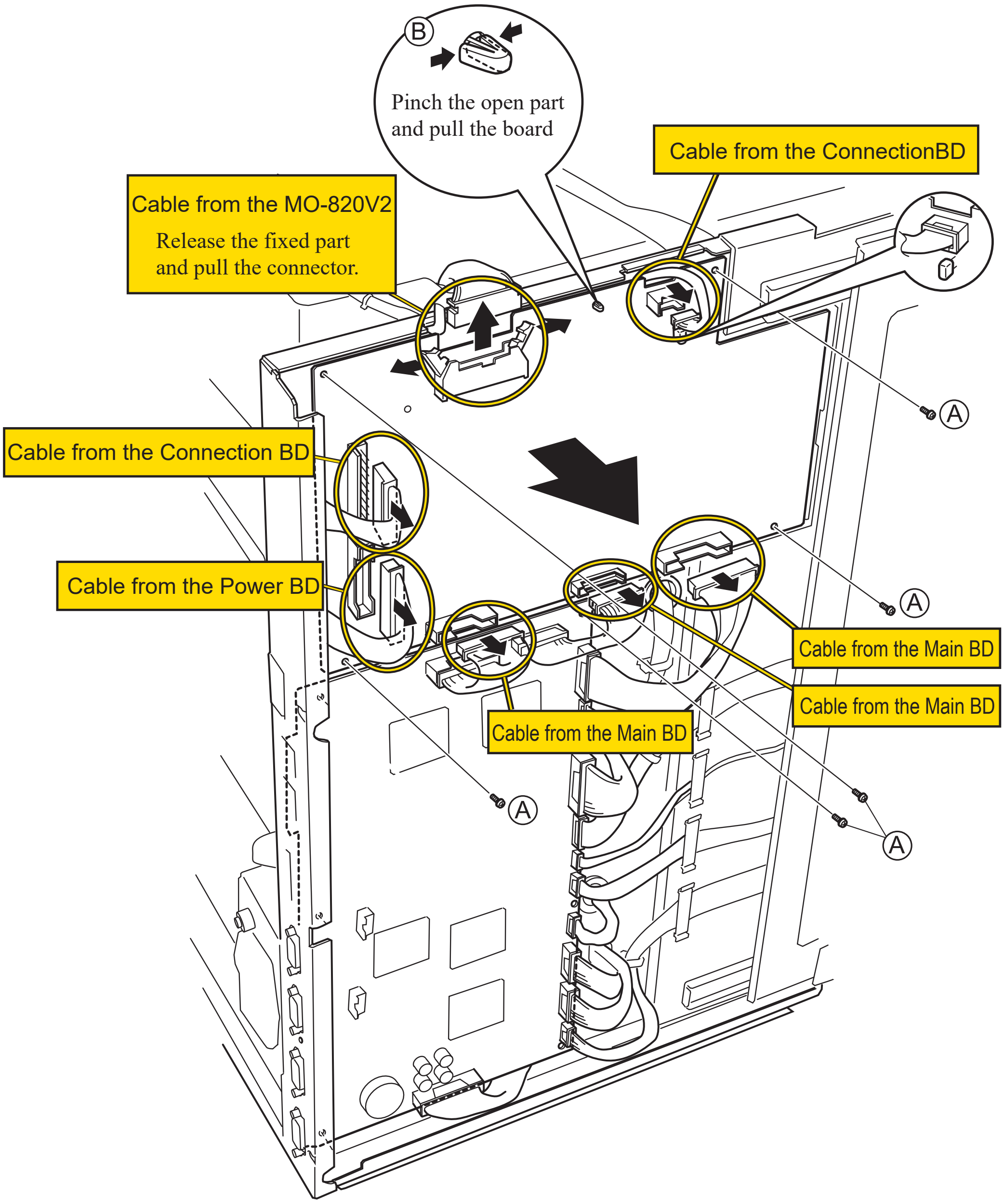
Removing the UT-7244 ANALOG BD

1 Remove the side cover according to the procedure described in “Removing the Side Cover”.

2 Remove the top cover according to the procedure described in “Removing the Top Cover”.

3 Remove the seven cable connectors which are connected to the ANALOG BD.

4 Remove the five screws A which secure the ANALOG BD. Pinch the fixture on the upper center of the board and remove the board.



5 To assemble the hematology analyzer, reverse the above procedure.

Removing the UT-7241/UT-7320 MAIN BD

NOTE
- When replacing a UT-7241/UT-7320 MAIN BD, enter the serial number on the serial number setting screen.

  Refer to “Serial Number Setting Screen” in Section 8.
- The design of the MAIN BD has been changed. There is no compatibility between the old and new boards. The model of the board (service part) used for replacement is different according to the Rev. number of the analyzer.

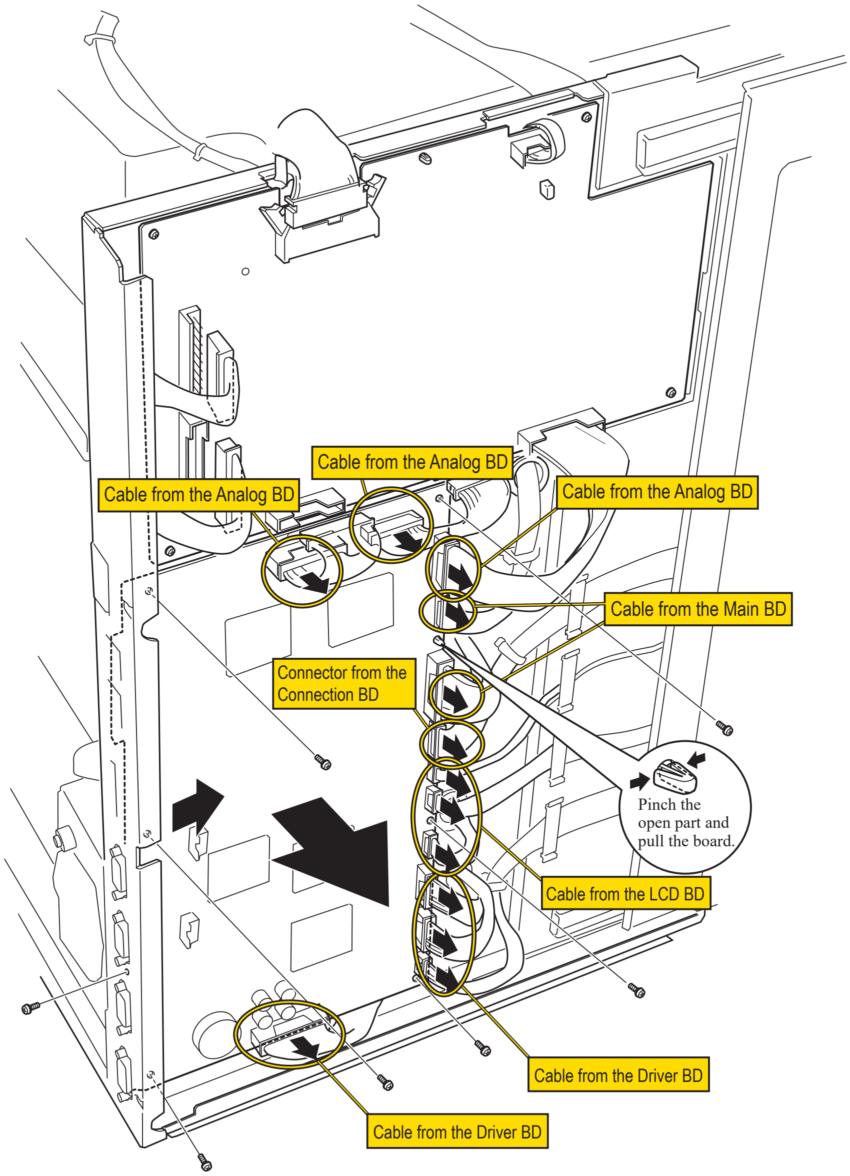
Board	MEK-7300K Rev. No	Service Part
		Model
MAIN BD	Rev. AA to Rev. AI	UT-7241
	Rev. AJ or later	UT-7320

1. Remove the side cover according to the procedure described in “Removing the Side Cover”.
2. Remove the top cover according to the procedure described in “Removing the Top Cover”.
3. Remove the rear cover according to the procedure described in “Removing the Rear Cover”.

4 Remove the 13 cable connectors which are connected to the MAIN BD.

5 Remove the five screws a which secure the MAIN BD, pinch the fixture b on the upper center of the board and remove the board. To disconnect the connectors on the back, pull the board toward the front panel and remove it.

6 To assemble the hematology analyzer, reverse the above procedure.



Replacing the UT-7243/UT-7321 DRIVER Board

NOTE
- When replacing a UT-7243 DRIVER BD that has a serial number of 04497 or earlier with a UT-7243 DRIVER BD that has a serial number of 04498 or later, replace the UT-7241 MAIN BD at the same time with a UT-7241 MAIN BD that has a serial number of 04518 or later.
- The design of the DRIVER board has been changed. There is no compatibility between the old and new boards. The model of the board (service part) used for replacement is different according to the Rev. number of the analyzer.

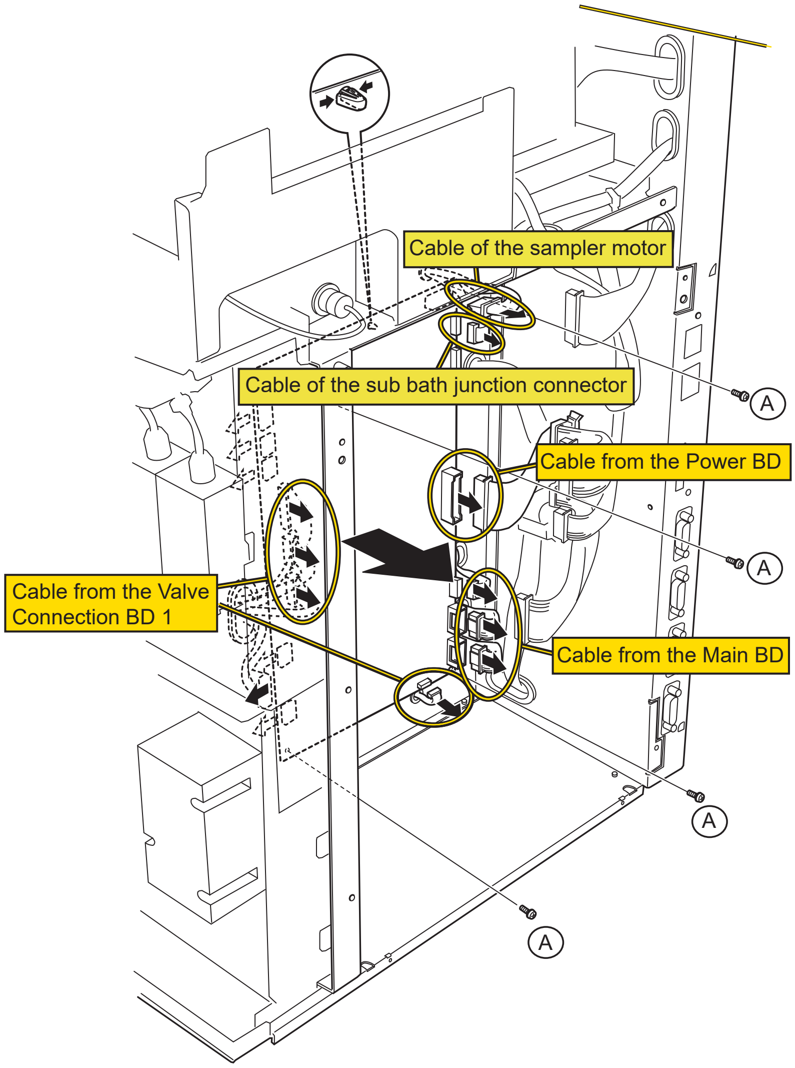
Board	MEK-7300K Rev. No	Service Part
		Model
DRIVER BD	Rev. AA to Rev. AI	UT-7243
	Rev. AJ or later	UT-7321

1. Remove the side cover according to the procedure described in “Removing the Side Cover”.
2. Remove the top cover according to the procedure described in “Removing the Top Cover”.
3. Remove the rear cover according to the procedure described in “Removing the Rear Cover”.
4. Remove the power supply part according to the procedure described in “Removing the Power Supply Part”.

5 Disconnect the seven cable connectors which are connected to the DRIVER BD.

6 Remove the five screws which secure the DRIVER BD, pinch the fixture on the upper center of the board and remove the board.

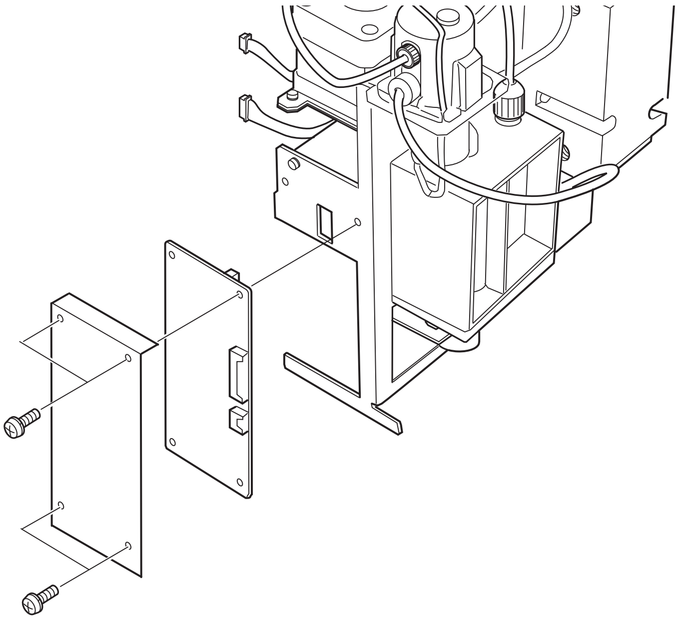
7 Reverse the above procedure to assemble the hematology analyzer.



Removing the UT-7200 MIXED PUMP BD

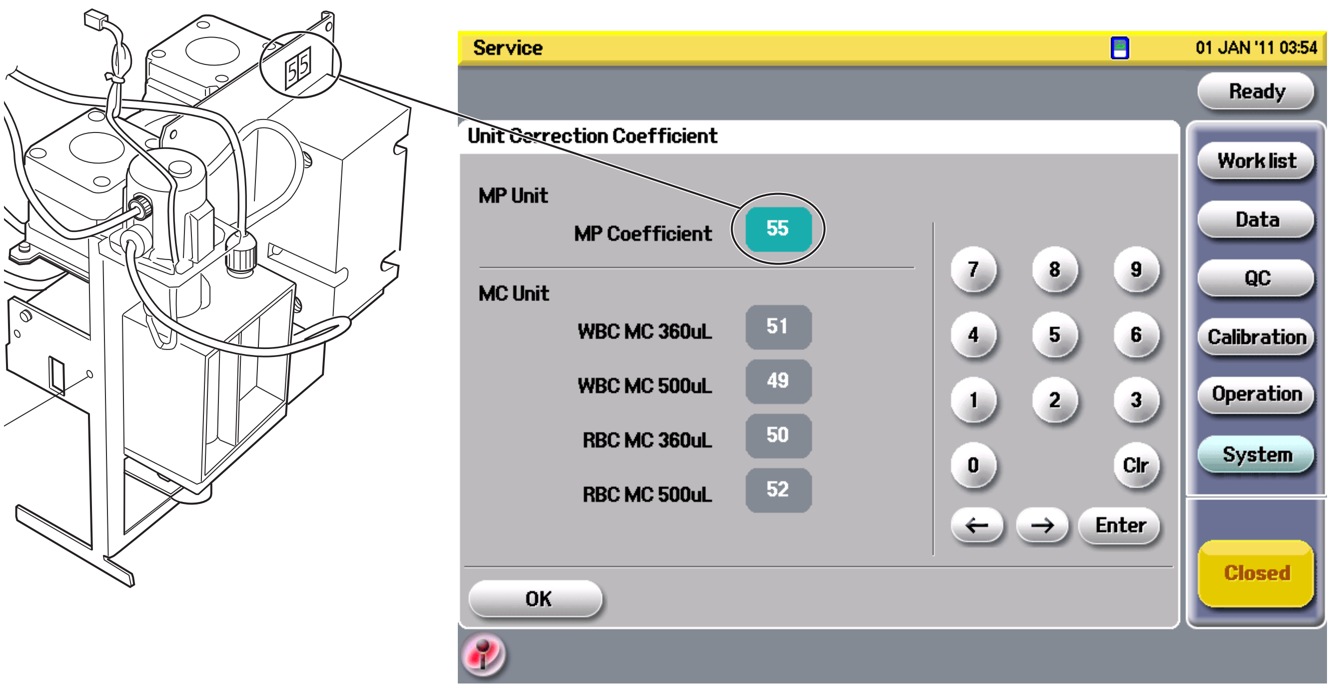
1 Remove the MP-730V mixed pump unit according to the procedure described in “Removing the MP-730V Mixed Pump Unit”.

2 Remove the four PSW4 × 8 screws which secure the MIXED PUMP BD and the board.



3 Reverse the above procedure to assemble the hematology analyzer.

4 After the replacement, press the power key while holding the reset key and enter the value on the mixed pump to the MP Coefficient column - Unit Calib. window - Instrument set - Service - System.



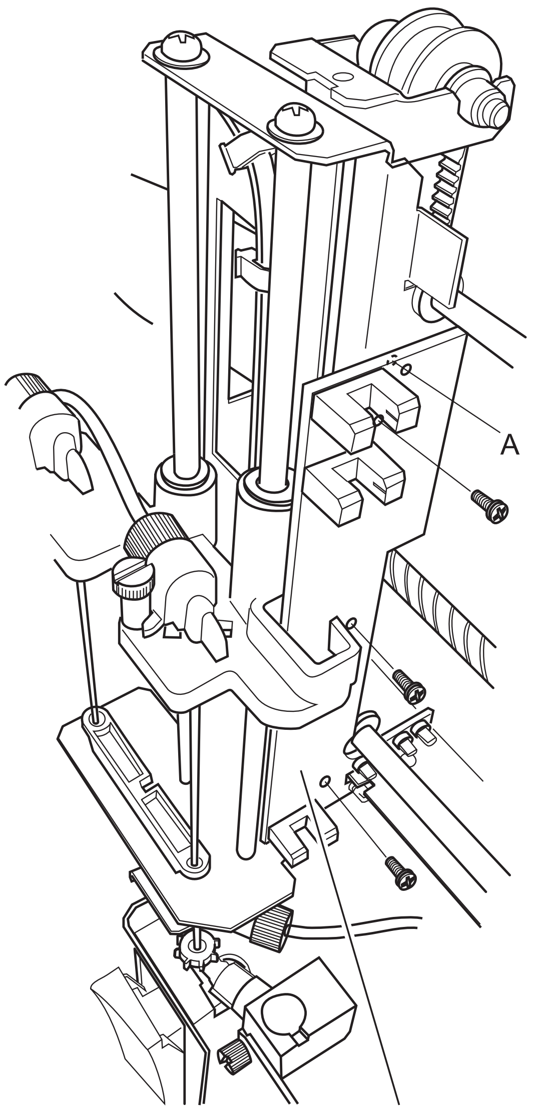
Removing the UT-7235 SAMPLER SENSOR BD

1 Set the measurement mode to closed mode and turn the analyzer power off.

NOTE: If the measurement mode is not set to closed mode, the SAMPLER SENSOR BD may be impossible to remove because of parts in the way.

2 Open the front cover according to the procedures described in “Opening the Front Cover”.

3 Remove the three PS3 × 6 screws and SAMPLER SENSOR BD from the MS-730V sampler unit.



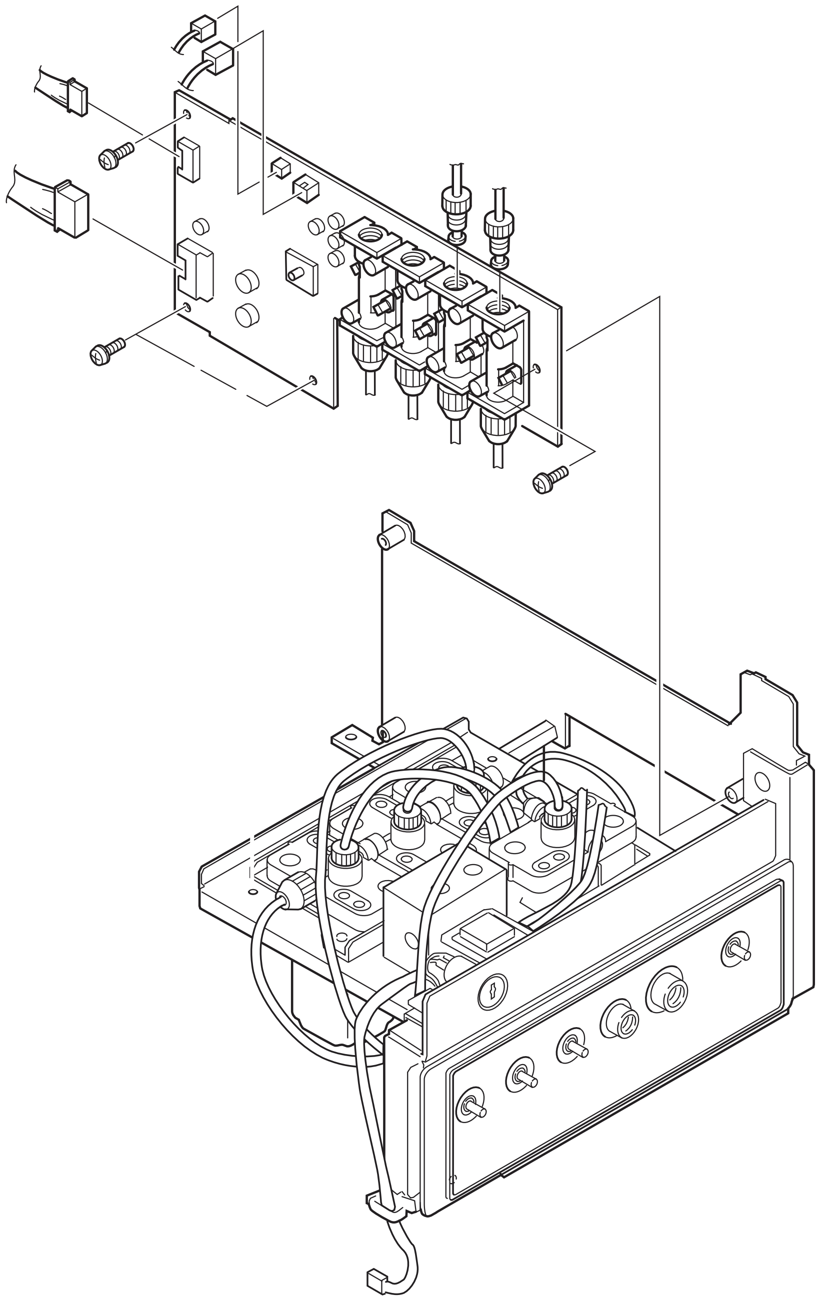
4 When attaching the board, adjust the hole A on the board and unit. A bar of the 2 mm diameter enables easy adjustment.

Removing the UT-7236 LIQUID SENSOR BD

1 Remove the LIQUID SENSOR BD after removing the JQ-730V inlet/outlet unit according to the procedures described in “Removing the JQ-730V Inlet/Outlet Unit”.

2 Remove all the cable connectors and piping tubes which are connected to the LIQUID SENSOR BD.

3 Remove the four PS3 × 6 screws which fix the LIQUID SENSOR BD to the JQ-730V chassis and remove the board.



4 Reverse the above procedure to attach the LIQUID SENSOR BD.

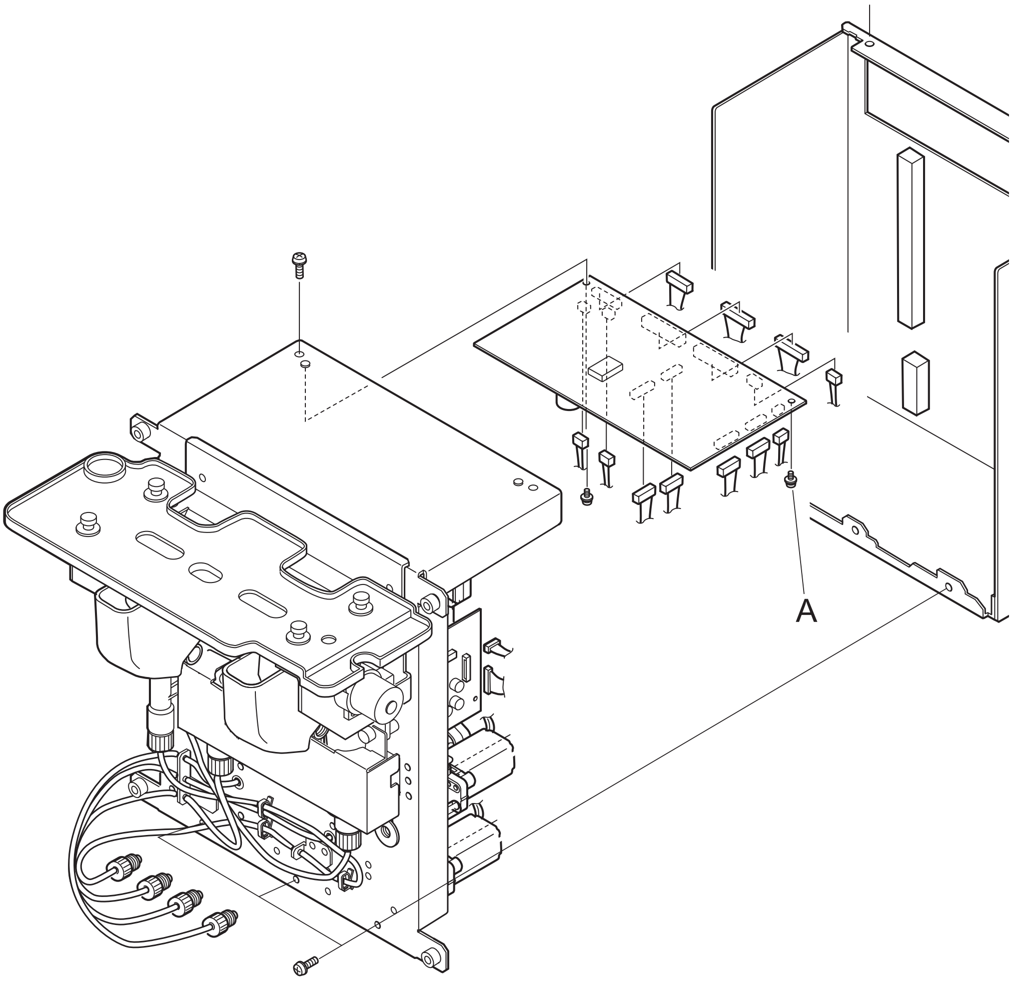
Removing the UT-7250 CONNECTION BD

1 Remove the CONNECTION BD, after removing the MC-730V CBC measuring unit according to the procedures described in “Removing the MC-730V CBC Measuring Unit”.

2 Remove the five screws which fix the rear cover of the CBC measuring unit and remove the rear cover.

3 Disconnect all the cable connectors which are connected to the CONNECTION BD.

4 Remove the two screws which fix the CONNECTION BD and remove the board.



5 Reverse the above procedure to attach the CONNECTION BD.

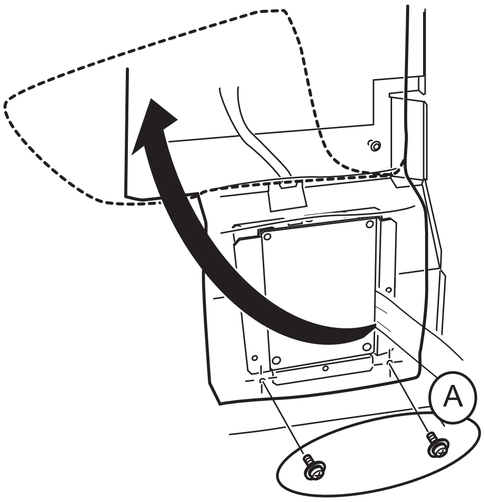
6 Firmly connect the cable connectors.

NOTE: The screw A is ground. Firmly fix the screw when attaching it.

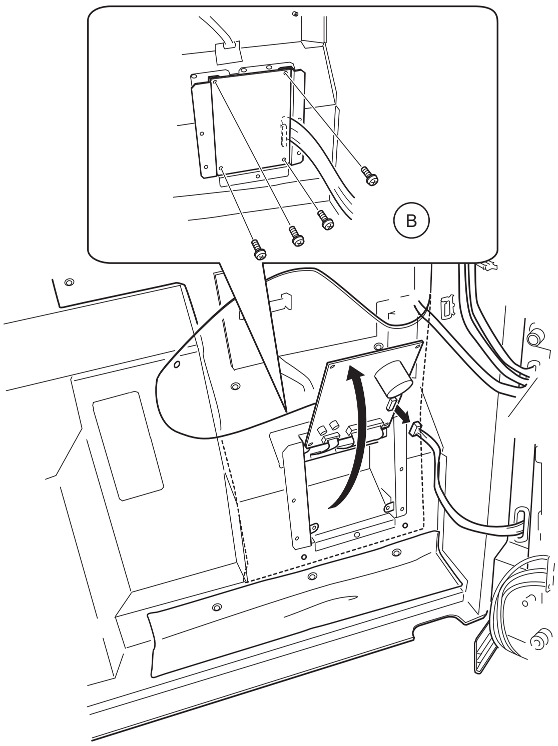
Removing the UT-7205/UT-7319 PRINTER DRIVER BD

1 Open the front cover according to the procedures described in “Opening the Front Cover”.

2 Remove the two PSW3 × 6 screws A which fix the drip-proof cover and open the cover.



3 Remove the four screws which fix the PRINTER DRIVER BD and lift up the board.

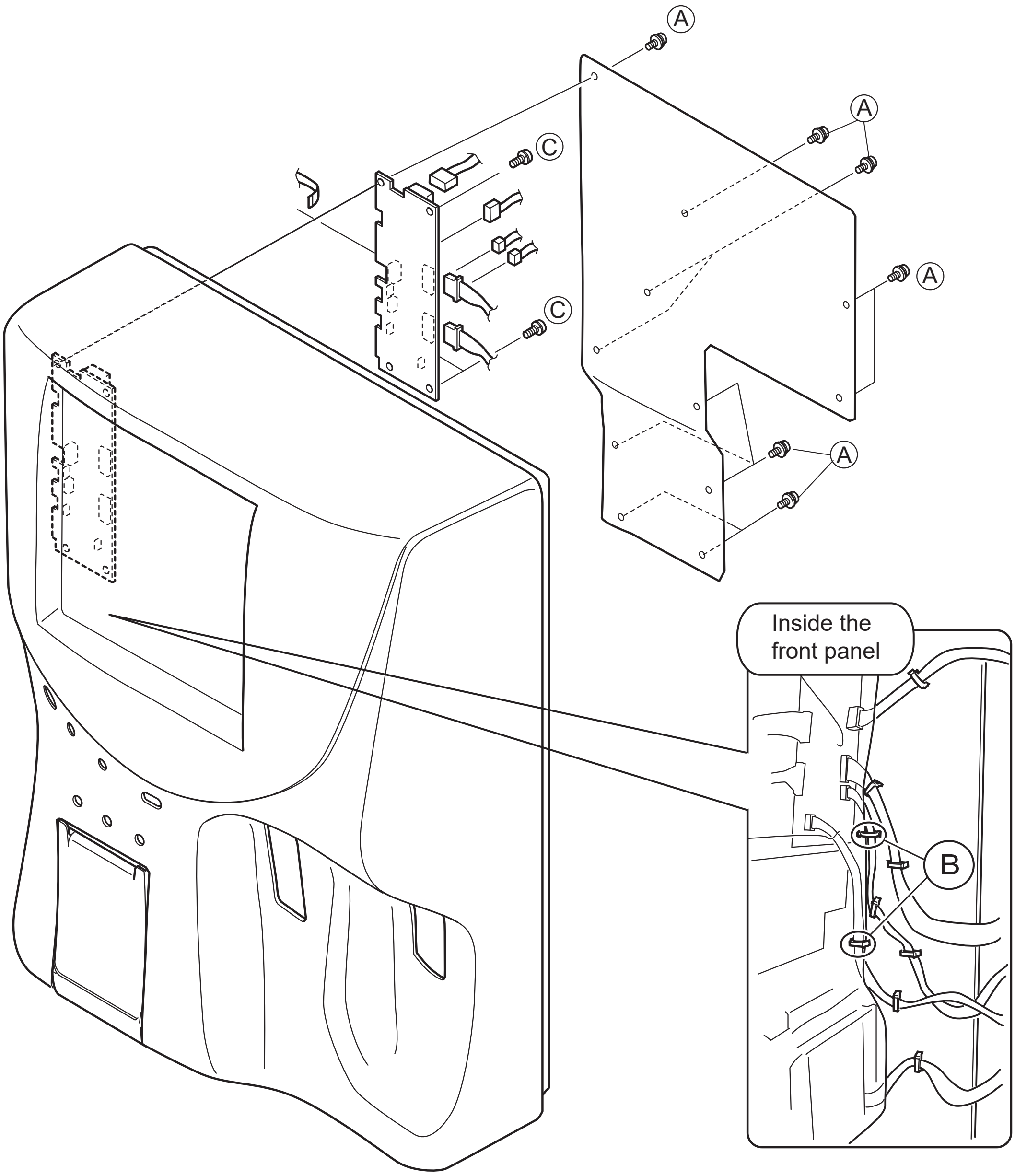


4 Remove all the cable connectors which are connected to the PRINTER DRIVER BD and remove the board.

5 Reverse the above procedure to attach the PRINTER DRIVER BD.

Removing the UT-7246 LCD BD

1. Open the front cover according to the procedures described in “Opening the Front Cover”.
2. Remove the 11 PSW3 × 6 screws A which secure the drip-proof cover, release the two locking wire saddles B and remove the drip-proof cover (refer to the illustration).
3. Remove all the connectors which are connected to the LCD BD.
4. Remove the four PS3 × 6 screws C which secure the LCD BD and the board.



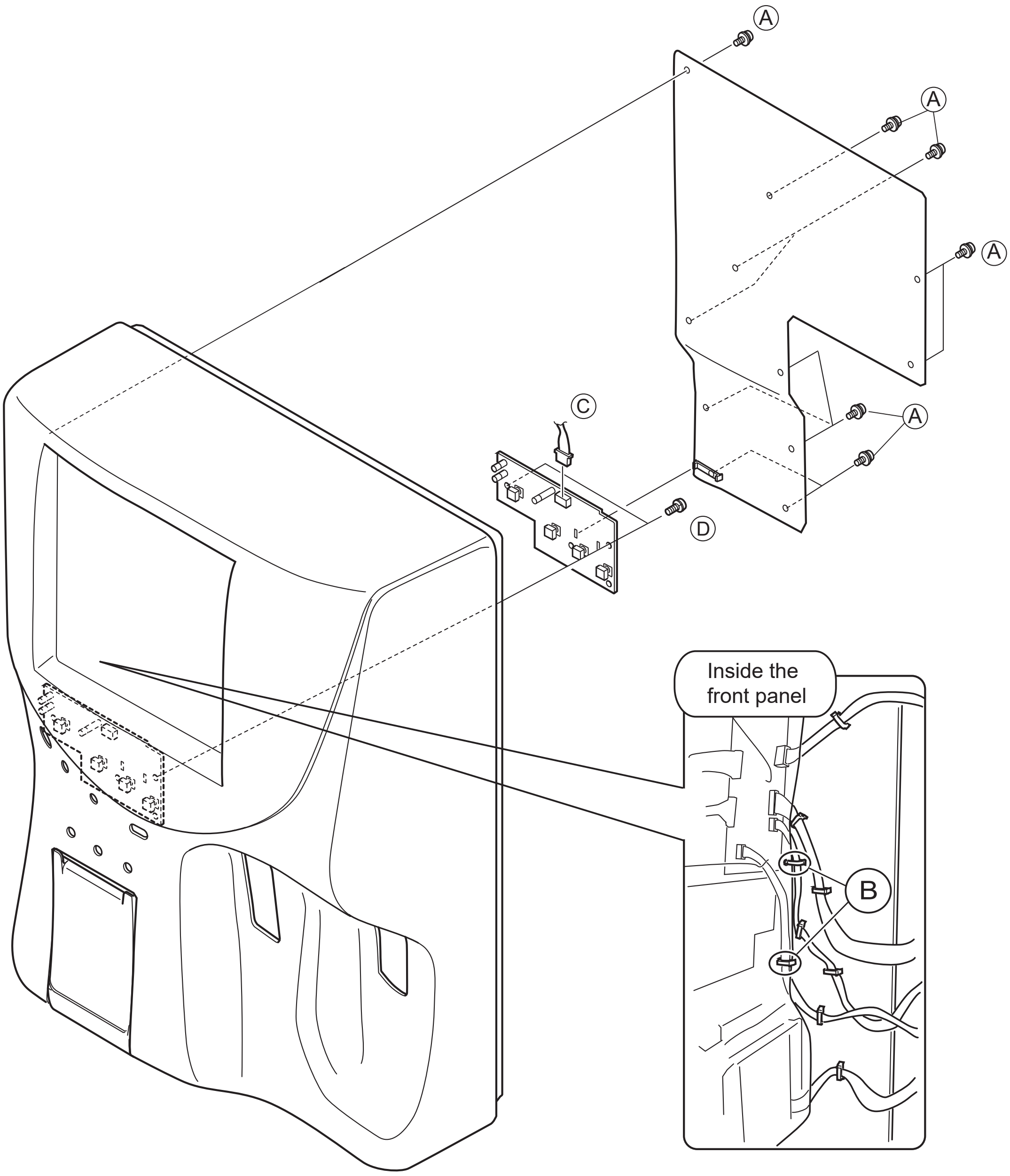
Removing the UT-7247 KEY BD

1 Open the front cover according to the procedures described in “Opening the Front Cover”.

2 Remove the 11 PSW3 × 6 screws A which secure the drip-proof cover, release the two locking wire saddles B and remove the drip-proof cover (refer to the illustration).

3 Disconnect the cable connector C which is connected to the KEY BD.

4 Remove the two PS3 × 6 screws D which secure the KEY BD, and remove the board.

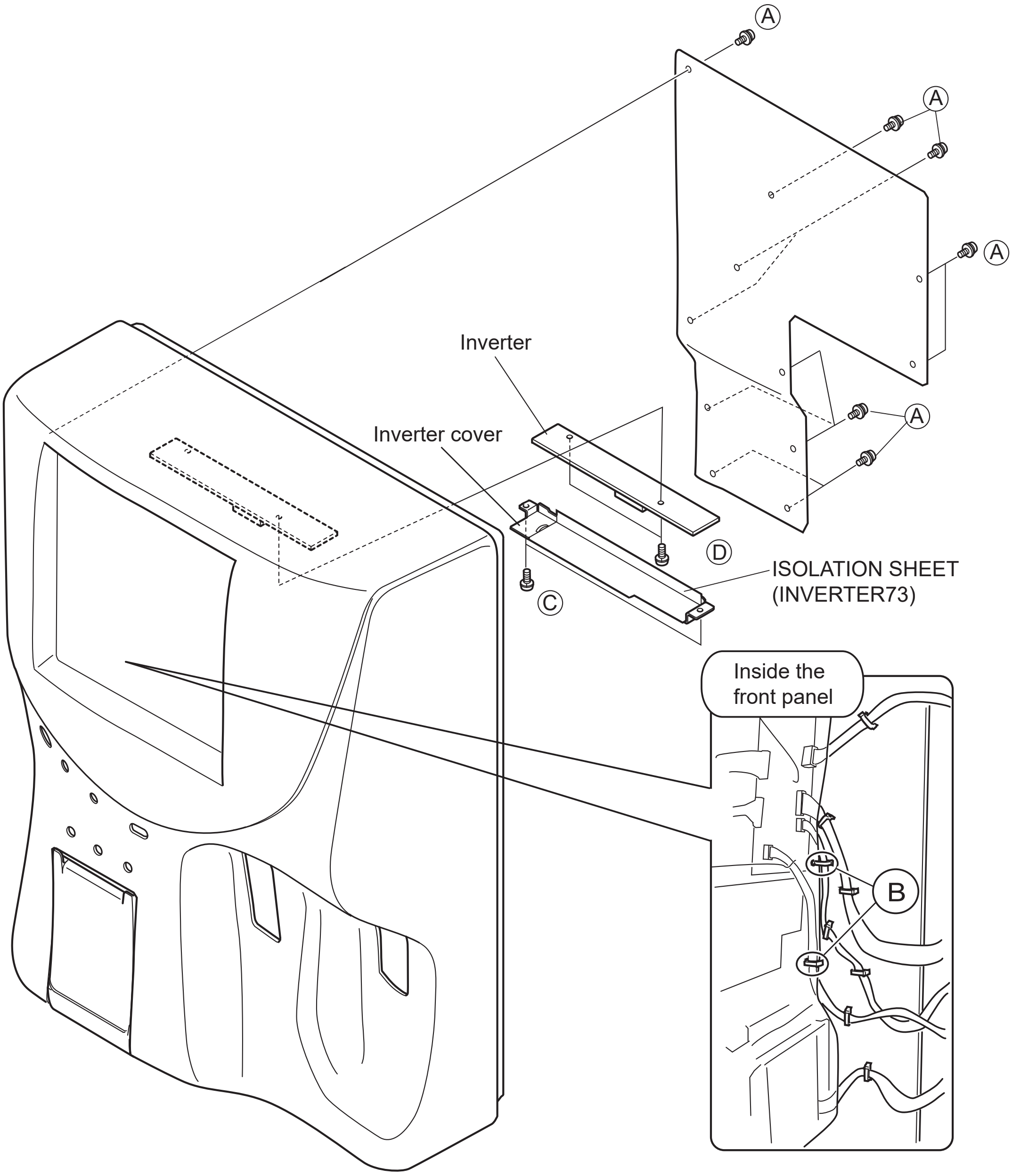


5 When attaching the new board, reverse the above procedure.

Removing the CXA-0454 Inverter

NOTE: The CXA-0454 inverter is on the PV-730VK front panel unit with Rev. AA.

1. Open the front cover according to the procedures described in “Opening the Front Cover”.
2. Remove the 11 PSW3 × 6 screws A which secure the drip-proof cover, release the two locking wire saddles B and remove the drip-proof cover (refer to the illustration).
3. Remove the ISOLATION SHEET which is hooked to the hole of the inverter cover (73) and two PS3 × 6 screws C.
4. Remove the two PS3 × 6 screws D which secure the inverter and inverter.

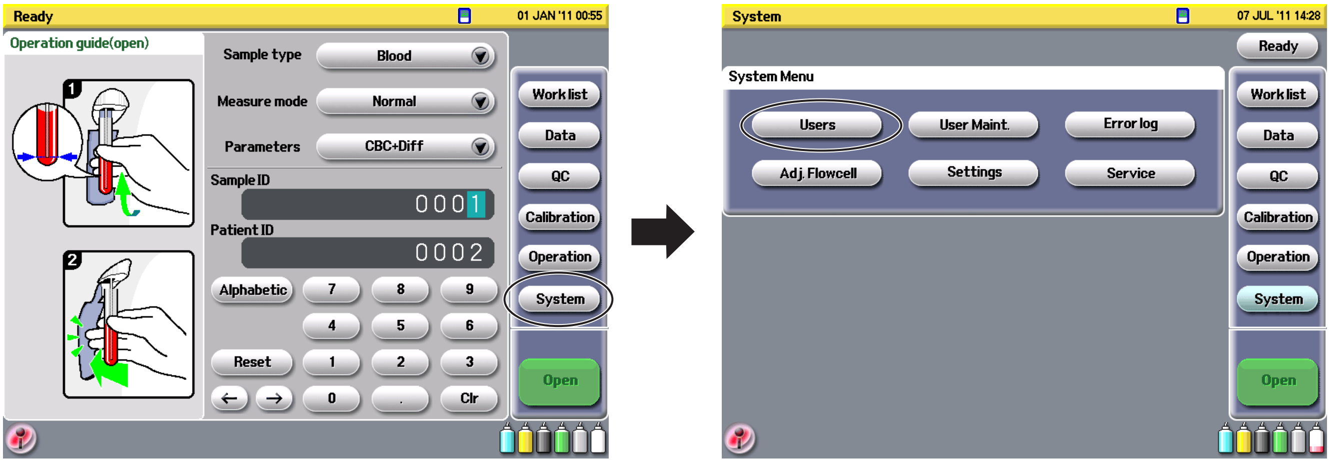


5 Adjustment

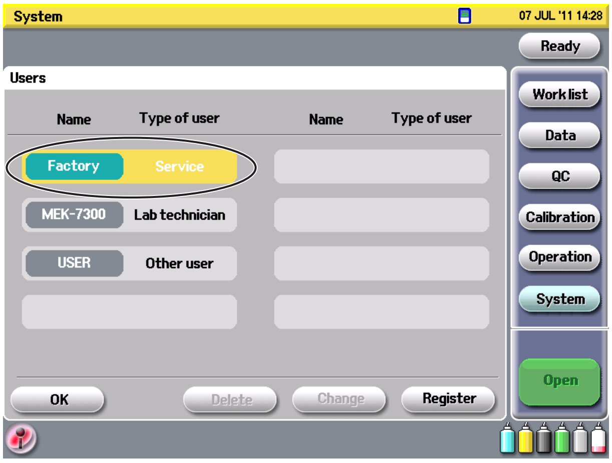
Adjusting the Units

To adjust the sensor and check and enter the corrected value, the Service screen must be displayed. To enter the Service screen, change the operator to “Factory”.

1 Press the System key → Users key.



2 Select “Factory” and press the OK key.



3 The password is requested. Enter “4321” and press the Enter key.

When the operator changes, the status bar is changed to yellow.

Adjusting MC-730V Measuring Unit

1 Adjusting the upper, middle and lower sensor output of the manometer:

Adjust the sensor voltage of the each WBC and RBC manometer on the Sensor Monitor screen.

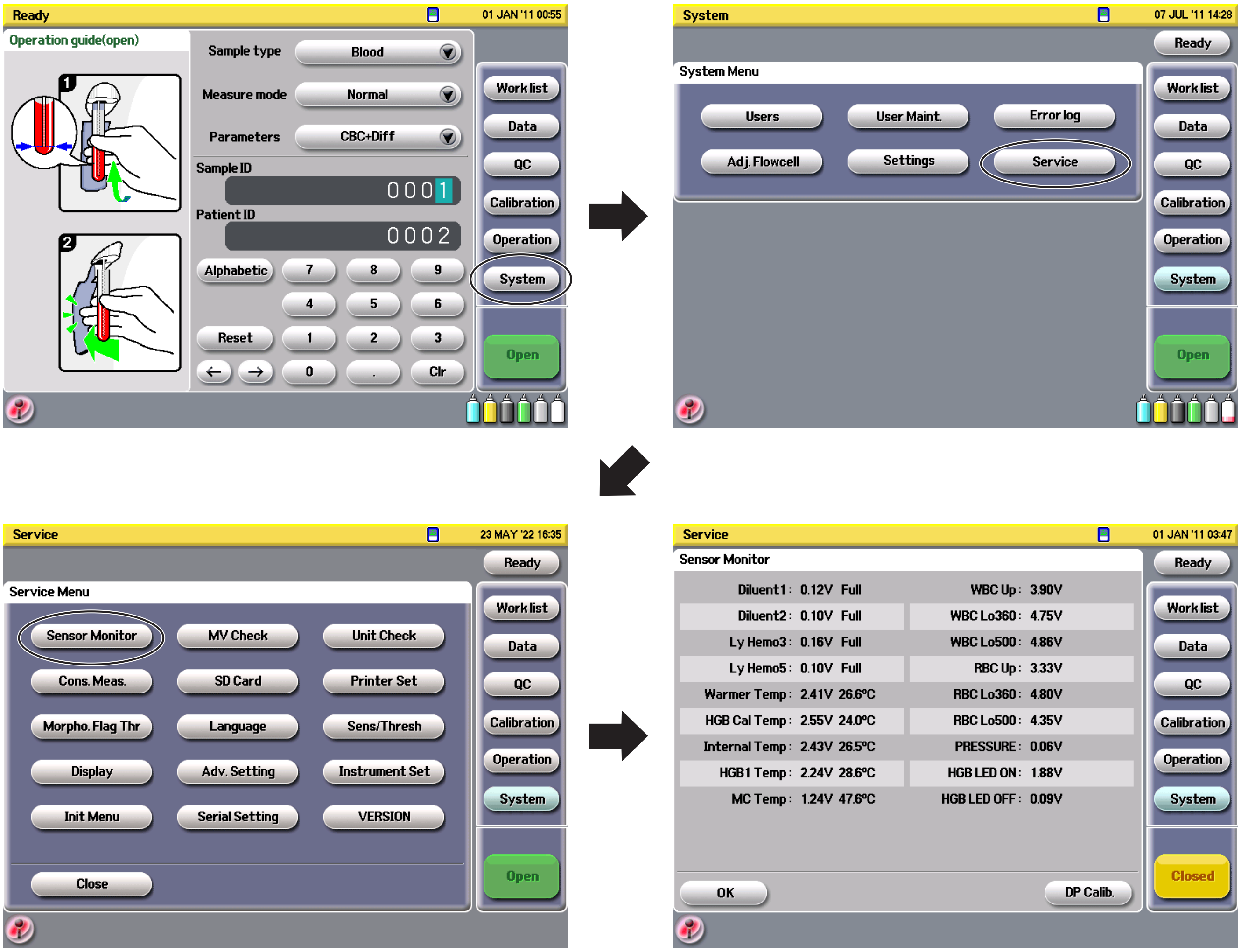
2 Setting the correction value of the manometer:

Set the volume correction value of the WBC and RBC manometer on the Sensor Monitor screen.

3 Adjusting the HGB sensor output voltage:

Adjust the HGB sensor voltage by turning the variable resistor.

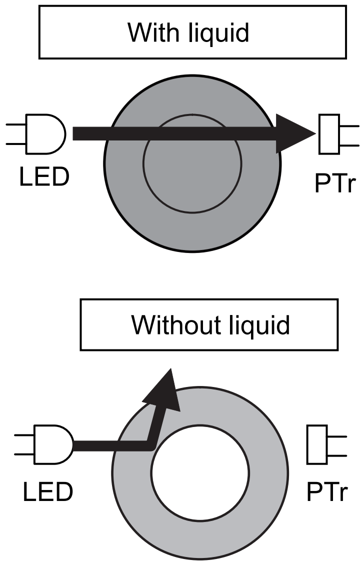
The adjustment is performed on the Sensor Monitor screen. Press the System key → Service key → Sensor Monitor key.



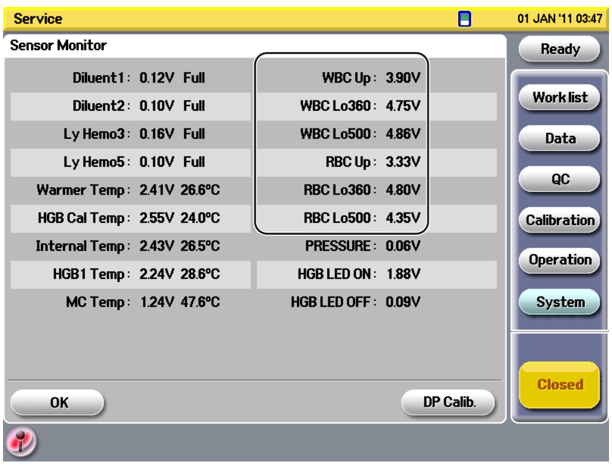
Adjusting Upper, Middle and Lower Sensor Output of the Manometer

The part which aspirates the diluted blood sample from the aperture when counting the blood cells and measures the volume is the manometer. The manometer is a transparent plastic cylinder with upper, middle and lower optical sensors that detect the fluid level in the manometer. When the sensor voltage is over 2.5 V, the sensor judges that it is in air. When the sensor voltage is under 2.5 V, the sensor judges that it is in liquid. To leave 1.0 V margin between the two conditions, the sensor voltage must be adjusted to be less than 1.5 V in liquid and greater than 3.5 V in air. When the sensor voltage is between 2.25 and 2.75 V, the “MANO ERROR” alarm occurs because the manometer may misjudge the situation.

The liquid sensor of the manometer detects the fluid level by the refraction of light. When liquid is in the manometer, the refractive index of the plastic and liquid is almost the same and the LED light travels straight to the light receiving element (PTr) without refraction.



When there is no liquid, the LED light refracts and does not reach the light receiving element (PTr) because the refractive index of the air and plastic is different.



WBC Up:	WBC manometer upper sensor
WBC Lo 360:	WBC manometer middle sensor
WBC Lo 500:	WBC manometer lower sensor
RBC Up:	RBC manometer upper sensor
RBC Lo 360:	RBC manometer middle sensor
RBC Lo 500:	RBC manometer lower sensor

The range of the manometer voltage is 1.5 V or less when there is liquid or 3.5 V or more when there is no liquid. If the voltage is out of the range, press the DP Calib. key and adjust the sensor voltage.

The DP Calibration screen is displayed as follows.

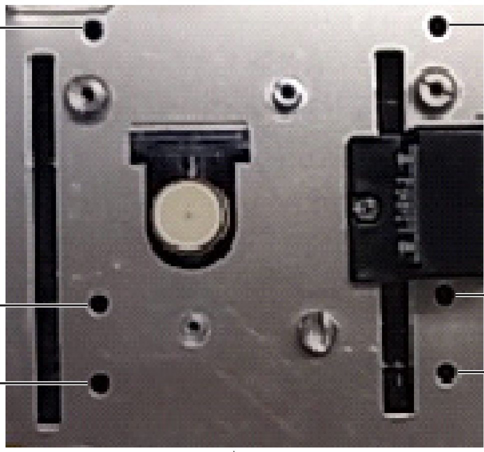
WBC
Up: WBC manometer upper sensor
Lo360: WBC manometer middle sensor
Lo500: WBC manometer lower sensor

RBC
Up: RBC manometer upper sensor
Lo360: RBC manometer middle sensor
Lo500: RBC manometer lower sensor

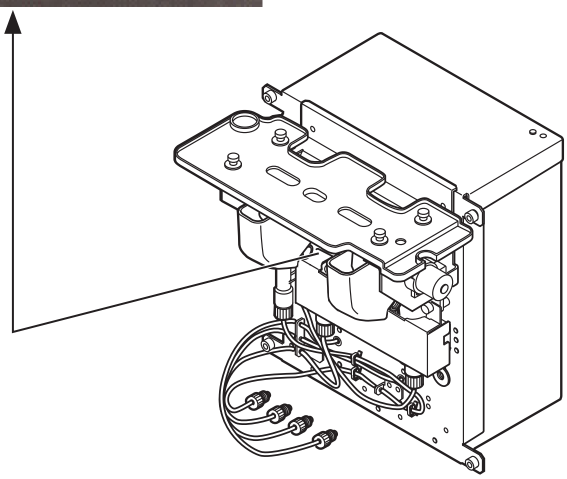
Change the WBC and RBC manometer voltage. Press the desired item to change and enter the setting value with the numeric key pad. The setting range is 1 to 255. The higher the value, the more voltage is generated. After the setting, press the Sens. Moni. key to return to the Sensor Monitor screen and check that the voltage is stable.

When the manometer sensor detects liquid, blue LED lights.

RBC manometer upper sensor
WBC manometer upper sensor



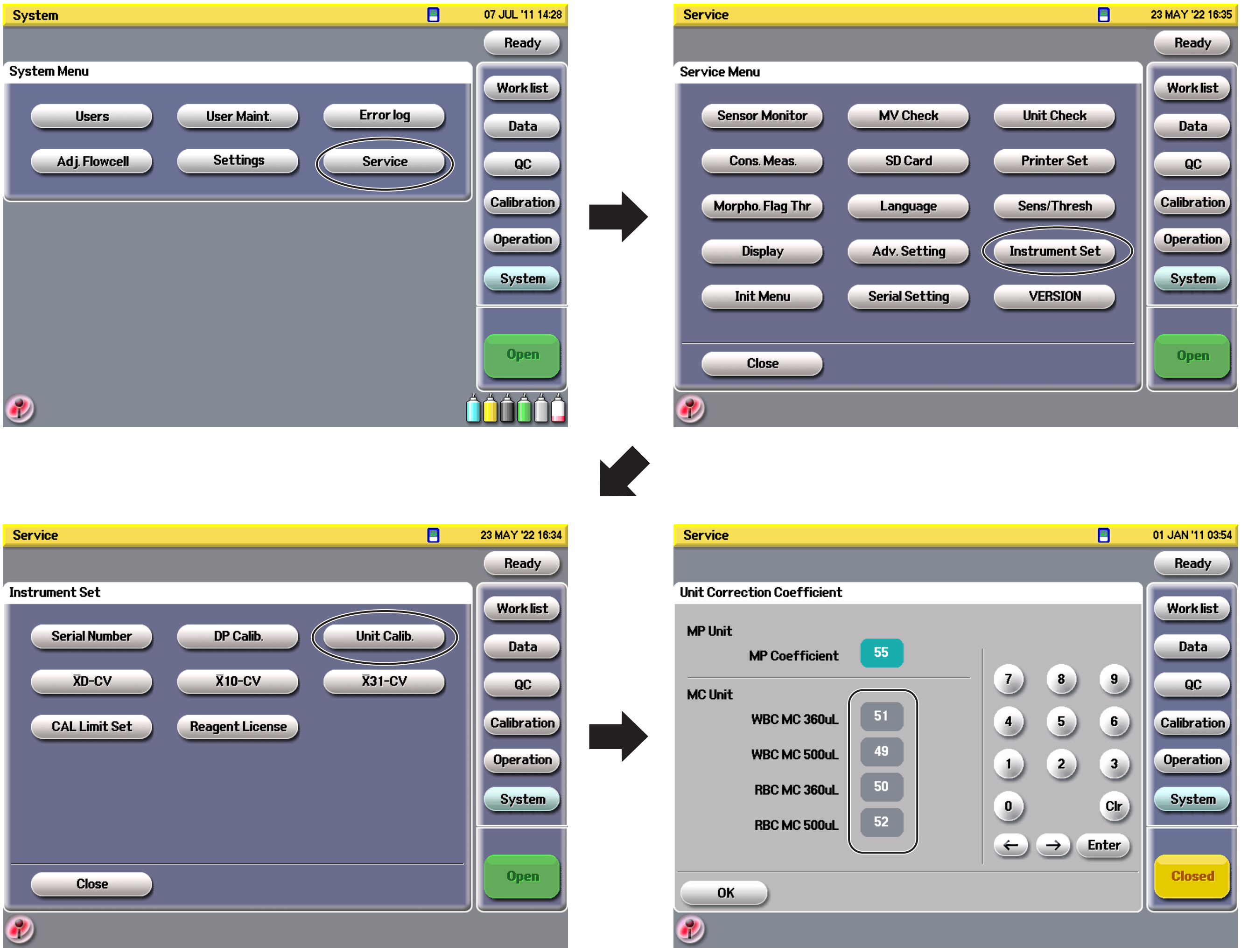
RBC manometer middle sensor
WBC manometer middle sensor
RBC manometer lower sensor
WBC manometer lower sensor



Setting the Correction Value of the Manometer

The manometer measures 360 µL and 500 µL sample correctly by setting the correction coefficient of XX% for the sample. The correction coefficient is set at the factory. Normally you only need to check but not change the coefficient.

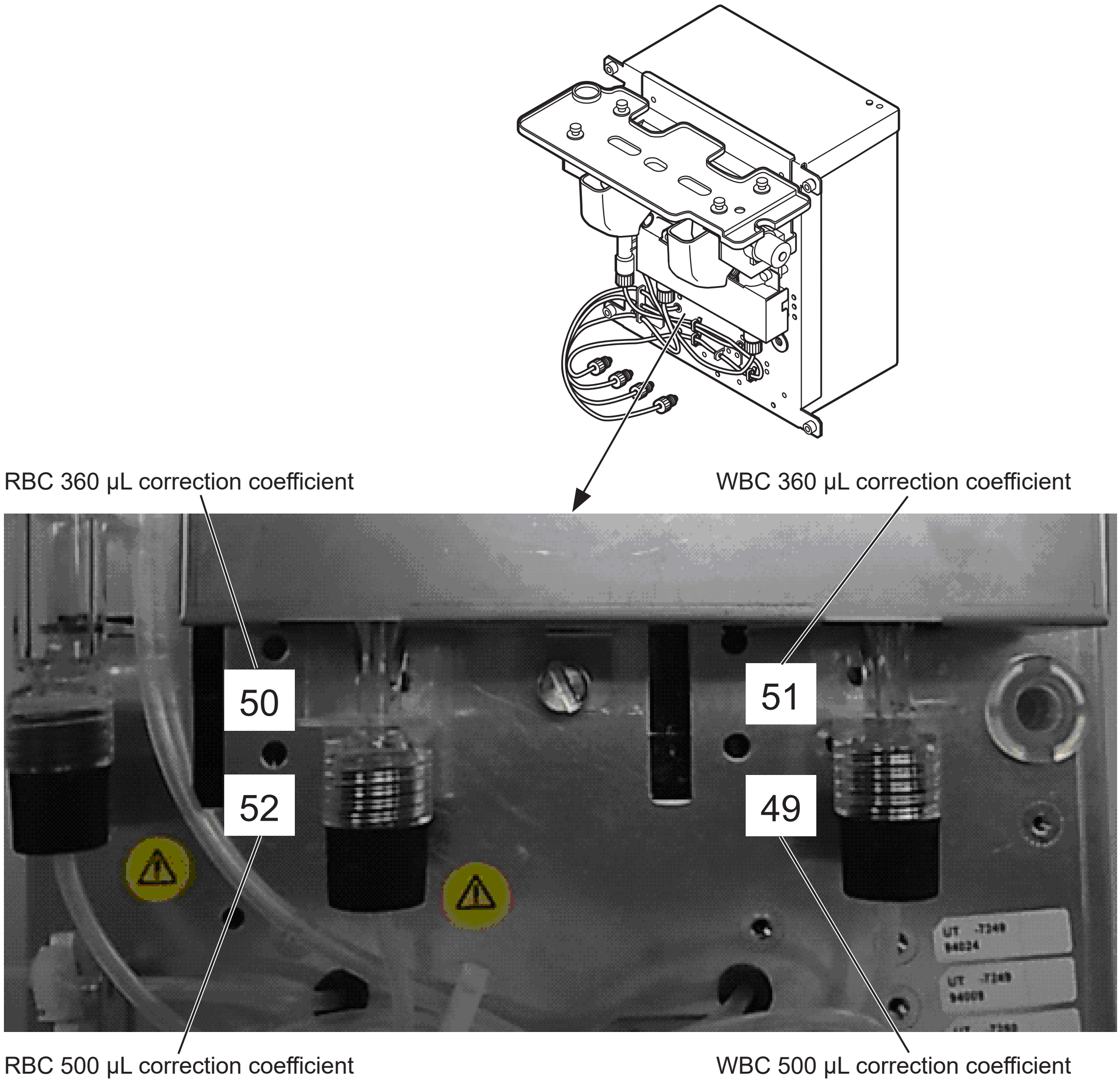
Open the Unit Correction Coefficient screen. Press the System key → Service key → Instrument Set key → Unit Calib. key.



Select the desired item to change. Enter the value with the numeric keypad and press the Enter key.

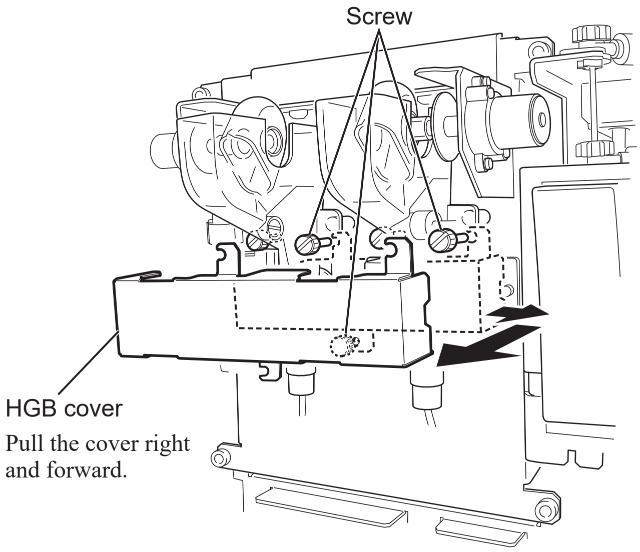
When the CBC measuring unit is replaced, the correction coefficient for the new unit is already set at the factory. So you do not need to set the coefficient.

When only the UT-7249-01 MEASURING BD is replaced, the correction coefficient for the new board is not set. Enter the coefficient on the board.

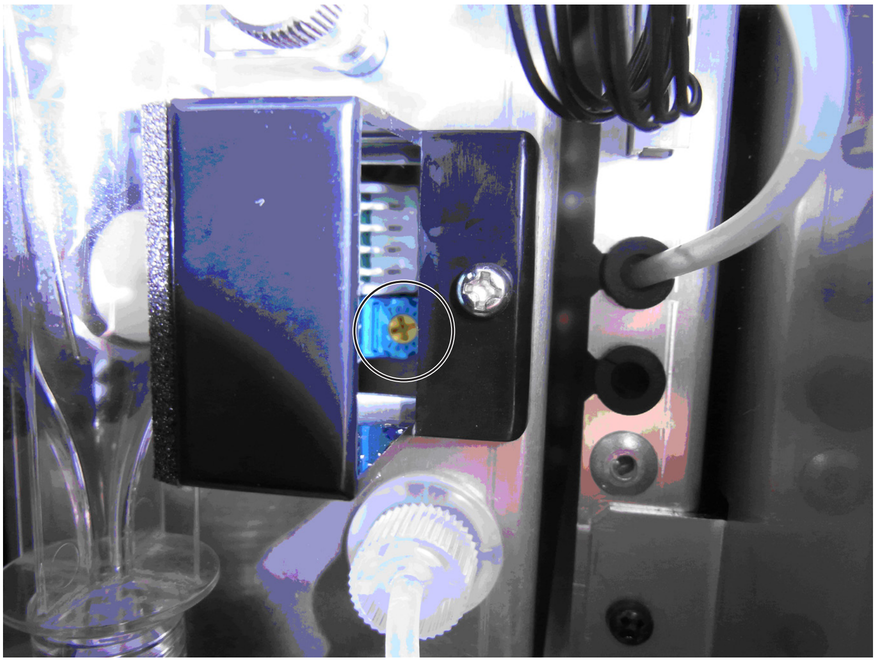


Adjusting the HGB Sensor Output Voltage

Loosen the screws that fix the HGB cover and remove the HGB cover.



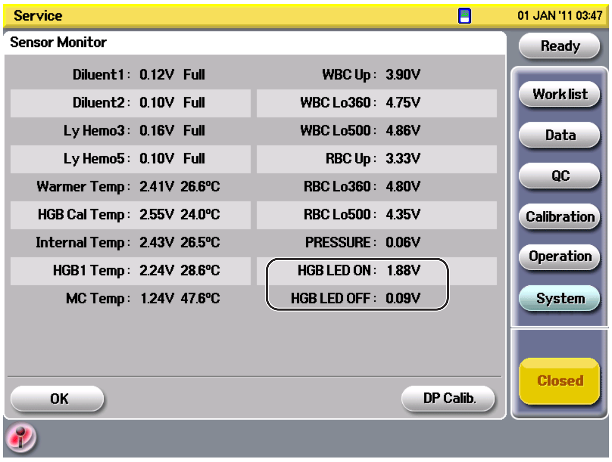
Adjust the HGB voltage by turning the volume checking the HGB LED ON and OFF voltage on the Sensor Monitor screen.



Normal value of the HGB voltage (with water in the measurement bath):

HEG LED ON: 3.0 ±0.5 V

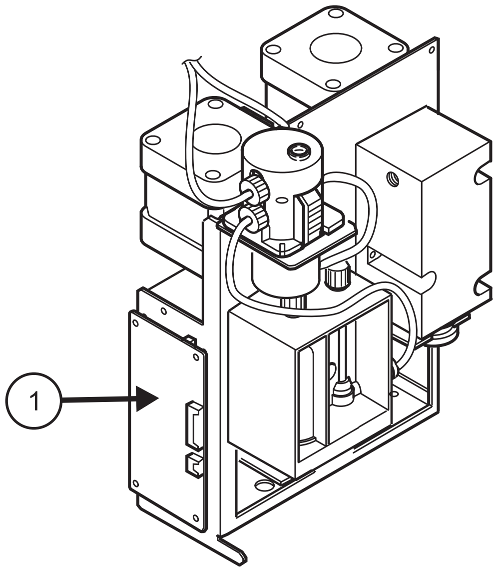
HGB LED OFF: 0.5 V or less



The HGB sensor cancels the effect of ambient light and reads the difference of HGB LED ON and OFF. Do not adjust the HGB LED OFF voltage. Only check it. If the voltage is out of range the circuit may be damaged.

Adjusting the MP-730V Mixed Pump Unit

Setting the Correction Coefficient of the Dilution Ratio

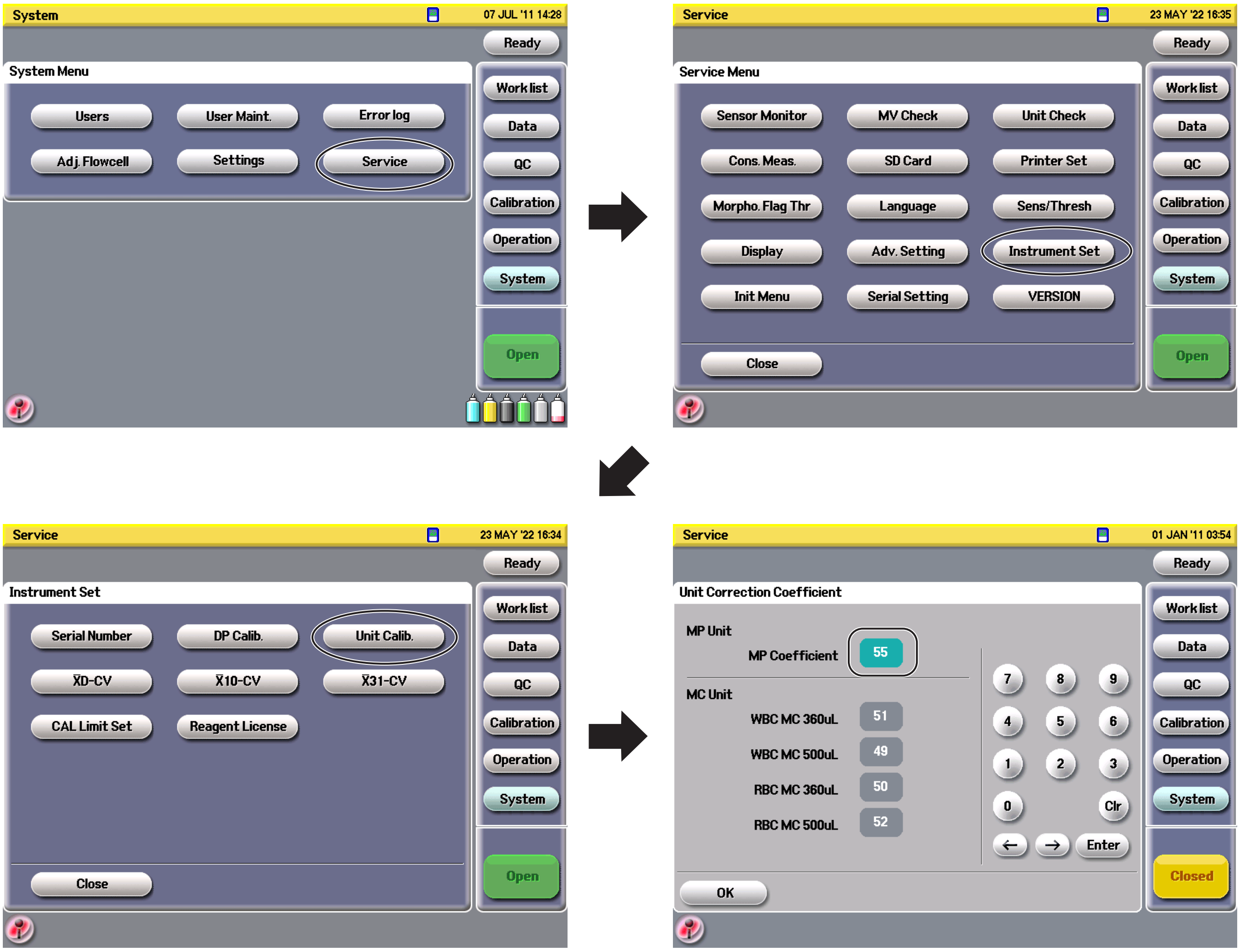


The diluter part creates the 200 times diluted blood sample by setting the correction coefficient of XX% for the sample. The correction coefficient is set at the factory. Normally you only need to check but not change the coefficient.

When the Mixed Pump unit is replaced, the dilution ratio correction coefficient for the new unit is already set at the factory. So you do not need to set the coefficient.

When only the UT-7200 MIXED PUMP BD is replaced, the correction coefficient for the new board is not set. Enter the coefficient on the board.

Open the Unit Correction Coefficient screen. Press the System key → Service key → Instrument Set key → Unit Calib. key.

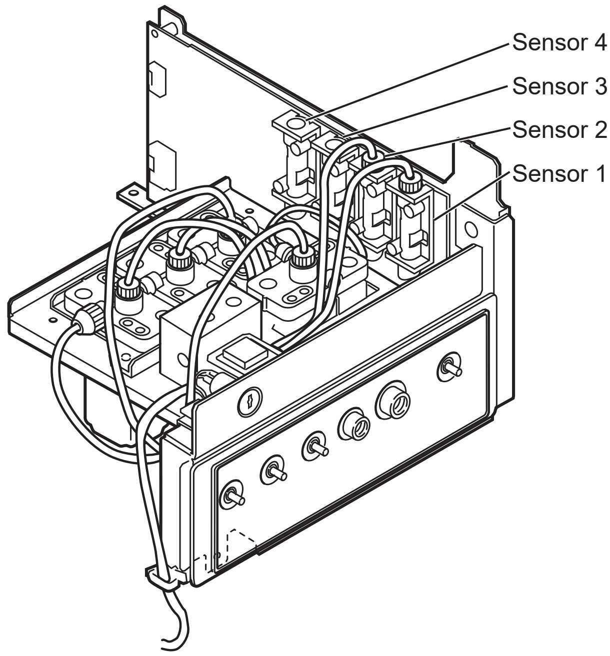


Select the MP Coefficient value, enter the value with the numeric keypad and press the Enter key.

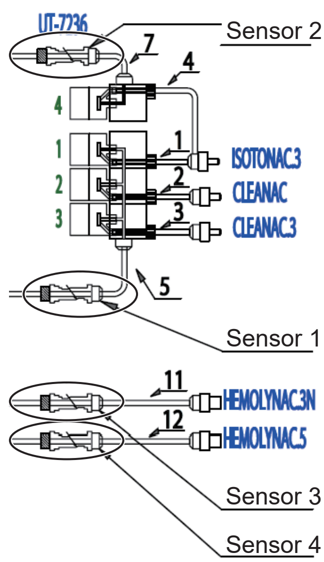
Adjusting the JQ-730V Inlet/outlet Unit

Adjusting the Liquid Sensor Voltage

Adjust the sensor voltage of the diluent, detergent and lysing reagent manometer on the Sensor Monitor window. The liquid sensor detects the fluid level using the refraction of light. When the liquid is in the manometer, the refractive index of the plastic and liquid is almost the same and the LED light goes straight and reaches to the light receiving element (PTr). When there is no liquid, the LED light refracts and does not reach the light receiving element (PTr) because the refractive index of the air and plastic is different.



The 5 reagents are connected to the inlet/outlet unit. The following 4 optical sensors are on the unit to judge the presence and absence of the reagents.



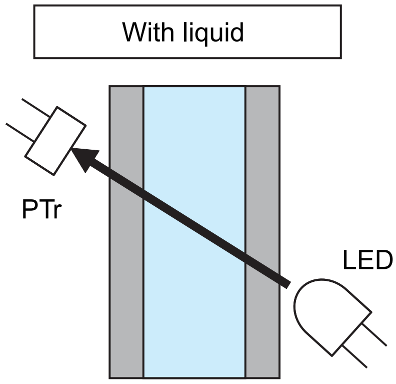
Sensor 2: for ISOTONAC•3 diluent

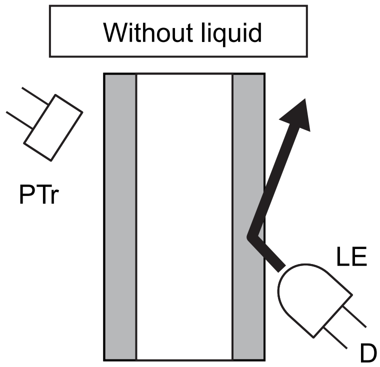
Sensor 1: for CLEANAC and CLEANAC•3 detergent and ISOTONAC•3 diluent

Sensor 3: for HEMOLYNAC•3N lysing reagent

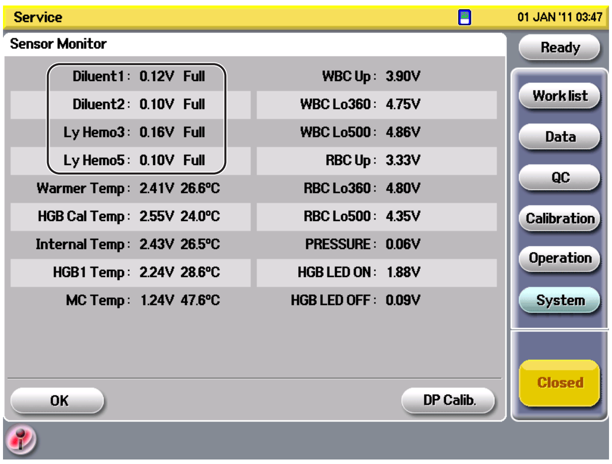
Sensor 4: for HEMOLYNAC•5 lysing reagent

When the sensor voltage is over 2.5 V, the sensor judges it is in air. When the sensor voltage is under 2.5 V, the sensor judges it is in liquid. To leave 1.0 V margin between the two states, the sensor voltage must be adjusted to be less than 1.5 V in liquid and more than 3.5 V in air.





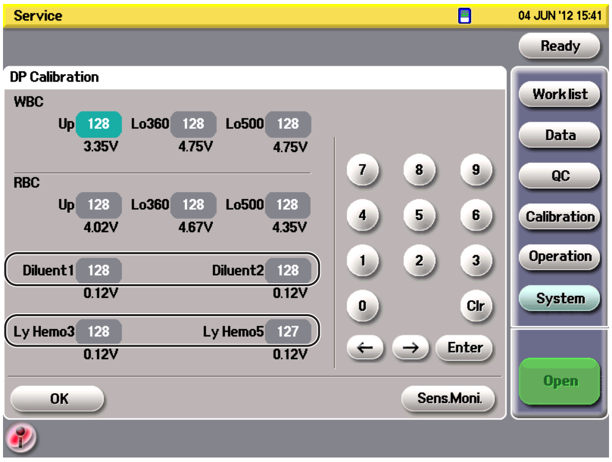
Press the System key → Service key → Sensor Monitor key.



Diluent1: common for detergent and diluent
Diluent2: diluent
Ly Hemo3: Hemolynac•3N
Ly Hemo5: Hemolynac•5

The range of the voltage is 1.5 V or less when there is liquid or 3.5 V or more when there is no liquid. If the voltage is out of the range, press the DP Calib. key and adjust the sensor voltage.

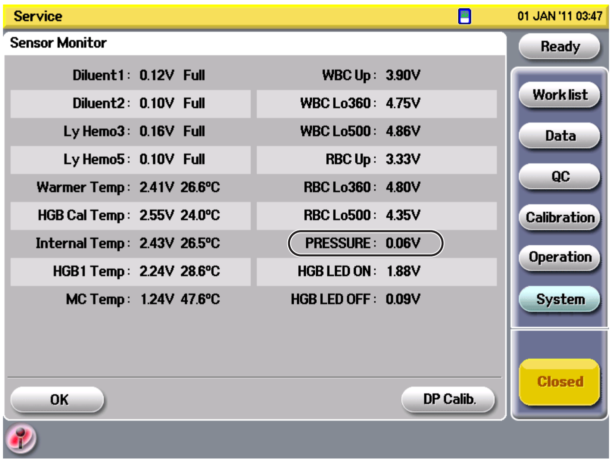
The DP Calibration screen is displayed as follows.



Change the setting value of the liquid sensor voltage. Press the desired item to change and enter the setting value with the numeric key pad. The setting range is 1 to 255 and the more value is entered, the more voltage is generated. After the setting, press the Sens. Moni. key to return to the Sensor Monitor screen and check that the voltage is stable.

Checking the Voltage of the Pressure Sensor

Normally the pressure is relieved and it is atmospheric pressure.



Under this condition, check that the pressure sensor is 0.0 V.

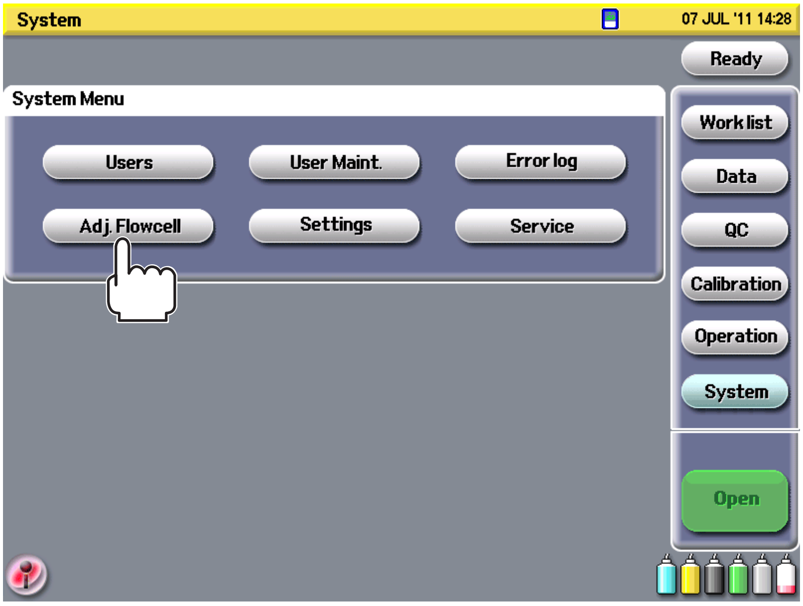
There is a VR to adjust the pressure sensor on the UT-7236 board but a dedicated tool is needed to apply correct pressure. So do not touch the VR.

Performing an Optical Adjustment

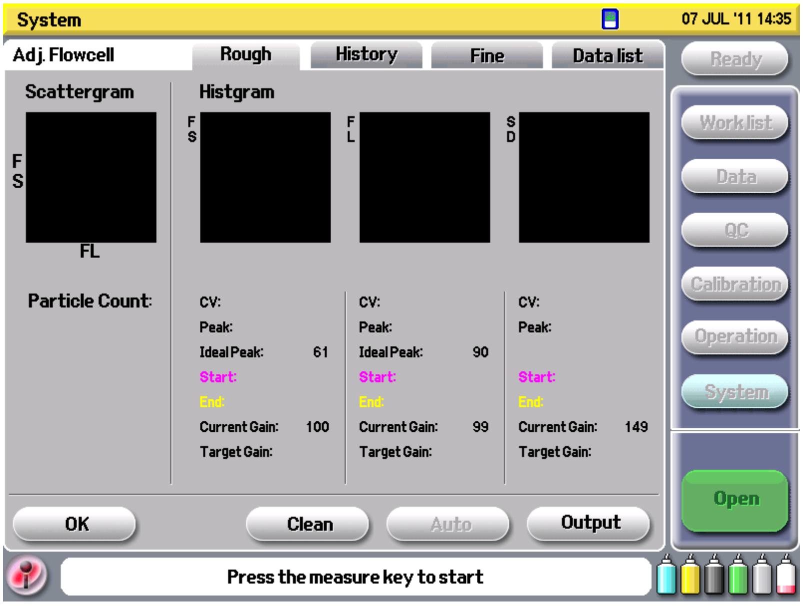
Measure the 7µm polymer microsphere suspensions and perform optical adjustment (rough and fine) on the Adjust flow cell window.

Displaying the Adj. Flowcell window.

1 Press the Adj. Flowcell key to display the Adj. Flowcell window.



2 Press the desired tab to adjust.



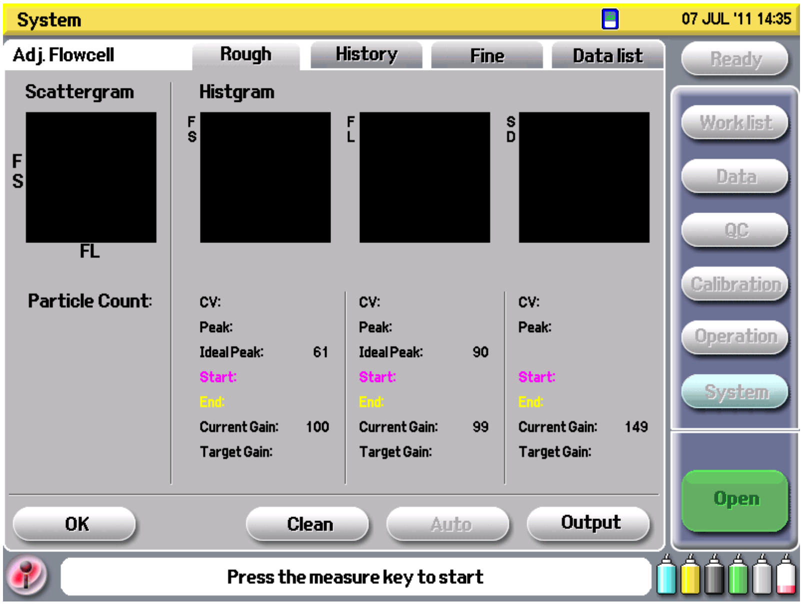
3 Press the OK key to return to the System screen.

Doing Optical Adjustment

Adjust the sensitivity and threshold for WBC 5 part measurement by flow cytometry method. The adjustment enables the analyzer to measure human blood correctly. After adjusting roughly with YZ-0194 7µm polymer microsphere suspensions, adjust finely with MEK-CAL measurement data. Do the adjustment when installing the analyzer or when each white blood cell distribution in the scattergram of normal human blood (stored at room temperature within eight hours after collection) is outside the area.

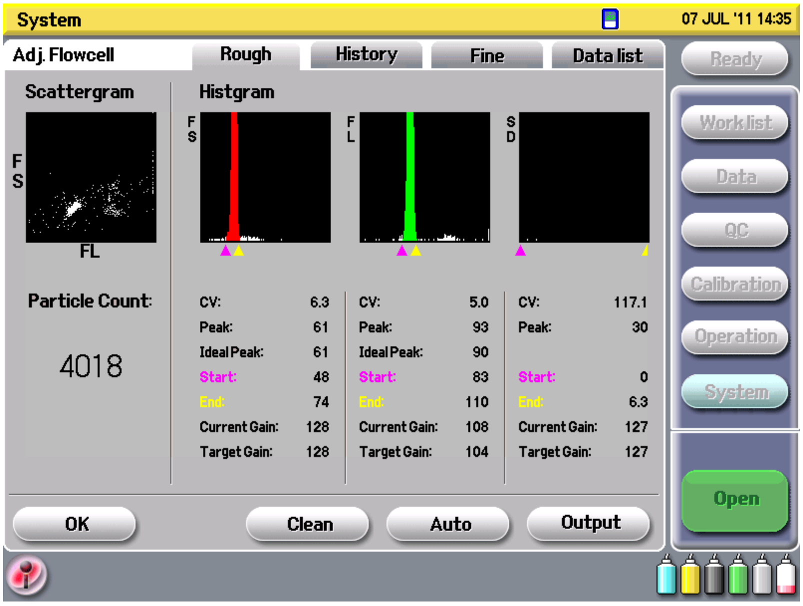
Doing Optical Adjustment Roughly

1. Press the Rough tab on the Adj. Flowcell window.
2. When the sampling mode is Closed, press the key and change the mode to Open.



3. Press the count switch to aspirate and count the YZ-0194 7µm polymer microsphere suspensions.

4 After measurement, the CV and peak of the FS and FL histogram are calculated and displayed. Check that the CV of FS and FL are 7.0 % or less.



5 If the CV is more than 7.0 %, press the Clean key to clean the flow cell. If the CV is still more than 7.0 % after cleaning, adjust the flow cell position.

If the CV of FS and FL is less than 7.0 %, press the Auto key.

6 When another window is displayed after adjustment, the analyzer automatically performs cleaning.

When doing more detailed setting, do the fine optical adjustment.

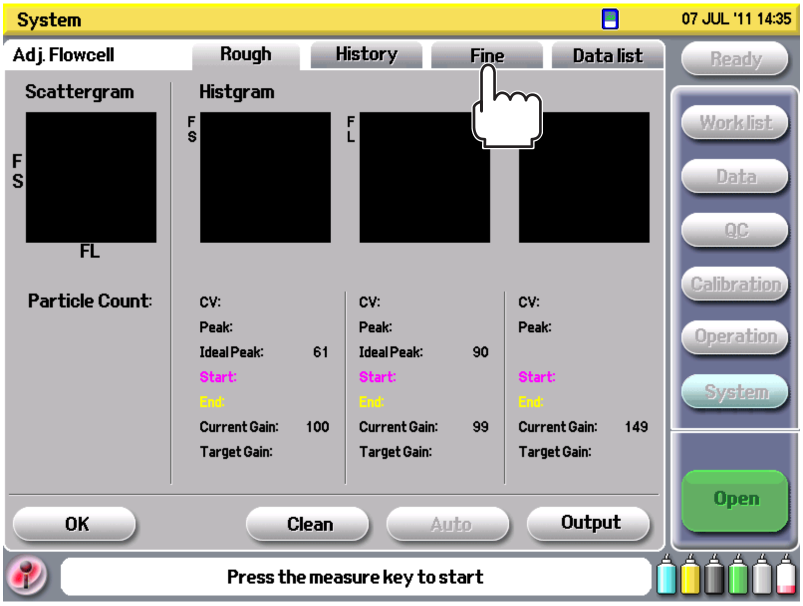
Doing Fine Optical Adjustment with MEK-CAL

Do fine optical adjustment using MEK-CAL measurement data to sort the WBC in 5 part correctly. Adjust the optical sensitivity using the center peak of the MEK-CAL scatter and move the scattergram distribution to the optimum place.

- Average Peak: Average peak of the two or more MEK-CAL centers
- Ideal Peak: Ideal peak of the optimum center peak
- Current Peak: Latest registered MEK-CAL center peak
- Gain: Gain for optical adjustment
- Target Gain: Optimum target gain
- Current Gain: Currently set gain
- Edit Gain: Gain for manual adjustment

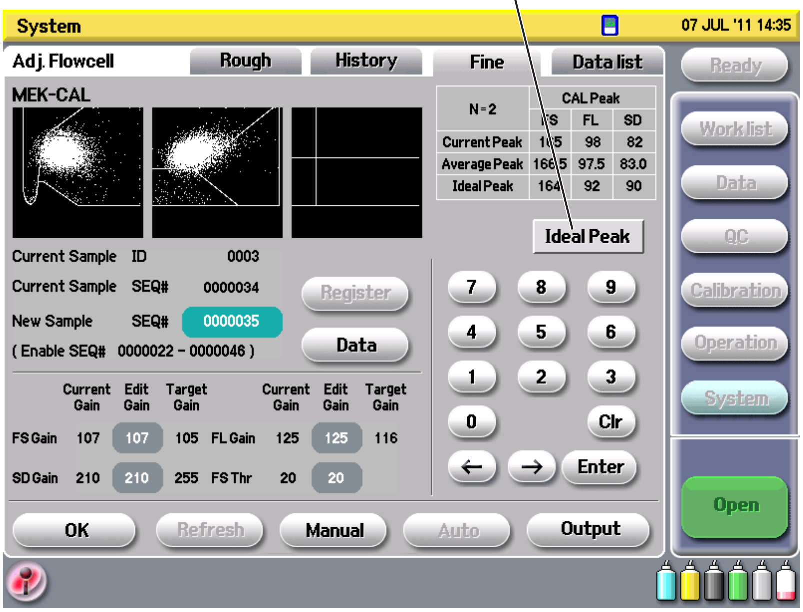
NOTE
- Before fine adjustment, do rough optical adjustment. Measure MEK-CAL 3 to 5 times.
- Use MEK-CAL for fine optical adjustment. You cannot adjust it correctly with human blood.
- Use MEK-CAL before the expiration date and follow the storage condition.

1 Press the Fine tab on the Adj. Flowcell window.



2 Press the Ideal Peak key to display the MEK-CAL Ideal Peak window.

Switches between the window to register data for fine optical adjustment and the window to enter MEK-CAL optical center assay value.



3 Enter the FS, FL and SD ideal peak and FS threshold. Enter the ideal peak on the assay sheet of the MEK-CAL.

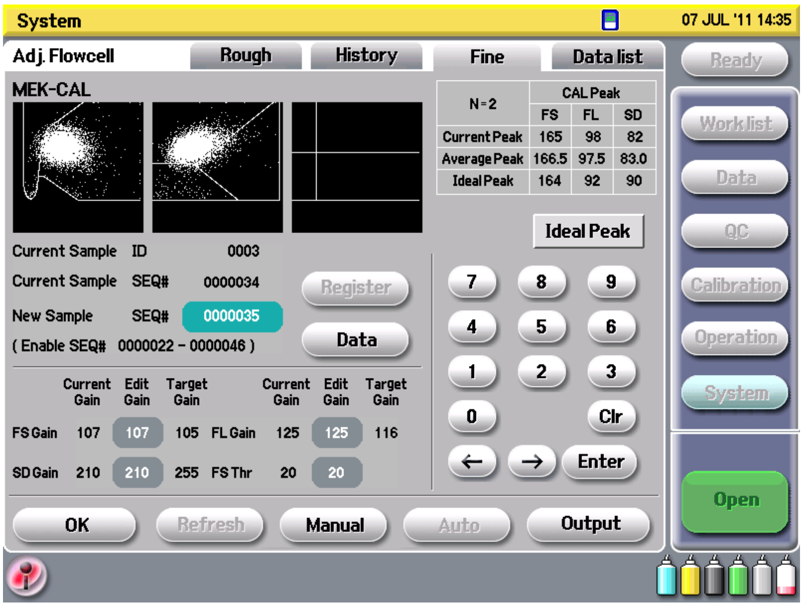
1) Touch the desired item.

2) Enter the number with the numeric key pad and press the Enter key.

4 Press the Ideal Peak key to return to the Fine window.

5 Enter the SEQ# of MEK-CAL measurement data to use sensitivity adjustment.

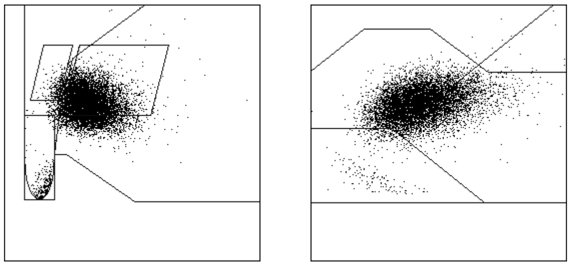
6 Press the Data key to load the measurement data of the New Sample SEQ#. The scattergram is displayed.



7 Check that the displayed scattergram is optimum for optical adjustment.

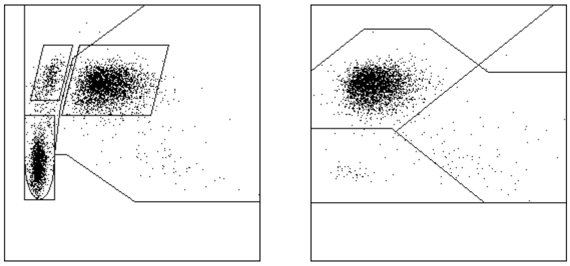
Scattergrams which can be used for optical adjustment

- Scattergrams are distributed in a circle.
- Distribution concentrates in a single center.

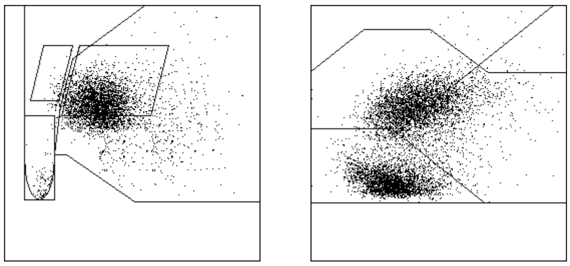


Scattergrams which cannot be used for optical adjustment

- When measuring human blood



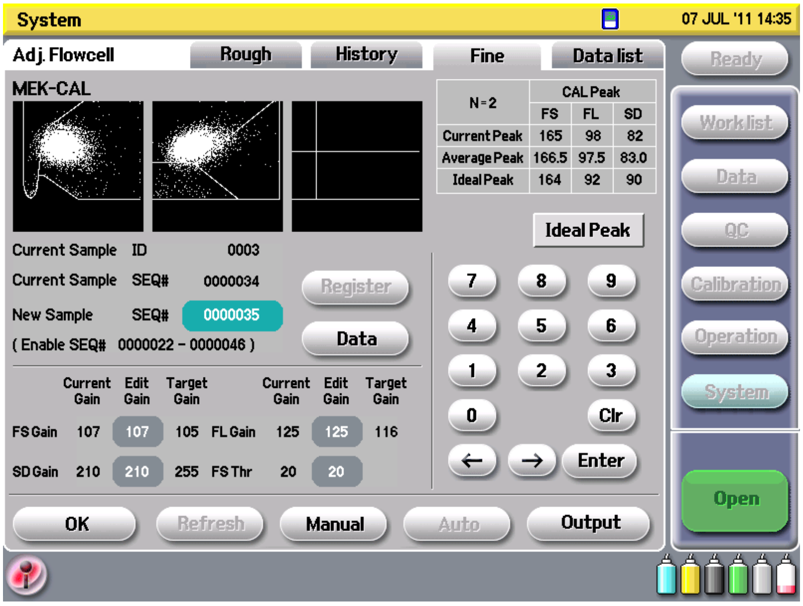
- When measuring expired MEK-CAL



- There are ghosts on the lower part.
- There are two or more distributions.

8 When the sample is optimum, press the Register key to register the measurement data to the data list. Check that the Average Peak is within ±2 of the assay value.

9 If the Average Peak is not within ±2 of the assay value, adjust the gain.



- Auto adjustment

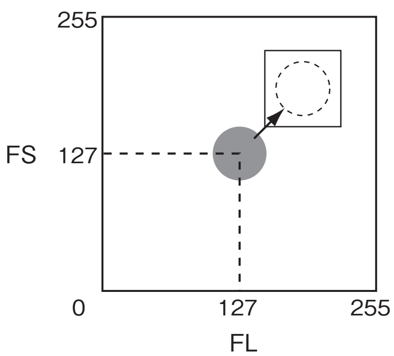
  Press the Auto key. The Target Gain is automatically adjusted and set to Current Gain.

- Manual adjustment

  Enter the value for Edit Gain. Use the arrow keys to move the cursor. Press the Manual key to set the value entered in Edit Gain to the Current Gain.

When adjusting the vertical axis of the scattergram, adjust the FS Gain. When adjusting the horizontal axis, adjust the FL Gain and SD Gain.

<Example: FS-FL scattergram>



To adjust the distribution to the square area, increase the FS and FL Gain.

10 Press the Refresh key and check the settings. The scattergrams are displayed again using the ratio of Edit Gain and Current Gain.

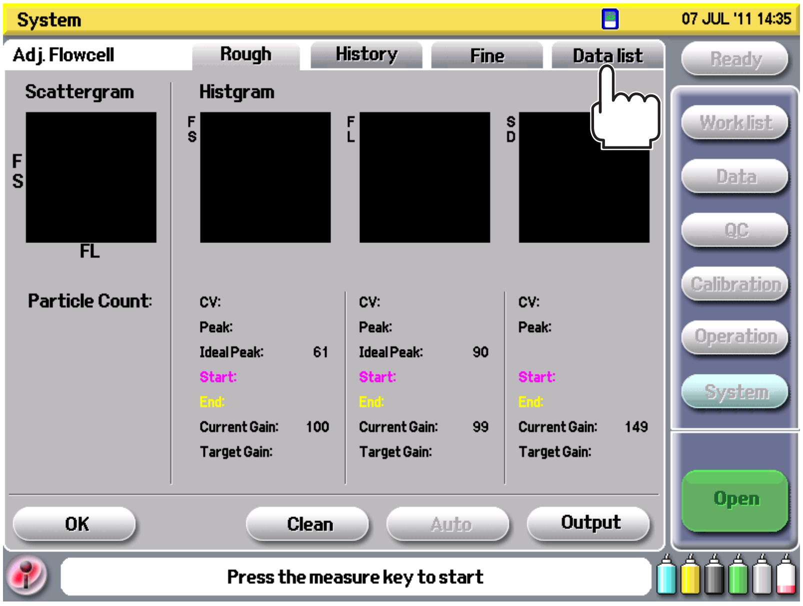
11 Press the Yes key to return to the Ready screen.

> **Calculating Target Gain**
>
> In the Fine tab of the Adj. Flowcell window, the center of the MEK-CAL is calculated from the scattergram of the data which is registered to the data list. The Target Gain is calculated from this Average Peak, Ideal Peak and Current Gain. When the Auto key is pressed, the current gain is changed to the value of Target Gain and saved.
> If the Target Gain is out of the 0 to 255 range or the center of the MEK-CAL is not calculated, an “Out of range” message is displayed, Target Gain is not displayed and the Auto key is not available. In this case, do rough adjust flow cell again.

Checking the Value of the Data List

When the data that can be used for optical adjustment is registered, check that there is no difference larger than ±2 between Average Peak and Ideal Peak on the Data List window.

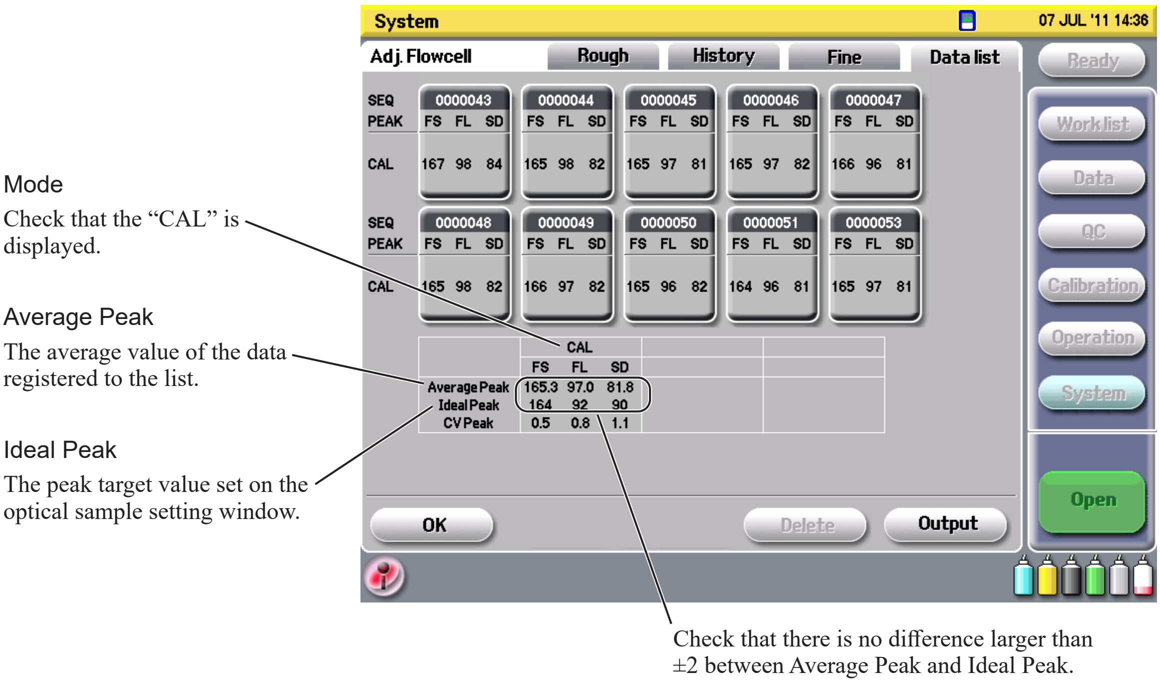
1 Press the Data List tab on the Adj. Flowcell window.



2 Check that "CAL" is displayed on Mode.

3 Check that there is no difference larger than ±2 between Average Peak and Ideal Peak.

If there is a difference larger than ±2, delete bad data from the list or adjust the gain.

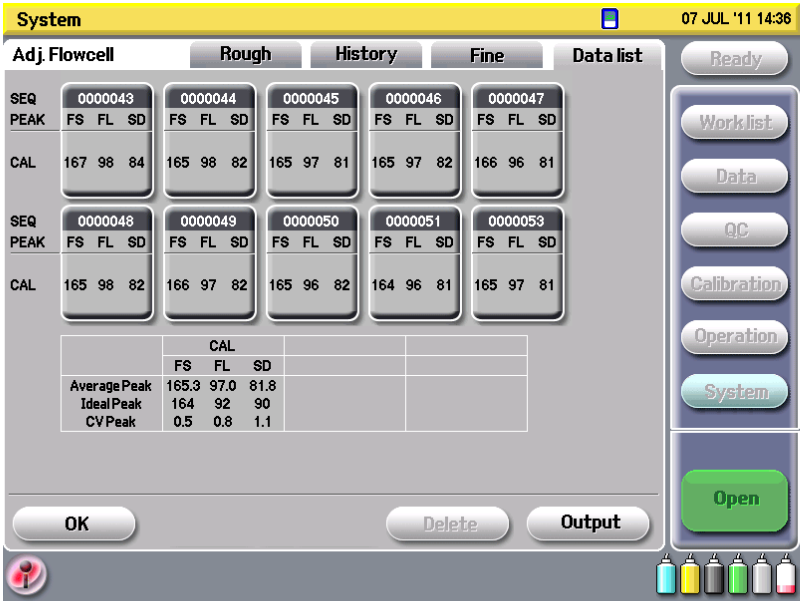


Checking the Center of the MEK-CAL

Check that there is no difference larger than ±2 between the Average Peak and Ideal Peak on the Fine window or Data list window.

Displaying the Data List Window

Press the Data list tab on the Adj. Flowcell screen to display Data list window. The registered data is displayed in list.



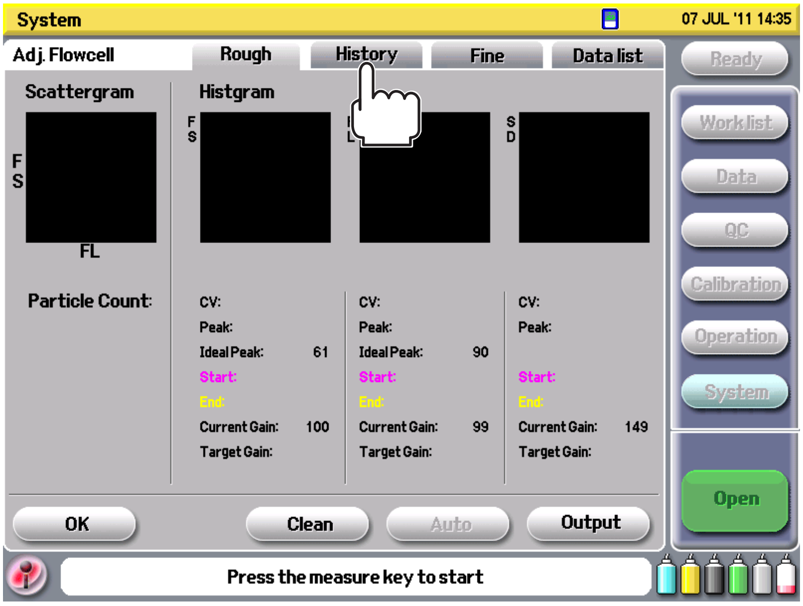
Deleting Data

- To delete one data, select the desired data to delete and press the Delete key.
- To delete all data, press the Delete key without selecting data. When a confirmation message appears, press the Yes key to delete all data.

Displaying the Optical Adjustment History

When doing optical adjustment and changing the gain, the SEQ#, Date, Operator and values of the latest data are saved as history. Up to 13 histories can be saved.

Press the History tab to display the History window.



Deleting Optical Adjustment History

NOTE: When the operator is set to User, history cannot be deleted.

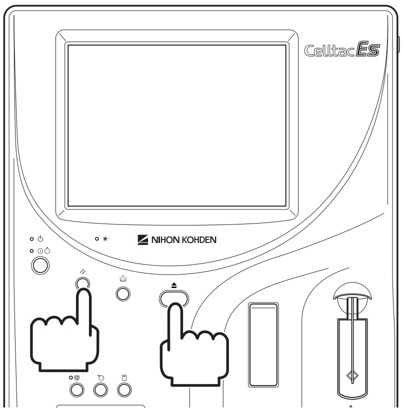
1 Press the Delete key on the History window of the Adj. Flowcell screen. A confirmation message appears.

2 Press the Yes key to delete all data.

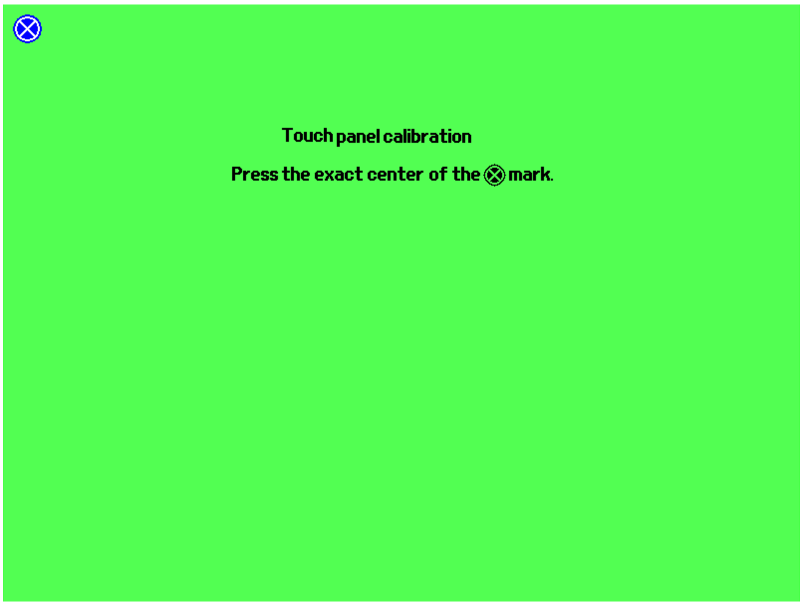
Press the No key to cancel.

Calibrating the Touch Screen

Calibrate the touch screen when the pressed position and operating position do not match.



1 Hold down the [⁄⁄ Reset] key until the emergency stop message disappears. Then press the [⏏ Eject] key while holding down the [⁄⁄ Reset] key. The Touch panel calibration screen appears.



2 Follow the instructions on the screen to calibrate the screen.

NOTE: Do not use a sharp object to press the mark. Use your finger.

After calibration is completed, the screen returns to the Ready screen.

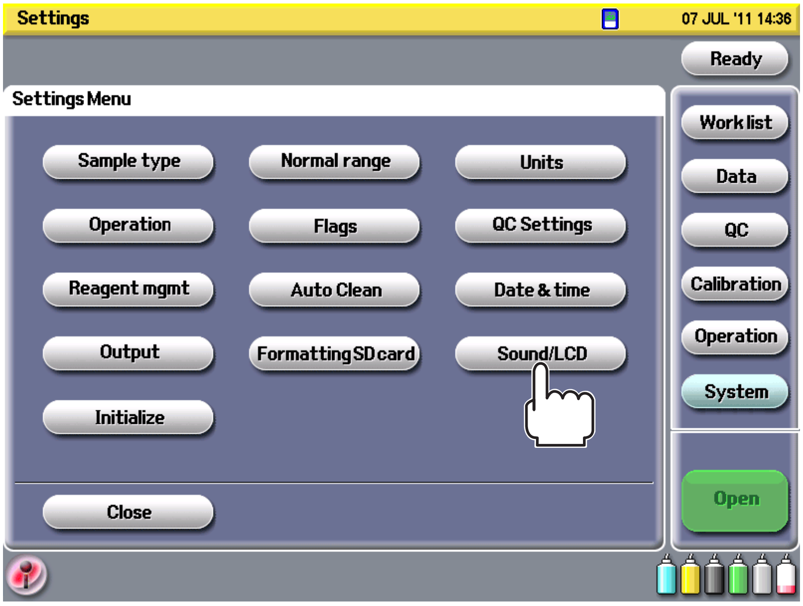
Changing Sound and LCD Settings

Setting Items

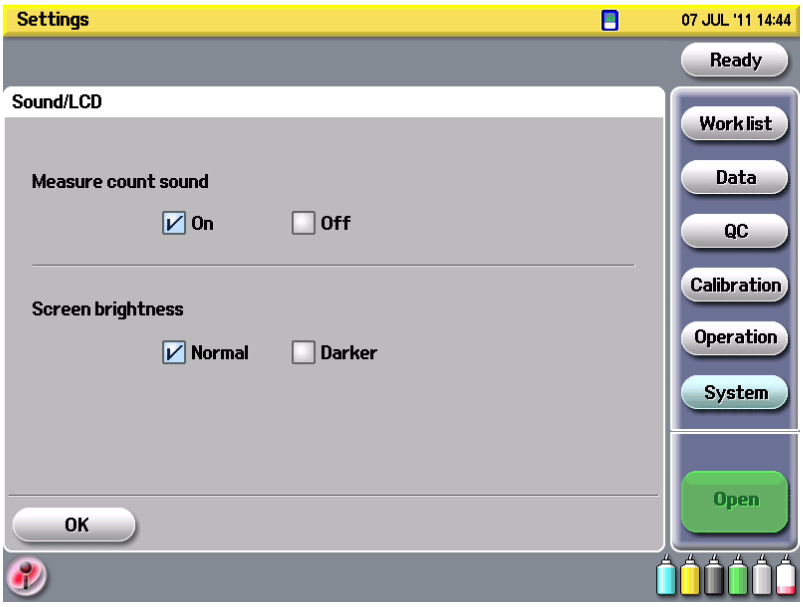
Item	Description		Default
Measure count sound	Select whether or not to create a sound during measurement.	On, Off	On
Screen brightness	Select the screen brightness.	Normal, Darker	Normal

Changing Sound and LCD Settings

1. Press the Sound/LCD key on the Settings screen to display the Sound/LCD window.



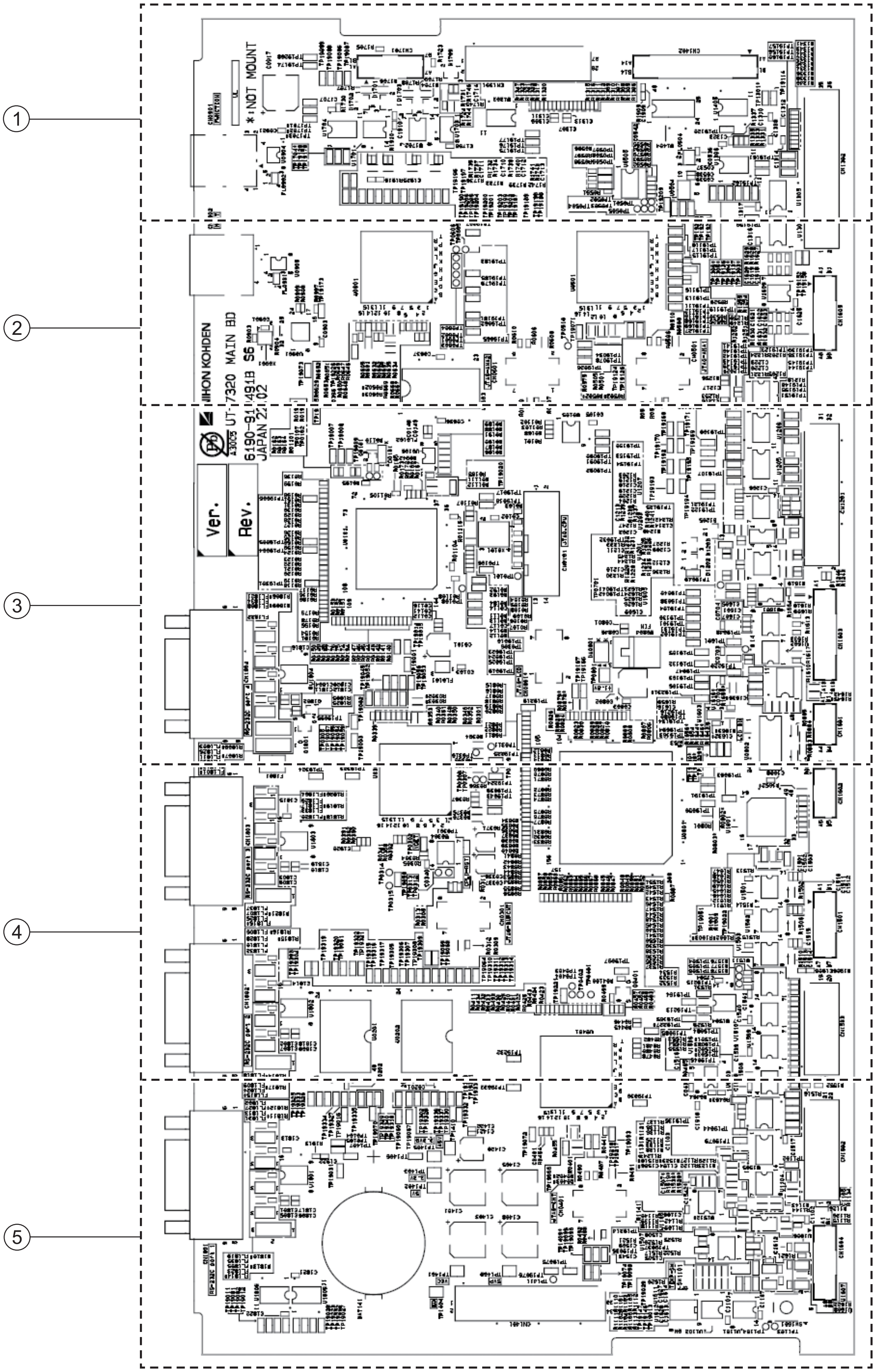
2. Change the settings by pressing the check box.



3. Press the OK key to return to the Settings screen.

Board Inside Description

UT-7320 MAIN BD (Rev. AJ or Later)



Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0101	CPU input reset signal	ED	At reset: Low	Analyzer does not operate correctly.	3
TP0102	Test pad 1 for CPU debugging	ED	—	—	3
TP0104	I2C communication for RTC (clock signal)	ED	Normal times: High When receiving data: Clock	Clock data is incorrect.	5
TP0105	I2C communication for RTC (data)	ED	Normal times: High When receiving data: serial data	Clock data is incorrect.	5
TP0106	NMI	ED	At reset: Low	Analyzer does not operate correctly.	3
TP0107	Test pad 2 for CPU debugging	ED	—	—	3
TP0108	Not used	ED	—	—	3
TP0301	Vcc (primary power source) voltage detection	ED	3.21 to 3.46 V	Analyzer cannot start.	4
TP0302	3.3 V (secondary power source) voltage detection	ED	3.21 to 3.46 V	Analyzer cannot start.	4
TP0305	System SRAM chip select	ED	High at address 0x03200000 to 0x0321FFFF	Analyzer does not operate correctly (cannot set the settings etc.).	3
TP0306	CPU input reset signal	ED	About 100 ms after detecting 3.3 V power source: cancel reset	Analyzer cannot start.	3
TP0307	Test pad 1 for BUFCNT debugging	ED	—	—	3
TP0308	Test pad 2 for BUFCNT debugging.	ED	—	—	3
TP0309	Test pad 3 for BUFCNT debugging	ED	—	—	3
TP0310	Test pad 4 for BUFCNT debugging	ED	—	—	3
TP0311	Test pad 5 for BUFCNT debugging	ED	—	—	3
TP0312	Unused test pad	ED	—	—	4
TP0313	Unused test pad	ED	—	—	4
TP0314	Unused test pad	ED	—	—	4
TP0315	Unused test pad	ED	—	—	4
TP0401	Test pad 1 for CNT debugging	ED	—	—	4
TP0402	Test pad 2 for CNT debugging	ED	—	—	4
TP0403	Test pad 3 for CNT debugging	ED	—	—	4
TP0404	Test pad 4 for CNT debugging	ED	—	—	4
TP0501	Test pad 1 for ANA1 debugging	ED	—	—	1
TP0502	Test pad 2 for ANA1 debugging	ED	—	—	1
TP0503	Test pad 3 for ANA1 debugging	ED	—	—	1
TP0504	Test pad 4 for ANA1 debugging	ED	—	—	1
TP0505	Test pad 5 for ANA1 debugging	ED	—	—	1
TP0507	DA converter Chip select	ED	Normal times: High When selecting: Low	RBC and WBC thresholds cannot be set. The brightness of the LCD display cannot be adjusted.	1

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0508	DA Converter Data signal	ED	Normal times: High When receiving data: serial data	RBC and WBC thresholds cannot be set. The screen brightness cannot be adjusted.	1
TP0509	DA Converter Clock signal	ED	Normal times: Low At clock output: about 1 MHz	RBC and WBC thresholds cannot be set. The screen brightness cannot be adjusted.	1
TP0510	Unused test pad	ED	—	—	1
TP0601	Test pad 1 for ANA2 debugging	ED	—	—	2
TP0602	Test pad 2 for ANA2 debugging	ED	—	—	2
TP0603	Test pad 3 for ANA2 debugging	ED	—	—	2
TP0604	Test pad 4 for ANA2 debugging	ED	—	—	2
TP0605	Test pad 5 for ANA2 debugging	ED	—	—	2
TP0606	Test pad 6 for ANA2 debugging	ED	—	—	2
TP0701	Unused test pad	ED	—	—	3
TP0801	LCD controller core power (1.8 V)	ED	1.764 to 1.836V	LCD does not display correctly.	3
TP1102	Heater control	EA_RX	Above about 40°C: Low	Cannot control the heater.	5
TP1103	Unused test pad	ED	—	—	5
TP1104	Unused test pad	ED	—	—	5
TP1202	Not implemented	ED	—	—	—
TP1301	Not implemented	ED	—	—	—
TP1303	Not implemented	ED	—	—	—
TP1304	Not implemented	ED	—	—	—
TP1305	Not implemented	ED	—	—	—
TP1306	Not implemented	ED	—	—	—
TP1401	Vcc voltage	ED	3.21 to 3.46 V	Analyzer does not start.	5
TP1402	5 V voltage	ED	4.93 to 5.30 V	Analyzer does not start.	5
TP1403	3.3 V voltage	ED	3.21 to 3.46 V	Analyzer does not start.	5
TP1404	ED	ED	—	—	5
TP1405	Backup system voltage (3.3 VB)	ED	When the power is on: 2.75 to 3.46 V When the power is off: 2.75 to 3.2 V	Cannot operate correctly. Setting data and clock are incorrect.	5
TP1406	Backup system voltage 1 (to check the current)	ED	When the power is on: 2.75 to 3.46 V When the power is off: 2.75 to 3.2 V	Cannot operate correctly. Setting data and clock are incorrect.	5
TP1407	Backup system voltage 2 (to check the current)	ED	When the power is on: 2.75 to 3.46 V When the power is off: 2.75 to 3.2 V	Cannot operate correctly. Setting data and clock are incorrect.	5
TP1408	Power voltage for the internal printer	EDP	4.84 to 5.30 V	Internal printer cannot operate correctly	5
TP1409	Not implemented	ED	—	—	—
TP1410	A 5 V voltage	EA_RX	4.93 to 5.30 V	Analyzer does not start.	5

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP1411	Unused test pad	ED	—	—	5
TP1501	Not implemented	ED	—	—	—
TP1502	Not implemented	ED	—	—	—
TP1503	Not implemented	ED	—	—	—
TP1504	Unused test pad	ED	—	—	4
TP1505	Unused test pad	ED	—	—	4
TP1506	Unused test pad	ED	—	—	4
TP1601	Unused test pad	ED	—	—	3
TP1701	Not implemented	ED	—	—	—
TP1702	Not implemented	ED	—	—	—
TP1703	Not implemented	ED	—	—	—
TP1704	Not implemented	ED	—	—	—
TP19001	Read signal (CPU output)	ED	At read access: Low	Analyzer does not operate correctly.	3
TP19002	Write signal (high byte) (CPU output)	ED	At write access: Low	Analyzer does not operate correctly.	3
TP19003	Write signal (low byte) (CPU output)	ED	At write access: Low	Analyzer does not operate correctly.	3
TP19004	Chip select (area 1) (CPU output)	ED	When address 0x07000000 to 0x07FFFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19005	Chip select (area 2) (CPU output)	ED	When address 0x06000000 to 0x06FFFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19006	Chip select (area 3) (CPU output), not used	ED	When address 0x05000000 to 0x05FFFFFF is selected: Low	—	3
TP19007	Chip select (area 4) (CPU output), not used	ED	When address 0x04000000 to 0x04FFFFFF is selected: Low	—	3
TP19008	Chip select (area 5) (CPU output)	ED	When address 0x03000000 to 0x03FFFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19009	Chip select (area 6) (CPU output)	ED	When address 0x02000000 to 0x02FFFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19010	Watchdog timer overflow (CPU output)	ED	At watchdog timer overflow: Low	When CPU runaway occurs, the system is not reset	3
TP19011	RS232C1 (for CRP) serial send signal	ED	Normal times: High When receiving data: serial data	Instrument that is connected to the external 232C connector (for serial port connector 1) does not operate correctly.	5
TP19012	RS232C4 (for barcode reader) serial send signal	ED	Normal times: High When sending data: serial data	The instrument that is connected to the external 232C connector (for barcode reader) cannot operate correctly.	5
TP19013	Internal printer serial send signal	ED	Normal times: High When sending data: serial data	Internal printer cannot operate correctly.	5
TP19014	Power off request signal from CPU	ED	Normal times: Low When requesting off: High	Cannot power off correctly.	3
TP19015	CPU output reset signal (CPU output)	ED	At BOOT start: Low At system start: High	Analyzer does not start.	3
TP19016	RTC clock	ED	32.768 kHz	Analyzer does not start.	5
TP19017	RBC, PLT data receive control interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot measure the RBC and PLT data correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19018	WBC (CBC), 5 DIFF data receive control interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot measure the WBC (CBC) and 5 DIFF data correctly.	3
TP19019	Manometer sensor, each position sensor, SW, DRIVER BD communication interrupt	ED	Normal times: High When an interrupt occurs: Low	Analyzer does not operate correctly.	3
TP19020	USB controller, USB current limit flag interrupt	ED	Normal times: High When an interrupt occurs: Low	The USB socket (host) cannot be used.	3
TP19022	SD card controller interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot use the SD card IF.	4
TP19023	RS232C2 (for PRINTER) interrupt	ED	Normal times: High When an interrupt occurs: Low	Instrument that is connected to the external 232C connector (for serial port connector 1) does not operate correctly.	3
TP19024	RS232C3 (for PC) interrupt	ED	Normal times: High When an interrupt occurs: Low	Instrument that is connected to the external 232C connector (for serial port connector 2) does not operate correctly.	3
TP19025	Touch panel controller, RTC, LCD controller interrupt	ED	Normal times: High When an interrupt occurs: Low	LCD does not display correctly. Touch panel is disabled. Clock data is incorrect.	3
TP19026	DA converter communication interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot communicate correctly with the DA converter.	2
TP19027	RS232C1 (for CRP) serial receive signal	ED	Normal times: High When sending data: serial data	The instrument that is connected to the external 232C connector (for OPTION conneector) cannot operate correctly.	5
TP19028	RS232C4 (for barcode reader) serial receive signal	ED	Normal times: High When sending data: serial data	The instrument that is connected to the external 232C connector (for barcode reader) cannot operate correctly.	5
TP19029	Internal printer serial receive signal	ED	Normal times: High When sending data: serial data	Internal printer cannot operate correctly.	5
TP19030	Power OFF request signal	ED	Normal times: Low When requesting off: High	Cannot power off correctly.	5
TP19031	RTC communication interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot communicate with RTC correctly.	5
TP19032	ROM for FPGA → CPLD serial data	ED	Normal times: High When receiving data: serial data	Cannot download the FPGA data correctly.	3
TP19033	Configuration completion signal 1 (MAIN BD circuit control FPGA)	ED	Normal times: Low At config completion: High	Analyzer does not start.	5

5

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19034	Configuration completion signal 2 (CBC system control FPGA)	ED	Normal times: Low At config completion: High	Analyzer does not start.	2
TP19035	Configuration completion signal 3 (5 DIFF system control FPGA)	ED	Normal times: Low At config completion: High	Analyzer does not start.	2
TP19036	Configuration completion signal 4 (DRIVER BD control FPGA 1)	ED	Normal times: Low At config completion: High	Analyzer does not start.	5
TP19037	Configuration completion signal 5 (DRIVER BD control FPGA 2)	ED	Normal times: Low At config completion: High	Analyzer does not start.	5
TP19038	Chip select 1 for ROM for FPGA data storage download (MAIN BD circuit control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	3
TP19039	Chip select 2 for ROM for FPGA data storage download (CBC system control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	4
TP19040	Chip select 3 for ROM for FPGA data storage download (5 DIFF system control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	3
TP19041	Chip select 4 for ROM for FPGA data storage download (DRIVER BD control FPGA 1)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	3
TP19042	Chip select 5 for ROM for FPGA data storage download (DRIVER BD control FPGA 2)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	3
TP19043	Configuration enable signal (FPGA in MAIN BD)	ED	Normal times: High At config enable: Low	Analyzer does not start.	4
TP19044	Configuration enable signal (FPGA in DRIVER BD)	ED	Normal times: High At config enable: Low	Analyzer does not start.	5
TP19045	SRAM chip select for scatter decompression	ED	When address 0X03000000 to 0x0307FFFF is selected: Low	Cannot display scatter correctly	3
TP19046	Configuration start signal (DRIVER BD control FPGA)	ED	At config. start: High	Analyzer does not start correctly.	5
TP19047	ROM download serial data for CPLD → FPGA	ED	Normal times: High When receiving data: serial data	Cannot download the FPGA data correctly.	3
TP19048	ROM clock for CPLD → FPGA	ED	When accessing the ROM for FPGA: 3 MHz	Cannot download the FPGA data correctly.	3
TP19049	Switch configuration or download of FPGA data	ED	Config: Low Download: High	Analyzer does not operate correctly. Cannot download the FPGA data correctly.	3
TP19050	LCD controller memory bank change	ED	When LCD controller internal register is selected: Low When VRAM is selected: High	LCD does not display correctly.	4
TP19051	Chip select for SD card controller	ED	When address 0x02400000 to 0x027FFFFF is selected: Low	Cannot use SD card IF.	4
TP19052	Chip select for DRIVER BD (FPGA)	ED	When address 0x06200000 to 0x062FFFFF is selected: Low	Actuator does not operate correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19053	Chip select for 5 DIFF control FPGA (ANA2)	ED	When address 0x06400000 to 0x064FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19054	Chip select for CBC system control FPGA (ANA1)	ED	When address 0x06300000 to 0x063FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19055	Chip select for MAIN BD circuit control FPGA (CNT)	ED	When address 0x06100000 to 0x061FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19056	Chip select for LCD controller	ED	When address 0x02000000 to 0x023FFFFF is selected: Low	LCD does not display correctly.	3
TP19057	Chip select for FLASH ROM	ED	When address 0x07000000 to 0x073FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19058	SRAM chip select for system data	ED	When address 0x03200000 to 0x0327FFFF is selected: Low	Analyzer does not operate correctly (cannot set the settings etc.).	4
TP19059	SRAM chip select for temporary data storage	ED	When address 0x03600000 to 0x037FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP19060	SRAM chip select for scatter memory	ED	When address 0x03400000 to 0x035FFFFF is selected: Low	Cannot memory scatter.	5
TP19061	Reset signal of the FLASH ROM	ED	At reset: Low	Analyzer does not operate correctly.	4
TP19062	Write signal 1 (high and low bytes)	ED	At write access: Low	Analyzer does not operate correctly.	2
TP19063	Write signal 2 (high and low bytes)	ED	At write access: Low	Analyzer does not operate correctly.	4
TP19064	Write signal 3 (high and low bytes)	ED	At write access: Low	Analyzer does not operate correctly.	4
TP19065	Read signal 1	ED	At read access: Low	Analyzer does not operate correctly.	2
TP19066	Read signal 2	ED	At read access: Low	Analyzer does not operate correctly.	5
TP19067	Read signal 3	ED	At read access: Low	Analyzer does not operate correctly.	5
TP19068	SRAM high byte select signal	ED	At SRAM access: Low	Analyzer does not operate correctly.	4
TP19069	SRAM low byte select signal	ED	At SRAM access: Low	Analyzer does not operate correctly.	4
TP19070	RTC clock enable signal	ED	32.768 kHz output from RTC at High	Analyzer does not start.	5
TP19071	System reset 1	ED	At reset: Low	Analyzer does not start.	2
TP19072	System reset 2	ED	At reset: Low	Analyzer does not start.	5
TP19073	System reset 3	ED	At reset: Low	Analyzer does not start.	2
TP19074	Power ON or OFF signal other than 5 or 3.3 V	ED	ON: High OFF: Low	Analyzer does not operate correctly.	5
TP19075	5 V power ON or OFF control signal	ED	ON: High OFF: Low	Analyzer does not start.	5
TP19076	3.3 V power ON or OFF control signal	ED	ON: High OFF: Low	Analyzer does not start.	5
TP19078	Each position sensor, SW, DRIVER BD communication interrupt	ED	Normal times: High When an interrupt occurs: Low	Analyzer does not operate correctly.	2
TP19079	MAIN BD to DRIVER BD serial communication	ED	Normal times: High When sending data: serial data	Actuator does not operate correctly.	5
TP19080	FPGA(CNT) to touch panel controller serial communication	ED	Normal times: High When sending data: serial data	Touch panel is disabled.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19081	RS232C2 (for PRINTER) serial send signal	ED	Normal times: High When sending data: serial data	Instrument that is connected to the external 232C connector (for serial port connector 1) does not operate correctly.	5
TP19082	RS232C3 (for PC) serial send signal	ED	Normal times: High When sending data: serial data	Instrument that is connected to the external 232C connector (for serial port connector 2) does not operate correctly.	5
TP19083	Chip select for serial EEPROM of MIXED PUMP BD	ED	Normal times: High When accessing: Low	Cannot set the diluter.	5
TP19084	Clock for serial EEPROM of MIXED PUMP BD	ED	Normal times: Low At clock output: 1 MHz	Cannot set the diluter.	5
TP19085	Serial EEPROM of MIXED PUMP BD EEPROM → FPGA SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the diluter.	5
TP19086	Chip select for digital potentiometers of LIQUID SENSOR BD	ED	Normal times: High When accessing: Low	Cannot set the liquid sensor.	1
TP19087	Chip select for serial EEPROM of LIQUID SENSOR BD	ED	Normal times: High When accessing: Low	Cannot set the liquid sensor.	1
TP19088	Clock for digital potentiometers of LIQUID SENSOR BD and serial EEPROM	ED	Normal times: Low At clock output: 1 MHz	Cannot set the liquid sensor.	1
TP19089	Digital potentiometers and serial EEPROM of LIQUID SENSOR BD → FPGA SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the liquid sensor.	1
TP19090	CPU AD data receiving select signal 0	ED	High/Low depending on the selected channel	Temperature data cannot be acquired. Pressure data cannot be acquired. Power voltage for the liquid sensor cannot be acquired.	3
TP19091	CPU AD data receiving select signal 1	ED	High/Low depending on the selected channel	Temperature data cannot be acquired. Pressure data cannot be acquired. Power voltage for the liquid sensor cannot be acquired.	3
TP19092	CPU AD data receiving select signal 2	ED	High/Low depending on the selected channel	Temperature data cannot be acquired. Pressure data cannot be acquired. Power voltage for the liquid sensor cannot be acquired.	3
TP19093	Reset signal for the internal printer	ED	At reset: Low	Internal printer does not operate correctly.	5
TP19094	Clock for buzzer control	ED	Normal times: Low When controlling: clock output	Buzzer sound is not generated correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19095	RS232C4 (for barcode reader) 5 V power supply power ON signal	ED	Normal times: High	The instrument that is connected to the external 232C connector (for barcode reader) cannot operate correctly.	3
TP19096	Clog removal control signal	ED	Normal times: Low When controlling: High	Cannot remove clogs.	5
TP19097	LCD display backlight power control signal	ED	Normal times: High	LCD does not display correctly.	4
TP19098	Clog removal circuit control signal	ED	Normal times: Low When controlling: clock output	Cannot remove clogs.	5
TP19099	Fan ON/OFF signal	ED	When fan is ON: High When fan is OFF: Low	Fan does not turn. Measurement results are not correct.	5
TP19100	Configuration data input for FPGA (MAIN BD circuit control FPGA)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19101	Chip select for FPGA data storage ROM configuration (MAIN BD circuit control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP19102	Clock for FPGA data storage ROM configuration (MAIN BD circuit control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP19103	Serial data for FPGA → FPGA ROM configuration (MAIN BD circuit control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP19104	Chip select for FPGA data storage ROM (MAIN BD circuit control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3
TP19105	ROM clock for FPGA data storage (MAIN BD circuit control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3
TP19106	Input serial data of FPGA ROM (MAIN BD circuit control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3
TP19107	Output serial data of FPGA ROM (MAIN BD circuit control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3
TP19108	RBC hardware noise flag	ED	Normal times: Low When detecting the hardware noise: High	Cannot detect the RBC hardware noise.	2
TP19109	RBC threshold detection flag	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	2

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19110	RBC peak detection	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	2
TP19111	Baseline release control signal when receiving the RBC data	ED	Normal times: Low When detecting the data: High	Cannot measure the RBC and PLT data correctly.	2
TP19112	RBC pulse width judgement flag, not used	ED	Normal times: Low When detecting the data: High	—	2
TP19113	WBC (CBC) pulse width judgement flag, not used	ED	Normal times: Low When detecting the data: High	—	2
TP19114	Baseline release control signal when receiving the WBC (CBC) data	ED	Normal times: Low When detecting the data: High	Cannot measure the WBC (CBC) data correctly.	1
TP19115	WBC (CBC) hardware noise flag	ED	Normal times: Low When detecting the hardware noise: High	Cannot detect the WBC hardware noise.	2
TP19116	WBC (CBC) threshold detection flag (High side)	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	2
TP19117	WBC (CBC) peak detection	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	2
TP19118	WBC (CBC) threshold detection flag (Low side)	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	2
TP19119	Baseline release trigger signal when receiving the RBC data	ED	Normal times: Low When detecting the data: High	Cannot measure the RBC and PLT data correctly.	2
TP19120	Baseline release trigger signal when receiving the WBC (CBC) data	ED	Normal times: Low When detecting the data: High	Cannot measure the WBC (CBC) data correctly.	1
TP19121	Liquid sensor detection signal of RBC manometer 500 µl	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	3
TP19122	Liquid sensor detection signal of RBC manometer 360 µl	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	3
TP19123	Liquid sensor detection signal of RBC manometer upper part	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	3
TP19124	Liquid sensor detection signal of WBC manometer 500 µl	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	3
TP19125	Liquid sensor detection signal of WBC manometer 360 µl	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	3
TP19126	Liquid sensor detection signal of WBC manometer upper part	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	3
TP19127	RBC/WBC setting data storage ROM → CPU, SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the RBC/WBC manometer sensor. Cannot measure the RBC/WBC (CBC) data correctly.	2
TP19128	Heater control	ED	At 40°C or higher: Low	Cannot control the heater.	1
TP19129	Configuration data input for FPGA (CBC circuit control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19130	Chip select for FPGA data storage ROM configuration (CBC system control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP19131	Clock for FPGA data storage ROM configuration (CBC system control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP19132	Serial data for FPGA → FPGA ROM configuration (CBC system control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP19133	WAIT signal from the LCD controller	ED	When accessing the LCD controller: Low	LCD does not display correctly.	4
TP19134	Touch screen controller reset signal	ED	Normal times: High At reset: Low	Touch panel is disabled.	3
TP19135	Reset signal for DRIVER BD control FPGA	ED	Normal times: High At reset: Low	Actuator does not operate correctly.	5
TP19136	Clock for RBC AD converter	ED	Normal times: High When receiving data: 1 MHz: clock output	Cannot measure the RBC and PLT data correctly.	1
TP19137	Clock for WBC AD converter	ED	Normal times: High When receiving data: 1 MHz: clock output	Cannot measure the WBC (CBC) data correctly.	1
TP19138	Chip select of WBC manometer sensor setting data storage ROM	ED	Normal times: High When accessing: Low	Cannot store the WBC manometer sensor setting value	3
TP19139	Chip select of digital potentiometers for WBC manometer sensor	ED	Normal times: High When accessing: Low	Cannot set the WBC manometer sensor. Cannot measure the WBC (CBC) data correctly.	3
TP19140	Not used	ED	—	—	—
TP19141	Not used	ED	—	—	—
TP19142	Chip select of RBC manometer sensor setting data storage ROM	ED	Normal times: High When accessing: Low	Cannot store the setting value of the RBC manometer sensor.	3
TP19143	Chip select of digital potentiometers for RBC manometer sensor	ED	Normal times: High When accessing: Low	Cannot set the RBC manometer sensor. Cannot measure the RBC data correctly.	3
TP19144	RBC/WBC setting data storage ROM, SPI clock for digital potentiometers	ED	Normal times: Low When accessing: clock output	Cannot set the RBC/WBC manometer sensor. Cannot measure the RBC/WBC (CBC) data correctly.	3
TP19145	RBC/WBC setting data storage ROM, SPI serial data for digital potentiometers	ED	Normal times: High When receiving data: serial data	Cannot set the RBC/WBC manometer sensor. Cannot measure the RBC/WBC (CBC) data correctly.	3
TP19146	Heater control (ON signal)	ED	At 40°C or lower: High	Cannot control the heater.	5
TP19147	Heater control (OFF signal)	ED	At 40°C or higher: Low	Cannot control the heater.	5
TP19148	Power ON/OFF control signal for HGB LED	ED	When the power is off: Low When the power in on: High	Cannot measure HGB correctly.	3
TP19149	RBC measurement enable signal (relay ON/OFF control)	ED	When measuring: Low When not measuring: High	Cannot measure the RBC and PLT data correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19150	RBC CAL pulse enable signal (relay ON/OFF control)	ED	When outputting the CAL pulse: Low When not outputting: High	Cannot check the RBC circuit.	3
TP19151	RBC remove clog enable (relay ON/OFF control)	ED	When remove clog is ON: Low When remove clog is OFF: High	Cannot remove RBC clogs.	3
TP19152	RBC peak hold reset signal	ED	Normal times: High At reset: Low	Cannot measure the RBC and PLT data correctly.	2
TP19153	WBC measurement enable signal (relay ON/OFF control)	ED	When measuring: Low When not measuring: High	Cannot measure the WBC (CBC) data correctly.	3
TP19154	WBC CAL pulse enable signal (relay ON/OFF control)	ED	When outputting the CAL pulse: Low When not outputting: High	Cannot check the WBC (CBC) circuit.	3
TP19155	WBC remove clog enable (relay ON/OFF control)	ED	When remove clog is ON: Low When remove clog is OFF: High	Cannot remove WBC (CBC) clogs.	3
TP19156	WBC peak hold reset signal	ED	Normal times: High At reset: Low	Cannot measure the WBC (CBC) data correctly.	1
TP19157	CAL pulse of RBC/WBC (CBC)	ED	Normal times: High When outputting the CAL pulse: Low/High	Cannot check the RBC/WBC (CBC) circuit.	1
TP19158	RBC AD conversion receive data selection bit 1	ED	Bit 1, 2 (00): measurement data Bit 1, 2 (01): electrode voltage Bit 1, 2 (10): ANA data	Cannot measure the RBC and PLT data correctly.	2
TP19159	RBC AD conversion receive data selection bit 2	ED	Bit 1, 2 (00): measurement data Bit 1, 2 (01): electrode voltage Bit 1, 2 (10): ANA data	Cannot measure the RBC and PLT data correctly.	1
TP19160	WBC AD conversion receive data selection bit 1	ED	Bit 1, 2, 3 (000): measurement data Bit 1, 2, 3 (001): electrode voltage Bit 1, 2, 3 (010): ANA data Bit 1, 2, 3 (011): HGB data	Cannot measure the WBC (CBC) data correctly.	1
TP19161	WBC AD conversion receive data selection bit 2	ED	Bit 1, 2, 3 (000): measurement data Bit 1, 2, 3 (001): electrode voltage Bit 1, 2, 3 (010): ANA data Bit 1, 2, 3 (011): HGB data	Cannot measure the WBC (CBC) data correctly.	1
TP19162	WBC AD conversion receive data selection bit 3	ED	Bit 1, 2, 3 (000): measurement data Bit 1, 2, 3 (001): electrode voltage Bit 1, 2, 3 (010): ANA data Bit 1, 2, 3 (011): HGB data	Cannot measure the WBC (CBC) data correctly.	1

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19163	LED ON signal for laser irradiation check	ED	Normal times: Low When laser irradiated: High	Laser does not turn on. Cannot measure the 5 DIFF data correctly.	3
TP19164	Serial data output from FPGA ROM (Driver BD circuit control FPGA 1)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	4
TP19165	Serial data output from FPGA ROM (Driver BD circuit control FPGA 2)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	4
TP19166	Clock signal for adjusting brightness of LCD backlight: Not used	ED	—	—	—
TP19167	Control signal for LCD display backlight: Not used	ED	—	—	—
TP19168	FPGA data storage ROM chip select (CBC system control FPGA)	ED	Normal times: High When selecting ROM: Low	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19169	FPGA data storage ROM clock (CBC system control FPGA)	ED	Normal times: High At config: clock output	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19170	Input serial data of the FPGA ROM (CBC system control FPGA)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19171	Output serial data of the FPGA ROM (CBC system control FPGA)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19173	USB controller (host) interrupt	ED	Normal times: High When an interrupt occurs: Low	USB (host) cannot communicate correctly.	2
TP19174	USB overcurrent detection flag	ED	Normal times: High When detecting overcurrent: Low	Cannot detect the over current failure of USB IF.	1
TP19175	5 DIFF FS threshold level detection flag	ED	Normal times: Low When detecting: High	Cannot measure the 5 DIFF data correctly.	1
TP19176	5 DIFF FS peak detection	ED	Normal times: Low When detecting: High	Cannot measure the 5 DIFF data correctly.	1
TP19177	Trigger signal for baseline release when receiving the 5 DIFF data	ED	Normal times: Low When detecting the data: High	Cannot measure the 5 DIFF data correctly.	1
TP19178	Laser key detection signal	ED	Normal times: Low When detecting the laser key: High	Cannot detect the laser key ON/OFF. Cannot perform 5 DIFF measurement.	1
TP19179	Clock signal for communication by USB (host) controller SPI	ED	Normal times: Low When accessing: clock output	The USB socket (host) cannot be used.	2

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Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19181	Chip select for communication by USB (host) controller SPI	ED	Normal times: High When accessing: Low	The USB socket (host) cannot be used.	2
TP19183	Serial data transmission for communication by USB (host) controller SPI	ED	Normal times: High When sending data: serial data	The USB socket (host) cannot be used.	2
TP19185	Serial data reception for communication by USB (host) controller SPI	ED	Normal times: High When receiving data: serial data	The USB socket (host) cannot be used.	2
TP19187	Configuration data input for FPGA (5 DIFF circuit section control FPGA)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	1
TP19188	Chip select for FPGA data storage ROM configuration (5 DIFF control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP19189	Clock for FPGA data storage ROM configuration (5 DIFF control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP19190	Serial data for FPGA → FPGA ROM configuration (5 DIFF control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP19191	LCD controller port interrupt	ED	Normal times: High When an interrupt occurs: Low	LCD does not display correctly.	4
TP19192	FPGA data storage ROM chip select (5 DIFF control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3
TP19193	FPGA data storage ROM clock (5 DIFF control FPGA)	ED	Normal times: High At config: clock output	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19194	Input serial data of FPGA ROM (5 DIFF control FPGA)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19195	Output serial data of FPGA ROM (5 DIFF control FPGA)	ED	Normal times: High When receiving data: serial data	FPGA cannot be configured correctly or FPGA data cannot be downloaded correctly. Analyzer does not start.	3
TP19196	USB (host) VBUS ON signal	ED	Normal times: High	The USB socket (host) cannot be used.	1
TP19197	5 DIFF data receive control interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot measure the 5 DIFF data correctly.	1
TP19198	5 DIFF AD conversion receive data selection bit 1	ED	Bit 1, 2, 3 (000): FS data Bit 1, 2, 3 (001): FL data Bit 1, 2, 3 (010): SD data	Cannot measure the 5 DIFF data correctly.	1
TP19199	5 DIFF AD conversion receive data selection bit 2	ED	Bit 1, 2, 3 (000): FS data Bit 1, 2, 3 (001): FL data Bit 1, 2, 3 (010): SD data	Cannot measure the 5 DIFF data correctly.	1

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19200	5 DIFF AD conversion receive data selection bit 3	ED	Bit 1, 2, 3 (000): FS data Bit 1, 2, 3 (001): FL data Bit 1, 2, 3 (010): SD data	Cannot measure the 5 DIFF data correctly.	1
TP19201	Clock for 5 DIFF AD converter	ED	Normal times: High When receiving data: 1 MHz: clock output	Cannot measure the 5 DIFF data correctly.	1
TP19202	5 DIFF CAL pulse	ED	Normal times: High When outputting the CAL pulse: Low/High	Cannot check the 5 DIFF circuit.	1
TP19203	5 DIFF CAL pulse output ON/OFF enable	ED	When outputting the pulse: Low When not outputting: High	Cannot check the 5 DIFF circuit.	1
TP19204	SPI clock for digital potentiometer for setting the 5 DIFF measurement sensitivity	ED	Normal times: Low When accessing: clock output	Cannot measure the 5 DIFF data correctly.	1
TP19205	Chip select for digital potentiometer for setting the 5 DIFF measurement sensitivity.	ED	Normal times: High When accessing: Low	Cannot measure the 5 DIFF data correctly.	1
TP19206	SPI serial data for digital potentiometer for setting the 5 DIFF measurement sensitivity.	ED	Normal times: High When receiving data: serial data	Cannot measure the 5 DIFF data correctly.	1
TP19207	5 DIFF peak hold reset signal	ED	Normal times: High At reset: Low	Cannot measure the 5 DIFF data correctly.	1
TP19208	Laser key detection output signal	ED	Normal times: Low When detecting the laser key: High	Cannot detect the laser key ON/OFF. Cannot perform 5 DIFF measurement.	1
TP19209	RBC threshold setting voltage	ED	Analog voltage for the threshold	Cannot measure the RBC and PLT data correctly.	1
TP19210	WBC (CBC) high threshold setting voltage	ED	Analog voltage for the threshold	Cannot measure the WBC (CBC) data correctly.	1
TP19211	WBC (CBC) low threshold setting voltage	ED	Analog voltage for the threshold	Cannot measure the WBC (CBC) data correctly.	1
TP19212	Analog voltage for adjusting brightness of LCD backlight	ED	When bright: 0 V When dark: 2.5V	LCD does not display correctly.	1
TP19213	MAIN BD to DRIVER BD serial communication	ED	Normal times: High When receiving data: serial data	Actuator does not operate correctly.	4
TP19214	Driver BD error flag signal	ED	Normal times: Low	Actuator does not operate correctly.	5
TP19215	FPGA (CNT) → serial EEPROM of MIXED PUMP BD SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the diluter.	4
TP19216	FPGA (CNT) to touch panel controller serial communication	ED	Normal times: High When receiving data: serial data	Touch panel is disabled.	3
TP19217	Busy signal for internal printer	ED	Normal times: Low When busy: High	Internal printer cannot operate correctly.	5
TP19218	Error signal for internal printer	ED	Normal times: High When error occurs: Low	Internal printer cannot operate correctly.	5
TP19219	LCD display inverter error signal: Not used	ED	—	—	—

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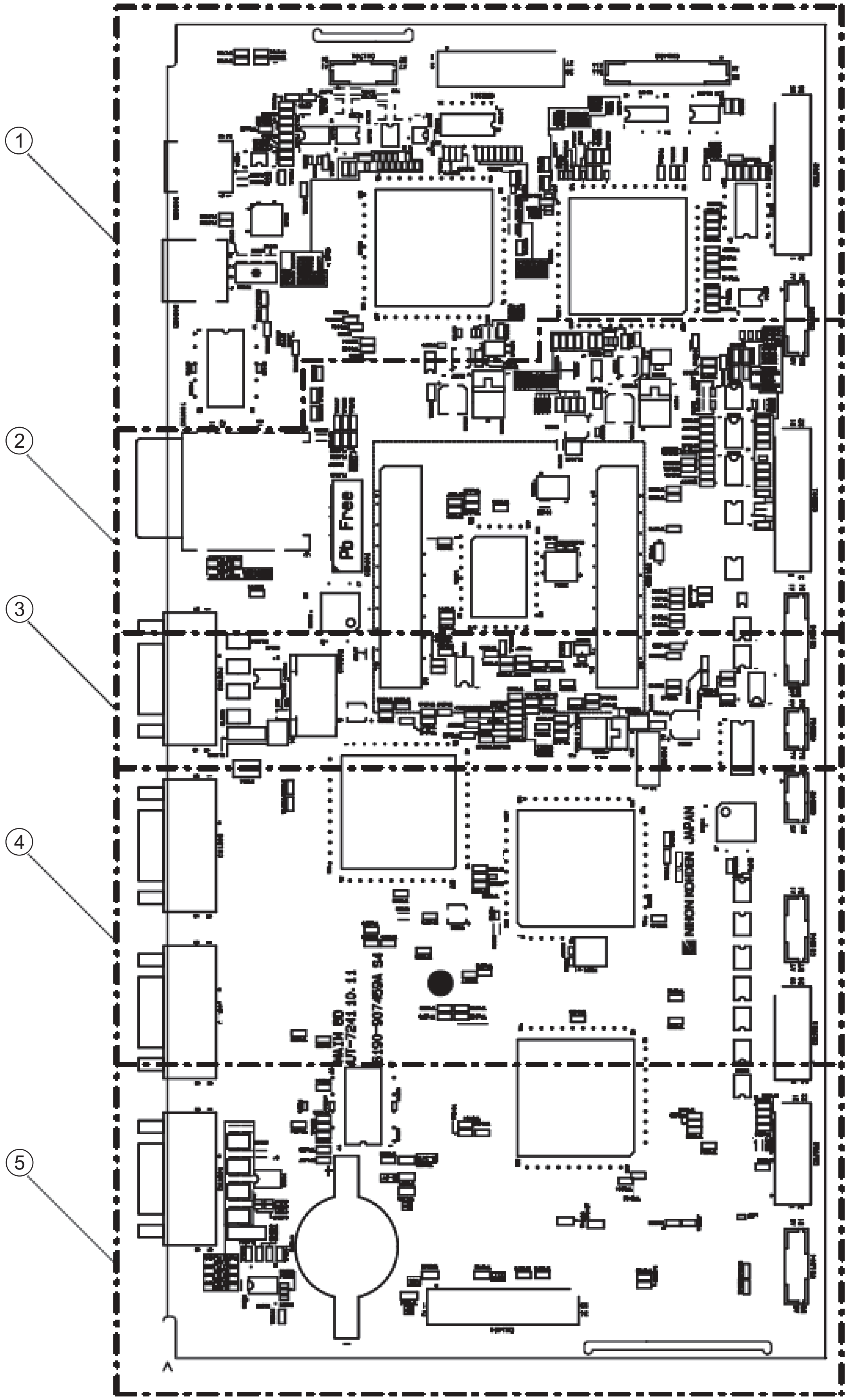
Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19220	LCD BD confirmation signal	ED	New board: Low UT-7246: High	LCD BD cannot be confirmed.	3
TP19221	FPGA (CNT) → serial EEPROM of LIQUID SENSOR BD SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the liquid sensor.	4
TP19222	RS232C2 (for PRINTER) serial receive signal	ED	Normal times: High When receiving data: serial data	Instrument that is connected to the external 232C connector (for serial port connector 1) does not operate correctly.	5
TP19223	RS232C3 (for PC) serial receive signal	ED	Normal times: High When receiving data: serial data	Instrument that is connected to the external 232C connector (for serial port connector 2) does not operate correctly.	5
TP19224	Configuration start signal (MAIN BD circuit control FPGA)	ED	When configuration starts: High	Analyzer does not start correctly.	4
TP19225	Configuration start signal (CBC circuit control FPGA)	ED	When configuration starts: High	Analyzer does not start correctly.	4
TP19226	Configuration start signal (5 DIFF circuit control FPGA)	ED	When configuration starts: High	Analyzer does not start correctly.	2
TP19227	Not implemented	ED	—	—	—
TP19228	Not implemented	ED	—	—	—
TP19229	Not implemented	ED	—	—	—
TP19230	Not implemented	ED	—	—	—
TP19231	Not implemented	ED	—	—	—
TP19232	Touch screen interrupt signal: Not used	ED	Normal times: High When an interrupt occurs: Low	—	—
TP19301	Address bus (A0)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	3
TP19302	Address bus (A1)	ED	Normal times: High When accessing: Changes according to data	Analyzer does not operate correctly.	5
TP19303	Address bus (A2)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19304	Address bus (A3)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19305	Address bus (A4)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19306	Address bus (A5)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19307	Address bus (A6)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19308	Address bus (A7)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19309	Address bus (A8)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19310	Address bus (A9)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19311	Address bus (A10)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19312	Address bus (A11)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19313	Address bus (A12)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19314	Address bus (A13)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19315	Address bus (A14)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19316	Address bus (A15)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19317	Address bus (A16)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19318	Address bus (A17)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19319	Address bus (A18)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19320	Address bus (A19)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19321	Address bus (A20)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19322	Address bus (A21)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19323	Address bus (A22)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4
TP19324	Address bus (A23)	ED	Normal times: High When accessing: Depends on the data	Analyzer does not operate correctly.	4

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP19325	Data bus (D0)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19326	Data bus (D1)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19327	Data bus (D2)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19328	Data bus (D3)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19329	Data bus (D4)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19330	Data bus (D5)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19331	Data bus (D6)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19332	Data bus (D7)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19333	Data bus (D8)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19334	Data bus (D9)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19335	Data bus (D10)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19336	Data bus (D11)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19337	Data bus (D12)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19338	Data bus (D13)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19339	Data bus (D14)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5
TP19340	Data bus (D15)	ED	Normal times: Low When accessing: Depends on the data	Analyzer does not operate correctly.	5

UT-7241 MAIN BD (Rev. AA to Rev. AI)



Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0301	Vcc (primary power source) voltage detection	ED	+3.21 to +3.46 V	Analyzer cannot start.	4
TP0302	5 V (secondary power source) voltage detection	ED	+4.93 to +5.21 V	Analyzer cannot start.	3
TP0303	Address bit (A0) is not used.	ED	—	—	4
TP0304	CPLD spare terminal is not used	ED	—	—	4
TP0305	SRAM chip select	ED	Address D80000 to DFFFFF: Low	Cannot operate correctly (cannot set).	4
TP0306	CPU input reset signal	ED	About 100 ms after detecting 5 V power source: cancel reset	Analyzer cannot start.	3
TP0401	FPGA JTAG connection signal (TCK) is not used.	ED	—	—	5
TP0402	FPGA JTAG connection signal (TDI) is not used.	ED	—	—	5
TP0403	FPGA JTAG connection signal (TMS) is not used.	ED	—	—	5
TP0404	FPGA JTAG connection signal (TDO) is not used.	ED	—	—	5
TP0405	FPGA spare terminal is not used.	ED	—	—	4
TP0406	FPGA internal circuit auxiliary power (2.5 V) (MAIN BD circuit control FPGA)	ED	2.4 to 2.6 V	Cannot operate correctly.	5
TP0407	FPGA core power (1.2 V) (MAIN BD circuit control FPGA)	ED	1.19 to 1.25 V	Cannot operate correctly.	5
TP0501	FPGA JTAG connection signal (TCK) is not used.	ED	—	—	2
TP0502	FPGA JTAG connection signal (TDI) is not used.	ED	—	—	2
TP0503	FPGA JTAG connection signal (TMS) is not used.	ED	—	—	2
TP0504	FPGA JTAG connection signal (TDO) is not used.	ED	—	—	2
TP0505	FPGA internal circuit auxiliary power (2.5 V) (CBC system control FPGA)	ED	2.4 to 2.6 V	Cannot operate correctly.	2
TP0506	FPGA core power (1.2 V) (CBC system control FPGA)	ED	1.19 to 1.25 V	Cannot operate correctly.	2
TP0601	FPGA JTAG connection signal (TCK) is not used.	ED	—	—	1
TP0602	FPGA JTAG connection signal (TDI) is not used.	ED	—	—	1
TP0603	FPGA JTAG connection signal (TMS) is not used.	ED	—	—	1
TP0604	FPGA JTAG connection signal (TDO) is not used.	ED	—	—	1
TP0605	FPGA internal circuit auxiliary power (2.5 V) (5 DIFF system control FPGA)	ED	2.4 to 2.6 V	Cannot operate correctly.	2
TP0606	FPGA core power (1.2 V) (5 DIFF system control FPGA)	ED	1.19 to 1.25 V	Cannot operate correctly.	1
TP0801	LCD controller core power (1.8 V)	ED	1.764 to 1.854 V	LCD does not display correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP1102	Heater control	ED	> 40°C: Low	Cannot control the heater.	5
TP1401	Vcc voltage	ED	+3.21 to +3.46 V	Analyzer cannot start.	5
TP1402	5 V voltage	ED	+4.93 to +5.30 V	Analyzer cannot start.	5
TP1403	3.3 V voltage	ED	+3.21 to +3.46 V	Analyzer cannot start.	5
TP1404	ED	ED	—	—	5
TP1405	Backup system voltage	ED	When the power is on: 2.65 to 3.43 V When the power is off: 2.4 to 3.1 V	Cannot operate correctly. Setting data and clock are incorrect.	5
TP1406	Backup system voltage 1 (to check the current)	ED	When the power is on: 2.65 to 3.43 V When the power is off: 2.4 to 3.1 V	Cannot operate correctly. Setting data and clock are incorrect.	5
TP1407	Backup system voltage 2 (to check the current)	ED	When the power is on: 2.65 to 3.43 V When the power is off: 2.4 to 3.1 V	Cannot operate correctly. Setting data and clock are incorrect.	5
TP1408	Power voltage for the internal printer	ED	+4.84 to +5.30 V	Internal printer cannot operate correctly.	5
TP1917	Read signal (5 V system: CPU output)	ED	At read access: Low	Analyzer does not operate correctly.	3
TP1918	Write signal (low byte) (5 V system: CPU output)	ED	At write access: Low	Analyzer does not operate correctly.	3
TP1919	Write signal (high byte) (5 V system: CPU output)	ED	At write access: Low	Analyzer does not operate correctly.	3
TP1920	DRAM low column address strobe (5 V system: CPU output)	ED	When address 400000 to 5FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1921	DRAM high column address strobe (5 V system: CPU output)	ED	When address 400000 to 5FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1922	Chip select (area 0) (5 V system: CPU output)	ED	When address 000000 to 1FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1923	Chip select (area 1) (5 V system: CPU output)	ED	When address 200000 to 3FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1924	DRAM low address strobe (5 V system: CPU output)	ED	When address 400000 to 5FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1925	Chip select (area 3) (5 V system: CPU output)	ED	When address 600000 to 7FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1926	Chip select (area 4) (5 V system: CPU output)	ED	When address 900000 to 9FFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1927	Chip select (area 5) (5 V system: CPU output)	ED	When address A00000 to BFFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1928	Chip select (area 6) (5 V system: CPU output)	ED	When address C00000 to DFFFFF is selected: Low	Analyzer does not operate correctly.	3
TP1929	Watchdog timer overflow (5 V system: CPU output)	ED	At watchdog timer overflow: Low	When the CPU runs away, the system is not reset.	3
TP1930	Spare not used	—	—	—	2
TP1931	CPU output reset signal (5 V system: CPU output)	ED	At BOOT start: Low At system start: High	Analyzer cannot start.	4
TP1932	RS232C (for PRINTER) serial send signal	ED	Normal times: High When sending data: serial data	Instrument that is connected external 232C connector (for option) cannot operate correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP1933	RS232C (for PC) serial send signal	ED	Normal times: High When sending data: serial data	Instrument that is connected external 232C connector (for serial board connector 2) cannot operate correctly.	3
TP1934	RS232C (for barcode reader) serial send signal	ED	Normal times: High When sending data: serial data	Instrument that is connected external 232C connector (for barcode reader) cannot operate correctly.	2
TP1935	Internal printer serial send signal	ED	Normal times: High When sending data: serial data	Internal printer cannot operate correctly.	5
TP1936	RS232C (for PRINTER) serial receive signal	ED	Normal times: High When receiving data: serial data	Instrument that is connected external 232C connector (for option) cannot operate correctly.	3
TP1937	RS232C (for PC) serial receive signal	ED	Normal times: High When receiving data: serial data	Instrument that is connected external 232C connector (for serial board connector 2) cannot operate correctly.	3
TP1938	RS232C (for barcode reader) serial receive signal	ED	Normal times: High When receiving data: serial data	Instrument that is connected external 232C connector (for barcode reader) cannot operate correctly.	2
TP1939	Internal printer serial receive signal	ED	Normal times: High When receiving data: serial data	Internal printer cannot operate correctly.	5
TP1940	CPU input reset signal	ED	At reset: Low	Analyzer does not operate correctly.	3
TP1941	CPU standby signal	ED	At reset: Low	Analyzer does not operate correctly.	3
TP1942	NMI	ED	At reset: Low	Analyzer does not operate correctly.	3
TP1943	WAIT signal from the LCD controller	ED	When accessing the LCD controller: Low	LCD does not display correctly.	4
TP1944	Data bus (D0) (5 V system: CPU output)	ED	Normal times: High Access times: depend on the data	Analyzer does not operate correctly.	2
TP1945	Data bus (D1) (5 V system: CPU output)	ED	Normal times: High Access times: depend on the data	Analyzer does not operate correctly.	2
TP1946	Address bus (A1) (5 V system: CPU output)	ED	Normal times: High Access times: depend on the data	Analyzer does not operate correctly.	3
TP1947	Address bus (A2) (5 V system: CPU output)	ED	Normal times: High Access times: depend on the data	Analyzer does not operate correctly.	3
TP1948	Power off request signal from CPU	ED	Normal times: Low When requesting off: High	Cannot power off correctly.	3
TP1949	LCD controller memory bank change	ED	When LCD controller internal register is selected: Low When VRAM is selected: High	LCD does not display correctly.	4
TP1950	Chip select for SD card controller	ED	Low at address C40000 to C7FFFF	Cannot use SD card IF.	4
TP1951	Chip select for USB controller	ED	Low at address C80000 to CBFFFF	Cannot use USB IF.	2
TP1952	SRAM chip select 3 for scatter memory	ED	Low at address B00000 to B7FFFF	Cannot memory scatter.	4

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP1953	SRAM chip select 2 for scatter memory	ED	Low at address A80000 to AFFFFF	Cannot memory scatter.	4
TP1954	SRAM chip select 1 for scatter memory	ED	Low at address A00000 to A7FFFF	Cannot memory scatter.	5
TP1955	SRAM chip select for scatter decompression	ED	Low at address 800000 to 97FFFF	Cannot display scatter correctly.	1
TP1956	Chip select for driver BD (FPGA)	ED	Low at address 9A0000 to 9AFFFF	Actuator does not operate correctly.	4
TP1957	Chip select for analog system FPGA	ED	Low at address 9B0000 to 9BFFFF	Cannot measure the CBC and 5 DIFF data correctly.	2
TP1958	Chip select for MAIN BD circuit control FPGA	ED	Low at address 990000 to 99FFFF	Analyzer does not operate correctly.	4
TP1959	Chip select for LCD controller	ED	Low at address C00000 to C3FFFF	LCD does not display correctly.	4
TP1960	Chip select for FLASH ROM	ED	Low at address 000000 to 3FFFFF	Analyzer does not operate correctly.	5
TP1961	Switch config or download of FPGA data	ED	Config: Low Download: High	Analyzer does not operate correctly or cannot down load FPGA data correctly.	2
TP1962	Write signal (high byte)	ED	At write access: Low	Analyzer does not operate correctly.	4
TP1963	Write signal (low byte)	ED	At write access: Low	Analyzer does not operate correctly.	4
TP1964	Write signal (high and low byte)	ED	At write access: Low	Analyzer does not operate correctly.	5
TP1965	SRAM high byte select signal	ED	At SRAM access: Low	Analyzer does not operate correctly.	5
TP1966	SRAM low byte select signal	ED	At SRAM access: Low	Analyzer does not operate correctly.	5
TP1967	Read signal	ED	At read access: Low	Analyzer does not operate correctly.	1
TP1968	DRAM low address strobe	ED	Low when selecting the address 400000 to 5FFFFF	Analyzer does not operate correctly.	4
TP1969	DRAM high column address strobe (5 V system: CPU output)	ED	Low when selecting the address 400000 to 5FFFFF	Analyzer does not operate correctly.	4
TP1970	DRAM low column address strobe (5 V system: CPU output)	ED	Low when selecting the address 400000 to 5FFFFF	Analyzer does not operate correctly.	4
TP1971	System lock	ED	25 MHz	Analyzer does not operate correctly.	2
TP1972	RTC clock enable signal	ED	32.768 kHz output from RTC at High	Analyzer does not start.	4
TP1973	System reset	ED	At rest: Low	Analyzer does not start.	1
TP1974	Power ON or OFF signal other than 5 or 3.3 V.	ED	ON: High OFF: Low	Analyzer does not operate correctly.	5
TP1975	5 V power ON or OFF control signal	ED	ON: High OFF: Low	Analyzer does not start.	5
TP1976	3.3 V power ON or OFF control signal	ED	ON: High OFF: Low	Analyzer does not start.	5
TP1977	Power OFF request signal	ED	Normal times: Low When requesting OFF: High	Cannot turn the power OFF correctly.	4
TP1978	ROM for FPGA → CPLD serial data	ED	Normal times: Low When receiving data: serial data	Cannot download the FPGA data correctly.	2

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP1979	Configuration completion signal (MAIN BD circuit control FPGA)	ED	Normal times: Low At config completion: High	Analyzer does not start.	4
TP1980	Configuration completion signal (CBC system control FPGA)	ED	Normal times: Low At config completion: High	Analyzer does not start.	1
TP1981	Configuration completion signal (5 DIFF system control FPGA)	ED	Normal times: Low At config completion: High	Analyzer does not start.	1
TP1982	Configuration completion signal (driver BD control FPGA 1)	ED	Normal times: Low At config completion: High	Analyzer does not start.	5
TP1983	Chip select for ROM for FPGA data storage download (MAIN BD circuit control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	2
TP1984	Chip select for ROM for FPGA data storage download (CBC system control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	2
TP1985	Chip select for ROM for FPGA data storage download (5 DIFF system control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	2
TP1986	Chip select for ROM for FPGA data storage download (driver BD control FPGA 1)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	2
TP1987	Serial data for ROM for CPLD → FPGA download	ED	Normal times: High When receiving data: serial data	Cannot download the FPGA data correctly.	3
TP1988	ROM clock for CPLD → FPGA	ED	When accessing the ROM for FPGA: 3.125 MHz	Cannot download the FPGA data correctly.	3
TP1989	Configuration enable signal (FPGA in MAIN BD)	ED	Normal times: High At config enable: Low	Analyzer does not start.	2
TP1990	Configuration enable signal (FPGA in DRIVER BD)	ED	Normal times: High At config enable: Low	Analyzer does not start.	5
TP1991	RTC clock	ED	32.768 kHz	Analyzer does not start.	3
TP1992	SRAM chip select	ED	Low at address D80000 to DFFFFF	Analyzer does not operate correctly (cannot set the settings etc.).	5
TP1993	DRIVER BD → MAIN BD serial communication	ED	Normal times: High When receiving data: serial data	Actuator does not operate correctly.	4
TP1994	MAIN BD → DRIVER BD serial communication	ED	Normal times: High When receiving data: serial data	Actuator does not operate correctly.	5
TP1995	Touch panel controller → CPU serial communication	ED	Normal times: High When receiving data: serial data	Touch panel is disabled.	3
TP1996	CPU → touch panel controller serial communication	ED	Normal times: High When receiving data: serial data	Touch panel is disabled.	3
TP1997	CPU → serial EEPROM of LIQUID SENSOR BD SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the liquid sensor.	1
TP1998	Serial EEPROM of MIXED PUMP BD → CPU SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the diluter.	5

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP1999	Chip select for serial EEPROM of MIXED PUMP BD	ED	Normal times: High When accessing: Low	Cannot set the diluter.	5
TP2000	Clock for serial EEPROM of MIXED PUMP BD	ED	Normal times: Low At clock output: 1 MHz	Cannot set the diluter.	5
TP2001	CPU → serial EEPROM of MIXED PUMP BD SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the diluter.	4
TP2002	Chip select for serial EEPROM of LIQUID SENSOR BD	ED	Normal times: High When accessing: Low	Cannot set the wave sensor.	1
TP2003	Clock for serial EEPROM of LIQUID SENSOR BD	ED	Normal times: Low At clock output: 1 MHz	Cannot set the wave sensor.	1
TP2004	Serial EEPROM of LIQUID SENSOR BD → CPU SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the wave sensor.	1
TP2005	Clock for buzzer control	ED	Normal times: High When controlling: clock output	Cannot buzz correctly.	3
TP2006	RS232C (for CRP) serial send signal	ED	Normal times: High When sending data: serial data	Instrument that is connected to the external 232C connector (for serial port connector 1) does not operate correctly.	5
TP2007	Configuration completion signal (driver BD control FPGA 2)	ED	Normal times: Low At config completion: High	Analyzer does not start.	5
TP2008	RS232C (for CRP) serial receive signal	ED	Normal times: High When receiving data: serial data	Instrument that is connected to the external 232C connector (for serial port connector 1) does not operate correctly.	5
TP2009	Chip select for ROM for FPGA data storage download (driver BD control FPGA 2)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.	2
TP2010	USB overcurrent detection flag	ED	Normal times: High When detecting overcurrent: Low	Cannot detect the over current failure of USB IF.	1
TP2011	Spare of LCD controller port, not used	ED	—	—	4
TP2012	Spare of LCD controller port, not used	ED	—	—	4
TP2013	Chip select for FPGA data storage ROM configuration (MAIN BD circuit control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly. Analyzer does not start.	2
TP2014	Clock for FPGA data storage ROM configuration (MAIN BD circuit control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP2015	Serial data for FPGA → FPGA ROM configuration (MAIN BD circuit control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly. Analyzer does not start.	3
TP2016	Chip select for FPGA data storage ROM (MAIN BD circuit control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2

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Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2017	FPGA data storage ROM clock (MAIN BD circuit control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3
TP2018	Input serial data of FPGA ROM	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	3
TP2019	Output serial data of FPGA ROM	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2020	RBC hardware noise flag	ED	Normal times: Low When detecting the hardware noise: High	Cannot detect the RBC hardware noise.	1
TP2021	RBC threshold detection flag	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	1
TP2022	RBC peak detection	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	1
TP2023	WBC hardware noise flag	ED	Normal times: Low When detecting the hardware noise: High	Cannot detect the WBC hardware noise.	1
TP2024	WBC threshold detection flag (High side)	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	1
TP2025	WBC threshold detection flag (Low side)	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	1
TP2026	WBC peak detection	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	1
TP2027	Liquid sensor detection signal of RBC manometer 500 µl	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	2
TP2028	Liquid sensor detection signal of RBC manometer 360 µl	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	2
TP2029	Liquid sensor detection signal of RBC manometer upper part	ED	Normal times: Low When detecting: High	Cannot measure the RBC and PLT data correctly.	2
TP2030	Liquid sensor detection signal of WBC manometer 500 µl	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	2
TP2031	Liquid sensor detection signal of WBC manometer 360 µl	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	2
TP2032	Liquid sensor detection signal of WBC manometer upper part	ED	Normal times: Low When detecting: High	Cannot measure the WBC (CBC) data correctly.	2
TP2033	Clock for RBC AD converter	ED	Normal times: High When receiving data: 1 MHz: clock output	Cannot measure the RBC and PLT data correctly.	2
TP2034	Clock for WBC AD converter	ED	Normal times: High When receiving data: 1 MHz: clock output	Cannot measure the WBC (CBC) data correctly.	1
TP2035	Chip select of WBC manometer sensor setting data storage ROM	ED	Normal times: High When accessing: Low	Cannot store the WBC manometer sensor setting value	2

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2036	Chip select of digital potentiometers for WBC manometer sensor	ED	Normal times: High When accessing: Low	Cannot set the WBC manometer sensor. Cannot measure the WBC (CBC) data correctly.	2
TP2037	Spare, not used	ED	—	—	2
TP2038	Spare, not used	ED	—	—	2
TP2039	Chip select of RBC manometer sensor setting data storage ROM	ED	Normal times: High When accessing: Low	Cannot store the setting value of the RBC manometer sensor.	2
TP2040	Chip select of digital potentiometers for RBC manometer sensor	ED	Normal times: High When accessing: Low	Cannot set the RBC manometer sensor. Cannot measure the RBC data correctly.	
TP2041	RBC/WBC setting data storage ROM, SPI clock for digital potentiometers	ED	Normal times: High When accessing: clock output	Cannot set the RBC/WBC manometer sensor. Cannot measure the RBC/WBC (CBC) data correctly.	2
TP2042	CPU → RBC/WBC setting data storage ROM, SPI serial data for digital potentiometers	ED	Normal times: High When receiving data: serial data	Cannot set the RBC/WBC manometer sensor. Cannot measure the RBC/WBC (CBC) data correctly.	2
TP2043	RBC/WBC setting data storage ROM → CPU, SPI serial data	ED	Normal times: High When receiving data: serial data	Cannot set the RBC/WBC manometer sensor. Cannot measure the RBC/WBC (CBC) data correctly.	2
TP2044	Power ON or OFF control signal for HGB LED	ED	Power OFF: Low Power ON: High	Cannot measure the HGB correctly	2
TP2045	RBC measurement enable signal (relay ON/OFF control)	ED	When measuring: Low When not measuring: High	Cannot measure the RBC and PLT data correctly.	2
TP2046	RBC CAL pulse enable signal (relay ON/OFF control)	ED	When outputting the CAL pulse: Low When not outputting: High	Cannot check the RBC circuit.	2
TP2047	RBC remove clog enable (relay ON/OFF control)	ED	When remove clog is ON: Low When remove clog is OFF: High	Cannot remove the RBC clog.	2
TP2048	RBC peak hold reset signal	ED	Normal times: High At reset: Low	Cannot measure the RBC and PLT data correctly.	1
TP2049	WBC measurement enable signal (relay ON/OFF control)	ED	When measuring: Low When not measuring: High	Cannot measure the WBC (CBC) data correctly.	2
TP2050	WBC CAL pulse enable signal (relay ON/OFF control)	ED	When outputting the CAL pulse: Low When not outputting: High	Cannot check the WBC (CBC) circuit.	2
TP2051	WBC remove clog enable (relay ON/OFF control)	ED	When remove clog is ON: Low When remove clog is OFF: High	Cannot remove the WBC (CBC) clog.	2
TP2052	WBC peak hold reset signal	ED	Normal times: High At reset: Low	Cannot measure the WBC (CBC) data correctly.	1
TP2053	CAL pulse of RBC/WBC (CBC)	ED	Normal times: High When outputting the CAL pulse: Low/High	Cannot check the RBC/WBC (CBC) circuit.	1
TP2054	RBC AD conversion receive data selection bit 1	ED	Bit 1, 2 (00): measurement data Bit 1, 2 (01): electrode voltage Bit 1, 2 (10): ANA data	Cannot measure the RBC and PLT data correctly.	1

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Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2055	RBC AD conversion receive data selection bit 2	ED	Bit 1, 2 (00): measurement data Bit 1, 2 (01): electrode voltage Bit 1, 2 (10): ANA data	Cannot measure the RBC and PLT data correctly.	1
TP2056	WBC AD conversion receive data selection bit 1	ED	Bit 1, 2, 3 (000): measurement data Bit 1, 2, 3 (001): electrode voltage Bit 1, 2, 3 (010): ANA data Bit 1, 2, 3 (011): HGB data	Cannot measure the WBC (CBC) data correctly.	1
TP2057	WBC AD conversion receive data selection bit 2	ED	Bit 1, 2, 3 (000): measurement data Bit 1, 2, 3 (001): electrode voltage Bit 1, 2, 3 (010): ANA data Bit 1, 2, 3 (011): HGB data	Cannot measure the WBC (CBC) data correctly.	1
TP2058	WBC AD conversion receive data selection bit 3	ED	Bit 1, 2, 3 (000): measurement data Bit 1, 2, 3 (001): electrode voltage Bit 1, 2, 3 (010): ANA data Bit 1, 2, 3 (011): HGB data	Cannot measure the WBC (CBC) data correctly.	1
TP2059	Heater control	ED	At 40°C or more: Low	Cannot control the heater.	1
TP2060	Chip select for FPGA data storage ROM configuration (CBC system control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP2061	Serial data for FPGA → FPGA ROM configuration (CBC system control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP2062	Clock for FPGA data storage ROM configuration (CBC system control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP2063	FPGA data storage ROM chip select (CBC system control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2064	FPGA data storage ROM clock (CBC system control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2065	Input serial data of the FPGA ROM (CBC system control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2066	Output serial data of the FPGA ROM (CBC system control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2067	5 DIFF FS threshold level detection flag	ED	Normal times: Low When detecting: High	Cannot measure the 5 DIFF data correctly.	1
TP2068	5 DIFF FS peak detection	ED	Normal times: Low When detecting: High	Cannot measure the 5 DIFF data correctly.	1
TP2069	5 DIFF AD conversion receive data selection bit 1	ED	Bit 1, 2, 3 (000): FS data Bit 1, 2, 3 (001): FL data Bit 1, 2, 3 (010): SD data	Cannot measure the 5 DIFF data correctly.	1

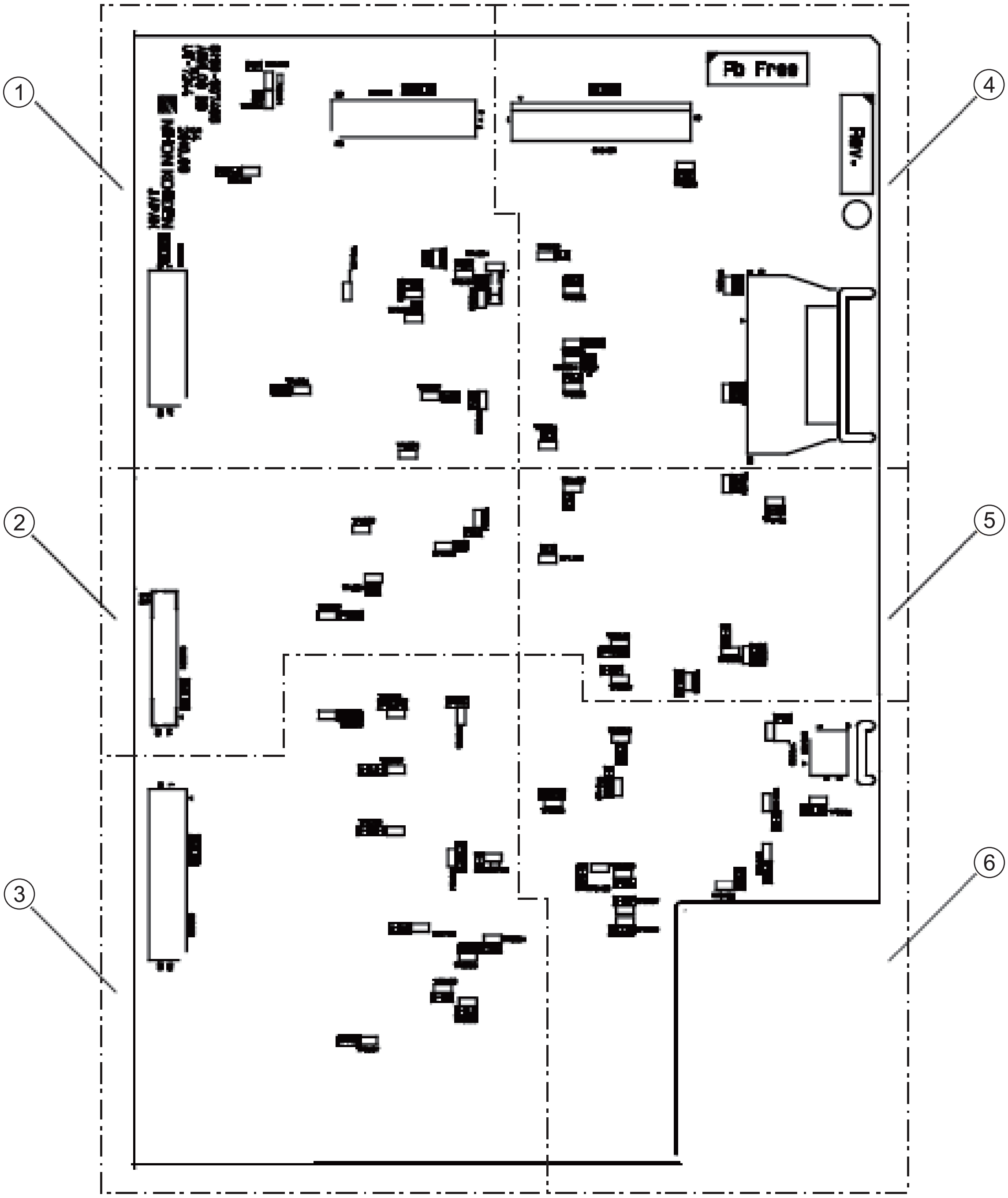
Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2070	5 DIFF AD conversion receive data selection bit 2	ED	Bit 1, 2, 3 (000): FS data Bit 1, 2, 3 (001): FL data Bit 1, 2, 3 (010): SD data	Cannot measure the 5 DIFF data correctly.	1
TP2071	5 DIFF AD conversion receive data selection bit 3	ED	Bit 1, 2, 3 (000): FS data Bit 1, 2, 3 (001): FL data Bit 1, 2, 3 (010): SD data	Cannot measure the 5 DIFF data correctly.	1
TP2072	5 DIFF AD converter clock	ED	Normal times: High When receiving data; 1 MHz: clock output	Cannot measure the 5 DIFF data correctly.	1
TP2073	5 DIFF CAL pulse	ED	Normal times: High When outputting the CAL pulse: Low/High	Cannot check the 5 DIFF circuit.	1
TP2074	5 DIFF CAL pulse output ON/OFF enable	ED	When outputting the pulse: Low When not outputting: High	Cannot check the 5 DIFF circuit.	1
TP2075	5 DIFF peak hold reset signal	ED	Normal times: High At reset: Low	Cannot measure the 5 DIFF data correctly.	1
TP2076	Laser key detection output signal	ED	Normal times: Low When detecting the laser key: High	Cannot detect the laser key ON/OFF. Cannot perform 5 DIFF measurement.	1
TP2077	Serial data for FPGA → FPGA ROM configuration (5 DIFF control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP2078	FPGA data storage ROM chip select (5 DIFF control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP2079	Clock for FPGA data storage ROM (5 DIFF control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly. Analyzer does not start.	1
TP2080	FPGA data storage ROM chip select (5 DIFF control FPGA)	ED	Normal times: High When selecting ROM: Low	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2081	FPGA data storage ROM clock (5 DIFF control FPGA)	ED	Normal times: High At config: clock output	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2082	Input serial data of FPGA ROM (5 DIFF control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2083	Output serial data of FPGA ROM (5 DIFF control FPGA)	ED	Normal times: High When receiving data: serial data	Cannot perform FPGA configuration correctly or cannot download the FPGA data correctly. Analyzer does not start.	2
TP2084	LCD controller port interrupt	ED	Normal times: High When an interrupt occurs: Low	LCD does not display correctly.	5
TP2085	USB controller interrupt	ED	Normal times: High When an interrupt occurs: Low	USB cannot communicate correctly.	1
TP2086	SD card controller interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot use the SD card IF.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2087	RBC, PLT data receive control interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot measure the RBC and PLT data correctly.	3
TP2088	WBC (CBC), 5 DIFF data receive control interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot measure the WBC (CBC) and 5 DIFF data correctly.	3
TP2089	Manometer sensor, each position sensor, SW, DRIVER BD communication interrupt	ED	Normal times: High When an interrupt occurs: Low	Analyzer does not operate correctly.	3
TP2090	USB controller interrupt	ED	Normal times: High When an interrupt occurs: Low	USB cannot communicate correctly.	3
TP2091	SD card controller interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot use the SD card IF.	2
TP2092	Touch panel controller, RTC, LCD controller interrupt	ED	Normal times: High When an interrupt occurs: Low	LCD does not display correctly. Touch panel is disabled. Clock data is incorrect.	3
TP2093	RS232C (for CRP) interrupt	ED	Normal times: High When an interrupt occurs: Low	Instrument that is connected to the external 232C connector (for serial port connector 1) does not operate correctly.	3
TP2094	Reset signal of the FLASH ROM, USB controller	ED	At reset: Low	Analyzer does not start. USB cannot communicate correctly.	1
TP2095	Baseline release control signal when receiving the RBC data	ED	Normal times: Low When detecting the data: High	Cannot measure the RBC and PLT data correctly.	1
TP2096	RBC pulse width judgement flag, not used	ED	Normal times: Low When the pulse width is abnormal: High	—	1
TP2097	Baseline release control signal when receiving the WBC (CBC) data	ED	Normal times: Low When detecting the data: High	Cannot measure the WBC (CBC) data correctly.	1
TP2098	WBC (CBC) pulse width judgement flag, not used	ED	Normal times: Low When the pulse width is abnormal: High	—	1
TP2099	5 DIFF data receive control interrupt	ED	Normal times: High When an interrupt occurs: Low	Cannot measure the 5 DIFF data correctly.	1
TP2100	Each position sensor, SW, DRIVER BD communication interrupt	ED	Normal times: High When an interrupt occurs: Low	Analyzer does not operate correctly.	2
TP2101	Read signal for USB controller	ED	At read access: Low	USB cannot communicate correctly.	1
TP2102	Data bus (D0) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2103	Data bus (D1) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2104	Data bus (D2) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2105	Data bus (D3) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2106	Data bus (D4) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2107	Data bus (D5) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2108	Data bus (D6) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2109	Data bus (D7) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2110	Data bus (D8) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2111	Data bus (D9) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2112	Data bus (D10) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2113	Data bus (D11) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2114	Data bus (D12) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2115	Data bus (D13) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2116	Data bus (D14) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2117	Data bus (D15) (5 V system: CPU output)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	3
TP2118	Write signal for USB controller	ED	At write access: Low	USB cannot communicate correctly.	1
TP2119	Data bus (D0) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1
TP2120	Data bus (D1) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1
TP2121	Data bus (D2) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1
TP2122	Data bus (D3) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1
TP2123	Data bus (D4) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1
TP2124	Data bus (D5) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2125	Data bus (D6) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2126	Data bus (D7) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2127	Data bus (D8) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2128	Data bus (D9) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2129	Data bus (D10) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2130	Data bus (D11) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1
TP2131	Data bus (D12) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2132	Data bus (D13) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2133	Data bus (D14) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	2
TP2134	Data bus (D15) (3 V system)	ED	Normal times: High When accessing: depend on the data	Analyzer does not operate correctly.	1

UT-7244 ANALOG BD



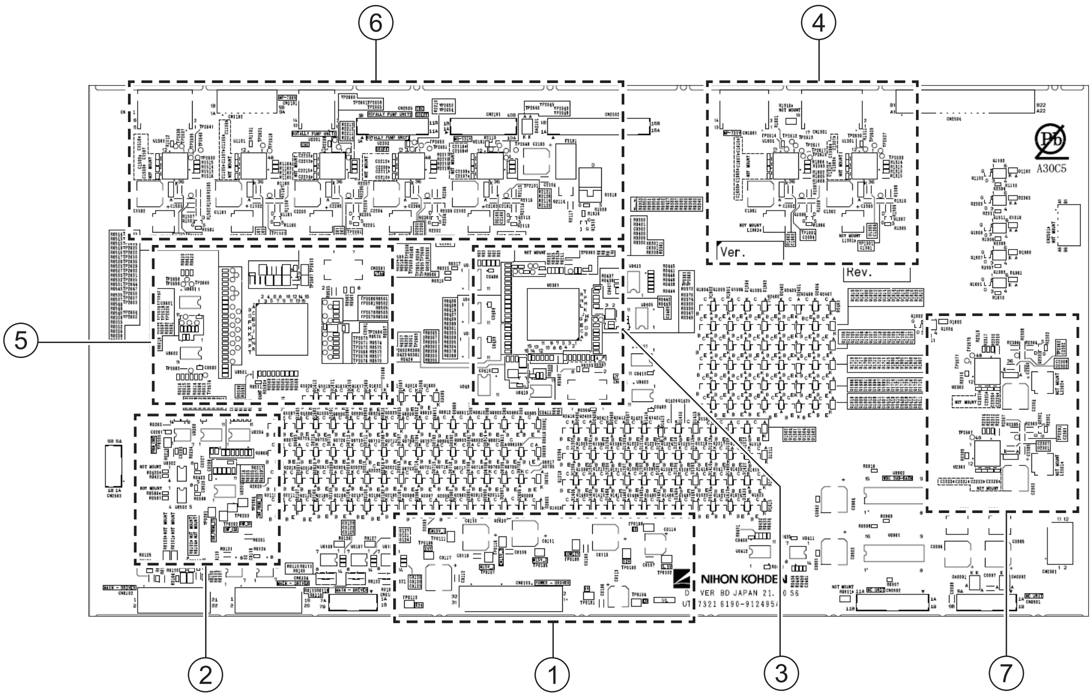
Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0101	–36 V (power voltage for data receiving part data measurement)	E36	–35.00 to –37.74 V	Cannot measure the data correctly.	1
TP0102	EA (GND for analog system circuit)	EA	0 V	—	1
TP0103	+5 V (digital system circuit power voltage)	ED	+4.93 to +5.30 V	Analyzer does not start.	1
TP0104	ED (GND for digital system circuit)	ED	0 V	—	1
TP0105	+15 V (analog system circuit power voltage)	EA	+14.55 to +15.75 V	Cannot measure the data correctly.	4
TP0106	–15 V (analog system circuit power voltage)	EA	–14.55 to –15.75 V	Cannot measure the data correctly.	1
TP0107	E36 (GND for data receiving part data measurement)	E36	0 V	—	1
TP0108	+5 V (analog part digital system circuit power voltage) (5 DIFF)	EA	+4.93 to +5.30 V	Cannot measure the 5 DIFF data correctly.	1
TP0109	+5 V (analog part digital system circuit power voltage) (CBC)	EA	+4.93 to +5.30 V	Cannot measure the RBC/ WBC (CBC) data correctly.	1
TP0403	RBC measurement data ANALOG BD input signal (R-IN)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the RBC and PLT data correctly.	6
TP0404	RBC electrode voltage ANALOG BD input signal (R-ELE)	EA	Normal times: Low When measuring the electrode voltage: 36 V or less	Cannot measure the electrode voltage of the RBC measurement part.	6
TP0405	Baseline correction signal of the RBC data receiving phase control part (R-ROB)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the RBC and PLT data correctly.	6
TP0406	RBC data receiving phase control part threshold level (RCLLEV)	EA	100 mV	Cannot measure the RBC and PLT data correctly.	6
TP0407	Threshold level detection signal of RBC data receiving phase control part (R-RBP)	EA	Normal times: Low When detected: High	Cannot measure the RBC and PLT data correctly.	6
TP0408	Received data after passing the RBC Bessel filter (R-FIL)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the RBC and PLT data correctly.	6
TP0409	Baseline release control signal when receiving the RBC data (R-GATE)	EA	Normal times: Low When detecting the data: High	Cannot measure the RBC and PLT data correctly.	6
TP0410	RBC hardware noise flag (R-NOISE)	EA	Normal times: Low When detecting the hardware noise: High	Cannot detect the RBC hardware noise.	6
TP0503	RBC threshold level (R-THR)	EA	Depend on the setting	Cannot measure the RBC and PLT data correctly.	3
TP0504	Received data after increasing the RBC setting sensitivity (R-ANA)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the RBC and PLT data correctly.	3
TP0505	RBC threshold detection flag (R-PLS)	EA	Normal times: Low When detected: High	Cannot measure the RBC and PLT data correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0506	RBC receiving data peak hold signal (R-PH)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the RBC and PLT data correctly.	3
TP0507	RBC peak detection (R-PKD)	EA	Normal times: Low When detected: High	Cannot measure the RBC and PLT data correctly.	3
TP0603	WBC (CBC) measurement data ANALOG BD input signal (W-IN)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the WBC (CBC) data correctly.	6
TP0604	WBC (CBC) electrode voltage ANALOG BD input signal (W-ELE)	EA	Normal times: Low When measuring the electrode voltage: 36 V or less	Cannot measure the electrode voltage of the WBC (CBC) measurement part.	5
TP0605	Baseline correction signal of the WBC (CBC) data receiving phase control part (W-ROB)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the WBC (CBC) data correctly.	5
TP0606	WBC (CBC) data receiving phase control part threshold level (WCLLEV)	EA	100 mV	Cannot measure the WBC (CBC) data correctly.	5
TP0607	Threshold level detection signal of WBC (CBC) data receiving phase control part (W-RBP)	EA	Normal times: Low When detected: High	Cannot measure the WBC (CBC) data correctly.	5
TP0608	Received data after passing the WBC (CBC) Bessel filter (W-FIL)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the WBC (CBC) data correctly.	6
TP0609	Baseline release control signal when receiving the WBC (CBC) data (W-GATE)	EA	Normal times: Low When detecting the data: High	Cannot measure the WBC (CBC) data correctly.	6
TP0610	WBC (CBC) hardware noise flag (W-NOISE)	EA	Normal times: Low When detecting the hardware noise: High	Cannot detect the WBC hardware noise.	5
TP0703	WBC (CBC) High threshold level (W-THR-H)	EA	Depend on the setting	Cannot measure the WBC (CBC) data correctly.	3
TP0704	WBC (CBC) Low threshold level (W-THR-L)	EA	Depend on the setting	Cannot measure the WBC (CBC) data correctly.	3
TP0705	Received data after increasing the WBC (CBC) setting sensitivity (W-ANA)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the WBC (CBC) data correctly.	3
TP0706	WBC (CBC) Low threshold detection flag (W-PLS-L)	EA	Normal times: Low When detected: High	Cannot measure the WBC (CBC) data correctly.	3
TP0707	WBC (CBC) High threshold detection flag (W-PLS-H)	EA	Normal times: Low When detected: High	Cannot measure the WBC (CBC) data correctly.	3
TP0708	WBC (CBC) receiving data peak hold signal (W-PH)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the WBC (CBC) data correctly.	3
TP0709	WBC (CBC) peak detection (W-PKD)	EA	Normal times: Low When detected: High	Cannot measure the WBC (CBC) data correctly.	3
TP0801	HGB measurement data	EA	Normal times: Low When detected: several V	Cannot measure the HGB correctly.	6
TP0802	WBC (CBC) AD converter receiving data	EA	Normal times: Low When detected: several V	Cannot measure the WBC (CBC) data correctly. Cannot measure the HGB correctly.	2

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0803	RBC AD converter receiving data	EA	Normal times: Low When detected: several V	Cannot measure the RBC and PLT data correctly.	3
TP0901	Receiving data before 5 DIFF FS peak hold (CL1)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	4
TP0902	5 DIFF FS measurement data ANALOG BD input signal (ANA1)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	4
TP0903	5 DIFF FS receiving data peak hold signal (PHA1)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	1
TP0904	Baseline correction signal of the 5 DIFF FS data receiving phase control part (RB1)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	4
TP0905	5 DIFF FS data receiving phase control part threshold level (RBTHR)	EA	460 mV	Cannot measure the 5 DIFF data correctly.	4
TP0906	Threshold level detection signal of the 5 DIFF FS data receiving phase control part (RBP)	EA	Normal times: Low When detected: High	Cannot measure the 5 DIFF data correctly.	1
TP0907	Baseline release control signal when receiving the 5 DIFF FS data (GATE)	EA	Normal times: Low When detecting the data: High	Cannot measure the 5 DIFF data correctly.	1
TP0908	Receiving data after passing the 5 DIFF FS Bessel filter (FIL1)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	4
TP1001	5 DIFF FL measurement data ANALOG BD input signal (ANA2)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	4
TP1002	Receiving data before the 5 DIFF FL peak hold (CL2)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	4
TP1003	Receiving data after passing the 5 DIFF FL Bessel filter (FIL2)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	4
TP1004	5 DIFF FL receiving data peak hold signal	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	1
TP1101	5 DIFF SD measurement data ANALOG BD input signal (ANA3)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	5
TP1102	Receiving data before the 5 DIFF SD peak hold	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	5
TP1103	Receiving data after passing the 5 DIFF SD Bessel filter (FIL3)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	5

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP1104	5 DIFF FL receiving data peak hold signal (PHA2)	EA	Normal times: Low When checking the measurement or circuit: pulse input	Cannot measure the 5 DIFF data correctly.	2
TP1201	5 DIFF FS threshold level (ANA1-THR)	EA	Depend on the setting	Cannot measure the 5 DIFF data correctly.	1
TP1202	Threshold level for 5 DIFF FS peak detection	EA	460 mV	Cannot measure the 5 DIFF data correctly.	2
TP1203	5 DIFF FS threshold detection flag (THP)	EA	Normal times: Low When detected: High	Cannot measure the 5 DIFF data correctly.	2
TP1204	5 DIFF FS peak detection (PKD)	EA	Normal times: Low When detected: High	Cannot measure the 5 DIFF data correctly.	2
TP1301	5 DIFF AD converter receiving data	EA	Normal times: Low When detected: several V	Cannot measure the 5 DIFF data correctly.	1
TP1401	Not used	—	—	—	5

UT-7321 DRIVER BD (Rev. AJ or Later)



Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0101	5 V	ED (TP0104)	4.93 to 5.30 V	DRIVER BD does not operate correctly.	1
TP0102	3.3 V	ED (TP0108)	3.21 to 3.46 V	DRIVER BD does not operate correctly.	1
TP0103	12 V	EDM12V (TP0109)	11.66 V to 12.50 V	The solenoid valve and sub bath do not operate correctly.	1
TP0104	ED (5 V ED terminal near the condenser)	ED (TP0108)	—	—	1
TP0105	M 15 V_2	EM15V_2 (TP0110)	14.63 V to 15.68 V	The solenoid valve does not operate correctly.	1
TP0106	24 V	E24 (TP0112)	21.24 V to 26.40 V	The motor, cap pierce door and heater do not work correctly.	1
TP0107	M 15 V_1	EM15V_1 (TP0111)	14.63 V to 15.68 V	The solenoid valve does not operate correctly.	1
TP0108	ED (+3.3 V ED terminal near the condenser)	ED (TP0108)	—	—	1
TP0109	EDM 12 V	EDM12V (TP0109)	—	—	1
TP0110	EM 15 V_2	EM15V_2 (TP0110)	—	—	1
TP0111	EM 15 V_1	EM15V_1 (TP0111)	—	—	1
TP0112	E24	E24 (TP0112)	—	—	1
TP0201	CNF_PROM4_CS (CS when MAIN BD accessing FLASH for DRV1)	ED (TP0104)	Normal times: High When accessing: Low	FPGA cannot be configured correctly.	2
TP0202	CNF_CLK (CLK signal when MAIN BD accessing FLASH for DRV1 and DRV2)	ED (TP0104)	Normal times: High At config: clock output	FPGA cannot be configured correctly.	2

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP0203	CNF_DO (Input data when MAIN BD accessing FLASH for DRV1 and DRV2)	ED (TP0104)	At config: data	FPGA cannot be configured correctly.	2
TP0204	CNF_PROM5_CS (CS when MAIN BD accessing FLASH for DRV2)	ED (TP0104)	Normal times: High When accessing: Low	FPGA cannot be configured correctly.	2
TP0205	PROM_CONT_5 (Change master for communicating with FLASH)	ED (TP0104)	MAIN BD master: High FPGA: master: Low	FPGA cannot be configured correctly.	2
TP0301	DRV1 debugging signal (DRV1 debugging terminal)	ED (TP0108)	—	—	3
TP0302	DRV1 debugging signal (DRV1 debugging terminal)	ED (TP0108)	—	—	3
TP0303	DRV1 debugging signal (DRV1 debugging terminal)	ED (TP0108)	—	—	3
TP0304	Not used (DRV1 debugging terminal)	ED (TP0108)	—	—	3
TP0305	Not used (DRV1 debugging terminal)	ED (TP0108)	—	—	3
TP0306	Not used (DRV1 debugging terminal)	ED (TP0108)	—	—	3
TP0307	Not used (DRV1 debugging terminal)	ED (TP0108)	—	—	3
TP1001	VREF for motor driver (motor current regulator) for lysing reagent pump	E24 (TP0112)	When rotating: about 0.71 V When current is down: about 0.29 V	Lysing reagent pump does not operate correctly.	4
TP1101	VREF for motor driver (motor current regulator) for diluter	E24 (TP0112)	When rotating: about 0.71 V When current is off: about 0.29 V	Diluter does not operate correctly.	6
TP1301	VREF for motor driver (motor current regulator) for sample pump	E24 (TP0112)	When rotating: about 0.71 V When current is off: about 0.29 V	Sample pump does not operate correctly.	4
TP1501	VREF for motor driver (motor current regulator) for sheath pump	E24 (TP0112)	When rotating: about 0.42 V When current is off: about 0.27 V	Sheath pump does not operate correctly.	6
TP2101	VREF for motor driver (motor current regulator) for cap pierce unit	E24 (TP0112)	When rotating: about 1.45 V When current is off: about 0.33 V	Cap pierce unit does not operate correctly.	6
TP2201	VREF for motor driver (motor current regulator) for rotary pump (for CBC)	E24 (TP0112)	When rotating: about 0.84 V When current is off: about 0.30 V	The rotary pump does not operate correctly	6
TP2202	VREF for motor driver (motor current regulator) for rotary pump (for 5 DIFF)	E24 (TP0112)	When rotating: about 0.84 V When current is off: about 0.30 V	The rotary pump does not operate correctly.	6
TP2301	VREF for motor driver (motor current regulator) for vertical sampler movement	E24 (TP0112)	When rotating: about 1.45 V When current is off: about 0.33 V	Sampler does not operate correctly.	7
TP2302	VREF for motor driver (motor current regulator) for horizontal sampler movermen t	E24 (TP0112)	When rotating: about 0.90 V When current is off: about 0.33 V	Sampler does not operate correctly.	7
TP2601	XFPGA_PROG2_3 (DRV1, DRV2 PROGRAM signals)	ED (TP0108)	Before config: Low When config starts: High	FPGA cannot be configured correctly.	5
TP2602	CNF_DONE_3 (DRV1 Configuration DONE)	ED (TP0108)	After config completion: High	FPGA cannot be configured correctly.	3

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2603	DRV1_INITN (DRV1 INITIAL signal)	ED (TP0108)	When config starts: High	FPGA cannot be configured correctly.	3
TP2604	XPRES_3 (DRV2 RESET)	ED (TP0108)	At reset: Low	FPGA cannot be configured correctly.	5
TP2605	XPCS_3 (DRV2 CS)	ED (TP0108)	When accessing: Low	FPGA cannot be configured correctly.	5
TP2606	XPRD_3 (DRV2 read strobe)	ED (TP0108)	When reading: Low	FPGA cannot be configured correctly.	5
TP2607	XPWR_3 (DRV2 write strobe)	ED (TP0108)	When writing: Low	FPGA cannot be configured correctly.	5
TP2608	P_CLK_3 (DRV2 CLK)	ED (TP0108)	24 MHz	FPGA cannot be configured correctly.	5
TP2609	CNF_DONE2_3 (DRV2 Configuration DONE)	ED (TP0108)	After config completion: High	FPGA cannot be configured correctly.	5
TP2610	DRV2_INITN (DRV1 INITIAL signal)	ED (TP0108)	When config starts: High	FPGA cannot be configured correctly.	5
TP2611	MT_DRV_RST1 (Reset signal for lysing pump motor driver)	ED (TP0108)	At electrical angle reset: High	Motor does not operate correctly.	4
TP2612	LYS_MT_EN_3 (Enable signal for lysing pump motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	4
TP2613	LYS-MT-CLK_3 (CLK signal for lysing pump motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	4
TP2614	LYS_MT_CW_3 (Direction of rotation setting for lysing pump motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	4
TP2615	LYS_MT_MODE1_3 (Excitation setting for lysing pump motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	4
TP2616	LYS_MT_MODE2_3 (Excitation setting for lysing pump motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2617	LYS_MT_MODE3_3 (Excitation setting for lysing pump motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	4
TP2618	LYS_MT_CDWN (Current down control for lysing pump)	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2619	MT_DRV_RST2 (Reset signal for diluter motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	6
TP2620	MD_MT_EN_3 (Enable signal for diluter motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	5
TP2621	MD-MT-CLK_3 (CLK signal for diluter motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	6
TP2622	MD_MT_CW_3 (Direction of rotation setting for diluter motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	5
TP2623	MD_MT_MODE1_3 (Excitation setting for diluter motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2624	MD_MT_MODE2_3 (Excitation setting for diluter motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2625	MD_MT_MODE3_3 (Excitation setting for diluter motor driver)	ED (TP0108)	See footnote.[1]	Motor does not operate correctly.	5
TP2626	MD_MT_CDWN (Current down control for diluter)	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2627	MT_DRV_RST1 (Reset signal for sample pump motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	4
TP2628	SAM_MT_EN_3 (Enable signal for sample pump motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	5
TP2629	SAM-MT-CLK_3 (CLK signal for sample pump motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	4
TP2630	SAM_MT_CW_3 (Direction of rotation setting for sample pump motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	4
TP2631	SAM_MT_MODE1_3 (Excitation setting for sample pump motor driver)	ED (TP0108)	See footnote.[1]	Motor does not operate correctly.	5
TP2632	SAM_MT_MODE2_3 (Excitation setting for sample pump motor driver)	ED (TP0108)	See footnote.[1]	Motor does not operate correctly.	5
TP2633	SAM_MT_MODE3_3 (Excitation setting for sample pump motor driver)	ED (TP0108)	See footnote.[1]	Motor does not operate correctly.	4
TP2634	SAM_MT_CDWN (Current down control for sample pump)	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2635	MT_DRV_RST2 (Reset signal for sheath pump motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	6
TP2636	SHE_MT_EN_3 (Enable signal for sheath pump motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	5
TP2637	SHE-MT-CLK_3 (CLK signal for sheath pump motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	6
TP2638	SHE_MT_CW_3 (Direction of rotation setting for sheath pump motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	6
TP2639	SHE_MT_MODE1_3 (Excitation setting for sheath pump motor driver)	ED (TP0108)	See footnote.[1]	Motor does not operate correctly.	6
TP2640	SHE_MT_MODE2_3 (Excitation setting for sheath pump motor driver)	ED (TP0108)	See footnote.[1]	Motor does not operate correctly.	6
TP2641	SHE_MT_MODE3_3 (Excitation setting for sheath pump motor driver)	ED (TP0108)	See footnote.[1]	Motor does not operate correctly.	6
TP2642	SHE_MT_CDWN (Current down control for sheath pump)	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2643	MT_DRV_RST1 (Reset signal for cap pierce unit motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	6

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2644	CAP1_MT_EN_3 (Enable signal for cap pierce unit motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	5
TP2645	CAP1-MT-CLK_3 (CLK signal for cap pierce unit motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	6
TP2646	CAP1_MT_CW_3 (Direction of rotation setting for cap pierce unit motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	6
TP2647	CAP1_MT_MODE1_3 (Excitation setting of cap pierce unit motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2648	CAP1_MT_MODE2_3 (Excitation setting of cap pierce unit motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	6
TP2649	CAP1_MT_MODE3_3 (Excitation setting of cap pierce unit motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	6
TP2650	CAP1_MT_CDWN (Current down control for cap pierce unit)	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2651	MT_DRV_RST2 (Reset signal for rotary pump (5 DIFF) motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	6
TP2652	MP1_MT_EN_3 (Enable signal for rotary pump (5 DIFF) motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	6
TP2653	MP1-MT-CLK_3 (CLK signal for rotary pump (5 DIFF) motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	6
TP2654	MP1_MT_CW_3 (Motor driver direction of rotation settings for rotary pump (5 DIFF))	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	6
TP2655	MP1_MT_MODE1_3 (Excitation setting of rotary pump (5 DIFF) motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2656	MP1_MT_MODE2_3 (Excitation setting of rotary pump (5 DIFF) motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2657	MP1_MT_MODE3_3 (Excitation setting of rotary pump (5 DIFF) motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2658	MP1_MT_CDWN (Current down control for rotary pump (5 DIFF))	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2659	MT_DRV_RST2 (Reset signal for rotary pump (CBC) motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	6
TP2660	MP2_MT_EN_3 (Enable signal for rotary pump (CBC) motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	6
TP2661	MP2-MT-CLK_3 (CLK signal for rotary pump (CBC) motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	6

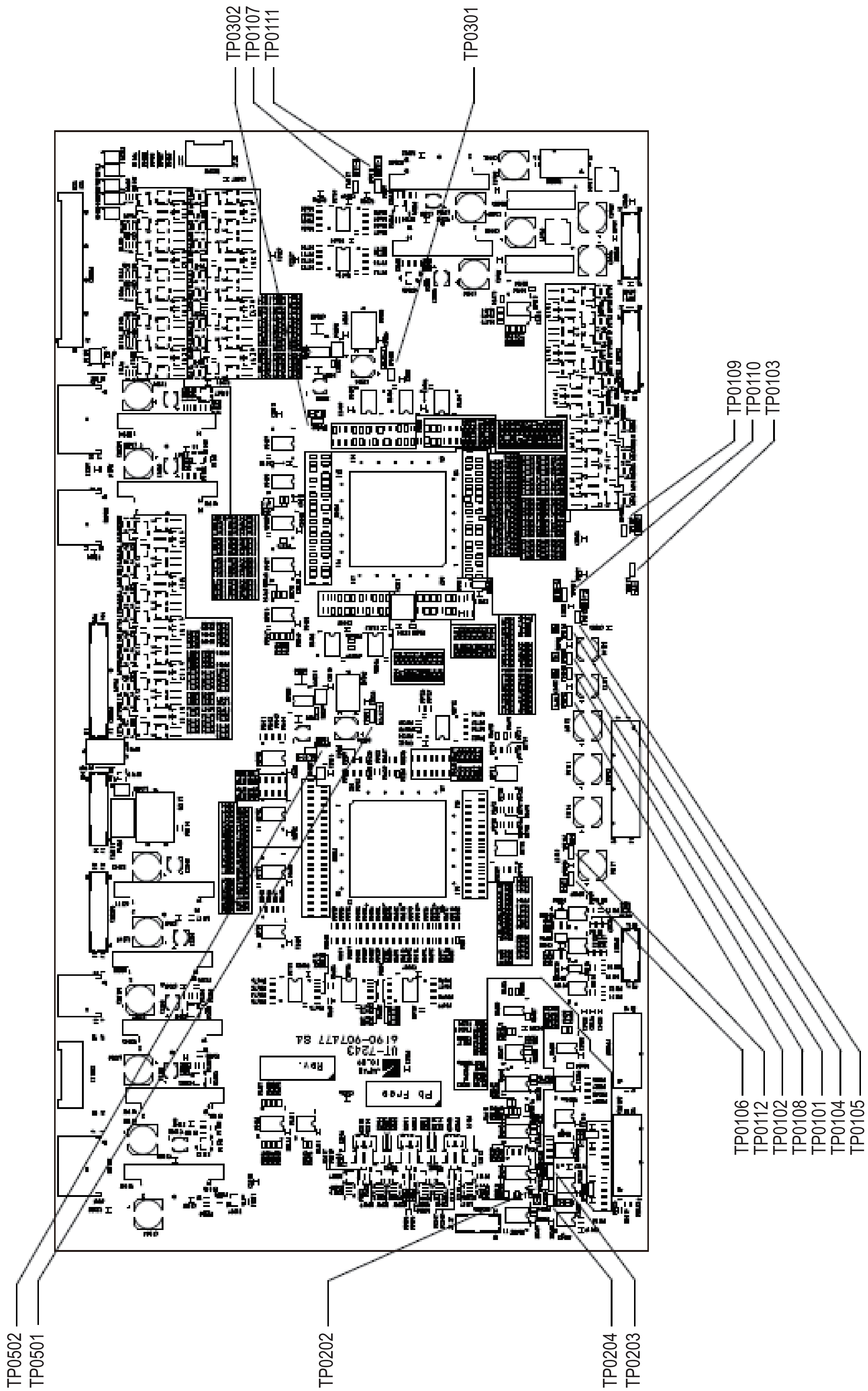
Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2662	MP2_MT_CW_3 (Direction of rotation setting for rotary pump (CBC) motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	5
TP2663	MP2_MT_MODE1_3 (Excitation setting for rotary pump (CBC) motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2664	MP2_MT_MODE2_3 (Excitation setting for rotary pump (CBC) motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2665	MP2_MT_MODE3_3 (Excitation setting for rotary pump (CBC) motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	6
TP2666	MP2_MT_CDWN (Current down control for rotary pump (CBC))	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2667	MT_DRV_RST3 (Reset signal for sampler vertical direction motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	7
TP2668	MS1_MT_EN_3 (Enable signal for sampler vertical direction motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	5
TP2669	MS1-MT-CLK_3 (CLK signal for sampler vertical direction motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	3
TP2670	MS1_MT_CW_3 (Direction of rotation setting for sampler vertical direction motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	5
TP2671	MS1_MT_MODE1_3 (Excitation setting of sampler vertical direction motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2672	MS1_MT_MODE2_3 (Excitation setting of sampler vertical direction motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2673	MS1_MT_MODE3_3 (Excitation setting of sampler vertical direction motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2674	MS1_MT_CDWN (Current down control for sampler vertical direction)	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5
TP2675	MT_DRV_RST3 (Reset signal for sampler horizontal direction motor driver)	ED (TP0108)	When electrical angle resets: High	Motor does not operate correctly.	7
TP2676	MS2_MT_EN_3 (Enable signal for sampler horizontal direction motor driver)	ED (TP0108)	Disabled: High Enabled: Low	Motor does not operate correctly.	5
TP2677	MS2-MT-CLK_3 (CLK signal for sampler horizontal direction motor driver)	ED (TP0108)	When motor is operating: clock output	Motor does not operate correctly.	7
TP2678	MS2_MT_CW_3 (Direction of rotation setting for sampler horizontal direction motor driver)	ED (TP0108)	When motor rotates clockwise: High When motor rotates counter clockwise: Low	Motor does not operate correctly.	5

Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect	BD Area
TP2679	MS2_MT_MODE1_3 (Excitation setting for sampler horizontal direction motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2680	MS2_MT_MODE2_3 (Excitation setting for sampler horizontal direction motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2681	MS2_MT_MODE3_3 (Excitation setting for sampler horizontal direction motor driver)	ED (TP0108)	See footnote. [1]	Motor does not operate correctly.	5
TP2682	MS2_MT_CDWN (Current down control for sampler horizontal direction motor)	ED (TP0108)	Normal times: Low When current is down: High	Motor does not operate correctly.	5

[1] Excitation changes in accordance with the combination of Mode 1, Mode 2 and Mode 3 signals in the following table.

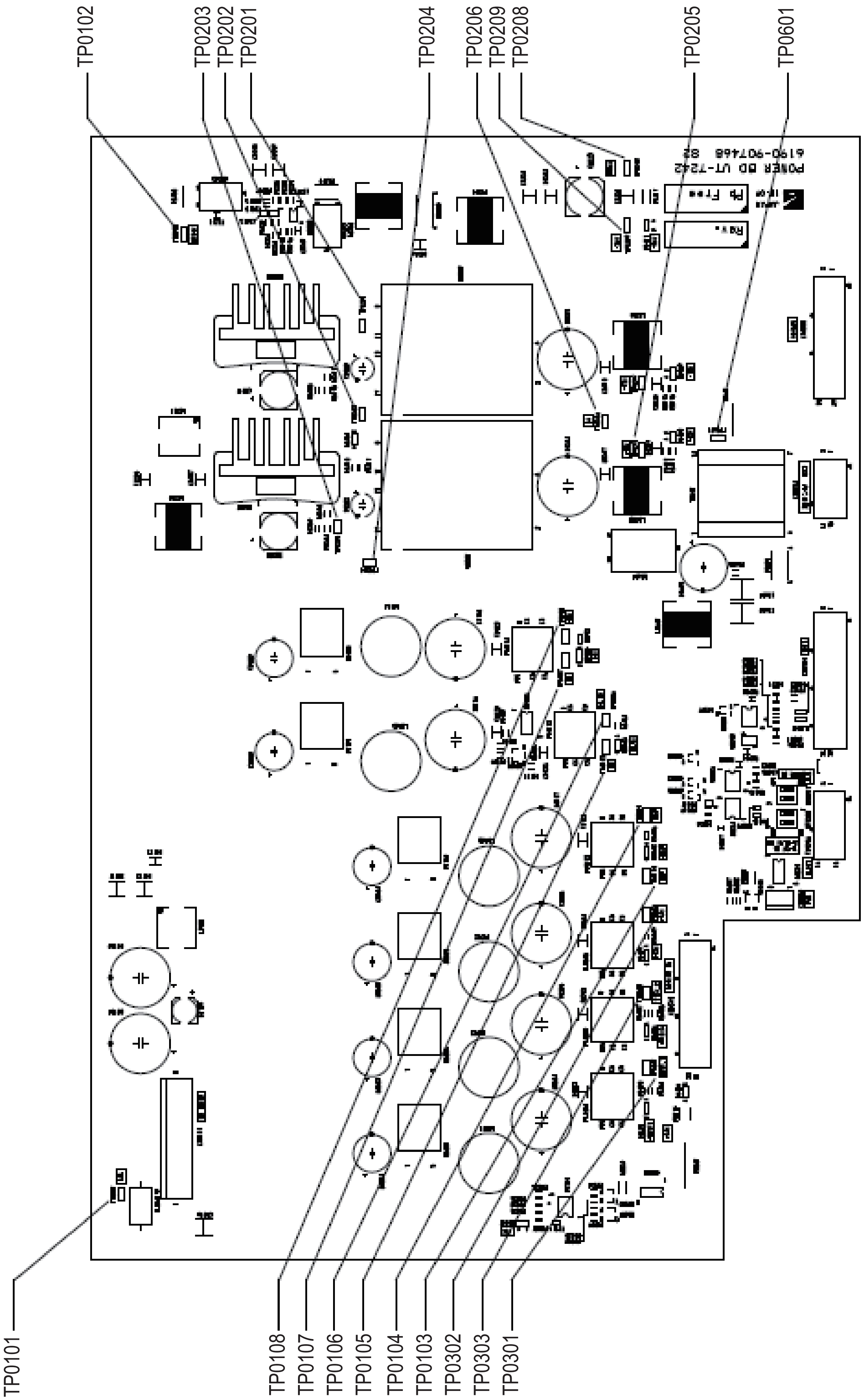
MODE1	MODE2	MODE3	Excitation
0	0	0	STANBY MODE
0	0	1	Full step
0	1	0	Half step
0	1	1	Quarter step
1	0	0	Half step
1	0	1	1/8 step
1	1	0	1/16 step
1	1	1	1/32 step

UT-7243 DRIVER BD (Rev. AA to Rev. AI)



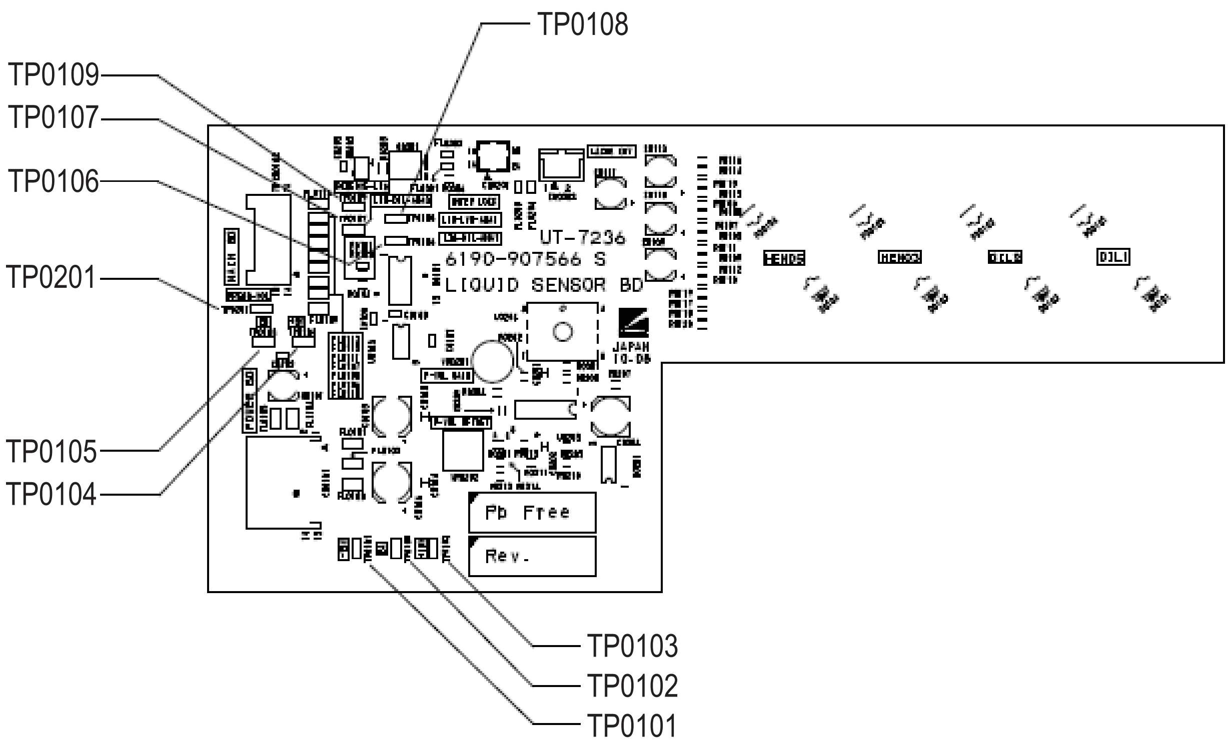
Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect
TP0101	+5 V (digital system circuit power voltage)	ED	+4.93 to +5.30 V	Analyzer does not start.
TP0102	+3.3 V (digital system circuit power voltage)	ED	+3.21 to +3.46 V	Analyzer does not start.
TP0103	+12 V (power voltage for three-way valve, pinch valve, buzzer, fan and LCD inverter)	E12	+11.66 to +12.50 V	Three-way valve, buzzer and fan do not operate. LCD backlight is dark. Analyzer does not operate correctly.
TP0104	ED (GND for digital system circuit)	ED	0 V	—
TP0105	+15 V (power voltage for two-way valve) 2	EM15V_2	+14.63 to +15.68 V	Two-way valve does not operate. Analyzer does not operate correctly.
TP0106	+24 V (power voltage for motor)	ED	+21.24 to +26.40 V	Motor does not start. Analyzer does not operate correctly.
TP0107	+15 V (power voltage for two-way valve) 1	EM15V_1	+14.63 to +15.68 V	Two-way valve does not operate. Analyzer does not operate correctly.
TP0108	ED (GND for digital system circuit)	ED	0 V	—
TP0109	EDM12V (GND for three-way valve, pinch valve, buzzer, fan and LCD inverter)	E12	0 V	—
TP0110	EM15V_2 (GND for two-way valve)	EM15V_2	0 V	—
TP0111	EM15V_1 (GND for two-way valve)	EM15V_1	0 V	—
TP0112	E24 (GND for motor)	E24	0 V	—
TP0201	Chip select for FPGA data storage ROM download (DRIVER BD control FPGA1)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.
TP0202	ROM clock for CPLD → FPGA	ED	When accessing the FPGA ROM: 3.125 MHz	Cannot download the FPGA data correctly.
TP0203	ROM download serial data for CPLD → FPGA	ED	Normal times: High When receiving data: serial data	Cannot download the FPGA data correctly.
TP0204	Chip select for FPGA data storage ROM download (DRIVER BD control FPGA2)	ED	Normal times: High When selecting ROM: Low	Cannot download the FPGA data correctly.
TP0205	Switch configuration or download of FPGA data	ED	Config: Low Download: High	Cannot download the FPGA data correctly.
TP0301	FPGA internal circuit supplemental power (2.5 V) (DRIVER BD control FPGA1)	ED	2.4 to 2.6 V	Cannot operate correctly.
TP0302	FPGA core power (1.2 V) (DRIVER BD control FPGA1)	ED	1.19 to 1.25 V	Cannot operate correctly.
TP0501	FPGA internal circuit supplemental power (2.5 V) (DRIVER BD control FPGA2)	ED	2.4 to 2.6 V	Cannot operate correctly.
TP0502	FPGA core power (1.2 V) (DRIVER BD control FPGA2)	EA	1.19 to 1.25 V	Cannot operate correctly.

UT-7242 POWER BD



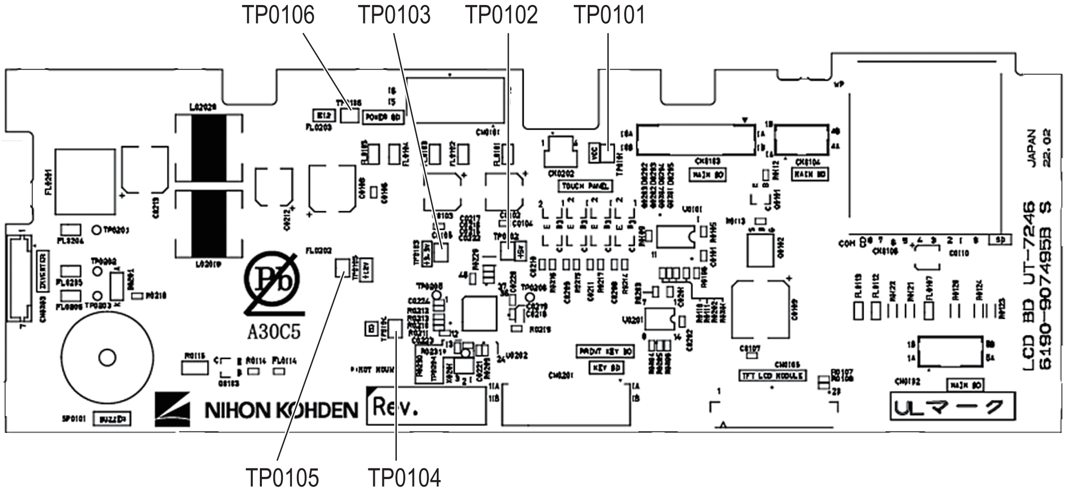
Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect
TP0101	E24	E24	0 V	—
TP0102	DC 24 V (switching power output)	E24	+21.24 to +26.40 V	Analyzer does not start.
TP0103	EDP (GND for internal printer power)	EDP	0 V	—
TP0104	+5 VP (power voltage for internal printer)	EDP	+4.84 to +5.30 V	Internal printer does not operate.
TP0105	ED (GND for digital system circuit)	ED	0 V	—
TP0106	+3.3 V (digital system circuit power voltage)	ED	+3.21 to +3.46 V	Analyzer does not start.
TP0107	ED (GND for digital system circuit)	ED	0 V	—
TP0108	+5 V (digital system circuit power voltage)	ED	+4.93 to +5.30 V	Analyzer does not start.
TP0201	+22 V (voltage for generate the analog power voltage –15 V)	E24	+21.14 to +22.43 V	Cannot measure the data correctly.
TP0202	E24	E24	0 V	—
TP0203	+22 V (voltage for generate the analog power voltage +15 V)	E24	+21.14 to +22.43 V	Cannot measure the data correctly.
TP0204	E24	E24	0 V	—
TP0205	+15 V (analog system circuit power voltage)	EA	+14.55 to +15.75 V	Cannot measure the data correctly.
TP0206	EA (GND for analog system circuit)	EA	0 V	—
TP0207	–15 V (analog system circuit power voltage)	EA	–14.55 to –15.75 V	Cannot measure the data correctly.
TP0208	E36 (GND for data receiving part data measurement)	E36	0 V	—
TP0209	–36 V (power voltage for data receiving part data measurement)	E36	–35.00 to –37.74 V	Cannot measure the data correctly.
TP0301	+15 V (power voltage for two-way valve) 1	EM15V_1	+14.63 to +15.68 V	Two-way valve does not operate. Analyzer does not operate correctly.
TP0302	+12 V (power voltage for three-way valve, pinch valve, buzzer, fan and LCD inverter)	E12	+11.66 to +12.50 V	Three-way valve, buzzer and fan do not operate. LCD backlight is dirk. Analyzer does not operate correctly.
TP0303	+15 V (power voltage for two-way valve) 2	EM15V_2	+14.63 to +15.68 V	Two-way valve does not operate. Analyzer does not operate correctly.
TP0601	Voltage for generating the clog removing voltage	ED	About 100 to 170 V	Cannot generate the clog removing voltage.

UT-7236 LIQUID SENSOR BD



Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect
TP0101	–15 V (analog system circuit power voltage)	EA	–14.55 to –15.75 V	Cannot measure the data correctly.
TP0102	EA (GND for analog system circuit)	EA	0 V	—
TP0103	+15 V (analog system circuit power voltage)	EA	+14.55 to +15.75 V	Cannot measure the data correctly.
TP0104	+5 V (digital system circuit power voltage)	ED	+4.93 to +5.30 V	Analyzer does not start.
TP0105	ED (GND for digital system circuit)	ED	0 V	—
TP0106	Liquid sensor detection signal (detergent)	ED	No liquid: 3.5 V or more With liquid: 1.5 V or less	Analyzer does not operate correctly.
TP0107	Liquid sensor detection signal (Isotonac3)	ED	No liquid: 3.5 V or more With liquid: 1.5 V or less	Analyzer does not operate correctly.
TP0108	Liquid sensor detection signal (Hemoynac3N)	ED	No liquid: 3.5 V or more With liquid: 1.5 V or less	Analyzer does not operate correctly.
TP0109	Liquid sensor detection signal (Hemolynac5)	ED	No liquid: 3.5 V or more With liquid: 1.5 V or less	Analyzer does not operate correctly.
TP0201	Pressure data	EA	Normal times: about 3.0 V Abnormal sheath pressure: 4.5 V or more Abnormal pressure sensor: 1.0 V or less	Analyzer does not operate correctly.

UT-7246 LCD BD



Symbol Number	Check Purpose	Corresponding Ground Pin	Judging Standard	Extent of the Effect
TP0101	Vcc voltage	ED (TP0104)	3.21 V to 3.46 V	Analyzer cannot start.
TP0102	5 V voltage	ED (TP0104)	4.93 V to 5.30 V	Analyzer cannot start. Touch panel does not respond.
TP0103	3.3 V voltage	ED (TP0104)	3.21 V to 3.46 V	Analyzer cannot start. LCD does not display correctly.
TP0104	ED	—	—	—
TP0105	12V (Buzzer, fan, LCD backlight)	E12 (TP0106)	11.66 V to 12.50 V	Buzzer does not start operate. LCD is dark.
TP0106	E12 (Buzzer, fan, LCD backlight)	—	—	—

6 Hazards

Overview

Operation, maintenance, and servicing of automated hematology systems may expose individuals to potential safety and health hazards. All work must be performed as described in this operator’s manual or as directed by your Nihon Kohden representative.

This section provides precautionary warnings and information necessary for the safe use of the analyzer system. Supplementary warnings are inserted throughout this manual and on the analyzer to alert personnel to potential hazards. Whenever hazard symbols are encountered on the analyzer, users must consult the operator’s manual to determine the nature of the potential hazard and actions that must be taken.

The standard warning conventions including signal words (e.g., caution) and symbols are described below. Safety symbols appear next to signal words that identify hazards.

Warning Conventions

Signal Words

WARNING:	A warning alerts the user to possible injury or death associated with the use or misuse of the analyzer.
CAUTION:	A caution alerts the user to possible injury or problems with the analyzer associated with its use or misuse such as analyzer malfunction, analyzer failure, damage to the analyzer, or damage to other property.
NOTE:	A note provides specific information, in the form of recommendations, prerequirements, alternative methods or supplemental information.

Safety Icons

⚠	The general hazard symbol identifies an activity or area that may present a hazard to personnel or equipment.
☣	The biohazard symbol identifies an activity or area where personnel may be exposed to infectious substances if procedural or engineering controls are not observed.

Hazard Information and Precautions

General

Automated hematology analyzers require the handling of whole blood and blood components by laboratory personnel. In addition, personnel must conduct maintenance to ensure proper performance of the analyzer. These activities result in potential contact with infectious substances and other hazards. The following are warnings, precautions, and standard practices to help prevent injury.

> ⚠ **CAUTION**
> If the analyzer is used or modified in a manner not specified by the manufacturer, the protection provided by the analyzer may be impaired.

Biohazards

> ⚠ **WARNING**
> Potential Biohazard. Consider all clinical specimens, reagents, controls, surfaces, or components that contain or have contacted blood, serum, or other bodily fluid as potentially infectious. Wear gloves, lab coats, and safety glasses, and follow other biosafety practices as specified in the OSHA Bloodborne Pathogen Rule (29 CFR Part 1910.1030)1 or other equivalent biosafety procedures.

> ⚠ **WARNING**
> Potential Biohazard. The cap pierce nozzle is sharp and potentially contaminated with infectious material. Avoid contact with the tip of the probe.

Spills of potentially infectious materials should be cleaned up in accordance with established biosafety practices. A generally accepted procedure for cleaning such spills is to absorb the spill with toweling or other absorbent material, wipe the area with an appropriate tuberculoidal disinfectant such as 0.5% sodium hypochlorite solution (refer to formula in “Decontamination Protocol” in Section 9).

Prior to maintenance, service, or shipping, the analyzer should be decontaminated in accordance with the procedures specified in “Decontamination Protocol” and/or “Strong and Transporting the Analyzer” in Section 9 as appropriate. Remove and dispose of contaminated disposables in accordance with local, state, and federal regulations.

Handling and Disposing of Biohazardous Material

Dispose of liquid and solid waste in accordance with local, state, and federal regulations. Probes, broken glass, and other sharps that are contaminated with potentially infectious substances should be collected in a “sharps” container for disposal as regulated medical waste. Contaminated gloves, wipes, swabs, and other disposables should be placed in a standard medical waste container.

Chemical Hazards

Prevent exposure to chemicals used in the operation and maintenance of the analyzer (including reagents) by using appropriate personal protective equipment, work procedures, and information on Material Safety Data Sheets (MSDS). For information or Material Safety Data Sheets (MSDS) contact your Nihon Kohden representative. Refer to Section 2 “Installation Procedures and Special Requirements” for an installation procedure for chemical containers.

Electrical Hazards

Basic electrical hazard awareness is essential to the safe operation of any hematology analyzer. To ensure safe operation of the analyzer:

> ⚠ **CAUTION**
> Electrical Hazard. Do not disconnect any electrical connection while the power is ON. Follow instructions for correctly powering OFF the analyzer and all connected equipment before performing maintenance on parts which require protective covers to be removed for access. Use only approved power cords and electrical accessories, such as those supplied with the analyzer, or provided by Nihon Kohden, to protect against electrical shock.

> ⚠ **CAUTION**
> Electrical Hazard. Turn OFF the power to the analyzer and disconnect the power cord before removing any analyzer panel that is securely fastened in place by screws.

> ⚠ **CAUTION**
> If the analyzer is used or modified in a manner not specified by the manufacturer, the protection provided by the analyzer may be impaired.

- Periodically inspect electrical cabling into and on the analyzer for signs of wear or damage.
- When moving equipment, lift all power cables clear of all system components.
- Keep liquids away from all electrical connectors (such as electrical outlets) or communication connectors (such as the serial sockets).
- Keep the floor dry.
- The electrical circuit spacing of the analyzer is based on pollution degree (2) and altitude [up to 3000 m (9800 ft)] as per IEC 61010-1:2010+Amendment 1:2016. Pollution degree 2 is defined as normally only nonconductive pollution occurs, temporary conductivity caused by condensation is to be expected.

Physical and Mechanical Hazards

Observe these basic rules for mechanical safety:

- Carefully follow all procedures and instructions.
- Keep all protective covers in place when processing specimens.
- Never allow any part of your body to enter the region of movement of any mechanical component when the analyzer is operating.
- Use caution when performing any maintenance procedure by opening the front panel, as moving parts can pinch.
- Do not wear articles of clothing or accessories that could catch on the system. Keep pockets free of items that could fall into the system. Keep long hair from catching on the system.
- Wear powder-free gloves and safety glasses when maintaining or repairing the analyzer.
- Use assistance or a mechanical lifting device when moving or lifting the analyzer.
- Use proper lifting techniques when moving reagent containers.

Reference

Occupational Safety and Health Administration, 29 CFR Part 1910.1030. Department of Labor. *Occupational Exposure to Bloodborne Pathogens*.

7 Maintenance

To be Replaced Periodically

- Sampling nozzle

  Replace the sampling nozzle once a year. It may affect the measurement accuracy.

- Pinch valve tube

  Replace the pinch valve tube once a year. It may affect the measurement accuracy. For replacement, contact your Nihon Kohden representative.

- Rinse O ring

  Replace the rinse O ring once a year. It may affect the measurement accuracy. For replacement, contact your Nihon Kohden representative.

- Pump tube

  Replace the pump tube every four months or every 3,000 measurements. It may affect the measurement accuracy.

- Filter

  Replace the filter every 1,000 measurements. It may affect the measurement accuracy.

- Solenoid valve (replace some valves according to the status of use)

  Replace the solenoid valve every 5 years or 25,000 measurements. It may affect the measurement accuracy. The number of measurement can be checked on the third page of the User Maintenance window. For replacement, contact your Nihon Kohden representative.

Refer to the following list for the code number and supply code of the periodic replacement parts.

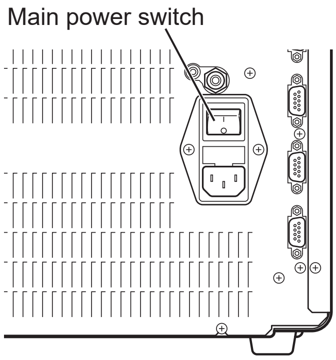
Periodic Replacement Parts	Name	Model/ Code No.	Supply Code
Sampling nozzle (two nozzles)	Sample tube assy	YZ-0341	T479A
Pinch valve tube	Pharmed tube 1 × 3 - 260	6114-924208	—
Pinch valve tube	Pharmed tube 100	6114-094961	—
Rinse O ring	PIERCE PACKING	6114-937377	—
Pump tube	Pump tube assy	YS-001B1	T462
Filter (10 filters)	Hemoglobin filter assy	YS-002B2	T802
Solenoid valve	—	—	—

Replacing the Fuses

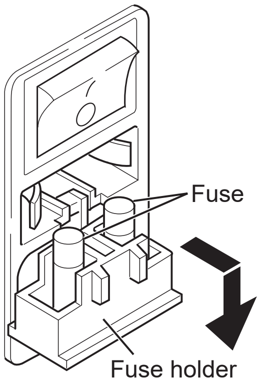
Maintenance item: **Fuse. 02183.15MXP 3.15A**
(Repair Part No. :104638A)

Replace the fuses

1. Turn off the main power switch on the rear panel of the analyzer and disconnect the power cord from the 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.

Periodic Maintenance Check Procedure

Preparation

According to Section 2 “Preparation” of the operator’s manual, turn on the power and check the obtained data from the hematology analyzer before the periodic maintenance check by counting the diluent and MEK-5D hematology control. The obtained data must be printed out with the optional printer or written for the record of the maintenance check. Also check that the “Priming” operation is normal after turning on the power. Prepare a container, syringe and CLEANAC•3 detergent to clean fluid path components such as aperture cap. When calibration in capillary mode is required, prepare the T857 sample cup and T812 or T813 micro cap.

Appearance

Check that there is no damage or fluid leakage on the hematology analyzer.

Safety

Required instrument: Nihon Kohden LCC-1101 leakage current checker

NOTE: Performing a safety inspection requires a Nihon Kohden specified LCC-1101 leakage current checker. Set the 2nd ED/3rd ED switch on the LCC-1101 to “3rd ED”.

For details on using the LCC-1101 leakage current checker, refer to the operator’s manual for the leakage current checker.

Checking the power cord

- Check that there is no damaged AC plug and exposed wire on the power cord.
- Check that the 3-pin plug type power cord is used and the 3 pins and plug housing are not deformed.
- Check that the resistance of the protective ground line of the power cord is 0.1 Ω or less by using an earth tester or check the continuity with a multimeter.

Check that the earth leakage current is 0.5 mA or less under normal condition. Check that the earth leakage current is 1.0 mA or less under each single fault condition.

Reagents

Check that Nihon Kohden recommended diluent, detergent and hemolysing reagent are used. Check that these reagents are used before the expiration date.

Cleaning/Replacing

1. Press the Strong clean key on the Operation screen to start strong cleaning.
2. Disconnect the diluent, detergent and reagent tubes other than the waste fluid tube from the right side panel of the hematology analyzer.
3. Press the Drain all key on the Operation screen to drain all the fluid inside the hematology analyzer.
4. Turn off the main power switch on the rear panel.
5. Open the front cover according to the procedure described in “Opening the Front Cover” of Section 4 “Disassembly and Assembly”.
6. Perform the following checking, cleaning and replacing.

Cleaning the rinse unit

Clean the rinse unit according to the procedure described in “Checking and Cleaning the Rinse Unit and Sampling Nozzles” in this section.

Cleaning the cap pierce needle

Clean the cap pierce needle according to the procedure described in “Checking and Cleaning the Cap Pierce Rinse Unit, Sampling Nozzle and Cap Pierce Needle” in this section.

Replacing the filters

Replace the filters with new ones according to the procedure described in “Checking, Cleaning or Replacing the Filters” in this section.

Replacing the pump tubes

Replace the pump tubes with new ones according to the procedure described in “Checking and Replacing the Pump Tubes” in this section.

Cleaning the sub baths, measurement baths and sampling cup

Clean the sub baths, measurement baths and sampling cup according to the procedure described in “Checking and Cleaning the Sub Baths, Measurement Baths, and Sampling Cup” in this section.

Cleaning the aperture caps

Clean the aperture caps according to the procedure described in “Cleaning the Aperture Caps” in this section.

Cleaning the touch screen

Clean the touch screen with a soft cloth moistened with 80% alcohol.

Checking and replacing the sampling nozzles

Check the sampling nozzles and replace them with new ones if they are damaged or PLT background noise increases according to the procedure described in “Checking and Replacing the Sampling Nozzles” in this section.

Sensor Monitor Screen

1. Turn on the main power switch on the rear panel.
2. While pressing the Reset key on the front panel, press the Power key on the front panel. The power turns on without priming. The Ready screen appears.
3. Press the System key on the screen. The System screen appears.
4. Press the Service key on the System screen. The Service screen appears.
5. Press the Sensor Monitor key on the Service screen. The Sensor Monitor screen which displays each sensor output voltage appears.
6. Check that the sensor output voltages of WBC Up, WBC Lo 360, WBC Lo 500, RBC Up, RBC Lo 360, RBC Lo 500, Diluent 1, Diluent 2, Ly Hemo3 and Ly Hemo5 are 3.5 V or more under no fluid condition. Write down each voltage on the check sheet.
7. Connect the diluent, detergent and reagent tubes to the right side panel of the hematology analyzer.
8. Press the Operation key on the screen. The Operation screen appears.
9. Press the Refill all key on the Operation screen. The screen returns to the Ready screen after priming operation is completed.
10. Check that the following sensor output voltages are displayed on the Sensor Monitor screen. Write down each voltage on the check sheet. If there is a sensor output voltage out of the acceptable range, adjust the sensor output voltage for the acceptable range according to Section 5 “Adjustment”.

    WBC Up, WBC Lo 360, WBC Lo 500, RBC Up, RBC Lo 360, RBC Lo 500, Diluent 1, Diluent 2, Ly Hemo3 and Ly Hemo5: 1.5 V or less

    ELECTRODE: 17.7 V to 18.3 V

    HGB LED ON: 1.5 V to 4.5 V (Adjust this voltage for 2.9 V to 3.1 V if it is out of 1.5 V to 4.5 V.)

    HGB LED OFF: 0.5 V or less

Circuit Check Screen

1 Press the Operation key on the screen. The Operation screen appears.

2 Press the Circuit Check key on the Operation screen. The Circuit check screen which displays the check result of specified measurement parameters appears.

3 Check that the following values are displayed on the Circuit Check screen.

WBC: 8.0±5%

RBC: 1.6±5%

HGB ON: 1.5 V to 4.5 V

HGB OFF: 0.5 V or less

MCV: 100 ±15%

PLT: 160 ±5%

Sensitivity and threshold

WBC: 5 (sensitivity), 4 (threshold)

RBC: 5 (sensitivity), AT (AUTO) or 5 (threshold)

PLT: 5 (threshold)

Background Noise

1 Press the count switch to count the diluent so that the background noise is checked. Refer to “Measuring Background Noise” in Section 2 “Preparation” of the operator’s manual. The measurement result appears.

2 Check that the following values are displayed on the screen.

WBC: 0.2 or less (× 103/µL)

RBC: 0.05 or less (× 106/µL)

HGB: 0.1 or less (g/dL)

PLT: 10 or less (× 103/µL)

TOC: 100 or less

Measuring the 7µm Polymer Microsphere Suspensions

1 Measure the 7µm polymer microsphere suspensions according to the procedure described in “Performing an Optical Adjustment” in Section 5 “Operating Instructions” of the operator’s manual.

2 Check that the CV of FS and FL are 7% or less on the Adj. Flowcell screen. If the CV is more than 7%, clean the flow cell, measure the 7µm polymer microsphere suspensions again, and adjust the flow cell position.

Measuring the MEK-5DN Hematology Control

1. Write down the lot number of the MEK-5DN hematology control on the check sheet.
2. Check the reproducibility by measuring the MEK-5DN hematology control. Refer to “Counting the Hematology Control” in Section 11 “Quality Control” of the operator’s manual.
3. Check that the obtained results are within the acceptable range. If the obtained data is out of the range, go to “New Calibration Coefficients”.

Current Calibration Coefficients

1. Press the Calibration key on the screen. The Calibration screen appears.
2. Measure the hematology control according to the facility’s requirement. The current calibration coefficients are displayed on the screen.
3. Write down the calibration coefficients on the check sheet if the obtained results are within the acceptable range at “Measuring the MEK-5DN Hematology Control” in this section.

New Calibration Coefficients

1. Write down the lot number of the MEK-3DN hematology control on the check sheet.
2. Measure the MEK-3DN hematology control three times. Refer to Section 6 “Calibration” of the operator’s manual.
3. Calibrate the hematology analyzer by entering the new calibration coefficient or measured data. Refer to Section 6 “Calibration” of the operator’s manual.

   NOTE: Before entering the new calibration coefficient or measured data, ask the customer if you can change the setting. Some customers calibrate the hematology analyzer for data consistency with other manufacturers’ hematology analyzers.

Software Version

1. Press the System key on the screen. The System screen appears.
2. Press the User Maint. key on the System screen. The User Maintenance screen appears.
3. Press the arrow key to display the fourth page.
4. Write down the software version on the check sheet.

Checking the Operations

Touch screen

Check the touch screen function. Refer to “Calibrating Touch Screen” in this section.

Date and time

Check the date and time settings. Refer to “Setting Date and Time” in Section 5 “Operating Instructions” of the operator’s manual.

Automatic cleaning operation

Check that the automatic cleaning operations are normal during this maintenance check.

Fluid leakage

Check that there is no fluid leakage on the hematology analyzer, especially after each automatic cleaning operation.

Dispense operation

Check that the constant volume of the diluent is properly dispensed when pressing the Dispense key on the screen in pre-dilution mode.

Open/Closed mode selection operation

Check that the cap pierce unit properly works when selecting the Open mode or Closed mode.

Built-in Printer Unit Operation (When the printer is installed)

Check that pressing the Feed key on the front panel feeds the recording paper and there is no dot missing on the paper by pressing the Print key on the front panel.

External Printer Unit Operation (When the external printer is connected)

Check that the paper feed operation properly works on the external printer and there is no dot missing on the paper.

Bar Code Reader Operation (When the bar code reader is installed)

1. Clean the light emitter and detector parts with a cotton swab moistened with 80% alcohol.
2. Check that the bar code reading operation properly works.

Others

Write down any other points on the check sheet.

Displaying User Maintenance Screen

General

You can display the total operating time, total number of counts, and number of counts that filters and pump tubes are used to determine the maintenance schedule.

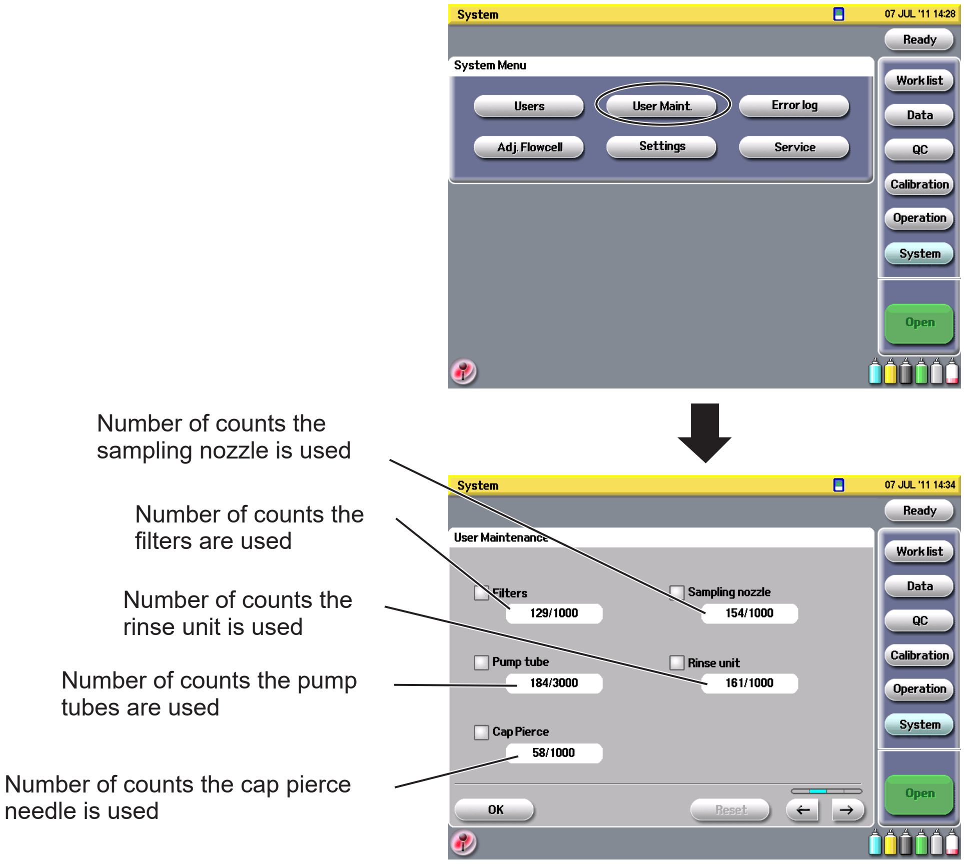
When filters or tubes are used more than the following number of sample counts, the messages appears on the Ready screen to prompt you to check and replace them.

Filters:	1,000 counts
Pump tubes:	3,000 counts
Cap pierce needle:	1,000 counts

Displaying the User Maintenance Screen

1 Press the User Maint. key on the System screen to display the User Maintenance screen.

2 Press the arrow key to display the second page.



The screen shows the number of counts that filters, pump tubes, cap pierce needle, sampling nozzle and rinse unit are used.

After checking and replacing filters, pump tubes, cap pierce needle, sampling nozzle and rinse unit, reset the counts to zero by pressing the Reset key.

3 Press the OK key to return to the System screen.

Replacing Filters

Materials Required

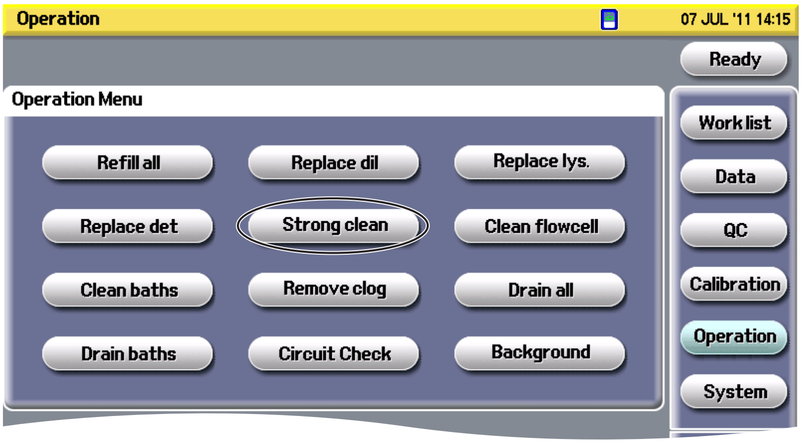
- Powder-free gloves, lab coat, safety glasses
- Phillips screwdriver
- Tweezers

Procedure

Replace the filters when they are clogged, dirty and/or after every 1,000 sample counts.

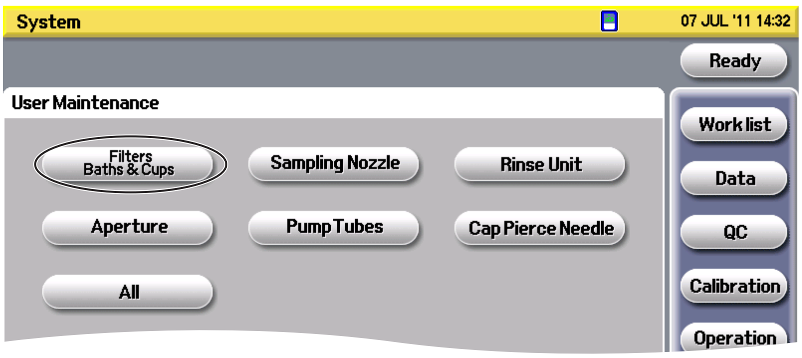
Replace the filter packing when they are dirty, deformed or damaged. For replacing the filter packing, contact your Nihon Kohden representative.

1 Press the Strong clean key on the Operation screen to perform strong cleaning to disinfect inside the analyzer. Refer to “Strong Cleaning” in Section 5 of the operator’s manual.

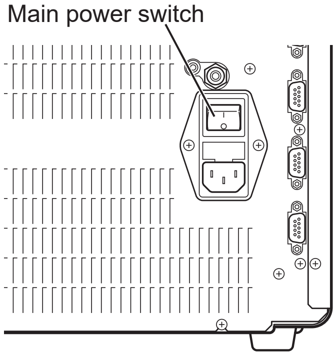


2 Press the Filters Baths & Cups key on the User Maintenance screen to drain the fluid from the analyzer.

Refer to “Displaying the User Maintenance Screen” in this section.

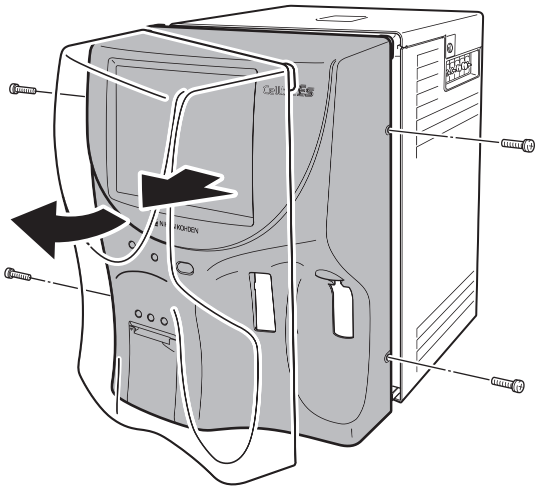


3 Turn off the main power switch on the rear panel of the analyzer and disconnect the power cord from the AC outlet.

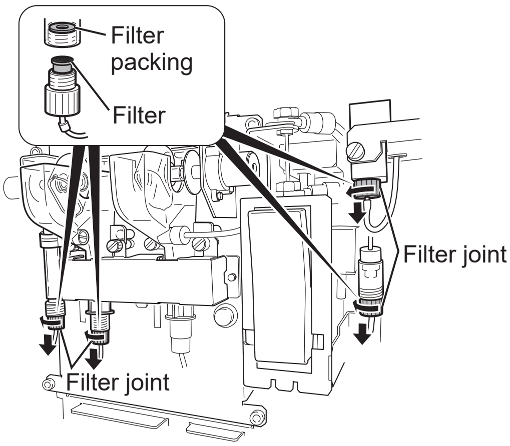


4 Remove the two screws on each side of the front cover of the hematology analyzer.

5 Open the front cover by pulling it from the right side. Check that the tube holder is closed before opening the front cover.

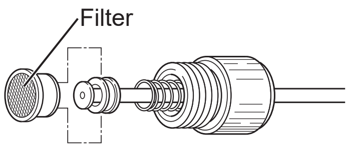


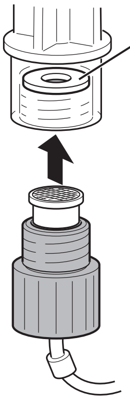
6 Remove the 4 filter joint assemblies by turning the tube connectors.



7 Remove the filter from each assembly. Use tweezers to remove any dust from the filter. If it is still dirty, replace it with a new one.

Replace the filter packing when they are dirty, deformed or damaged. For replacing the filter packing, contact your Nihon Kohden representative.





8 Reattach the filter joint assemblies to the bottom of the RBC measurement bath and air trap. Make sure that the tube with the same number as the number label on the attaching part is connected back to the original position. Only finger tighten the filter joint.

NOTE
- When attaching the filter joint assembly, be careful not to bend or damage the filter packing at the bottom of the measurement bath.
- If there is leakage noted after installment of the filter, check that there are no scratches or damage around the filter. Damage may occur if a component is overtightened.

9 Reattach the front cover and fasten it with the two screws on each side of the front cover.

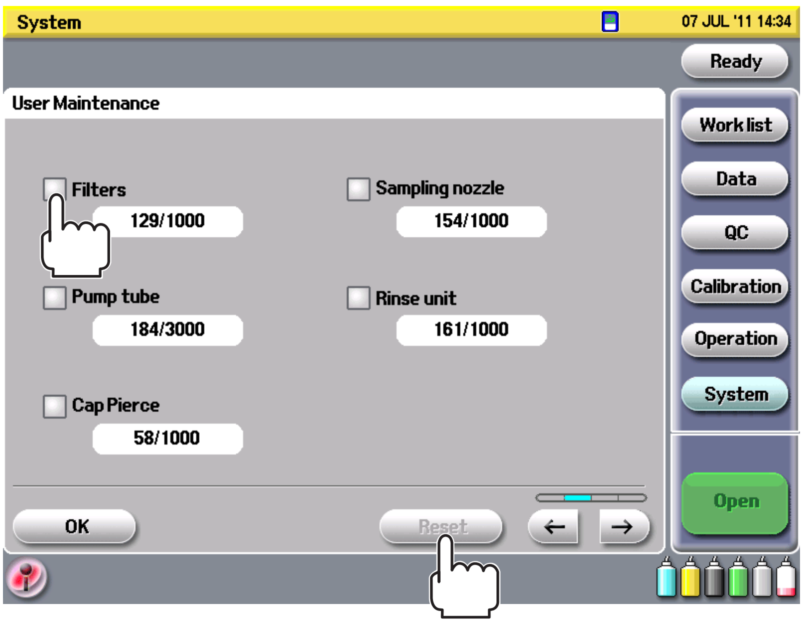
10 Turn on the power of the analyzer.

1) Connect the power cord to the AC outlet and turn on the main power switch.

2) Press the [Power] key. The analyzer starts priming the fluid pathway.

11 If filters were replaced, reset the filter counter. Before resetting the counter, the measurement baths and sub baths should be cleaned. Refer to the “Checking and Cleaning Measurement Baths, Sub Baths and MC Tray” section.

To reset the counter, check <Filters> and press the Reset key on the User Maintenance screen to reset the counts to zero.



12 Fill in the Maintenance Check Sheet.

13 Measure background noise at least twice.

14 Run quality controls before running patient samples.

Checking and Cleaning Measurement Baths, Sub Baths and MC Tray

Check the measurement baths, sub baths and MC tray every day.

Clean the measurement baths, sub baths and MC tray when there is any blood or dust on them. (Once a month or every 1,000 sample counts)

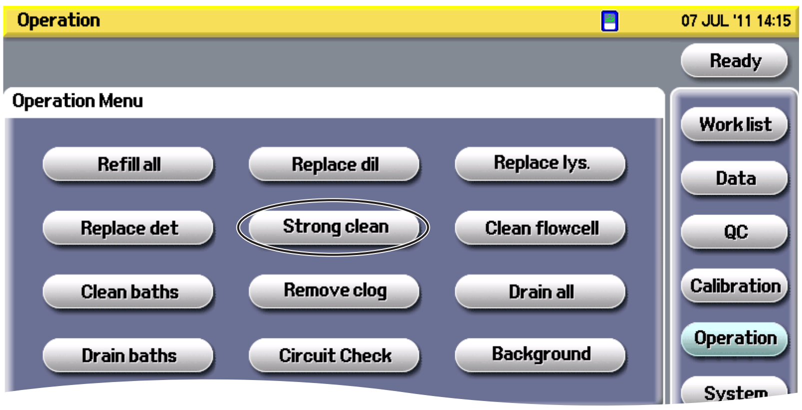
Materials Required

- Powder-free gloves, lab coat, safety glasses
- Phillips and flat-blade screwdrivers
- CLEANAC•3 detergent
- Dry lint-free cloth

Procedure

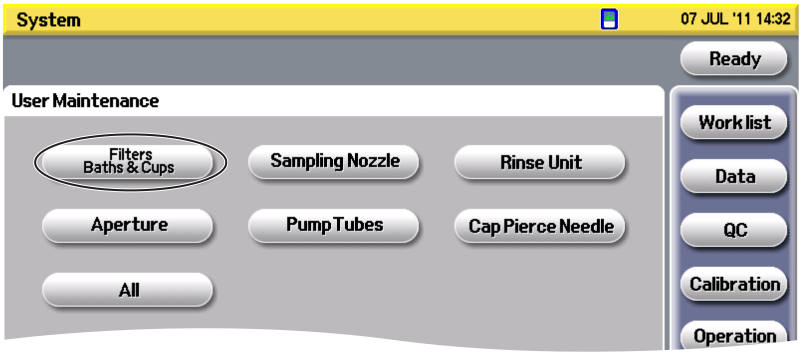
NOTE
- The sub bath and measurement bath are made of special plastic. When cleaning the sub bath and measurement bath, do not damage the surface (inside). After cleaning, do not touch the surface (inside) with bare hands. It may be the cause of dirt.
- Do not use alcohol to clean the sub bath and measurement bath.

1 Press the Strong clean key on the Operation screen to perform strong cleaning to disinfect inside the analyzer. Refer to “Strong Cleaning” in Section 5.

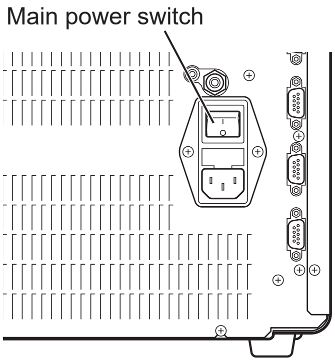


2 Press the Filters Baths & Cups key on the User Maintenance screen to drain the fluid from the analyzer.

Refer to “Displaying the User Maintenance Screen” in this section.

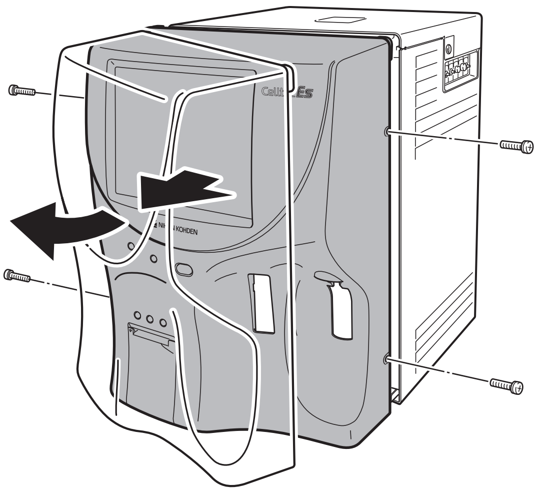


3 Turn off the main power switch on the rear panel of the analyzer and disconnect the power cord from the AC outlet.

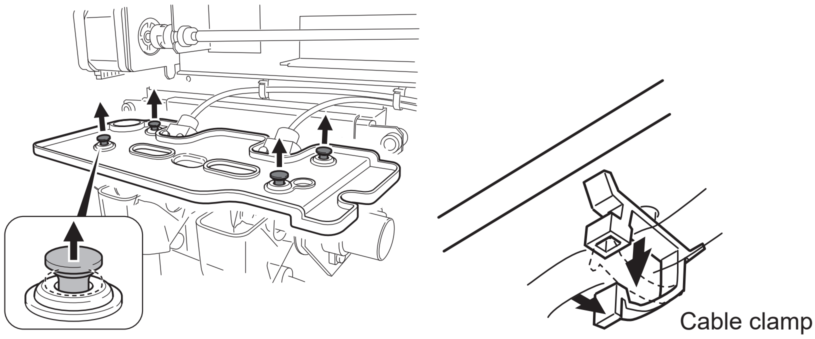


4 Remove the two screws on each side of the front cover of the hematology analyzer.

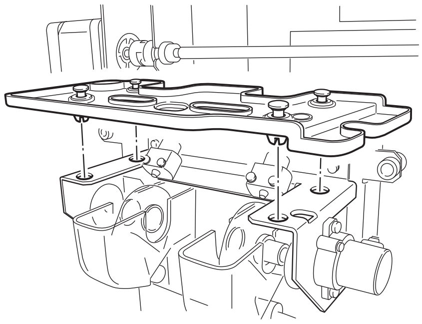
5 Open the front cover by pulling it from the right side. Check that the tube holder is closed before opening the front cover.



6 Pull up the four tabs of the MC tray until they click and release the cable clamp on the bottom of the tray.



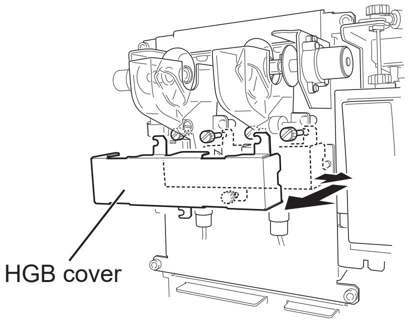
7 Remove the MC tray by pulling up.



8 Rinse the MC tray with water and wipe it with a dry lint-free cloth.

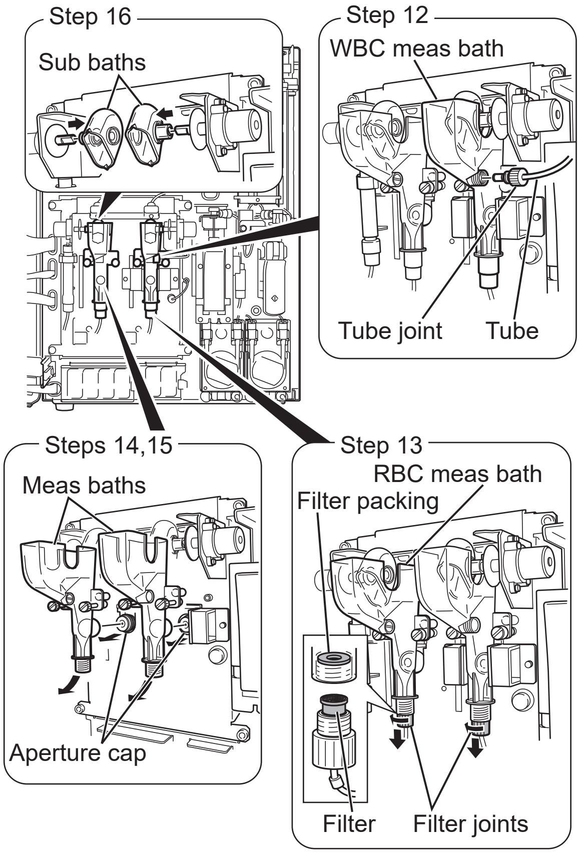
9 Loosen the two screws beside the measurement bath.

10 Loosen the screw on the HGB cover and remove the HGB cover.



11 Check the WBC and RBC measurement baths and sub baths. If there is any blood or dust on them, remove and clean them taking the following steps.

12 Remove the tube joint connected to the WBC measurement bath by turning the knurl joint.



13 Remove filter joints on the RBC and WBC measurement bath assemblies by turning the tube connectors. The joint with filter is connected to the RBC measurement bath. Remove the filter packing together with the filter joints.

14 Loosen the screws fastening the measurement baths. (The screws cannot be removed from the measurement baths.)

15 Remove the measurement baths by pulling them toward you to remove them from the aperture and then pulling them downward.

16 Remove the sub baths by pulling them to the center.

17 Soak the measurement baths and sub baths in CLEANAC•3 detergent for about 10 minutes.

18 Rinse the measurement baths and sub baths with water and wipe them with a dry lint-free cloth.

19 Reattach the sub baths to their original positions.

20 Reattach the measurement baths so that the sub bath is in the measurement bath, the shaft of the sub bath is in the tab of the measurement bath, and the round indent of the measurement bath fits the aperture.

21 Tighten the screws which were loosened in step 9 to fasten the measurement baths.

NOTE: Before tightening the screws, check and remove any dirt or rust on and around the screws. If dirt or rust is present, noise alarm may occur during measurement.

22 Reconnect the filter joints to the RBC and WBC measurement bath assemblies by turning the tube connectors. Attach the filter packing to the RBC measurement bath.

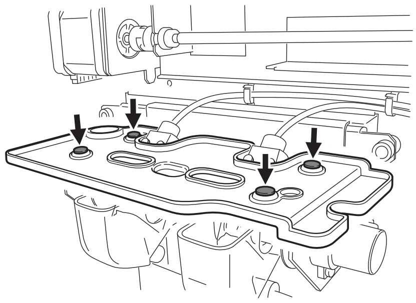
NOTE: When connecting the filter joints to the RBC measurement bath, check the following:

- The filter packing is not bent or damaged.
- The filter joint is fixed firmly.
- If there is leakage after installing the filter, check that there are no scratches or damage around the filter and connect the joint again.

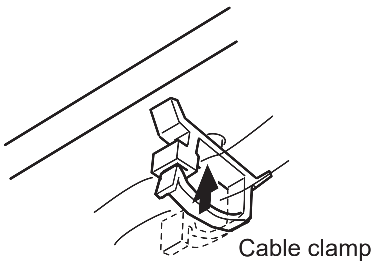
23 Reattach the tube joint to the WBC measurement bath by turning the knurl joint.

24 Reattach the HGB cover and fasten it with three screws.

25 Put the MC tray so that the fixing tabs and holes of the clump match.



26 Push the fixing tab to fix the MC tray and fix the cable with the cable clamp on the bottom of the tray.



27 Reattach the front cover and fasten it with two screws on each side.

28 Turn on the power of the analyzer.

1) Connect the power cord to the AC outlet and turn on the main power switch.

2) Press the [Power] key. The analyzer starts priming the fluid pathway.

29 Fill in the Maintenance Check Sheet.

30 Measure background noise at least twice.

31 Run quality controls before running patient samples.

Checking, Cleaning and Replacing the Rinse Unit, Sampling Nozzles, Cap Pierce Nozzle and Sample Cup

Check and clean the rinse unit and cap pierce nozzle once a month or every 1,000 sample counts whichever comes first.

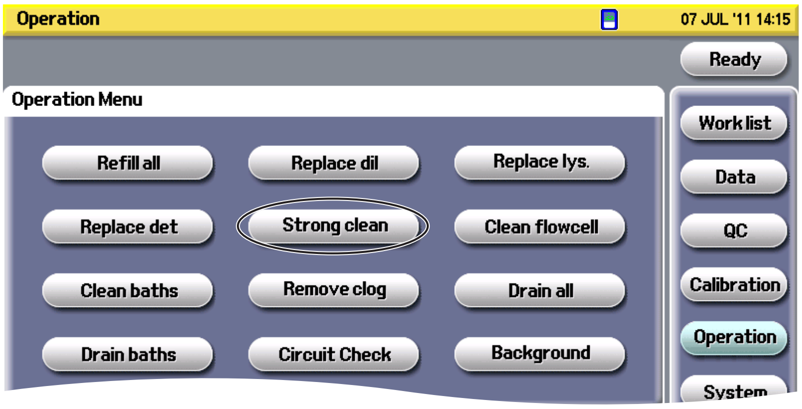
> ⚠ **WARNING**
> The cap pierce nozzle is sharp and potentially contaminated with infectious materials. Be careful when handling the cap pierce nozzle and performing this procedure.

Materials Required

- Powder-free gloves, lab coat, safety glasses
- Phillips and flat-blade screwdrivers
- Cotton swabs
- CLEANAC•3 detergent
- Lint-free pad
- New cap pierce nozzle (when required)

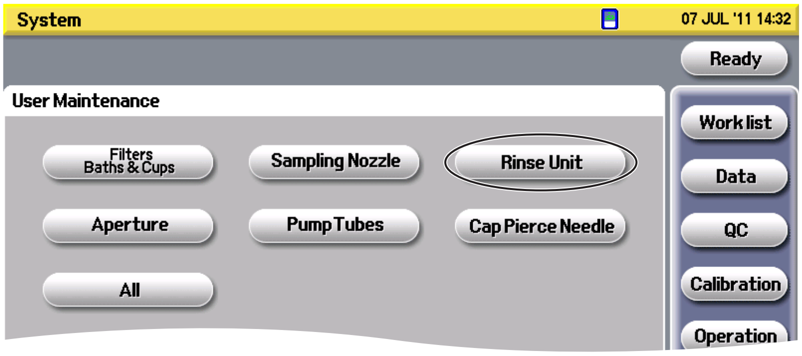
Procedure

1 Press the Strong clean key on the Operation screen to perform strong cleaning to disinfect inside the analyzer. Refer to “Strong Cleaning” in Section 5.

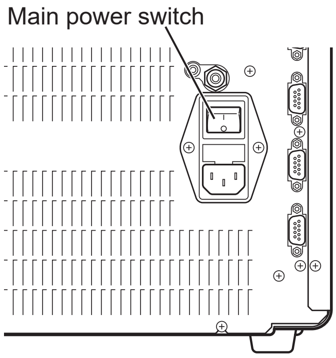


2 Press the Rince Unit key on the User Maintenance screen to drain the fluid from the analyzer.

Refer to “Displaying the User Maintenance Screen” in this section.

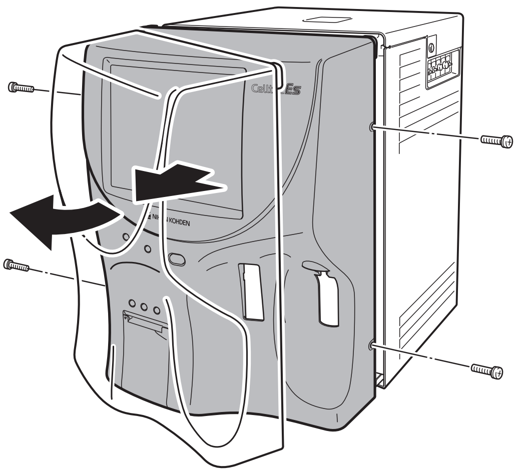


3 Turn off the main power switch on the rear panel of the analyzer and disconnect the power cord from the AC outlet.

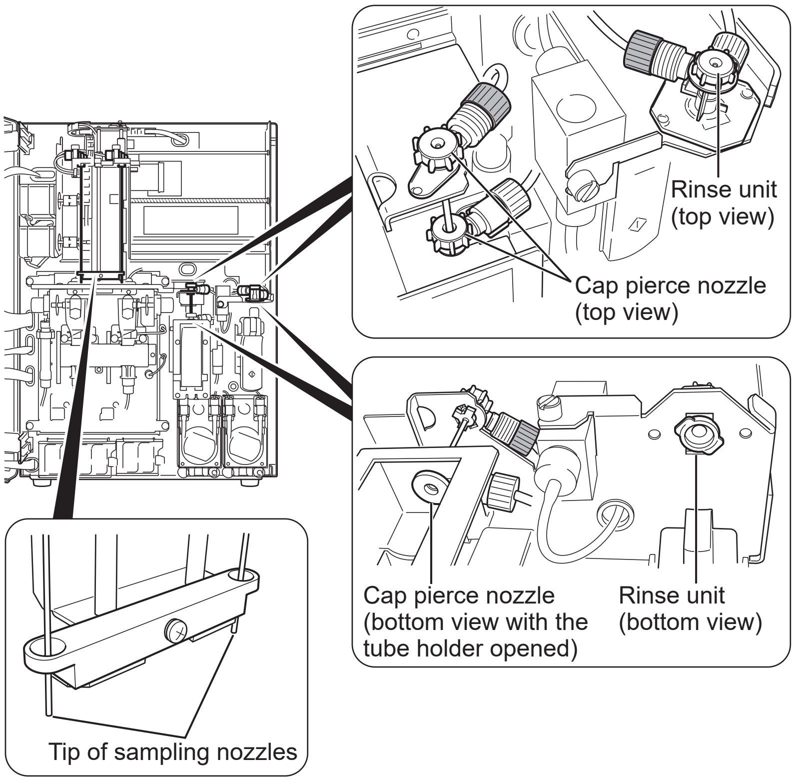


4 Remove the two screws on each side of the front cover of the hematology analyzer.

5 Open the front cover by pulling it from the right side. Check that the tube holder is closed before opening the front cover.



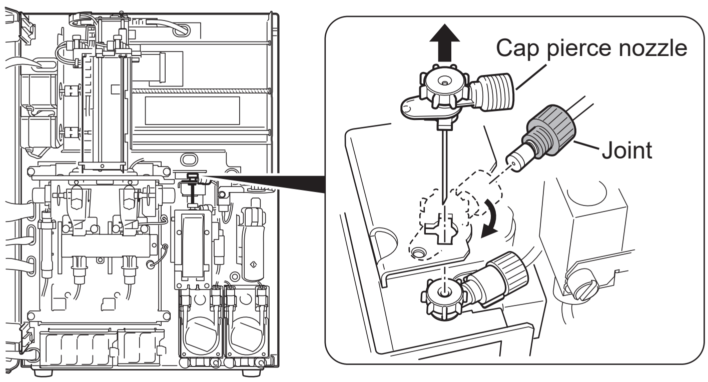
6 Check the following parts for dirt or blood clot. Remove blood or salt crystals on the rinse unit and the tip of the cap pierce nozzle and sampling nozzles with a cotton swab or lint-free pad moistened with CLEANAC•3 detergent.



If the cap pierce nozzle is damaged or dirt or blood cannot be removed, replace the cap pierce nozzle with a new one.

To replace the cap pierce nozzle:

1) Turn the cap pierce nozzle 90º clockwise.



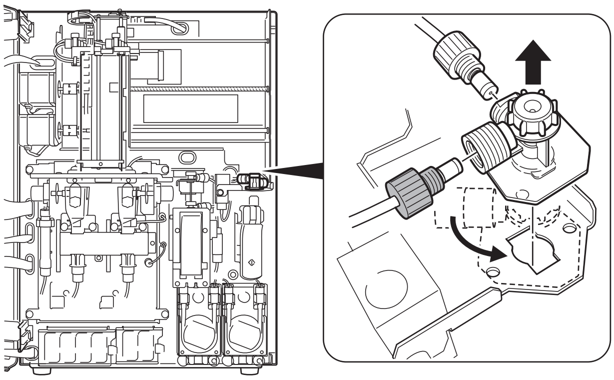
2) Remove the joint from the cap pierce nozzle.

3) Pull the cap pierce nozzle up to remove it.

4) Reattach the joint to the new cap pierce nozzle.

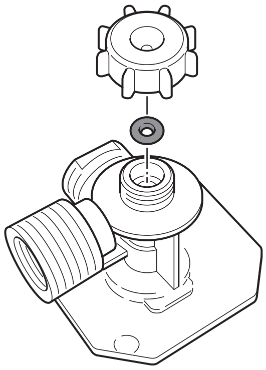
5) Insert the cap pierce nozzle into the cap pierce nozzle guide and turn the cap pierce nozzle 90º counterclockwise.

7 Turn the rinse unit cap counterclockwise to remove the rinse unit.



8 Loosen the joint assemblies to remove the tubes. Be careful not to lose the O-ring from the rinse unit.

9 Insert a cotton swab into the rinse unit from the bottom and push out the O-ring to remove it from the rinse unit.



10 Wipe the inside of the rinse unit and rinse unit cap with a cotton swab moistened with CLEANAC•3 detergent. If they are still dirty, soak them in CLEANAC•3 for about 10 minutes.

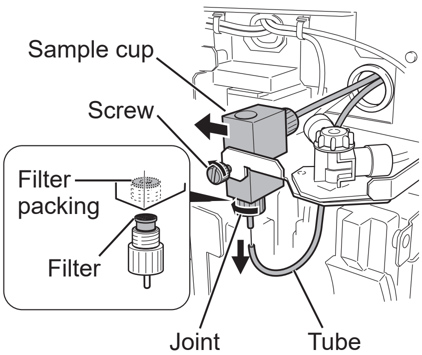
NOTE: Do not use alcohol to clean the rinse unit.

11 Rinse the rinse unit, rinse unit cap and O-ring with water and dry thoroughly with a dry cloth.

12 Reattach the O-ring to the rinse unit and return the rinse unit and rinse unit cap to the original position.

When replacing the O-ring, clean the rinse unit and rinse unit cap and attach the new O-ring.

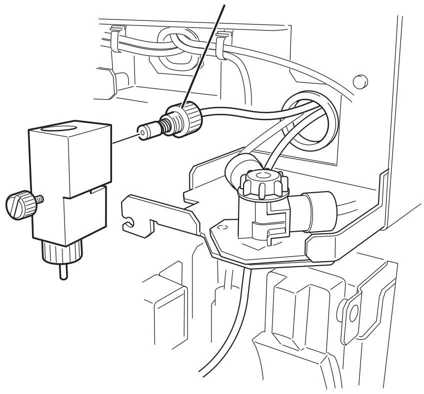
13 Remove the tube from the sample cup.



14 Remove the joint from the bottom of the sample cup. Remove the filter and filter packing together with the joint.

15 Loosen the screw of the sample cup and remove the sample cup by turning the sample cup clockwise.

16 Remove the transparent joint.



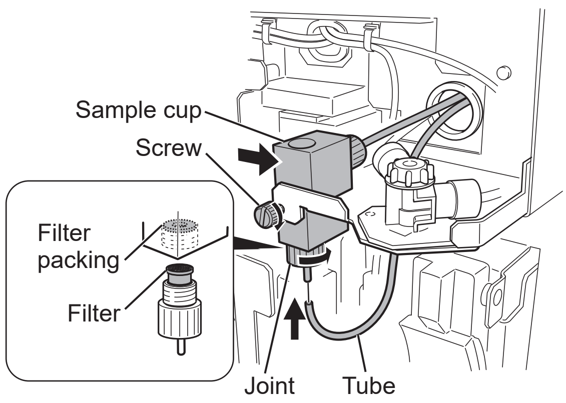
17 Soak the sample cup in CLEANAC•3 for about 10 minutes.

18 Rinse the sample cup with water and dry thoroughly with a dry cloth.

19 Reattach the joint which was removed in step 14 to the bottom of the sample cup. Attach the packing inside the sample cup.

NOTE
- Do not bend the packing inside the sample cup.
- Attach the joint firmly.
- If there is a leak, check that the filter is not damaged or cracked and attach the joint again.

20 Reattach the transparent joint.



21 Reattach the sample cup to the original position and fix the cup with screw.

22 Reattach the tube.

23 Reattach the front cover and fasten it with two screws on each side.

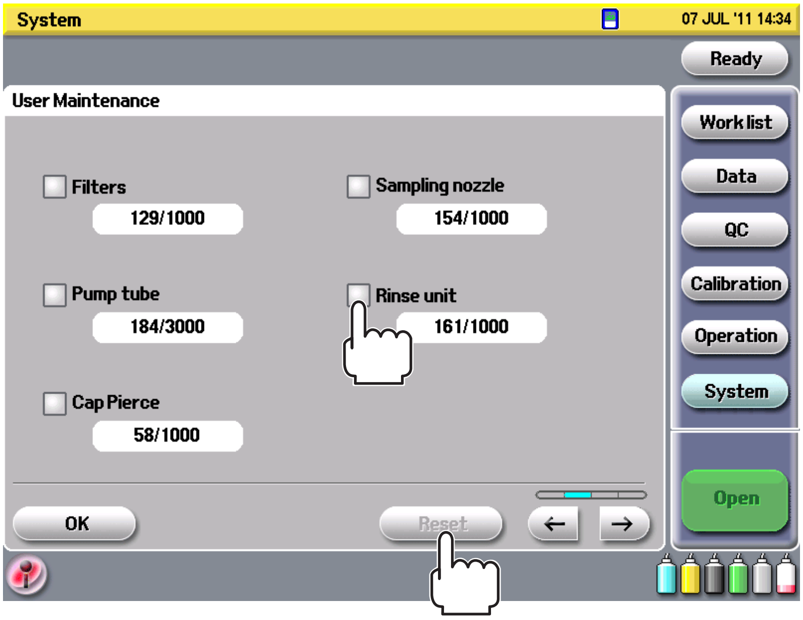
24 Press the main power switch on the rear panel to turn on the main power.

25 Turn on the power of the analyzer.

1) Connect the power cord to the AC outlet and turn on the main power switch.

2) Press the [Power] key. The analyzer starts priming the fluid pathway.

26 If the rinse unit and cap pierce nozzle were checked and cleaned, the rinse unit and cap pierce nozzle counter will have to be reset. To reset the counter, check <Rinse unit> and/or <Cap Pierce> and press the Reset key on the User Maintenance screen to reset the counts to zero.



27 Fill in the Maintenance Check Sheet.

28 Measure background noise at least twice.

29 Run quality controls before running patient samples.

Checking, Cleaning and Replacing the Sampling Nozzles

Check and clean the sampling nozzles once every four months or every 3,000 sample counts whichever comes first.

When PLT background count increases or the sampling nozzle is bent, replace the sampling nozzles with a new one.

> ⚠ **WARNING**
> The sampling nozzles are sharp and potentially contaminated with infectious materials. Be careful when handling the sampling nozzles and performing this procedure.

Materials Required

- Powder-free gloves, lab coat, safety glasses
- Phillips and flat-blade screwdrivers
- Cotton swabs
- CLEANAC•3 detergent
- Lint-free pad
- New sampling nozzle(s) (when required)

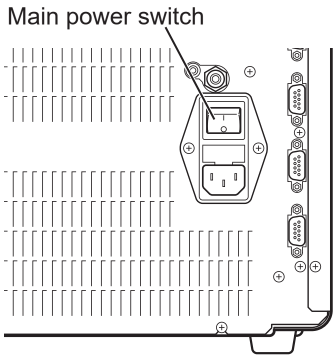
Procedure

1 1. Press the Strong clean key on the Operation screen to perform strong cleaning to disinfect inside the analyzer. Refer to “Strong Cleaning” in Section 5.

2 Press the Sampling Nozzle key on the User Maintenance screen to drain the fluid from the analyzer.

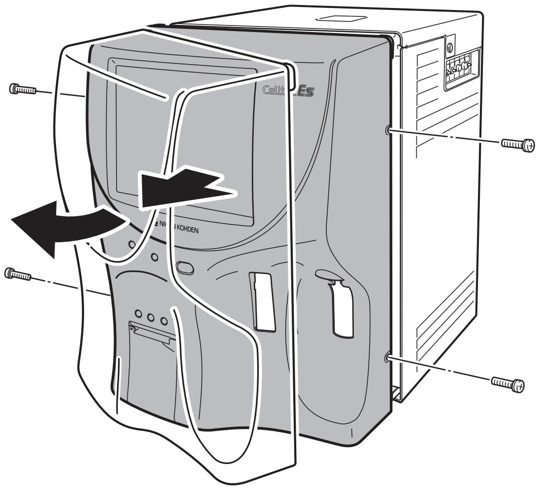
Refer to “Displaying the User Maintenance Screen” in this section.

3 Turn off the main power switch on the rear panel of the analyzer and disconnect the power cord from the AC outlet.



4 Remove the two screws on each side of the front cover of the hematology analyzer.

5 Open the front cover by pulling it from the right side. Check that the tube holder is closed before opening the front cover.



6 Check the sampling nozzles for dirt or blood clot. Remove blood or salt crystals on the tip of the sampling nozzles with a cotton swab or lint-free pad moistened with CLEANAC•3 detergent.

If the sampling nozzle is damaged or dirt/blood cannot be removed, replace the sampling nozzle with a new one.

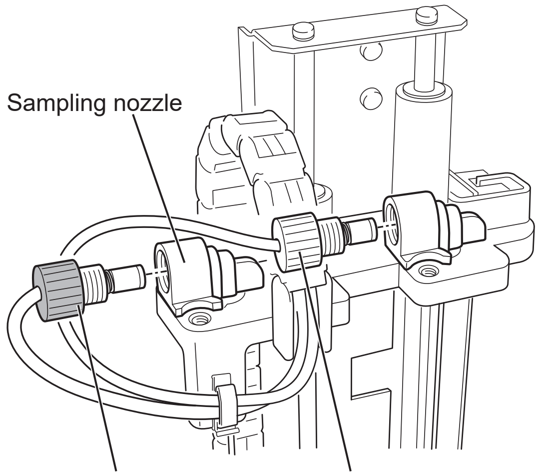
To replace sampling nozzles:

1) Loosen the sampling nozzle screw from each of the sampling nozzle.

NOTE: Be careful not to drop the screws into the analyzer.

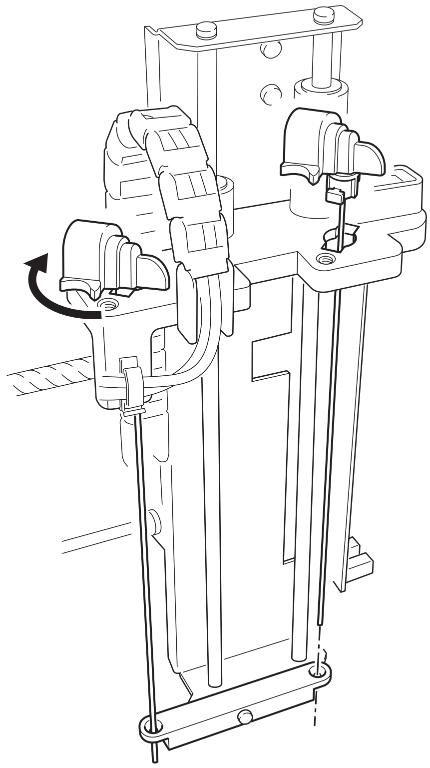
2) Remove the joint from each sampling nozzle.

NOTE: Diluent may flow out from the sampling nozzle when the joint is removed.



3) Turn each sampling nozzle 45º clockwise.

4) Pull the sampling nozzle up to remove it.



5) Attach the new sampling nozzles by reversing the above procedure. Make sure that the white joint is attached to the right sampling nozzle and the black joint to the left sampling nozzle. Fasten the sampling nozzles with the sampling nozzle screws.

NOTE: Attach the sampling nozzles correctly by letting the nozzles into the guides.

7 Reattach the front cover and fasten it with the two screws on each side.

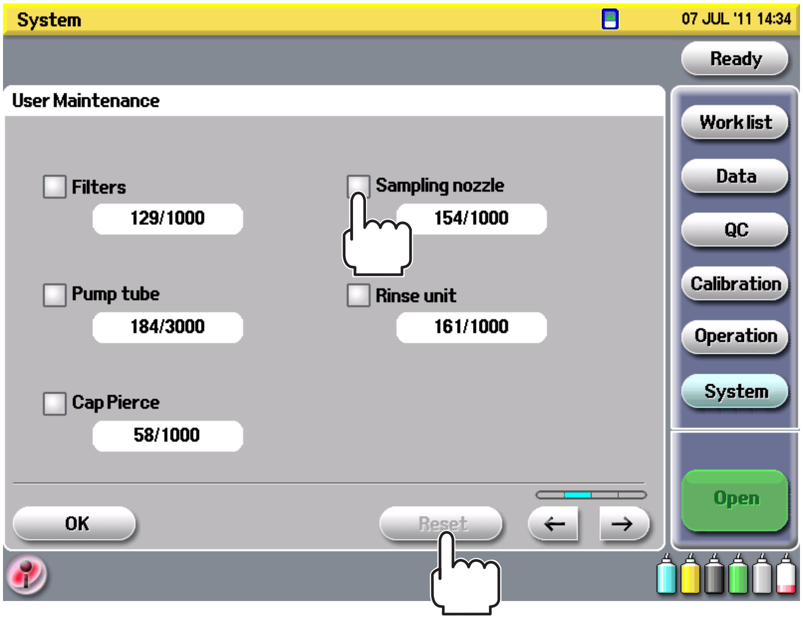
8 Press the main power switch on the rear panel to turn on the main power.

9 Turn on the power of the analyzer.

1) Connect the power cord to the AC outlet and turn on the main power switch.

2) Press the [Power] key. The analyzer starts priming the fluid pathway.

10 If the sampling nozzles were checked and cleaned, the sampling nozzle counter will have to be reset. To reset the counter, check <Sampling nozzle> and press the Reset key on the User Maintenance screen to reset the counts to zero.



11 Fill in the Maintenance Check Sheet.

12 Measure background noise at least twice.

13 Run quality controls before running patient samples.

Replacing Pump Tube

Check the pump tube for water droplets and leaks every day.

Replace the pump tube when there are water droplets or leaks. (Once every 4 months or every 3,000 sample counts whichever comes first.)

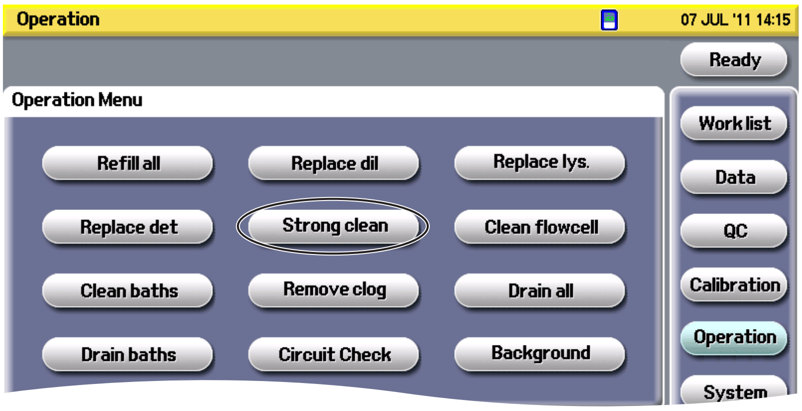
NOTE: Do not leave the pump tube with water droplets or leaks on it.

Materials Required

- Powder-free gloves, lab coat, safety glasses
- Phillips screwdriver

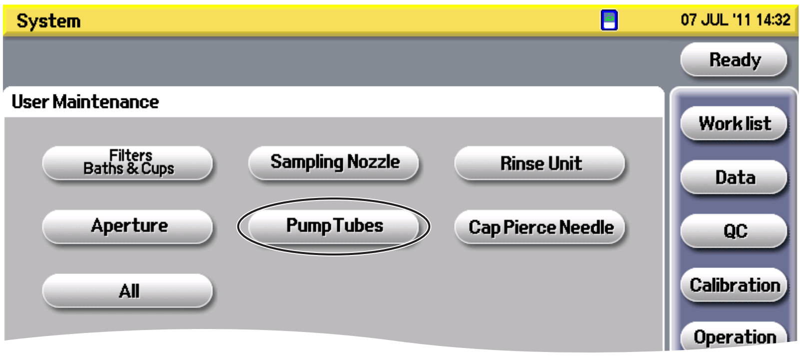
Procedure

1 Press the Strong clean key on the Operation screen to perform strong cleaning to disinfect inside the analyzer. Refer to “Strong Cleaning” in Section 5 of the operator’s manual.

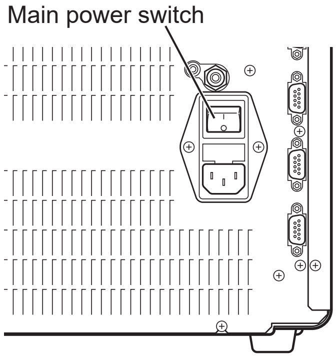


2 Press the Pump Tubes key on the User Maintenance screen to drain the fluid from the analyzer.

Refer to “Displaying the User Maintenance Screen” in this section.

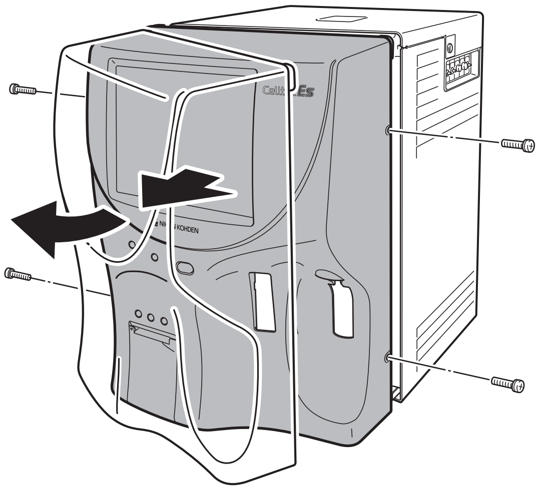


3 Turn off the main power switch on the rear panel of the analyzer and disconnect the power cord from the AC outlet.

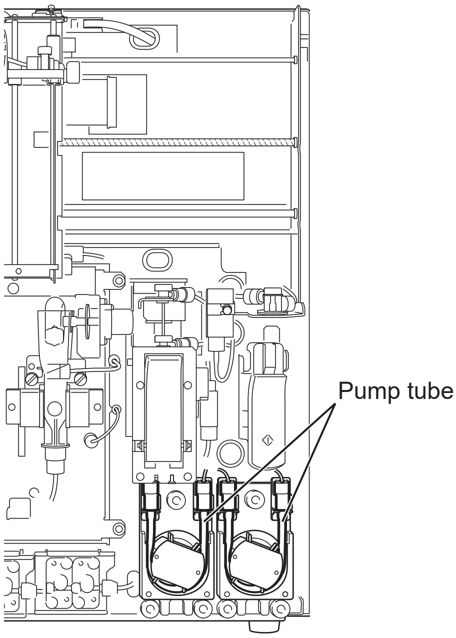


4 Remove the two screws on each side of the front cover of the hematology analyzer.

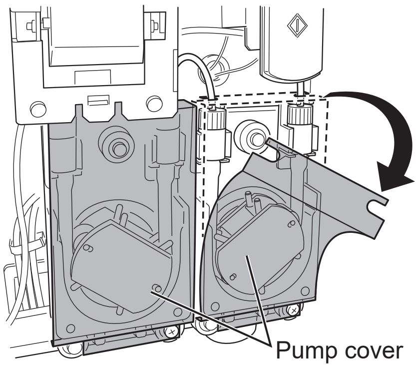
5 Open the front cover by pulling it from the right side. Check that the tube holder is closed before opening the front cover.



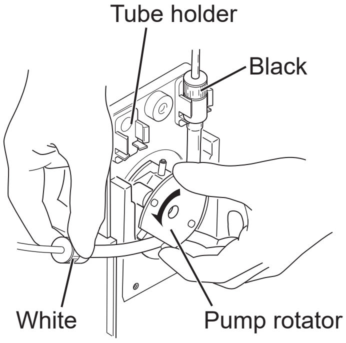
6 Check the pump tube for water droplets and leaks. If any droplet or leak is found, replace the tube with a new one by using the following steps.



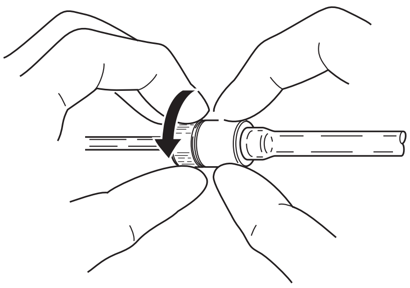
7 Remove the pump covers.



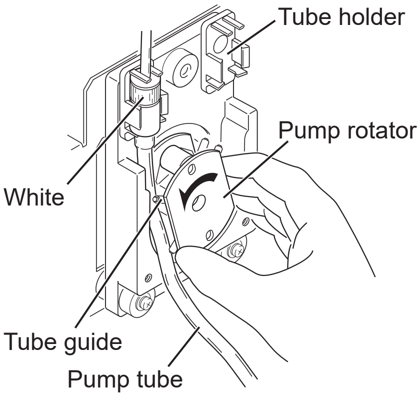
8 Pull out the white tube joint from the tube holder and pull out the pump tube by turning the pump rotator counterclockwise. Then pull the black tube joint out of the tube holder.



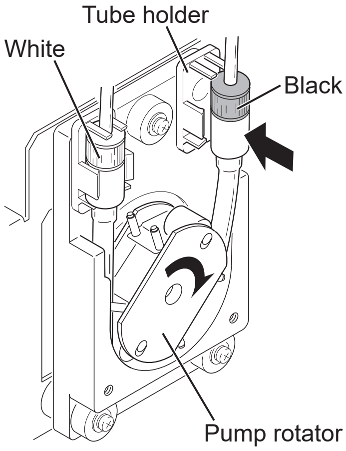
9 Remove the white and black tube joints and replace the pump tube.



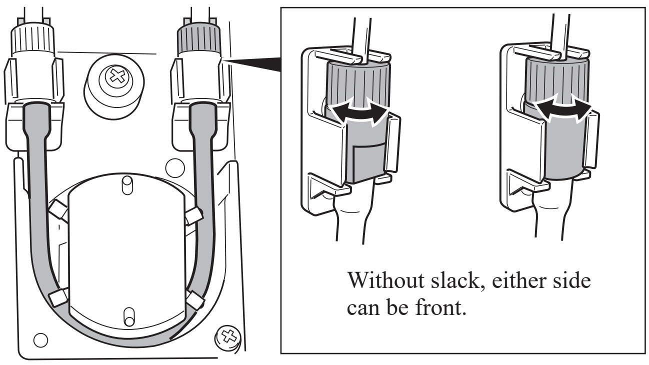
10 Return the white tube joint to the original position and push the pump tube into the tube guide by turning the rotator counterclockwise.



11 Return the black tube joint to the original position.



NOTE
- Be careful not to pinch the new pump tube between the tube guide and housing. This may damage the pump tube.
- Do not attach the black tube joint to the tube holder before the white tube joint because internal compressed air may disconnect the tube.
- Put back the pump tube properly. If the pump tube has slack, remove the slack by turning the rotator clockwise. If the pump tube has slack, it will be damaged by the tube guide.
- Make sure the joints are held properly by the tube holder as shown below. Otherwise, the pump tube may be damaged or the life of the pump tube will be shortened.



12 Reattach the pump covers.

13 Reattach the front cover and fasten it with the two screws on each side.

14 Press the main power switch on the rear panel to turn on the main power.

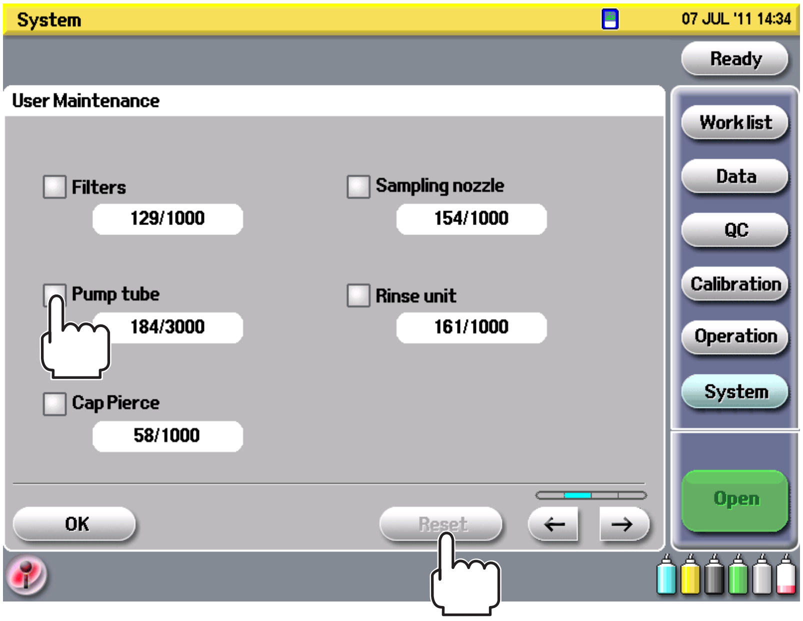
15 Turn on the power of the analyzer.

1) Connect the power cord to the AC outlet and turn on the main power switch.

2) Press the [Power] key. The analyzer starts priming the fluid pathway.

7

16 If the pump tube was replaced, the pump tube counter will have to be reset. To reset the counter, check <Pump tube> and press the Reset key on the User Maintenance screen to reset the counts to zero.



17 Fill in the Maintenance Check Sheet.

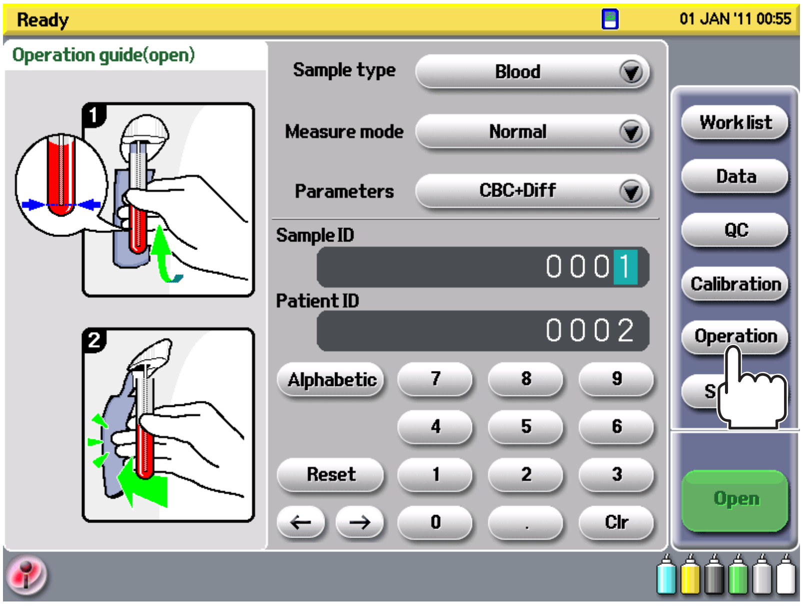
18 Measure background noise at least twice.

19 Run quality controls before running patient samples.

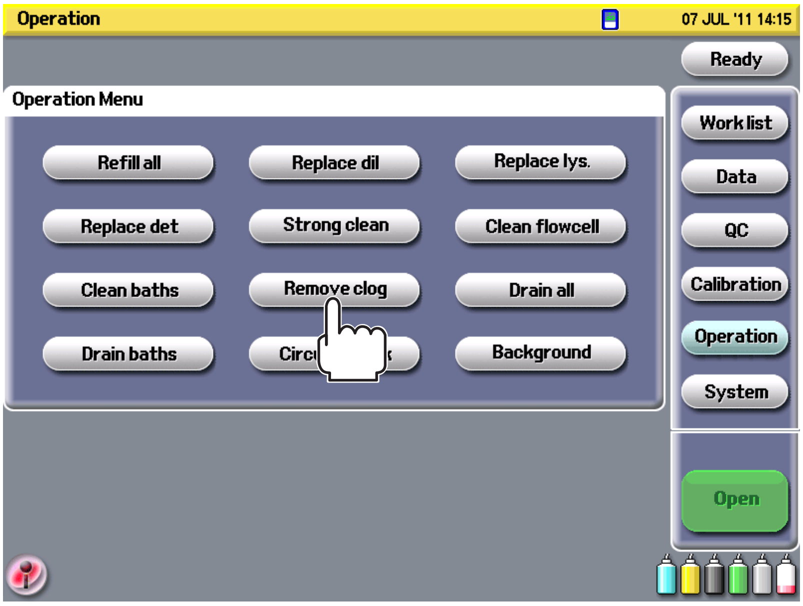
Removing a Clog from the Aperture

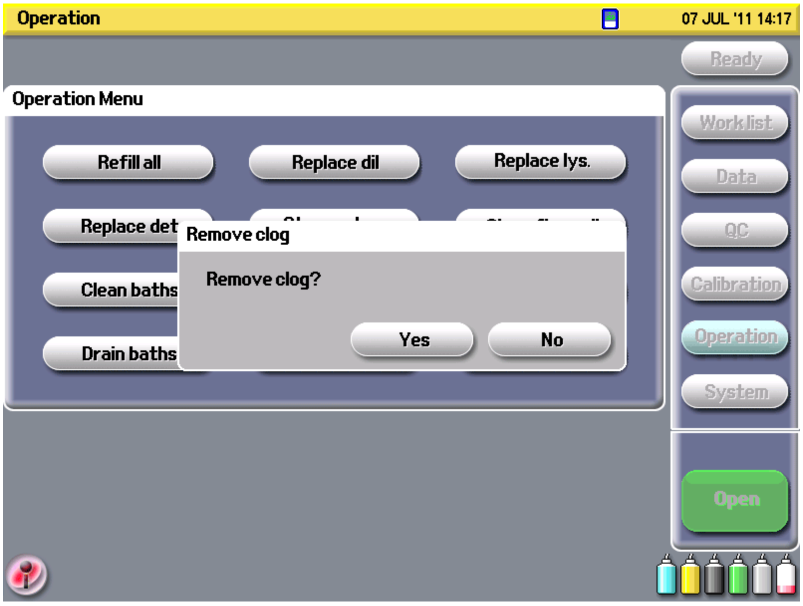
When the “CLOG” alarm occurs, remove the clog by the following procedure.

1 Press the Operation key on the screen to display the Operation screen.



2 Press the Remove clog key on the Operation screen. The confirmation message appears.





3 Press the Yes key to remove the clog from the aperture. The analyzer starts removing the clog and the “Removing clog” message appears on the screen.

Press the No key to cancel the procedure.

After removing the clog, the screen returns to the Operation screen.

Cleaning Aperture Caps

Materials Required

- Powder-free gloves, lab coat, safety glasses
- Phillips and flat-blade screwdrivers
- Dry cloth or tissue paper
- CLEANAC•3 detergent
- Microscope

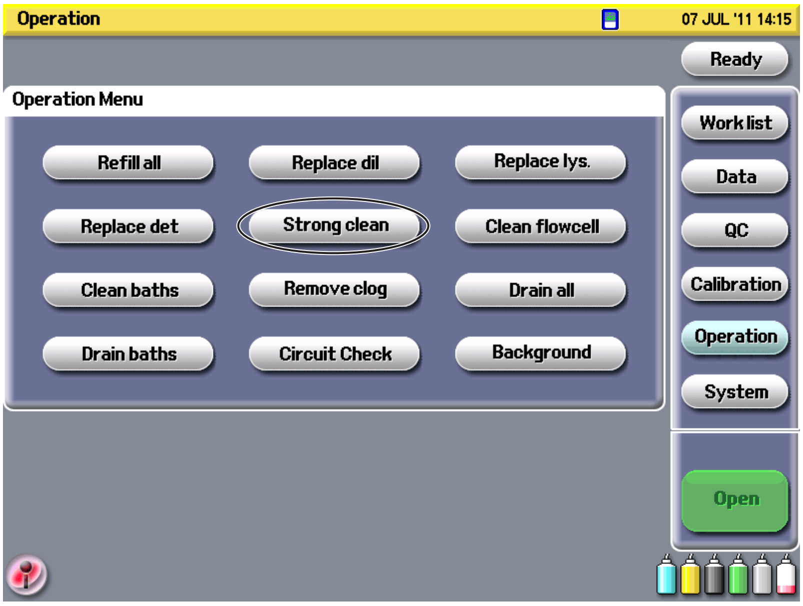
Procedures

For daily cleaning of the aperture caps, press the [Clean] key on the front panel.

However, if the “CLOG” message frequently appears or the background count is high, clean the aperture caps as directed in the following procedure.

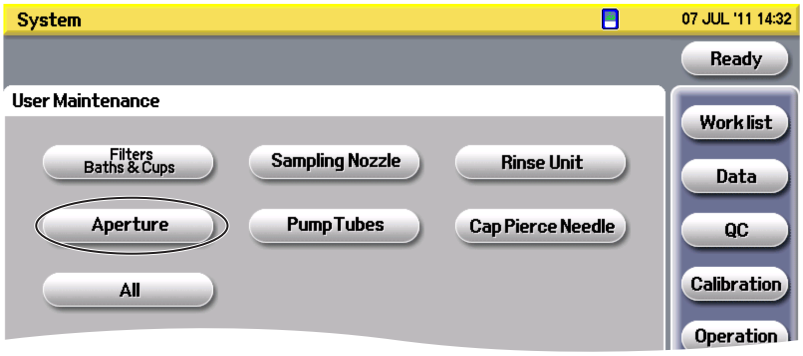
NOTE: The aperture caps are behind the measurement baths.

1 Press the Strong clean key on the Operation screen to perform strong cleaning to disinfect inside the analyzer. Refer to “Strong Cleaning” in Section 5 of the operator’s manual.

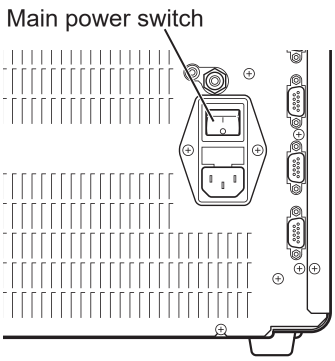


2 Press the Aperture key on the User Maintenance screen to drain the fluid from the analyzer.

Refer to “Displaying the User Maintenance Screen” in this section.



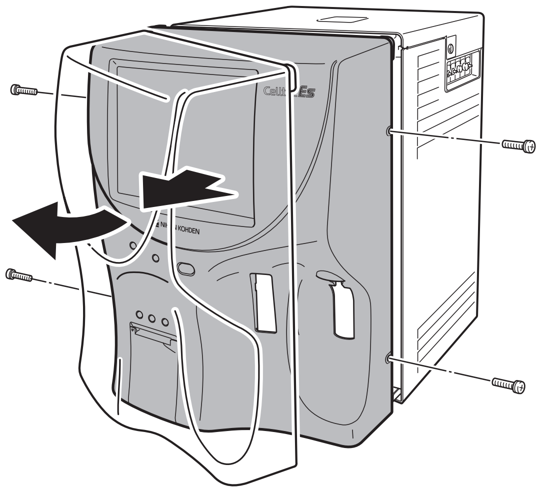
3 After draining, turn off the main power switch on the rear panel of the analyzer and disconnect the power cord from the AC outlet.



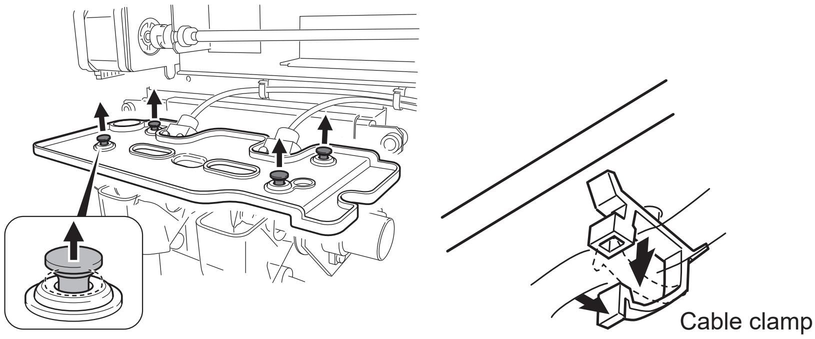
NOTE: Be sure all reagent has drained into the container. Failure to do so may result in a liquid spill.

4 Remove the two screws on each side of the front cover of the hematology analyzer.

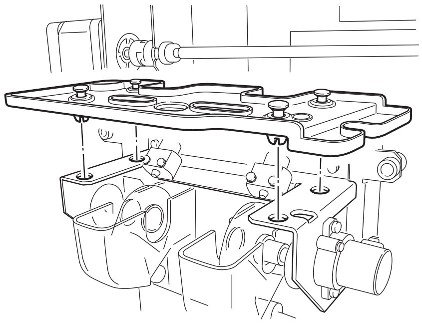
5 Open the front cover by pulling it from the right side. Check that the tube holder is closed before opening the front cover.



6 Pull up the four tabs of the MC tray until they click and release the cable clamp on the bottom of the tray.

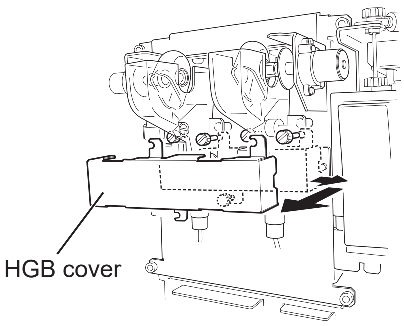


7 Remove the MC tray by pulling it up.



8 Loosen the two screws beside the measurement bath.

9 Remove the screw on the HGB cover and remove the HGB cover.



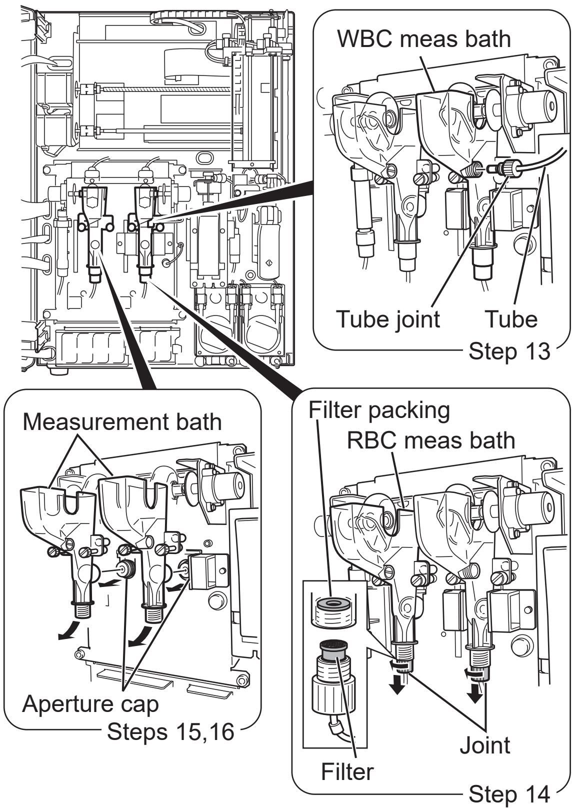
7

10 Remove the tube joint connected to the WBC measurement bath by turning the knurl joint.

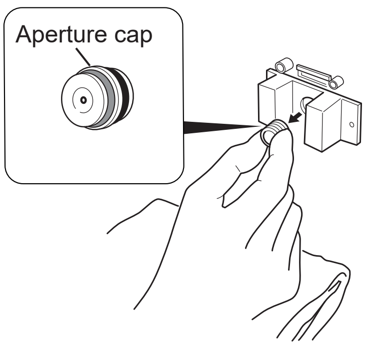
11 Remove the filter joints on the RBC and WBC measurement bath assemblies by turning the tube connectors.

12 Loosen the screws fastening the measurement baths. (The screws cannot be removed from the measurement baths.)

13 Remove the measurement baths by pulling them toward you to remove them from the aperture and then pulling them downward.



14 Place a cloth or tissue paper under your hand and remove the aperture cap by pulling it toward you. If it is not easy to pull the aperture cap, move it slowly left and right to remove it.



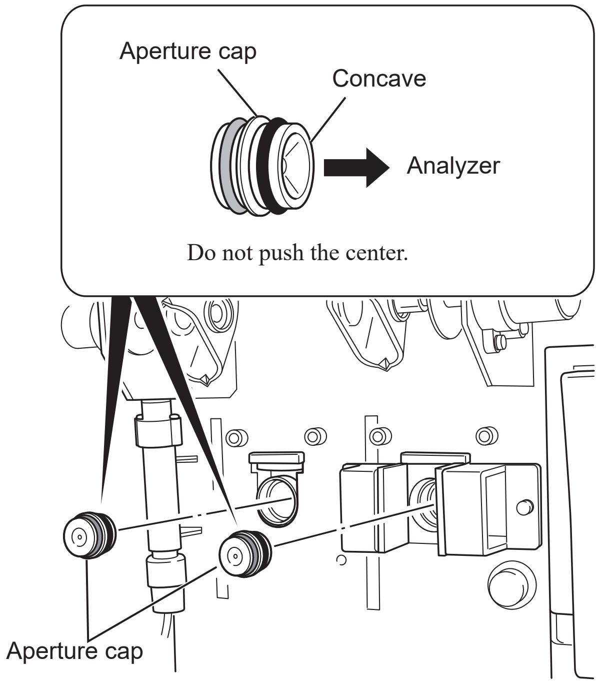
15 Carefully rinse the aperture cap. Remove all protein build-up, especially from the inside. The condition of the aperture cap can be checked with a 100× microscope.

16 If a clog or dust still remains in the aperture caps, soak the aperture caps in CLEANAC•3 detergent for about an hour.

> ⚠ **CAUTION**
>
> Handle the aperture caps with care. They can be damaged if a sharp object is used to clean them.

17 Rinse the aperture caps with water and replace them in the original positions. Make sure that the black O-ring is facing the hole (analyzer side).

NOTE: When replacing the aperture cap, do not push the aperture cap with your ball of finger. The aperture cap may be broken.



18 Reattach the measurement baths so that the sub bath is in the measurement bath, the shaft of the sub bath is in the tab of the measurement bath, and the round indent of the measurement bath fits the aperture.

19 Tighten the screws which were loosened in step 15 to fasten the measurement baths.

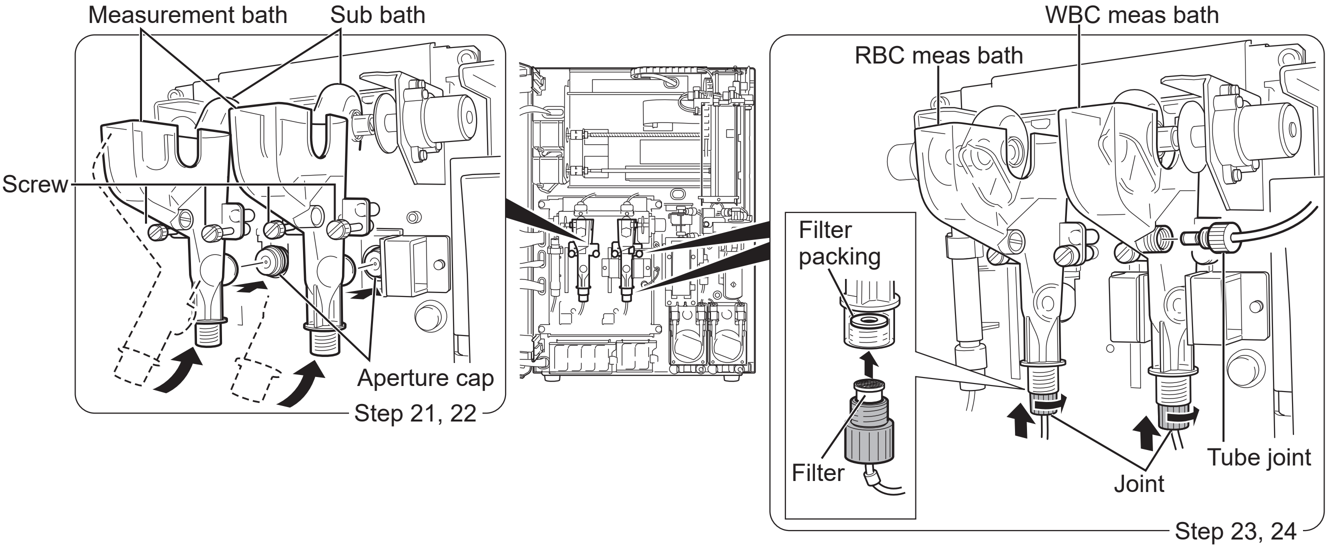
NOTE: Before tightening the screws, check and remove any dirt or rust on and around the screws. If dirt or rust is present, noise alarm may occur during measurement.

20 Reconnect the filter joints to the RBC and WBC measurement bath assemblies by turning the tube connectors. Attach the filter packing to the RBC measurement bath.

NOTE
- Do not bend the packing inside the sample cup.
- Attach the joint firmly.
- If there is a leak, check that the filter is not damaged or cracked and attach the joint again.

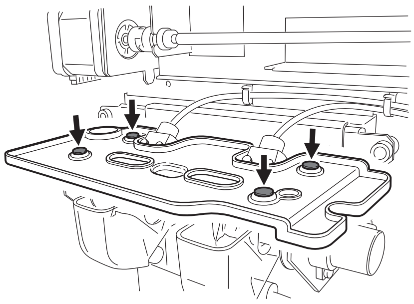
7

21 Reattach the tube joint to the WBC measurement bath by turning the knurl joint.

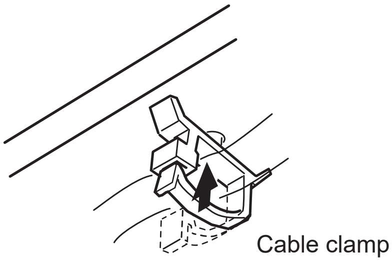


22 Reattach the HGB cover and fasten it with the screw.

23 Put the MC tray so that the fixing tabs and holes of the clump match.



24 Push the fixing tab to fix the MC tray and fix the cable with the cable clamp on the bottom of the tray.



25 Reattach the front cover and fasten it with the two screws on each side.

26 Turn on the power of the analyzer.

1) Connect the power cord to the AC outlet and turn on the main power switch.

2) Press the [Power] key. The analyzer starts priming the fluid pathway.

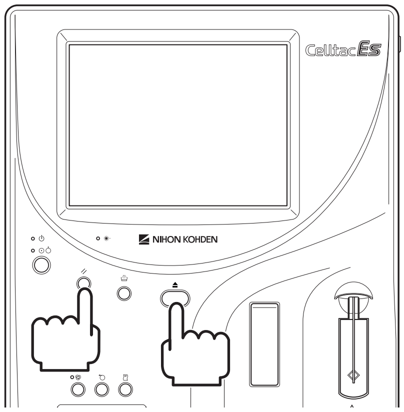
27 Fill in the Maintenance Check Sheet.

28 Measure background noise at least twice.

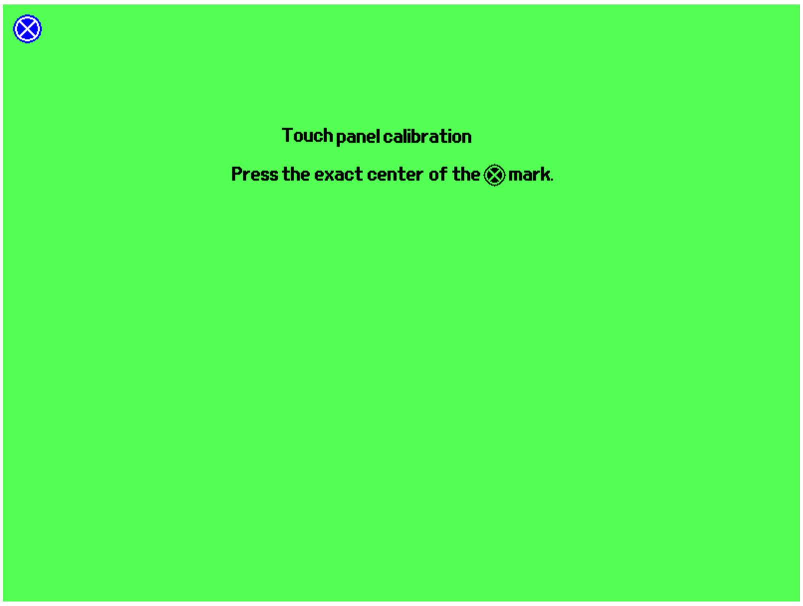
29 Run quality controls before running patient samples.

Calibrating the Touch Screen

Calibrate the touch screen when the pressed position and operating position do not match.



1 Hold down the [⁄⁄ Reset] key until the emergency stop message disappears. Then press the [⏏ Eject] key while holding down the [⁄⁄ Reset] key. The Touch panel calibration screen appears.



2 Follow the instructions on the screen to calibrate the screen.

NOTE: Do not use a sharp object to press the mark. Use your finger.

After calibration is completed, the screen returns to the Ready screen.

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-7300K

Instrument Serial Number: __________ Hardware Revision: ______________________

Software Version: ____________

Appearance

There is no damage on the hematology analyzer.	Yes	No
There is no fluid leakage on the hematology analyzer.	Yes	No

Safety

There is no damaged AC plug and exposed wire on the power cord.	Yes	No
3-pin plug type power cord is used and the 3 pins and plug housing are not deformed.	Yes	No
Resistance of the protective ground line of the power cord is 0.1 Ω or less.	Yes	No
Earth leakage current is 0.5 mA or less under normal condition.	Yes (mA)	No
Earth leakage current is 1.0 mA or less under each single fault condition.	Yes (mA)	No

Reagents

Nihon Kohden recommended diluent, detergent and hemolysing reagent are used.	Yes	No
ISOTONAC·3 diluent is not past the expiration date.	Yes	No
CLEANAC detergent is not past the expiration date.	Yes	No
CLEANAC·3 detergent is not past the expiration date.	Yes	No
HEMOLYNAC·3N hemolysing reagent is not past the expiration date.	Yes	No
HEMOLYNAC·5 hemolysing reagent is not past the expiration date.	Yes	No

Cleaning/Replacing

Rinse unit is cleaned.	Yes	No
Cap pierce needle is cleaned.	Yes	No
Four filters are replaced with new ones.	Yes	No
Two pump tubes are replaced with new ones.	Yes	No
Sampling cup (Bath for WBC 5 part differential measurement) is cleaned.	Yes	No
Two sub baths and two measurement baths are cleaned.	Yes	No
Two aperture caps are cleaned.	Yes	No
Touch screen is cleaned with a soft cloth moistened with 80% alcohol.	Yes	No
Two sampling nozzles are cleaned or replaced with new ones if they are damaged or PLT background noise increases.	Yes	No

Serial Number Setting screen

Write the serial number on the Serial Number Setting screen. Serial number: __________

If the MAIN BD (UT-7253) is replaced, enter the new serial number on the screen.

Sensor Monitor Screen

Write each sensor output voltage on the Sensor Monitor screen as follows:

- WBC Up: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- WBC Lo360: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- WBC Lo500: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- RBC Up: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- RBC Lo360: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- RBC Lo500: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- Diluent1: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- Diluent2: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- Ly Hemo3: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- Ly Hemo5: ______V under no fluid condition (Acceptable range: 3.5 V or more)
- WBC Up: ______V filled with fluid (Acceptable range: 1.5 V or less)
- WBC Lo360: ______V filled with fluid (Acceptable range: 1.5 V or less)
- WBC Lo500: ______V filled with fluid (Acceptable range: 1.5 V or less)
- RBC Up: ______V filled with fluid (Acceptable range: 1.5 V or less)
- RBC Lo360: ______V filled with fluid (Acceptable range: 1.5 V or less)
- RBC Lo500: ______V filled with fluid (Acceptable range: 1.5 V or less)
- Diluent1: ______V filled with fluid (Acceptable range: 1.5 V or less)
- Diluent2: ______V filled with fluid (Acceptable range: 1.5 V or less)
- Ly Hemo3: ______V filled with fluid (Acceptable range: 1.5 V or less)
- Ly Hemo5: ______V filled with fluid (Acceptable range: 1.5 V or less)
- HGB LED ON: ______V with fluid (Acceptable range: 1.5 V to 4.5 V)
- HGB LED OFF: ______V with no fluid (Acceptable range: 0.5 V or less)
- ELECTRODE: ______V filled with fluid (Acceptable range: 17.7 V to 18.3 V)
- MJ (Warmer temperature): ______°C filled with fluid
- CD (Temperature inside chassis): ______°C filled with fluid
- DILUTER CF: ______ (Compensation of dilution ratio)
- MEAS UNIT CF: ______ (Compensation of manometer volume)

Circuit Check Screen

Write each value on the CIRCUIT CHECK screen as follows:

- WBC: _______(Acceptable range: 8.0±5%)
- RBC: _______(Acceptable range: 1.6±5%)
- HGB ON: _______(Acceptable range: 1.5 V to 4.5 V)
- HGB OFF: _______(Acceptable range: 0.5 V or less)
- MCV: _______(Acceptable range: 100±15%)
- PLT: _______(Acceptable range: 160±5%)
- Sensitivity: WBC: (____), RBC: (____)
- Threshold: WBC: (____), RBC: (____), PLT: (____)

Background Noise Check

Write each value displayed on the screen after pressing the count switch:

- WBC: ______ (Acceptable range: 0.2 or less (x 103/μL))
- RBC: ______ (Acceptable range: 0.05 or less (x 106/μL))
- HGB: ______ (Acceptable range: 0.1 or less (g/dL))
- PLT: ______ (Acceptable range: 10 or less (x 103/μL))
- TOC: ______ (Acceptable range: 100 or less)

Check with 7µm polymer microsphere suspensions

Write each value on the PARTICLE TEST screen when the 7µm polymer microsphere suspensions are aspirated with the sampling nozzle.

- FS CV%: ______ (Acceptable range: 7% or less)
- FS PEAK: ______
- FL CV%: ______ (Acceptable range: 7% or less)
- FL PEAK: ______
- TOC: ______

Check with MEK-5DN Hematology Control

Write down the lot number of the MEK-5DN hematology control and all the $\overline{X}$-R data on the $\overline{X}$-R (NORMAL) screen when the hematology control is aspirated with the sampling nozzle.

Lot No. of MEK-5DN: _________________

- WBC: X ______, R ______
- NE%: X ______, R ______
- LY%: X ______, R ______
- MO%: X ______, R ______
- EO%: X ______, R ______
- BA%: X ______, R ______
- RBC: X ______, R ______
- HGB: X ______, R ______
- HCT: X ______, R ______
- MCV: X ______, R ______
- MCH: X ______, R ______
- MCHC: X ______, R ______
- PLT: X ______, R ______

Current Calibration Coefficients

Write down the calibration coefficients as follows:

- WBC: ______ (Venous blood mode), ______ (Capillary blood mode)
- RBC: ______ (Venous blood mode), ______ (Capillary blood mode)
- HGB: ______ (Venous blood mode), ______ (Capillary blood mode)
- HCT: ______ (Venous blood mode), ______ (Capillary blood mode)
- PLT: ______ (Venous blood mode), ______ (Capillary blood mode)
- NE%: ______ (Venous blood mode)
- LY%: ______ (Venous blood mode)
- MO%: ______ (Venous blood mode)
- EO%: ______ (Venous blood mode)
- BA%: ______ (Venous blood mode)
- RDW: ______ (Venous blood mode)
- MPV: ______ (Venous blood mode)

New Calibration Coefficients

Write down the lot number of the MEK-CAL calibrator, new calibration coefficients and measured data as follows:

Lot No. of MEK-CAL: _______________

	Venous blood		Capillary blood	
Parameter	Measured data	Calibration coefficient	Measured data	Calibration coefficient
WBC				
RBC				
HGB				
HCT				
PLT				
NE%				
LY%				
MO%				
EO%				
BA%				
RDW				
MPV				

7

Software Version

Write down the software version on the User Maintenance screen:

Software version: ___________

Operations

Touch screen function is checked. Yes No

Date and time settings are checked. Yes No

Automatic cleaning operations are normal during this maintenance check. Yes No

There is no fluid leakage on the hematology analyzer. Yes No

Constant volume of the diluent is properly dispensed when pressing the Dispense key on the screen in pre-dilution mode. Yes No

Cap pierce unit properly works and the Open mode or Closed mode is selected. Yes No

Built-in Printer Unit Operation (When the printer is installed)

Pressing the Feed key on the front panel feeds the recording paper and there is no dot missing on the paper by pressing the Print key on the front panel. Yes No

External Printer Unit Operation (When the external printer is connected)

Paper feed operation properly works on the external printer and there is no dot missing on the paper. Yes No

Bar Code Reader Operation (When the bar code reader is connected)

Light emitter and detector parts are cleaned with a cotton swab moistened with 80% alcohol. Yes No

Bar code reading operation properly works. Yes No

Others

Write down any other points on this sheet.

8 Service Screen

General

Provided on the Service screen has useful functions for servicing the MEK-7300.

These functions are not used by the user; therefore, they are not mentioned on the Operator's Manual.

They are intended for use by appropriately skilled service personnel. Improper use can cause leaks inside the equipment.

The Service screen includes functions that can only be used with dedicated tools at a factory. Without the specific tools, such functions do not operate. Do not use these functions, which are not explained in this Service Manual.

The Service screen is subject to addition of functions for reasons such as improvement of productivity. For information on how to use new functions, contact your Nihon Kohden representative.

Never use the functions without learning how to use them. There is a risk of damaging the analyzer if the functions are used without proper knowledge.

Displaying the Service Screen

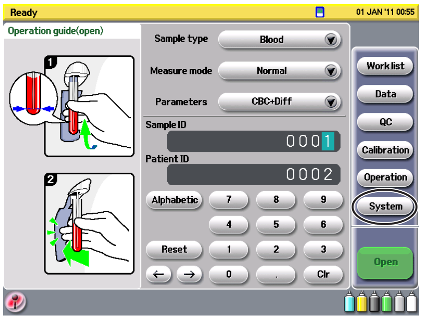
1 To access the Service screen, the User setting must be set to [Factory].

1) Select [System] on the right side of the window and select [Users].

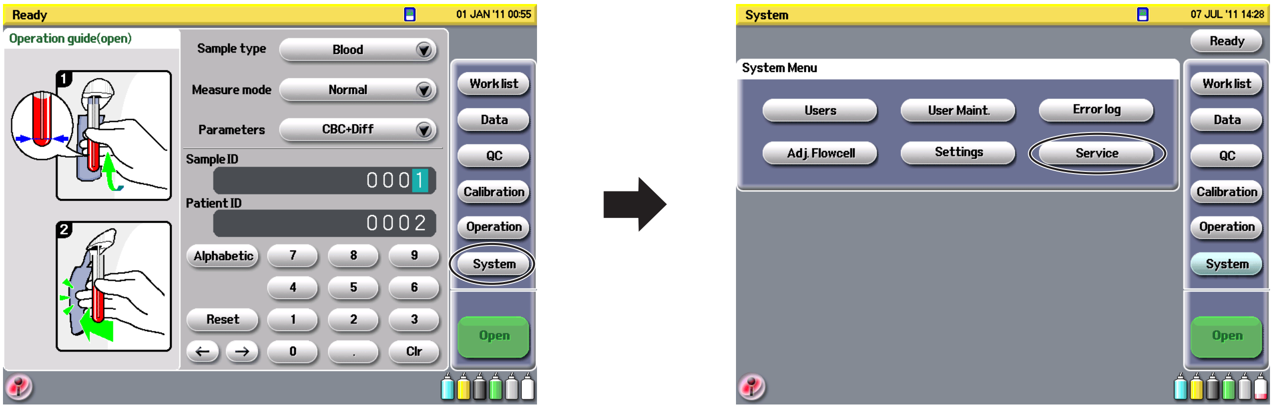
2) Select [Factory] and press [OK].

3) When you are prompted to enter the password, enter [4321] and press the [ENTER] key.

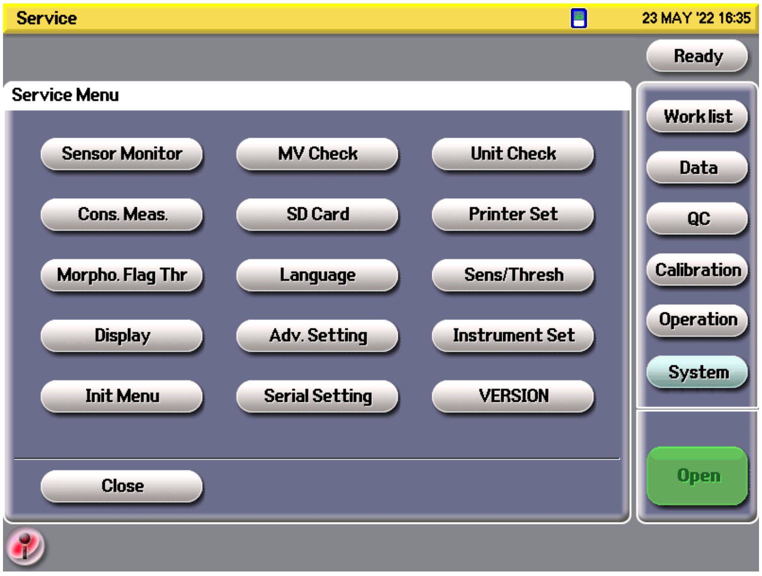
4) The bar at the top of the window turns orange when the operator changes.



2 Select [System] on the right side of the window and select [Service].



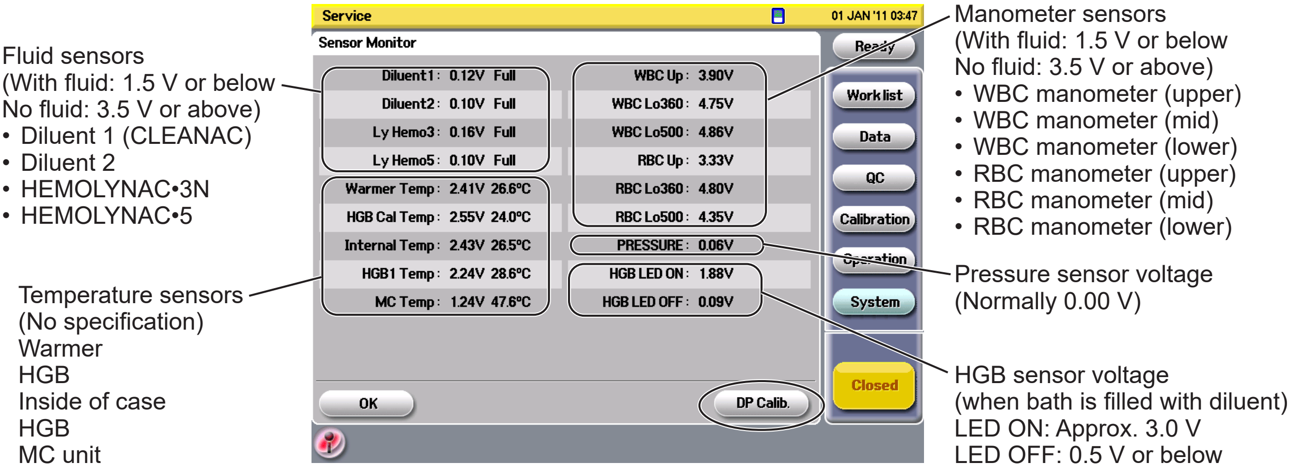
The following functions are available on the Service screen:



- SensorMonitor
- MVCheck
- UnitCheck
- Cons.Meas.
- SD Card
- PrinterSet
- Morpho.FlagThr
- Language
- Sens/Thresh
- Display
- Adv.Setting
- Instrument Set
- InitMenu
- SerialSetting
- VERSION (software version 02-08 or later only)

Sensor Monitor Screen

This screen allows you to check the voltage of each sensor.



Press the [DP Calib.] key at the bottom of the window to change sensor voltage settings.

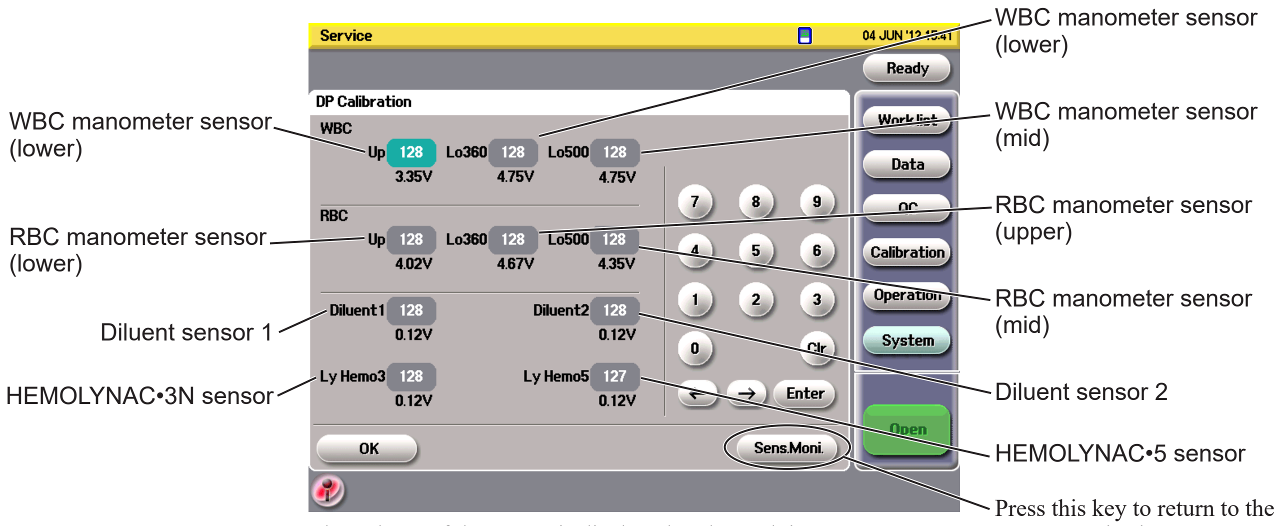
8

DP Calibration

This screen is for adjusting the offset voltages for the manometer sensors and fluid sensors. Select the sensor for which to change the voltage setting and press [Enter] after entering a value.

To check sensor voltages, press the [Sens.Moni.] key at the bottom right.

Increasing the setting value raises the sensor voltage while decreasing the setting value lowers the sensor voltage (0 to 255).



The voltage of the sensor is displayed under each item.

MV Check Screen

MC Valve:

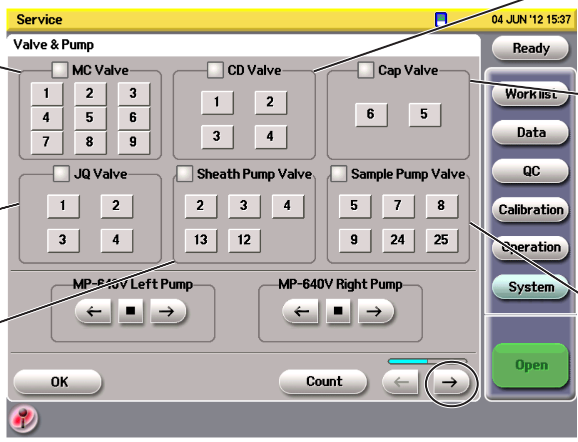
Solenoid valves in MC-730V. Involved with CBC measurement

JQ Valve:

Solenoid valves in priming/ draining unit of JQ-730V

Sheath Pump Valve:

Fluid control valves for sheath pump (MJ-730V)



CD Valve:

Solenoid valves in JQ-731V

Cap Valve:

Valves that control the rinse part of the cap pierce unit (MS-731V). Included in JQ-732V unit

Sample Pump Valve:

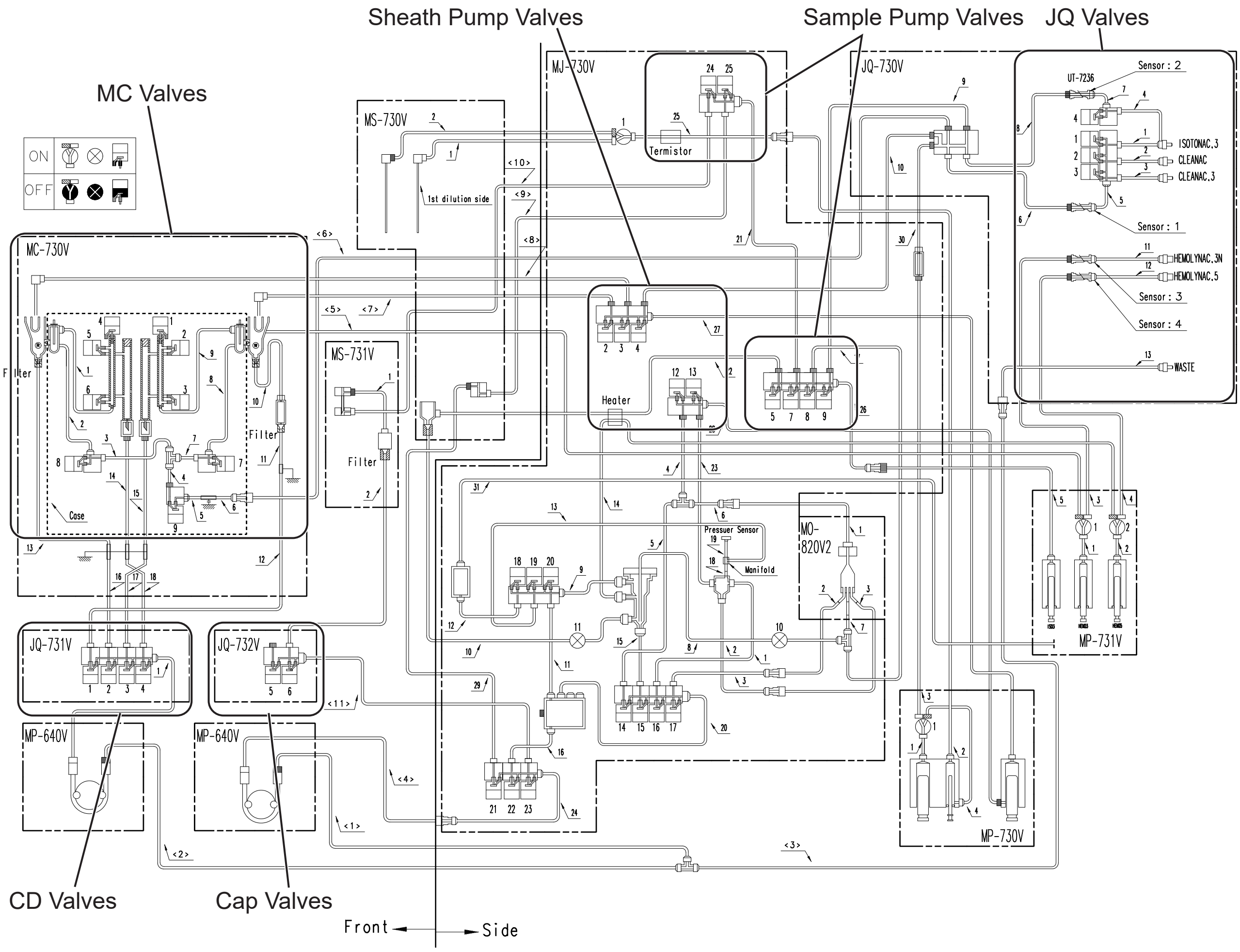
Fluid control valves for sample pump (MJ-730V)

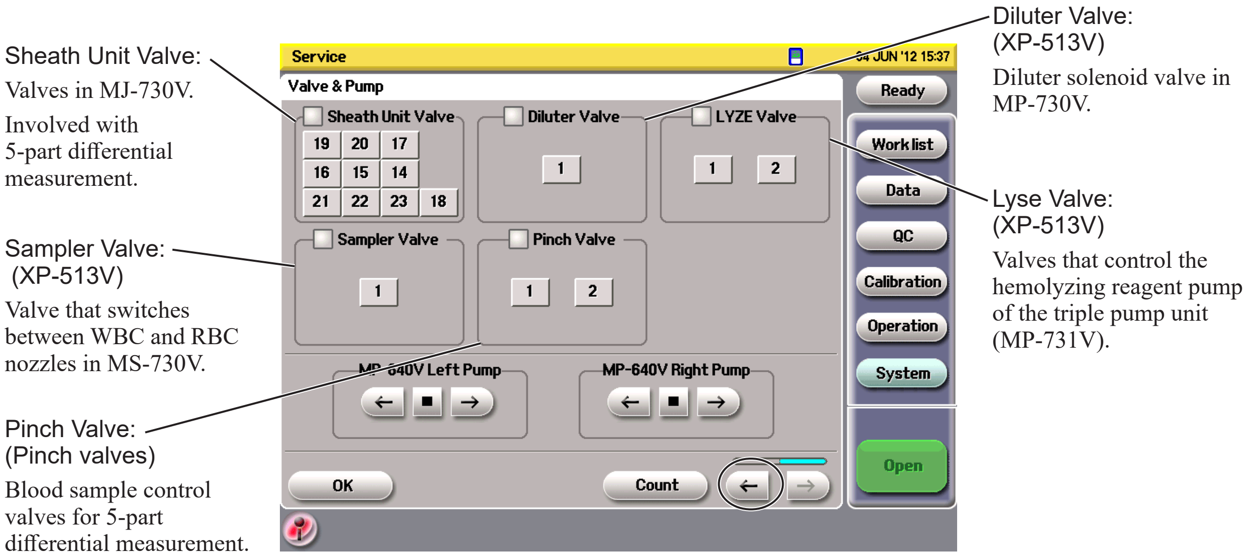
This screen controls each unit's solenoid valves individually.

Pressing a number turns on the corresponding solenoid valve. Pressing the number again turns it off.

There is no limit to the number of solenoid valves you can turn on at the same time on this screen.

To go to the next solenoid valve control screen, press the right arrow key at the bottom of the window.

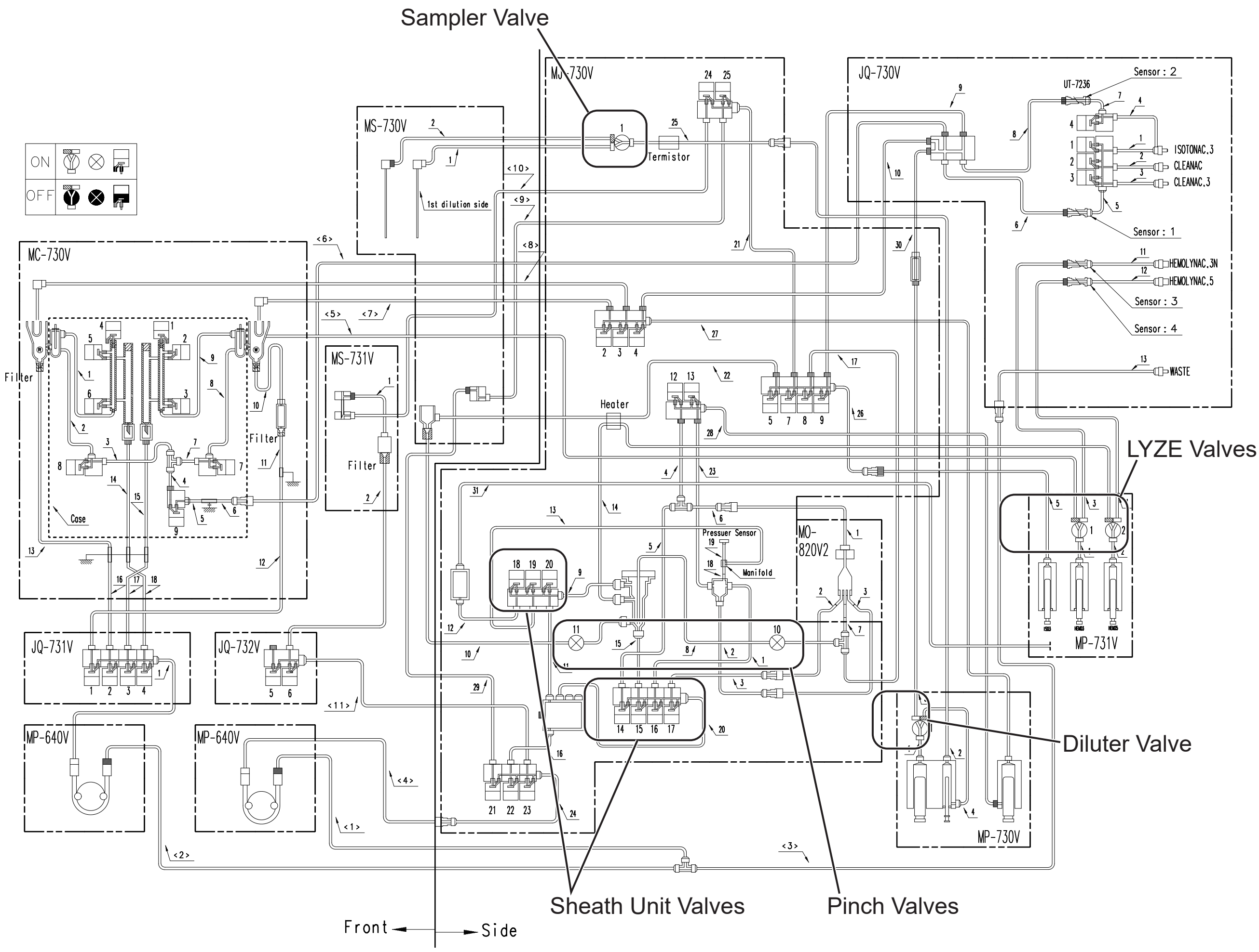




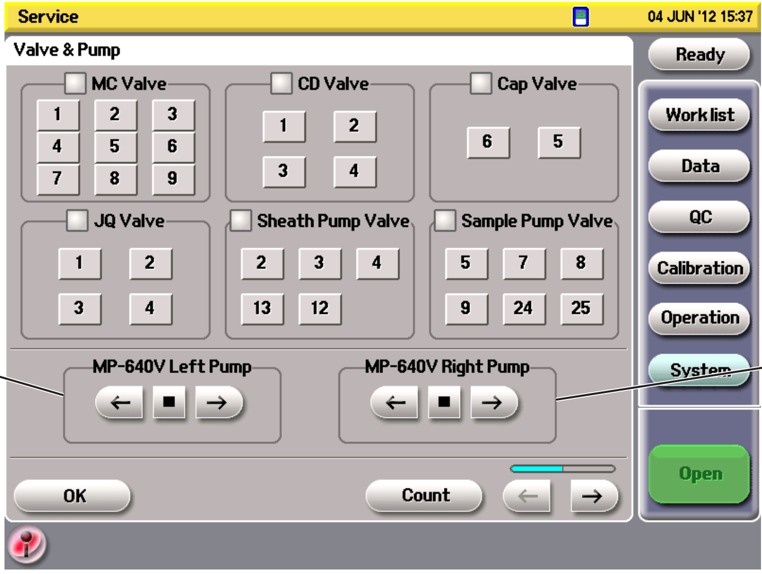
In addition to XP-612V, XP-513V and pinch valves are controlled on this screen.

Up to five solenoid valves (XP-513V and pinch valves) can be turned on at the same time on this screen. If more than five solenoid valves are turned on, it may damage the power supply unit.

Pressing the left arrow key at the bottom of the window returns to the previous solenoid valve control screen.



CBC-side Rotary Pump (MP-640V) Left side



5 Diff-side Rotary Pump (MP-640V) Right side

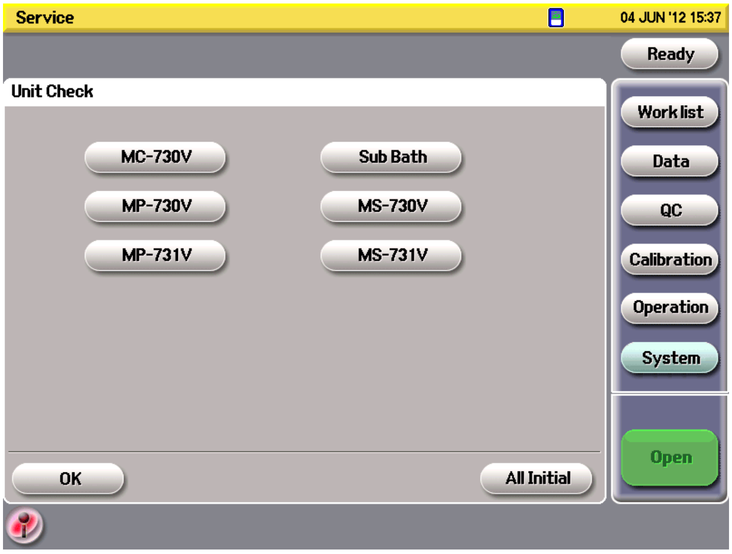
Rotary pumps have two operating directions: forward and reverse. (The ■ button stops the pump.)

Pump operation can be performed in addition to solenoid valve control. This enables checking for leaks in the flow path and correct solenoid valve function.

Operating the pumps without taking into consideration the flow of fluid can cause leaks, as well as damage to tubes and solenoid valves.

Unit Check Screen

This screen allows individual control of units. It is useful for performing checks after replacing a unit.

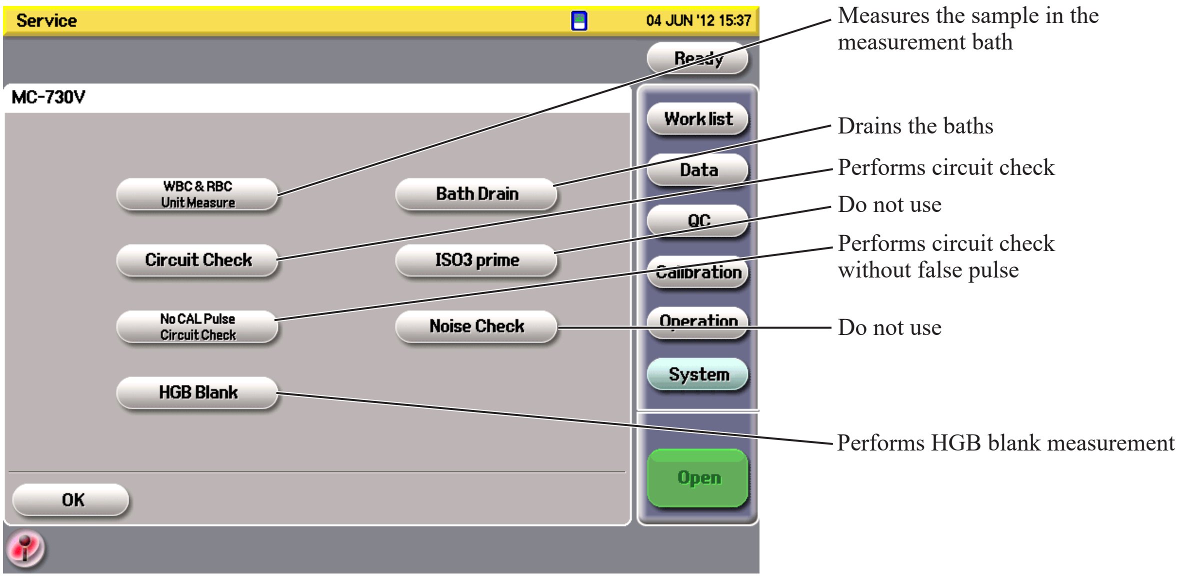


- MC-730V: MC-730V check
- MP-730V: MP-730V check
- MP-731V: MP-731V check
- Sub Bath: Sub bath check
- Sampler: MS-730V check
- Cap Pierce: MS-731V check
- All Initial: Initialization of operations of all units

If operations have been stopped using the RESET key, press [All Initial] to initialize all units before further maintenance.

MC Unit Noise Check Screen

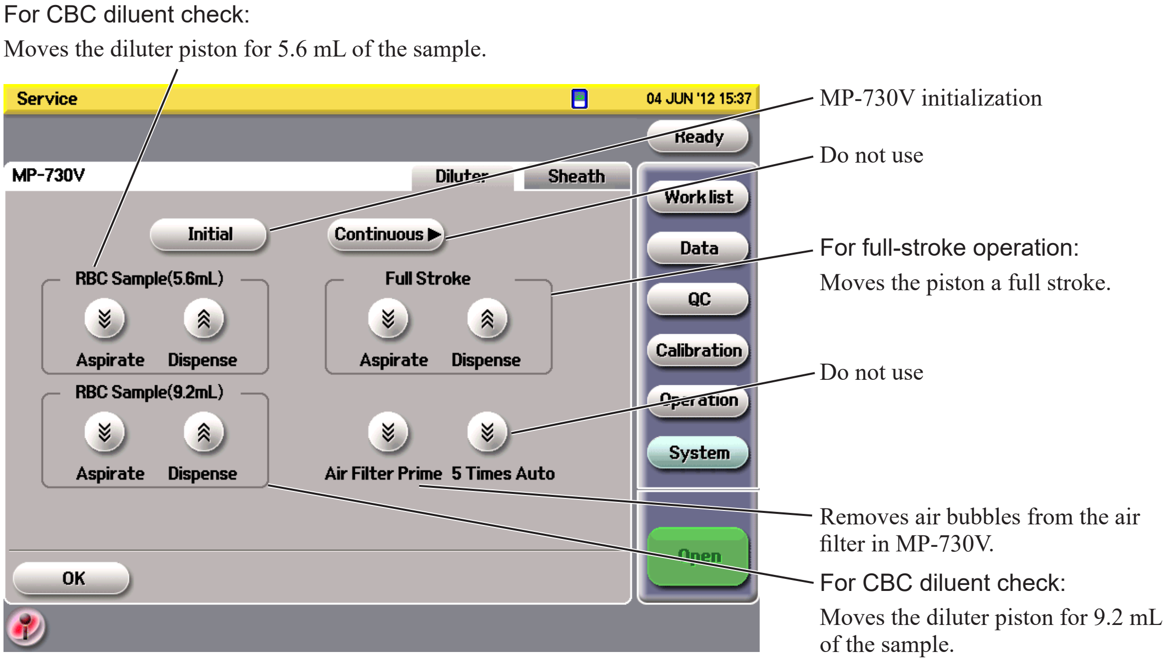
This screen provides functions to help identify the cause of noise in the analyzer.



If the analyzer is started by pressing RESET and Power ON, the [A: 068 HGB INITIALIZE ERROR] error message appears. This error can be canceled by pressing the [HGB Blank] key when the WBC measurement bath is filled with diluent.

MP-730V (Diluter) Check Screen

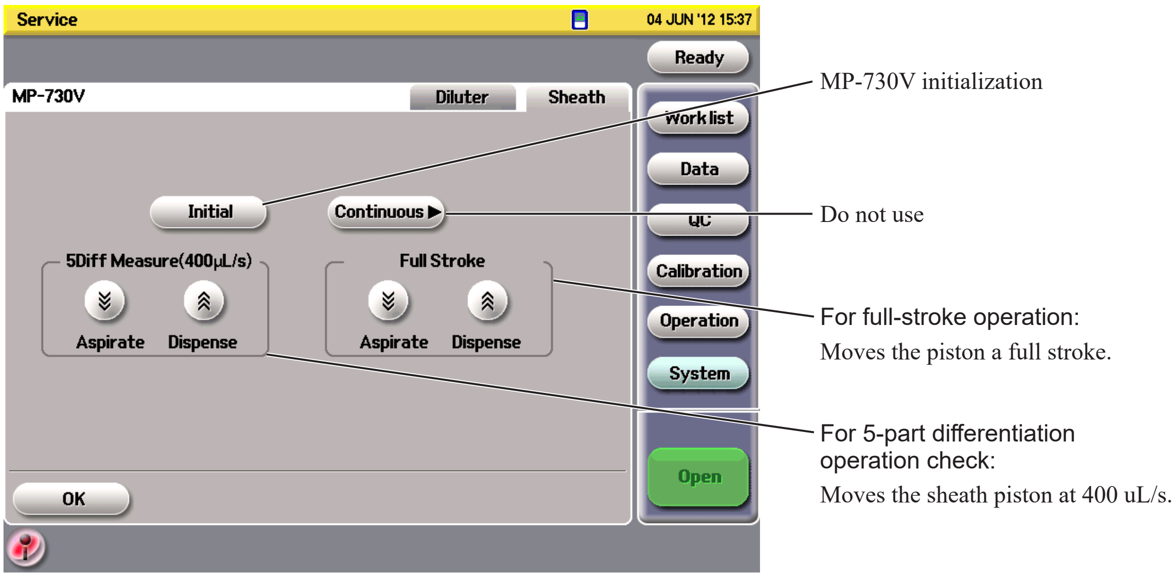
This screen checks the operation of the MP-730V diluter syringe. Press [Aspirate] to draw in diluent. Press [Dispense] to release the diluent.



Always press [Initial] before using this function.

Diluent will be dispensed from the WBC sample nozzle.

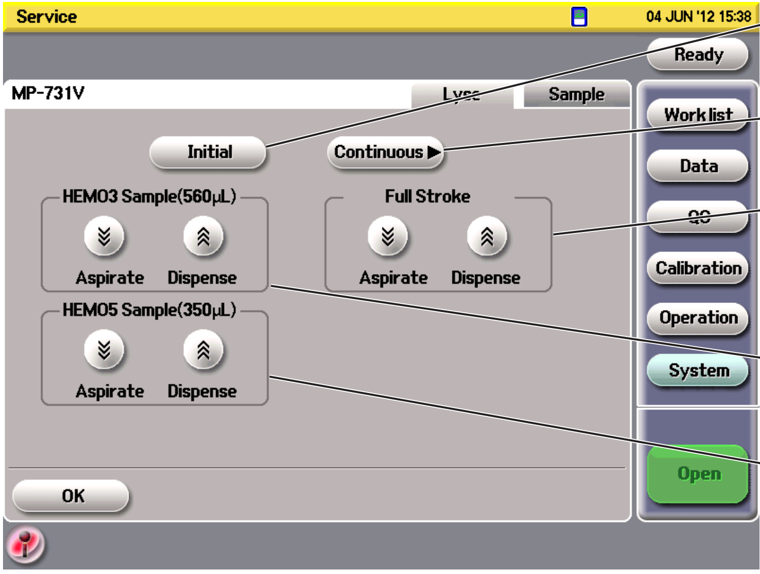
MP-730V (Sheath) Check Screen



This screen checks the operation of the MP-730V sheath syringe. Always press [Initial] before using this function.

Press [Aspirate] to draw in diluent from the diluent port. Press [Dispense] to release the diluent to the waste chamber.

MP-731V (Lyse Pump) Check Screen

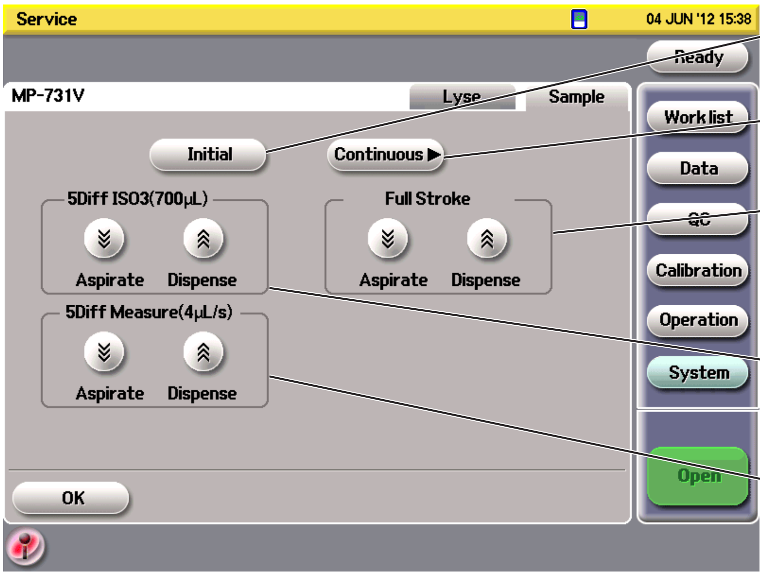


This screen checks operation of the MP-731V hemolyzing reagent syringe. Always press [Initial] before using this function.

Press [Aspirate] to draw in hemolyzing reagent. Press [Dispense] to release the reagent.

Hemolyzing reagent is dispensed to the respective outlets: HEMOLYNAC•3 to the WBC bath and HEMOLYNAC•5 to the mixing chamber.

Sample Pump (MP-731V) Check Screen

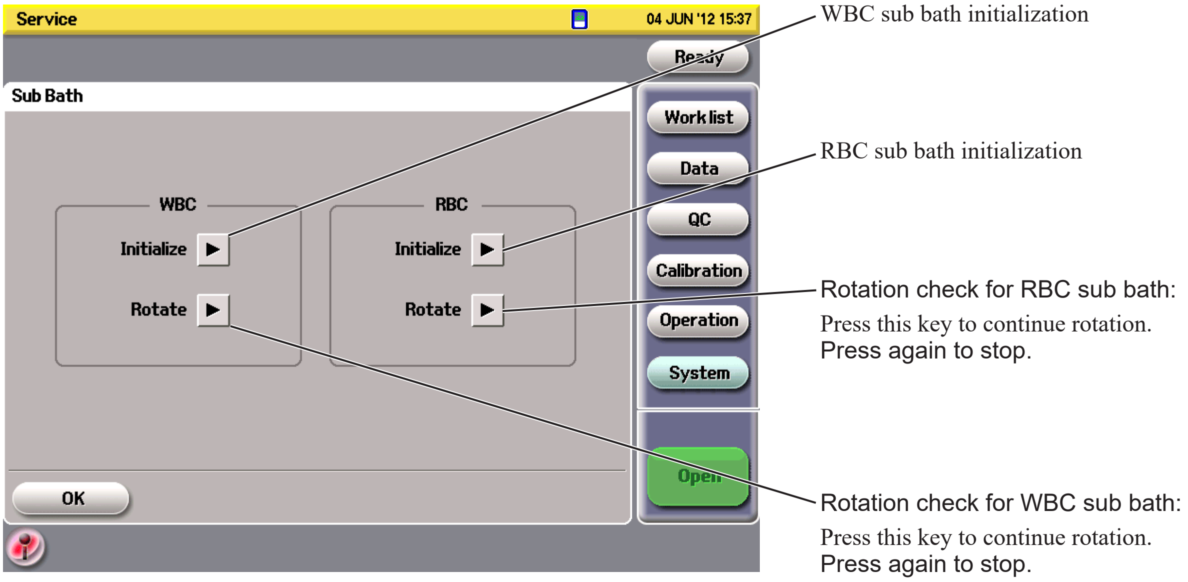


This screen checks the operation of the MP-731V five-part differentiation sample syringe. Press [Aspirate] to draw in diluent, and press [Dispense] to release the diluent.

Always press [Initial] before using this function.

Diluent will be dispensed from each outlet.

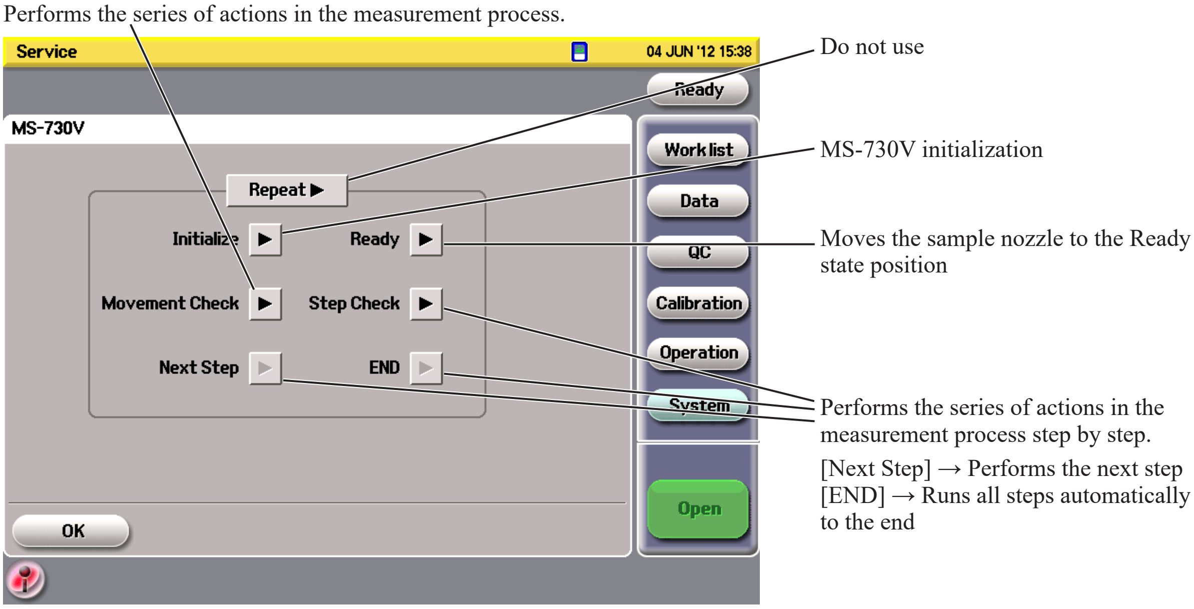
Sub Bath Check Screen



This screen checks the individual sub bath operations.

Always press [Initial] before using this function.

Sampler (MS-730V) Check screen

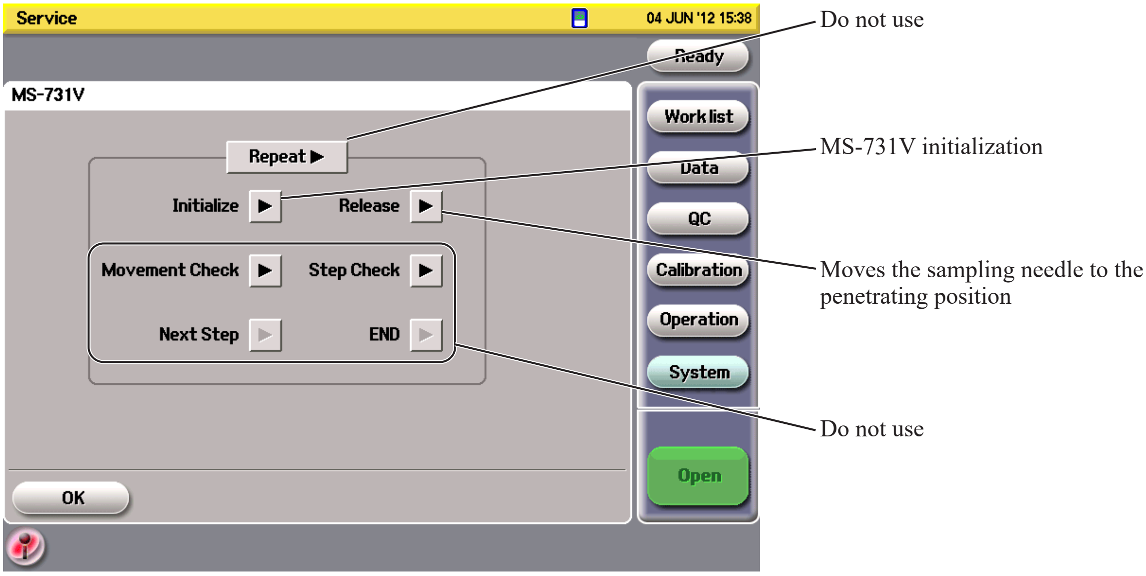


This screen checks the individual sampler operations.

Always press [Initial] before using this function.

The nozzle will move; take due care to prevent it from bending or breaking.

Cap Pierce (MS-731V) Check Screen

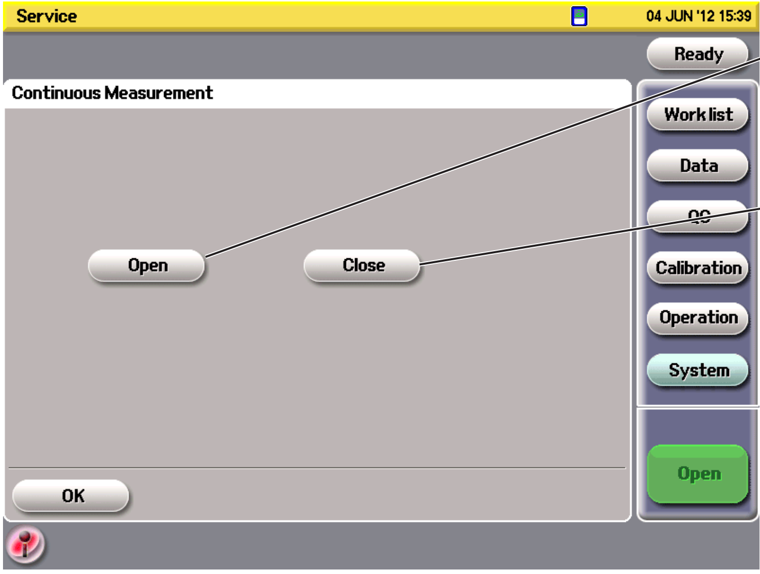


This screen checks the cap pierce operation.

Always press [Initialize] before using this function.

The sampling needle will move; take due care to prevent accidental puncturing.

Continuous Measurement Screen



Open

Performs continuous measurement in open mode

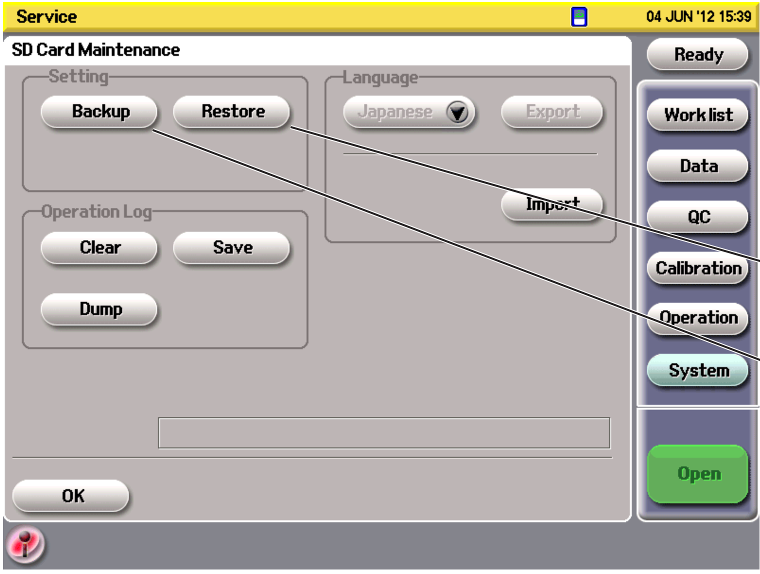
Close

Performs continuous measurement in closed mode

Run continuous measurement (aging) only after checking that there are sufficient amounts of the reagents and that there is no accumulated waste fluid.

SD Card Screen

This screen backs up data and settings to the SD card.



Restores data and settings from the SD card

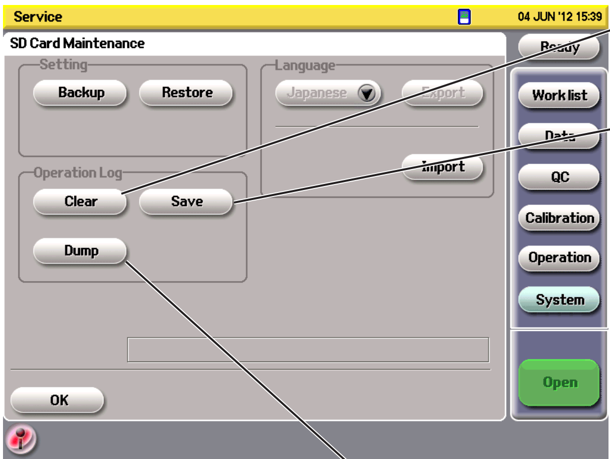
Saves data and settings to the SD card

Data that is backed up and restored

- Calibration coefficient and other settings
- Sensitivity threshold
- Measurement data from the analyzer's memory (including scattergrams)
- QC data and upper/lower limits

NOTE
- Only the current settings can be saved and multiple conditions cannot be saved.
- Data is deleted upon restoration.

This screen saves the analyzer's operation logs to the SD card.



Clear button:
Deletes operation logs stored in the analyzer.

Save button:
Outputs operation logs stored in the analyzer to the SD card.

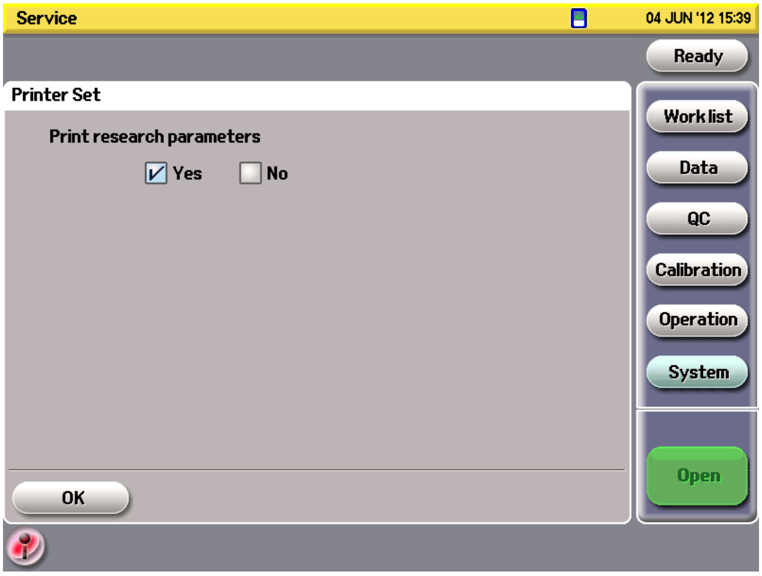
Dump button:
Display operation logs.

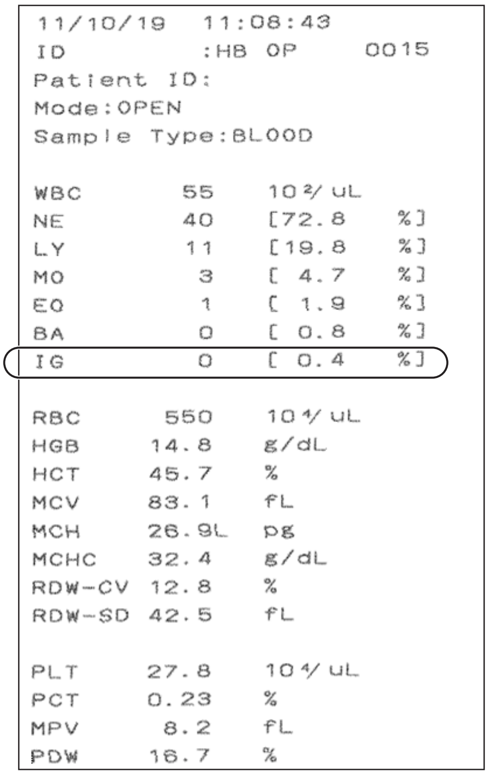
8

Printer Settings Screen

Printing the research parameters

This setting selects whether or not to output IG% and IG# using the internal printer.



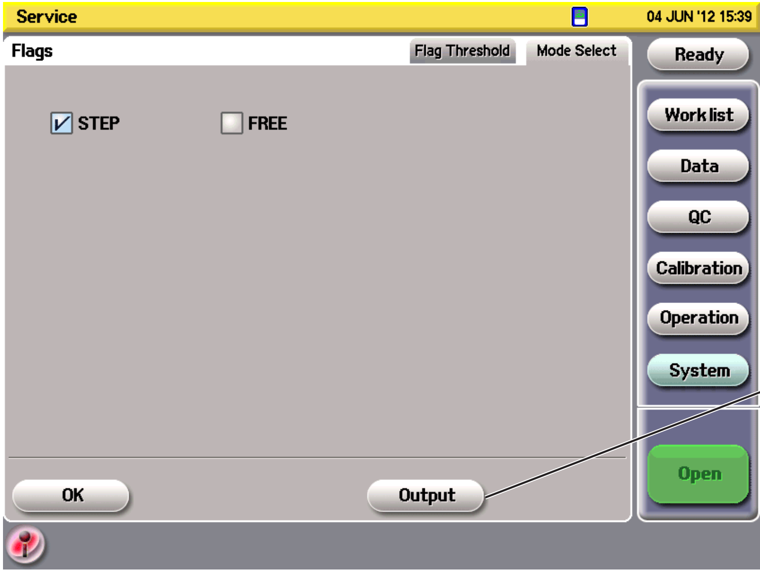

11/10/19 11:08:43
ID :HB OP 0015
Patient ID:
Mode:OPEN
Sample Type:BLOOD

WBC	55	10^2/uL	
NE	40	[72.8	%]
LY	11	[19.8	%]
MO	3	[4.7	%]
EO	1	[1.9	%]
BA	0	[0.8	%]
IG	0	[0.4	%]
RBC	550	10^4/uL	
HGB	14.8	g/dL	
HCT	45.7	%	
MCV	83.1	fL	
MCH	26.9L	pg	
MCHC	32.4	g/dL	
RDW-CV	12.8	%	
RDW-SD	42.5	fL	
PLT	27.8	10^4/uL	
PCT	0.23	%	
MPV	8.2	fL	
PDW	16.7	%	

IG% and IG# cannot be printed from an external printer or card printer.

Morpho. Flag Settings Screen

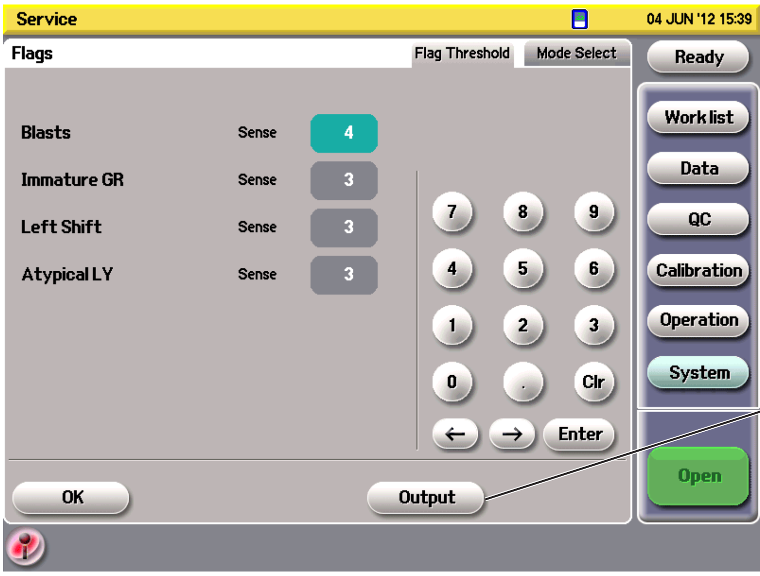
This screen is changes threshold settings for each flag.



STEP
Enables the setting of thresholds out of 5 levels for each flag.

FREE (Do not use)
Enables the setting of thresholds by entering values for each flag.

Saves a screenshot of this screen to the SD card.

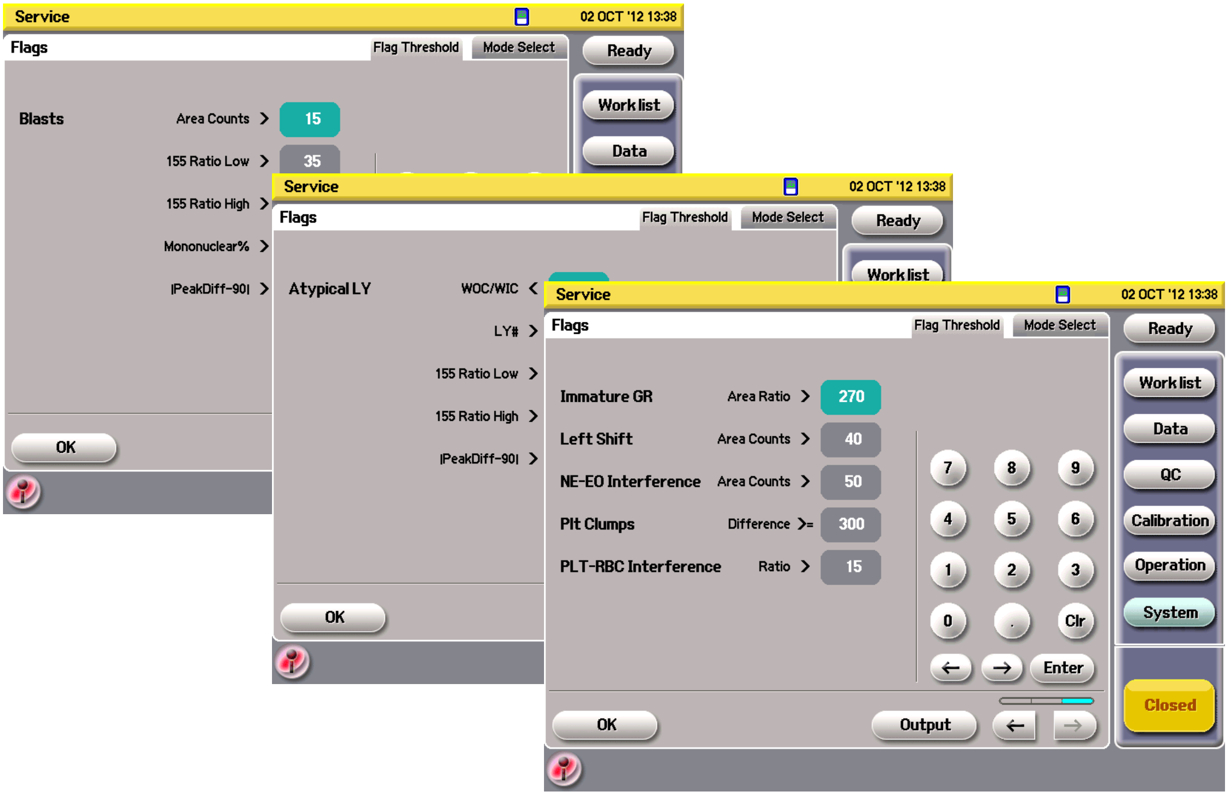


The thresholds for the following four flags can be changed:
- Blast
- IG
- Left Shift
- At-Ly

Saves a screenshot of this screen to the SD card.

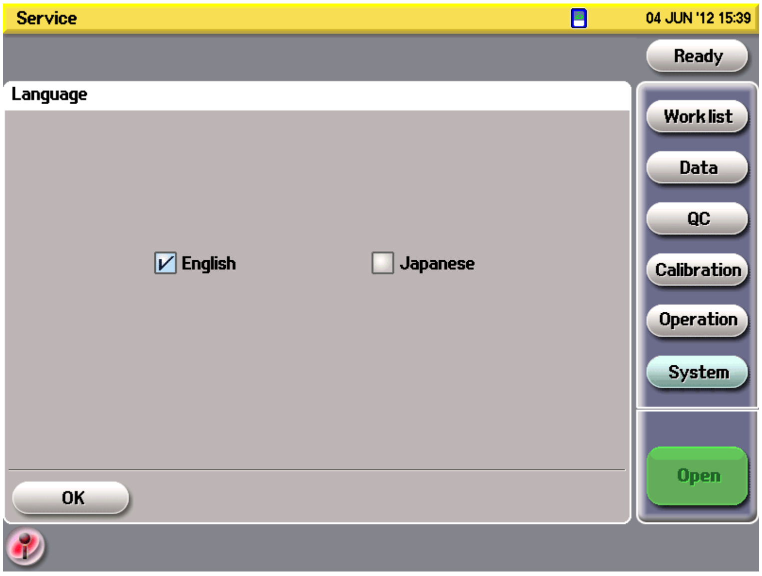
Threshold values can be set to a value in the range of 1 to 5, with 5 causing the easiest trigger for flags to be set.

On the FREE screen, detailed settings are available for flag thresholds.



Language Settings Screen

This screen sets the user interface language.



NOTE: The initial values to be applied when settings are reset depends on the language set here.

Japanese:
Unit system that is used in Japan.
Date/Time: YY/MM/DD

English:
Unit system that is used in the U.S.A.
Date/Time: DD/MMM/YY

Sens/Threshold Screen

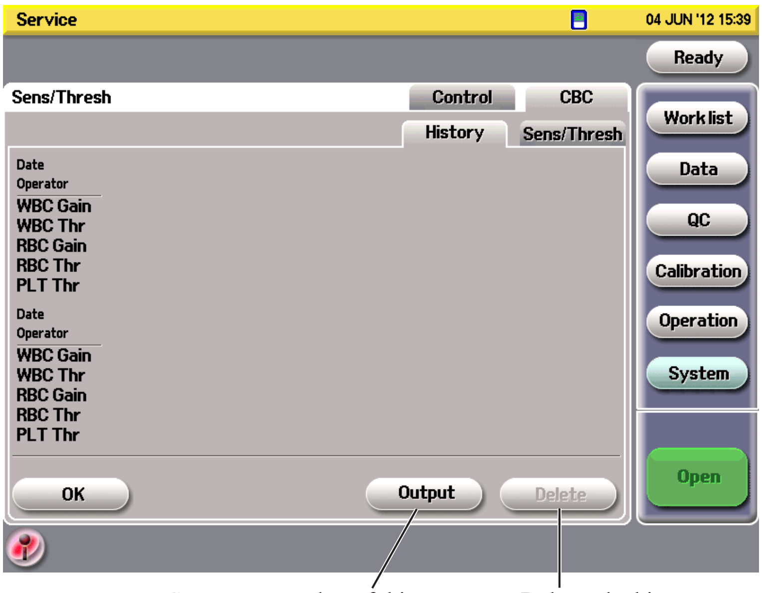
This screen sets the impedance sensitivity and thresholds for human blood measurement.

The threshold settings for RBC and PLT are generally set to [Auto], but when using a fixed threshold, remove the check from the AUTO checkbox and enter a value.

Select off to use a fixed threshold for RBC

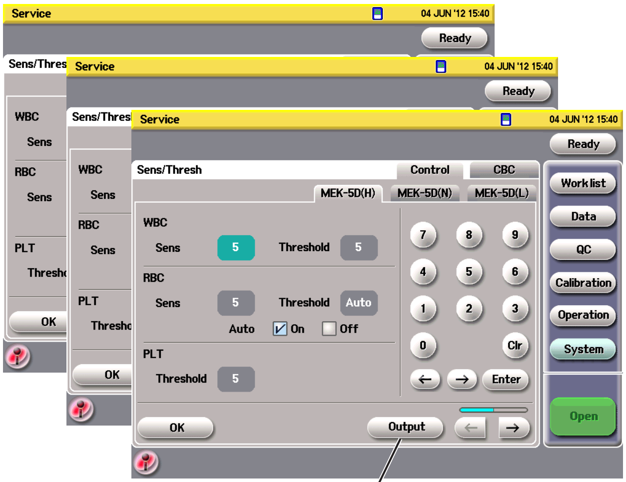
Use this key to save a screenshot of this screen to the SD card.

You can check the history of changes applied to the sensitivity and threshold settings.

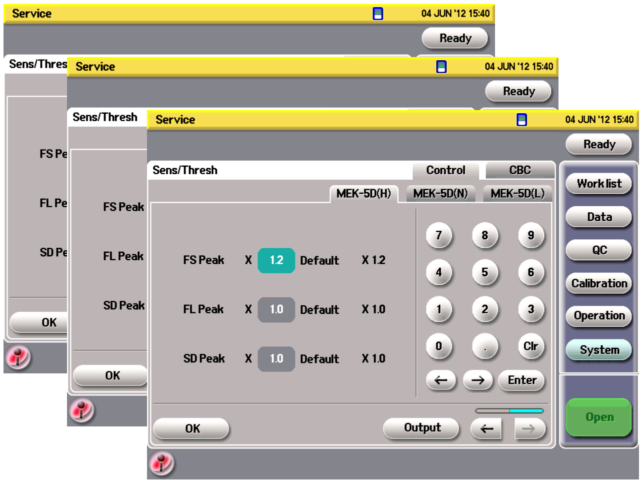


Saves a screenshot of this screen to the SD card

Deletes the history record



Saves a screenshot of this screen to the SD card



You can set the CBC sensitivity and thresholds for MEK-5DL/N/H and the offsets for optical sensitivity.

8

Display Settings Screen

The screen sets the display of scattergrams and histograms on the result screen.

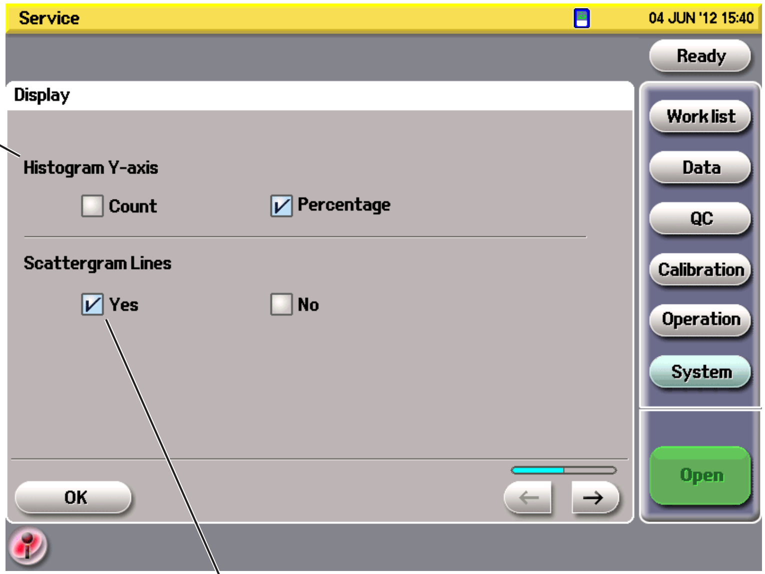
Sets how the histogram is displayed

Histogram

Max value of the vertical axis is fixed. The higher the cell count, the taller the height of the histogram becomes.

Distribution

The vertical direction is fixed to full scale regardless of the overall count values. This makes it easy to read the distribution pattern, but the overall count values are not shown.



Select whether or not to show a separator lines in the scattergram

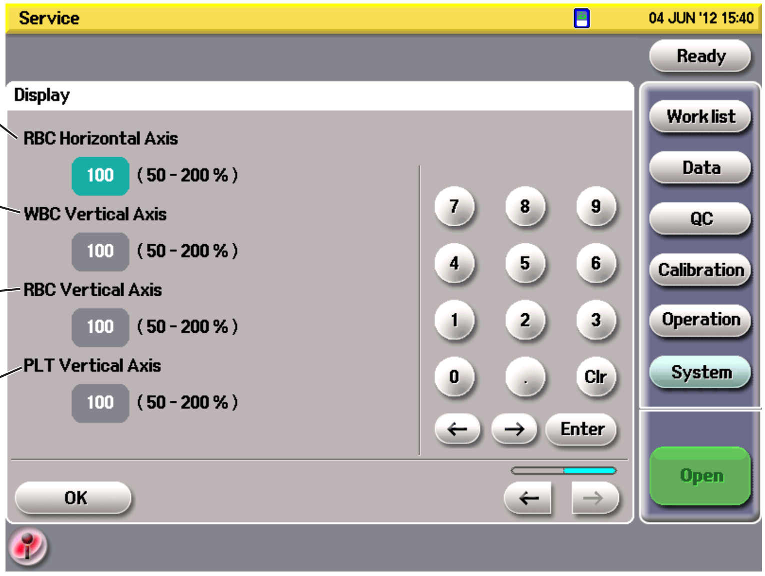
The ratio of the vertical axis of the histogram and the position of the scale of histogram for RBC can be adjusted.

Adjusts the position of the scale of the RBC histogram

Sets the max value of the vertical axis of the WBC histogram

Sets the max value of the vertical axis of the RBC histogram

Sets the max value of the vertical axis of the PLT histogram



Use this function when the position of the RBC histogram scale does not match the MCV.

Advanced Settings Screen

Set the number of decimal places when displaying WBC and Diff values. (Default: Normal)

Normal: 1 decimal place

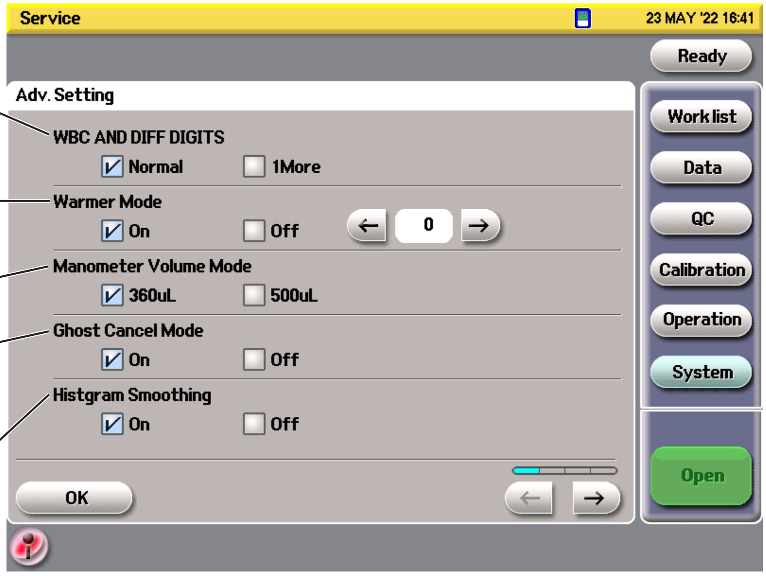
1More: 2 decimal places

Warmer control
On: Normal operation
Off: Terminate operation
Value: Do not change
(Default: 0)

Not used.
(Default: 360uL)

Not used.
(Default: On)

Selects whether to smooth out the WBC, RBC, and PLT histograms.
(Default: On)



This screen changes various settings for measurement. For normal use, use the default settings.

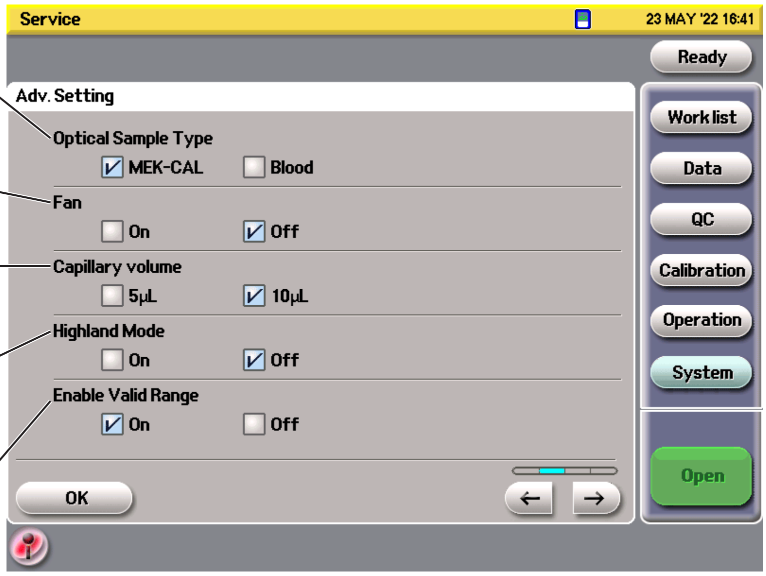
Selects whether to use MEK-CAL or human blood for optical adjustment.
(Default: MEK-CAL)

Fan status
On: Fan is running
Off: Fan is stopped
(Default: Off)

Sets the amount of blood to be used for capillary blood measurement.
(Default: 10 uL)

Highland mode
Turn this mode on when using the analyzer in a location more than 1,000 m above sea level. (Default: Off)

Selects whether to attach an asterisk (*) mark after low PLT/WBC measurement values.
(Default: On)



Continue 5D Mode

Settings for CBC and optical sensitivity are different for control blood and human blood.
For QC measurement ($\overline{X}$-R or L&J), the sensitivity is automatically switched; however, to measure control using normal measurement, you must change the sample type to ‘Control’.
After measurement is completed, the sample identification automatically returns to ‘Blood’.

Selects whether to continue measurement in the control mode. (Default: Off)

When the analyzer is turned off, the setting returns to Off.

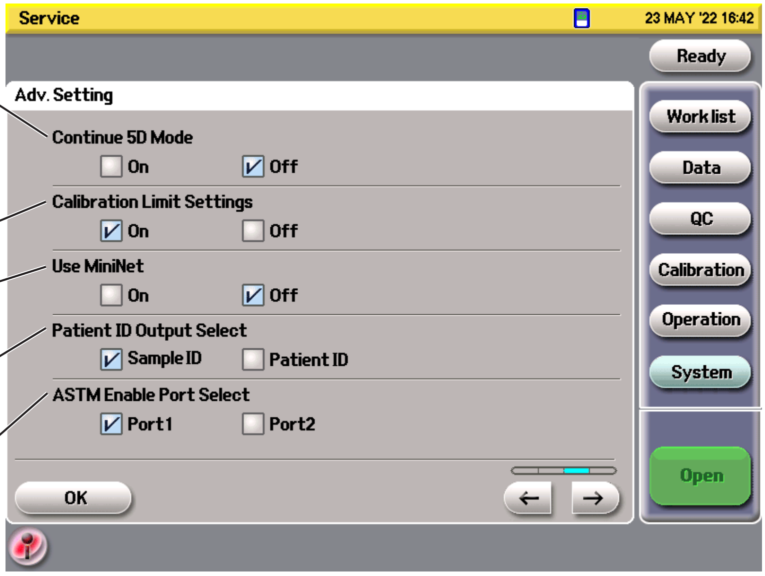
- On: When a measurement in the control mode is finished, the sample type remains ‘Control’.
- Off: When a measurement in control mode is finished, the sample type changes to ‘Blood’.

Selects whether to set the upper and lower limits on the Calibration screen.
(Default: On)

Not used. Set this setting to Off.

Selects whether sample ID or patient ID is output as Patient ID information for PC (V03-02, V05-01), ASTM or USB communication.
(Default: Sample ID)

Selects Port 1 or 2 for ASTM communication.
(Default: Port 1)



The following settings are available in the software version 02-07 or later.

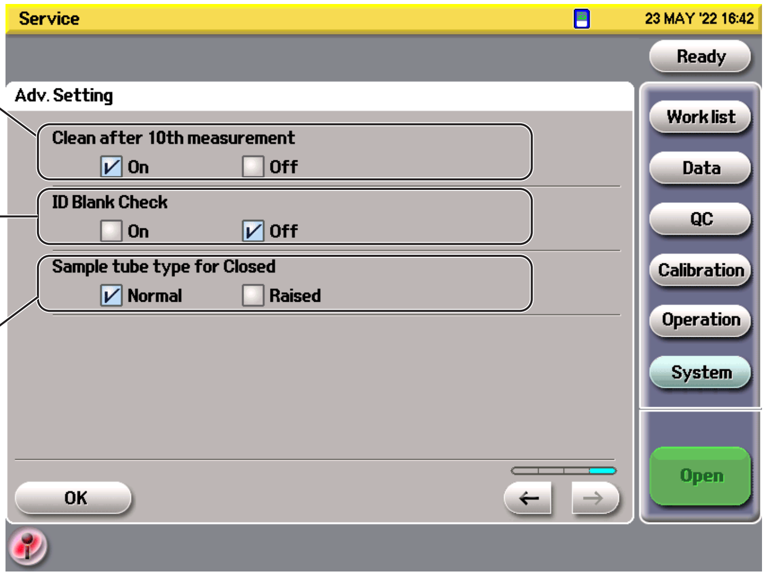
The analyzer automatically cleans the fluid path after every 10th measurement.
(Default: On)

Sets whether measurement can be performed without entering an ID. (Default: Off)

- On: Measurement cannot be performed when no ID is entered. A buzzer sounds when measurement is attempted.
- Off: Measurement can be performed without entering an ID.

Select the type of sample tube to use for measurement.
(Default: Normal)

NOTE: The sample may not be aspirated correctly if this setting is changed.

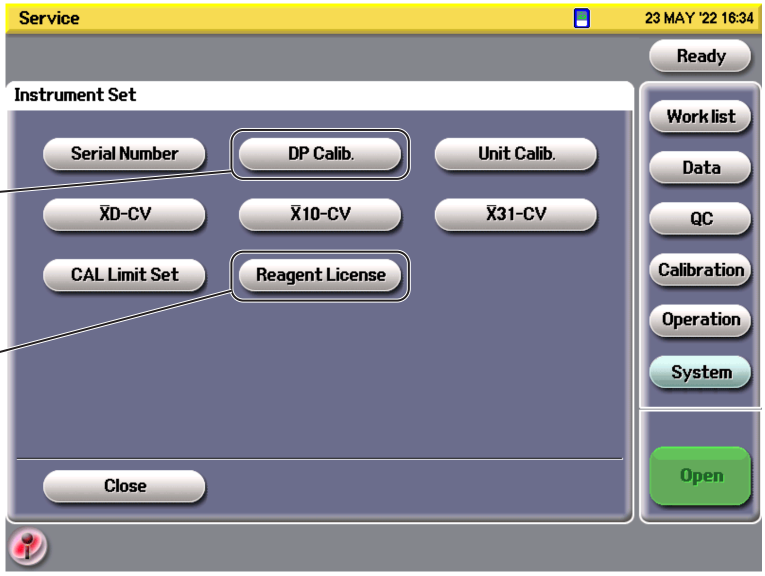


Instrument Settings Screen

This screen sets individual default values for the analyzer and checks the average and CV.

Pressing this key opens the DP Calibration screen.
Refer to “DP Calibration” in Section 8.

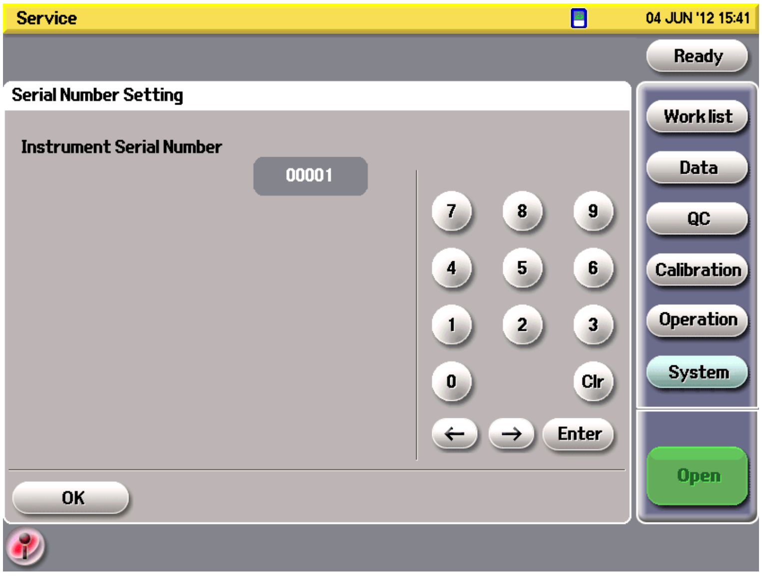
Not used. (This key is displayed on the analyzer with the software version 02-10 or later only.)



- Serial Number
- DP Calib.
- Unit Calib.
- $\overline{X}$D-CV
- $\overline{X}$10-CV
- $\overline{X}$31-CV
- CAL Limit Set
- Reagent License (software version 02-10 or later only)

Serial Number Setting Screen

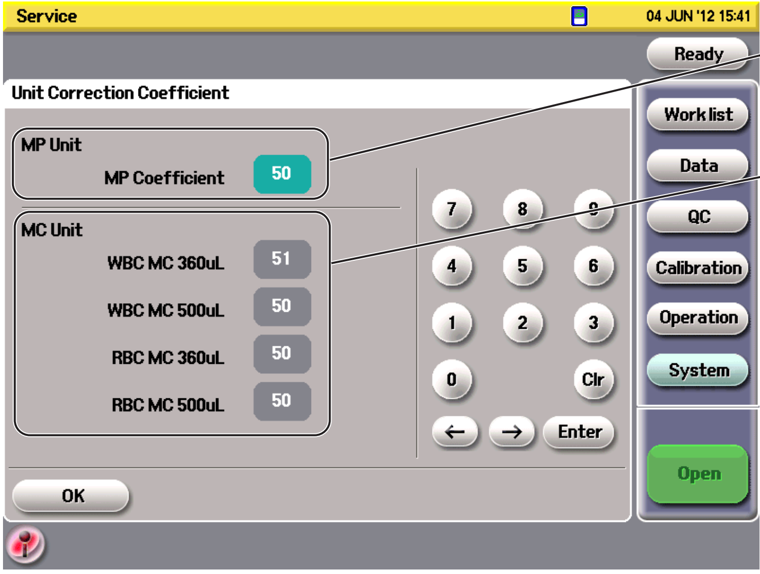
This screen checks and sets the instrument's serial number.



The measurement data includes a serial number. Always compare it with the serial number on the analyzer's label and confirm that they match.

If the MAIN BD (UT-7241/UT-7320) is replaced, enter the new serial number on this screen.

Unit Correction Coefficient Screen



Dilution ratio correction coefficient for diluter (MP-730V)

Manometer correction coefficient for MC unit (MC-730V)
- WBC MC 360 uL: 360 uL correction (WBC)
- WBC MC 500 uL: 500 uL correction (WBC)

- RBC MC 360 uL: 360 uL correction (RBC)
- RBC MC 500 uL: 500 uL correction (RBC)

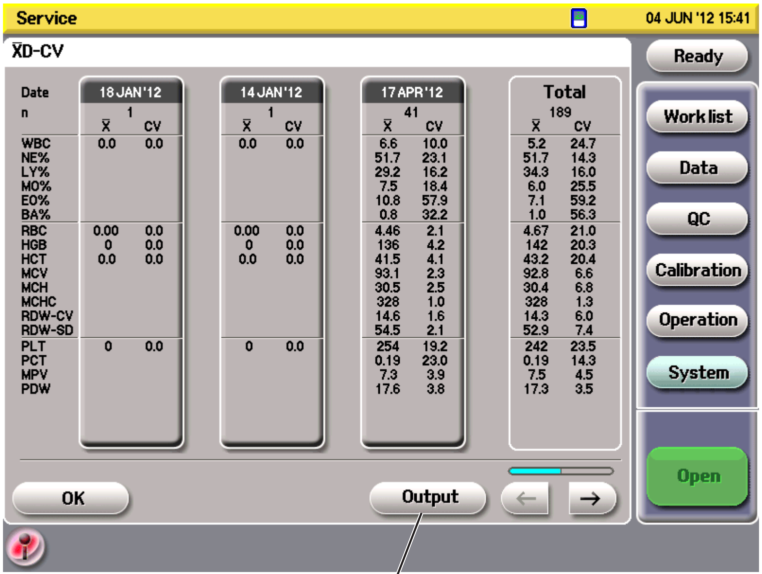
This screen sets the correction coefficients for the dilution ratio and the aspiration volume in the manometer.

After a unit (MC-730V, MP-730V) or a board (UT-7200, UT-7249-01) has been replaced, compare the correction coefficients with those indicated on the unit's label and confirm that they match.

If the correct correction coefficients are not set, accurate calculation and measurement cannot be ensured.

$\overline{X}$D-CV Screen

Based on all stored normal value data, this screen displays the daily average and center values for the past three days.



Saves a screenshot of this screen to the SD card

Use as a way to acquire the center values (MCV, MCH, MCHC) for $\overline{X}$B management

The periodic average of $\overline{X}$D data is used as the center value for each item and as the initial value for $\overline{X}$B management.

Use as basic data for quality control

Mean corpuscular data (MCV, MCH, and MCHC) has a stable physiological fluctuation range, which allows $\overline{X}$D and CV data to be used as basic data for QC.

Use for statistical calculations

The data distribution for calculation can be independently specified for each item (normal range setting and correlation). Therefore, the data can be used for statistical calculations, such as the determination of a standard range specific to the institution.

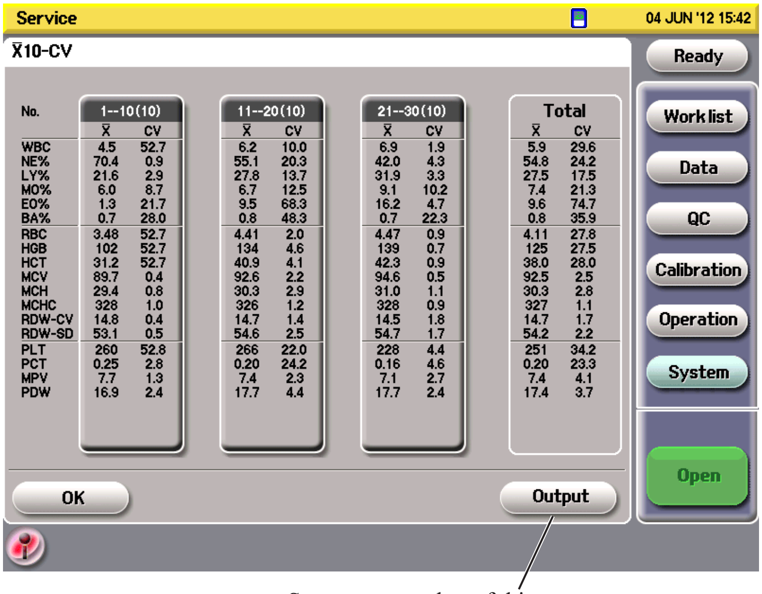
Samples with measured values that are out of pre-set range are not included in the calculation.

$\overline{X}$10-CV Screen

Based on all stored normal value data, this screen displays the average and center values for every 10 samples.

Use this screen when continuously measuring hematology control blood and checking the reproducibility of the machine.

The screen displays the average and center values for 3 sets of 10 counts, in other words the average and center values from 30 samples, as well as the average mean and CV mean for every 10 counts.



Saves a screenshot of this screen to the SD card

The last 30 samples are used for calculation regardless of the standard value range.

$\overline{X}$31-CV Screen

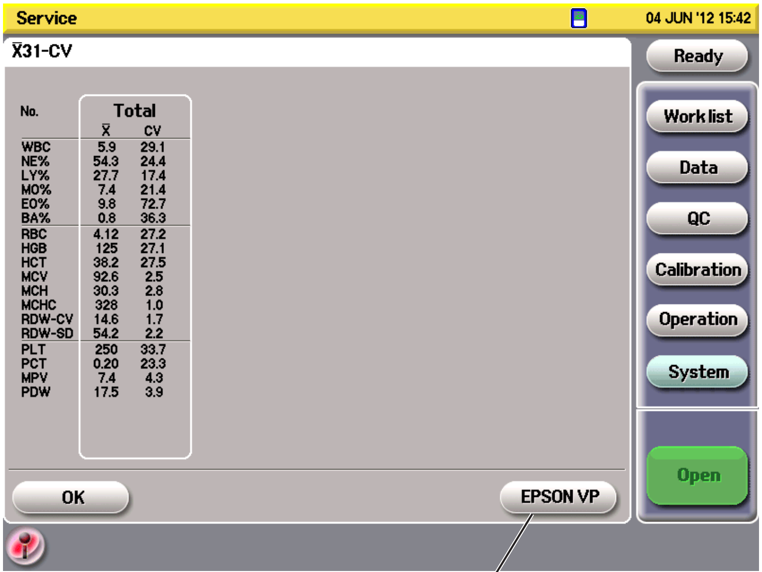
Based on all stored normal value data, this screen displays the average and center values for the last 31 samples measured.

If there are more than 30 measurement data sets, the last 31 data sets are used to calculate the average and CV%.

The last 31 samples are used for calculation regardless of the standard value range.

$\overline{X}$31-CV data is not calculated when there are less than 31 data sets.

Background measurement data, calibration measurement data, and QC measurement data are not included in this calculation.



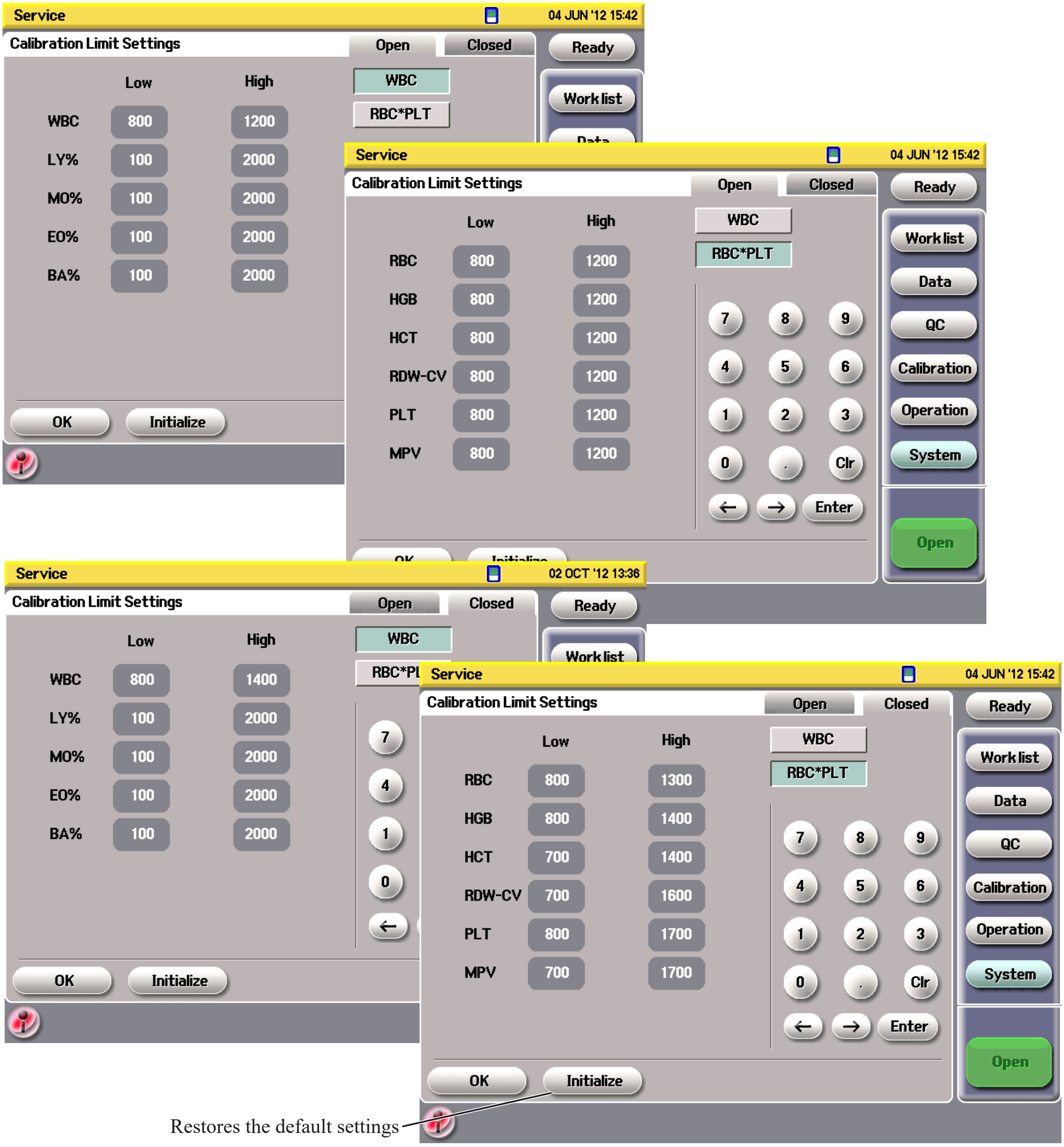
Outputs the average and CV% to an external printer.

Calibration Limit Settings

This screen sets limits for the calibration factor.

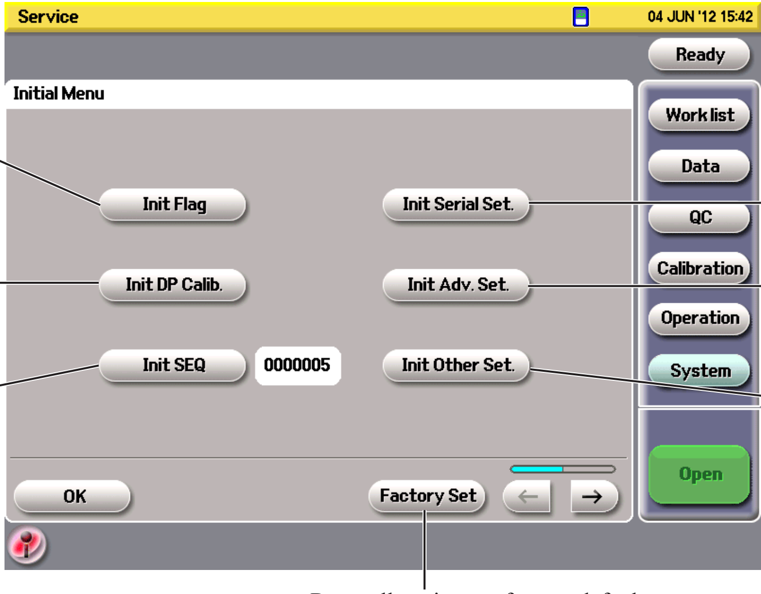
If Calibration Limit Setting is ON, the calibration factor is limited within a specified range.

To prevent incorrectly calibration factor by mistake



Initial Menu Screen

This screen is used primarily to initialize the Service screen settings.



Initializes thresholds for flags

Initializes all fluid sensor digital potentiometer values to 127

Initializes the sequence number to 1

Initializes the serial number

Initializes advanced settings

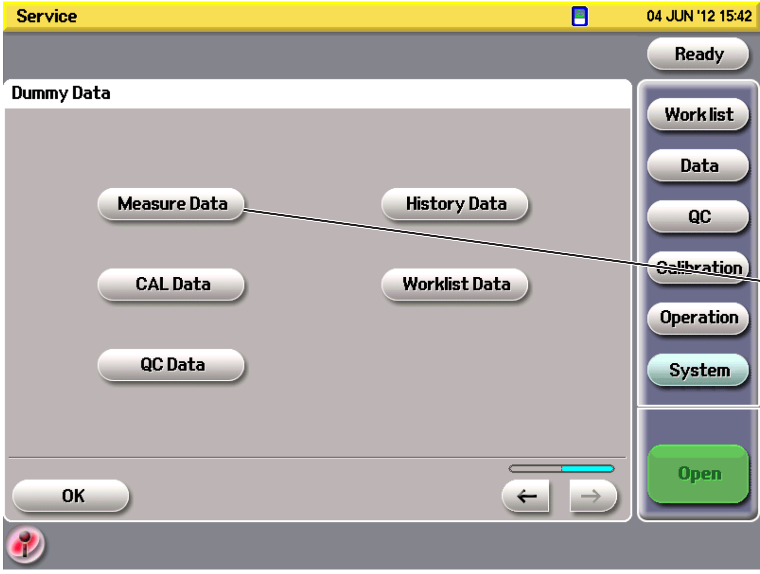
Initializes the following items:
- Language
- Sensitivity and thresholds
- Display
- Unit calibration coefficients

Reset all settings to factory defaults

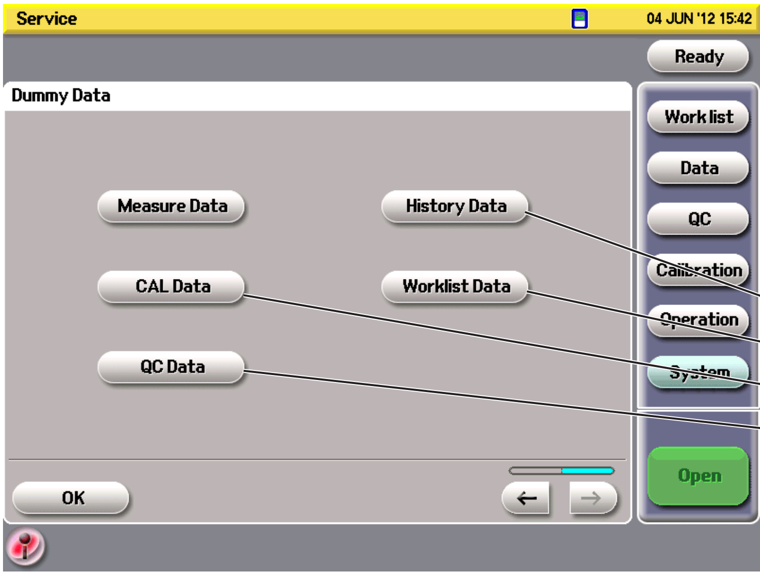
Dummy Data Screen

This screen allows for the creation of the following demonstration data.

This function creates a DUMMY_DATA (1-byte, all capital letters) folder on the SD card for MEK-7300. Data saved in the folder can be read into the analyzer.



Do not use



This screen allows for the creation of the following demonstration data:

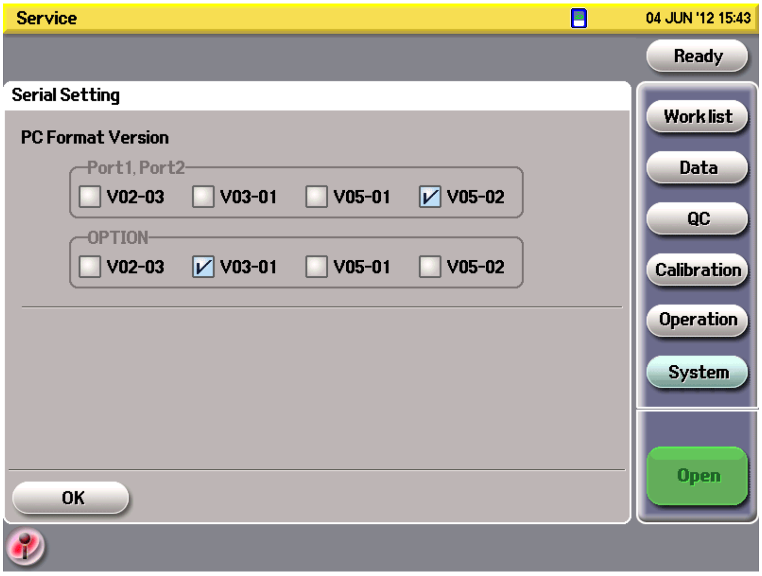
- History data
- Work list data
- Calibration data
- QC data

When demonstration data is created, the relevant stored data will be deleted.

After demonstration, delete all data via the [Initial] screen. Performing measurements with the demonstration data existing can cause problems, such as not being able to save data.

Serial Setting Screen

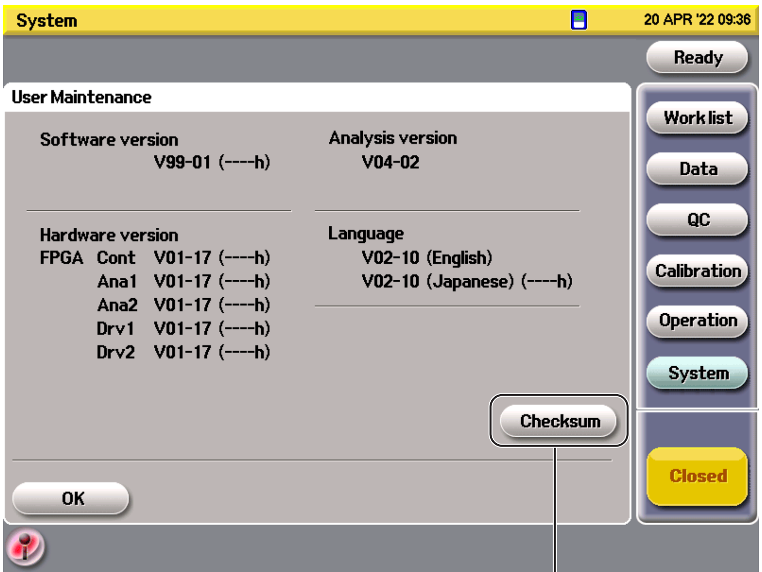
This screen sets the PC format version for serial communication.



PC format version can be specified to ensure compatibility.

User Maintenance (Version) Screen

The User Maintenance (version) screen is available on analyzers with software version 02-08 or later.



Calculates the checksums of the installed programs.

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Contact information is accurate as of Mar 2022. 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-7300K_0634-900772F

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