

Operator's Manual

LabH 60/LabH 63/LabH 65/LabH 66/LabH 68

Animal-Dedicated Hematology Analyzer

(Life Science)



© 2025 Shenzhen Mindray Animal Medical Technology Co., Ltd. All rights reserved.

For this Operator's Manual, the issued date is 2025-08.

IMPORTANT!

The product is veterinary use only.

Intellectual Property Statement

Shenzhen Mindray Animal Medical Technology Co., Ltd. (hereinafter called Mindray Animal Medical) owns the intellectual property rights to this product and this manual. This manual may refer to information protected by copyright or patents and does not convey any license under the patent rights or copyright of Mindray Animal Medical, or of others.

Mindray Animal Medical intends to maintain the contents of this manual as confidential information. Disclosure of the information in this manual in any manner whatsoever without the written permission of Mindray Animal Medical is strictly forbidden.

Release, amendment, reproduction, distribution, rental, adaptation, translation or any other derivative work of this manual in any manner whatsoever without the written permission of Mindray Animal Medical is strictly forbidden.

mindray is the trademark of SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD. in China and other countries. All other trademarks that appear in this manual are used only for informational or editorial purposes. They are the property of their respective owners.

Responsibility on the Manufacturer Party

Contents of this manual are subject to changes without prior notice.

All information contained in this manual is believed to be correct. Mindray Animal Medical shall not be liable for errors contained herein nor for incidental or consequential damages in connection with the furnishing, performance, or use of this manual.

Mindray Animal Medical is responsible for the effects on safety, reliability and performance of this product, only if:

- all installation operations, expansions, changes, modifications and repairs of this product are conducted by Mindray Animal Medical authorized personnel.
- the electrical installation of the relevant room complies with the applicable national and local requirements.
- the product is used in accordance with the instructions for use.



WARNING

- It is important for the hospital or organization that employs this equipment to carry out a reasonable service/maintenance plan. Neglect of this may result in machine breakdown or injury of human health.

- Be sure to operate the analyzer under the situation specified in this manual; otherwise, the analyzer will not work normally and the analysis results will be unreliable, which would damage the analyzer components and cause personal injury.

NOTE:

This equipment must be operated by skilled/trained clinical professionals.

Warranty

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Exemptions

Mindray Animal Medical's obligation or liability under this warranty does not include any transportation or other charges or liability for direct, indirect or consequential damages or delay resulting from the improper use or application of the product or the use of parts or accessories not approved by Mindray Animal Medical or repairs by people other than Mindray Animal Medical authorized personnel.

This warranty shall not extend to:

- Malfunction or damage caused by improper use or man-made failure.
- Malfunction or damage caused by unstable or out-of-range power input.
- Malfunction or damage caused by force majeure such as fire and earthquake.
- Malfunction or damage caused by improper operation or repair by unqualified or unauthorized service people.
- Malfunction of the instrument or part whose serial number is not legible enough.
- Others not caused by instrument or part itself.

Customer Service Department

Manufacturer:	Shenzhen Mindray Animal Medical Technology Co., Ltd.
Address:	Room 702, Tower 4, YESUN Intelligent Community III, No.1301-88 Guanguang Road, Xinlan Community, Guanlan Street, Longhua District, Shenzhen 518110, P. R. China
Website:	www.mindrayanimal.com
E-mail Address:	service@mindrayanimal.com
Tel:	+86 755-33997000

Contents

1 Safety Information	1 - 1
1.1 Labels and Symbols on the System	1 - 1
1.2 Safety-related Symbols and Messages	1 - 8
1.2.1 General Safety Messages	1 - 9
1.2.2 Analyzer Transportation and Installation-related Safety Messages	1 - 10
1.2.3 Safety Messages Related to Reagents, Controls, and Calibrators	1 - 10
1.2.4 Maintenance-related Safety Messages	1 - 11
1.2.5 Laser Warning	1 - 12
1.2.6 Network Security	1 - 12
2 Using This Manual	2 - 1
2.1 Overview	2 - 1
2.2 Who Should Read This Manual	2 - 1
2.3 How to Find Information	2 - 1
2.4 Conventions Used in This Manual	2 - 2
3 Understanding Your System	3 - 1
3.1 Intended Use	3 - 1
3.2 Description	3 - 1
3.2.1 Model Configuration	3 - 1
3.2.2 Structure and Components	3 - 1
3.2.3 Modules and Components	3 - 2
3.2.4 Accessories	3 - 5
3.3 Overview of Software Interfaces	3 - 6
3.4 Reagents, Controls and Calibrators	3 - 9
3.4.1 Reagents	3 - 9
3.4.2 Controls and Calibrators	3 - 10
4 Understanding the System Principles	4 - 1
4.1 Overview	4 - 1
4.2 WBC Measurement	4 - 1
4.2.1 SF CUBE Cell Analysis Technology	4 - 1
4.2.2 Derivation of WBC-Related Parameters	4 - 3
4.3 Hemoglobin Concentration Measurement	4 - 4
4.3.1 A Test Model Using the Colorimetric Method	4 - 4
4.3.2 Derivation of HGB	4 - 5
4.4 RBC/PLT Measurement	4 - 5
4.4.1 Sheath Flow Impedance Method	4 - 5
4.4.2 SF CUBE Cell Analysis Technology	4 - 5
4.4.3 RBC-Related Parameters	4 - 6
4.4.4 PLT-Related Parameters	4 - 6
4.4.5 Reticulocyte Parameters	4 - 9
4.5 Wash	4 - 10
5 Installing and Connecting the System	5 - 1

5.1 Notes for Analyzer Installation	5 - 1
5.1.1 Space Requirements	5 - 1
5.1.2 Power Requirements	5 - 2
5.1.3 Environment Requirements	5 - 2
5.1.4 Fuse Requirement	5 - 3
5.1.5 Moving and Installing the Analyzer	5 - 3
5.2 Connecting the Analyzer System	5 - 3
5.2.1 Connecting the Reagents	5 - 3
5.2.2 Connecting to the Peripherals	5 - 5
6 Customizing the Analyzer Software	6 - 1
6.1 Introduction	6 - 1
6.2 Saving Settings after Changes	6 - 2
6.3 Analyzer Settings	6 - 2
6.3.1 System Setup	6 - 2
6.3.2 User Management	6 - 6
6.3.3 Manage Animal Type	6 - 7
6.3.4 Auxiliary Setup	6 - 8
6.3.5 Para. Setup (Administrators)	6 - 9
6.3.6 Maintenance (Administrators)	6 - 11
6.3.7 Reagent Setup	6 - 11
6.3.8 Gain Setup (Administrators)	6 - 11
7 Operating Your Analyzer	7 - 1
7.1 Overview	7 - 1
7.1.1 Daily Operating Process	7 - 1
7.1.2 Introduction to the Software Screen	7 - 2
7.2 Preparations before Operation	7 - 2
7.3 Startup and Login	7 - 3
7.3.1 Starting up the Analyzer	7 - 3
7.3.2 Login	7 - 4
7.3.3 Switching Login Account	7 - 5
7.4 Preparing Samples	7 - 5
7.4.1 Preparing Whole Blood Samples	7 - 6
7.4.2 Preparing Prediluted Samples	7 - 6
7.4.3 Preparing Body Fluid Samples	7 - 6
7.5 Sample Analysis	7 - 7
7.5.1 Setting up Sample Information	7 - 7
7.5.2 Performing Sample Analysis	7 - 8
7.6 Entering/Exiting Standby Status	7 - 11
7.7 Shutting down the Analyzer	7 - 12
8 Reviewing Sample Results	8 - 1
8.1 Introduction	8 - 1
8.2 Reviewing Sample Results	8 - 1
8.2.1 Operations on the Table Review Screen	8 - 1
8.2.2 Searching for Sample Records	8 - 3
8.2.3 Graph Review	8 - 5
8.2.4 Communication	8 - 7
8.2.5 Exporting Sample Results	8 - 8

8.2.6 Calculating CV Values	8 - 9
8.2.7 Editing Information	8 - 9
8.2.8 Validating/Canceling Validation (Administrators)	8 - 10
8.2.9 Deleting Sample Records	8 - 11
8.3 Flags of Analysis Results	8 - 11
8.3.1 Parameter Flags	8 - 11
8.3.2 Flags of Abnormal Blood Cell Differential or Morphology Results	8 - 12
9 Using the QC Program	9 - 1
9.1 Overview	9 - 1
9.2 Setting up QC Files (Administrators)	9 - 1
9.2.1 Setting up New QC Files	9 - 1
9.2.2 Editing QC files	9 - 3
9.2.3 Deleting QC files	9 - 4
9.3 Running QC Tests	9 - 4
9.3.1 Running Controls on the QC Count Screen	9 - 4
9.3.2 Running Controls on the Count Screen	9 - 5
9.4 Reviewing QC Results	9 - 6
9.4.1 QC Graph Review	9 - 6
9.4.2 QC Table Review	9 - 7
9.4.3 Deleting QC Records (Administrators)	9 - 8
9.4.4 Communication	9 - 9
9.4.5 Exporting Data	9 - 9
9.5 When QC Results are Out of Range	9 - 11
9.5.1 Troubleshooting	9 - 11
9.5.2 Analyzing the Causes	9 - 11
9.5.3 Taking Corrective Measures	9 - 11
9.5.4 Verifying Effectiveness of Corrective Measures	9 - 12
10 Calibrating Your Analyzer	10 - 1
10.1 Overview	10 - 1
10.2 When to Calibrate	10 - 1
10.3 Checking before Calibration	10 - 1
10.4 Running the Calibration Programs	10 - 1
10.4.1 Notes before Calibration	10 - 2
10.4.2 Manual Calibration	10 - 2
10.4.3 Calibrating with Calibrators (Administrators)	10 - 3
10.4.4 Verifying Calibration Factors	10 - 4
10.5 Calibration History	10 - 5
11 Printing	11 - 1
11.1 Setting up Print Template	11 - 1
11.2 Printing Sample Result Report	11 - 1
11.2.1 Printing Current Sample Result Report	11 - 1
11.2.2 Printing from the Table Review Screen	11 - 1
11.2.3 Printing from the Graph Review Screen	11 - 2
11.2.4 Printing Microscopic Parameter Results	11 - 2
11.3 Printing QC Result Report	11 - 3
11.3.1 Printing QC Results in Specified QC Files	11 - 3
11.3.2 Printing QC Graphs in Specified QC Graph	11 - 3

11.4 Printing Manual Calibration Factors	11 - 3
12 Service	12 - 1
12.1 Overview	12 - 1
12.2 When and Why to Perform the Maintenance	12 - 1
12.2.1 Maintenance of Parts and Components	12 - 1
12.2.2 Manual Cleaning	12 - 3
12.2.3 Replacing the Parts and Components	12 - 3
12.3 Reagent Management	12 - 4
12.3.1 Viewing Reagent Information	12 - 4
12.3.2 Troubleshooting for Mistaken Reagent Error Messages	12 - 4
12.3.3 Replacing the Reagents	12 - 5
12.3.4 Discharging the Wastes	12 - 7
12.4 Probe Cleanser Maintenance	12 - 8
12.4.1 Routine Probe Cleanser Maintenance	12 - 8
12.4.2 Probe Cleanser Maintenance to Parts and Components	12 - 9
12.5 Auto-cleaning of the Parts and Components	12 - 9
12.6 Manual Cleaning of Parts and Components	12 - 9
12.6.1 Cleaning the Probe Wipe and Blood Barrier Bracket	12 - 10
12.6.2 Cleaning the Analyzer Front Cover	12 - 11
12.7 Preparing to Pack-up	12 - 12
12.8 Screen Calibration	12 - 14
12.9 Viewing and Exporting Logs	12 - 14
12.9.1 Viewing Logs	12 - 15
12.9.2 Exporting Logs	12 - 15
13 Troubleshooting	13 - 1
13.1 Overview	13 - 1
13.2 Checking Analyzer Status	13 - 1
13.3 Error Messages and Solutions	13 - 2
13.4 Fault Diagnosis	13 - 21
A Index	A - 1
B Specification	B - 1
B.1 Test Parameters	B - 1
B.2 Sampling Features	B - 4
B.2.1 Sample Volumes Required for Each Analysis	B - 4
B.2.2 Throughput	B - 4
B.3 Performance Specifications	B - 4
B.3.1 Display Ranges for Major Parameters	B - 4
B.3.2 Background/Blank Count Requirements	B - 4
B.3.3 Linearity Requirements	B - 5
B.3.4 Repeatability	B - 6
B.3.5 Carryover	B - 7
B.4 Input/Output Devices.	B - 8
B.4.1 Keyboard	B - 8
B.4.2 Mouse	B - 8
B.4.3 External Barcode Scanner	B - 8
B.4.4 Printer	B - 8
B.4.5 USB Drive	B - 8

B.5 Interfaces	B - 8
B.6 Fuse	B - 9
B.7 Temperature Protection Switch	B - 9
B.8 EMC Description	B - 9
B.9 Noise Level	B - 11
B.10 Dimensions and Weight	B - 12
B.11 Contraindication	B - 12
B.12 Safety Classification	B - 12
C Accessories and Packing List	C - 1
C.1 Accessories of the Analyzer	C - 1
C.2 Optional Accessories of the Analyzer	C - 1
C.3 Packing List	C - 1
D Communication	D - 1
E Declaration of Conformity	E - 1
F References	F - 1
G Maintenance Logs	G - 1

This page intentionally left blank.

1 Safety Information

1.1 Labels and Symbols on the System

CAUTION

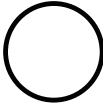
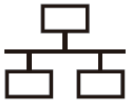
During the daily use of the analyzer, especially the cleaning process, the operator shall ensure the intactness of the labels.

The general meaning assigned to geometric shapes, safety colors and contrast colors for safety signs are as follows:

Geometric shape	Meaning	Safety color	Contrast color	Graphical symbol color
	Prohibition	Red	White	Black
	Mandatory action	Blue	White	White
	Warning	Yellow	Black	Black

You may find the following symbols on package or the body of the instrument:

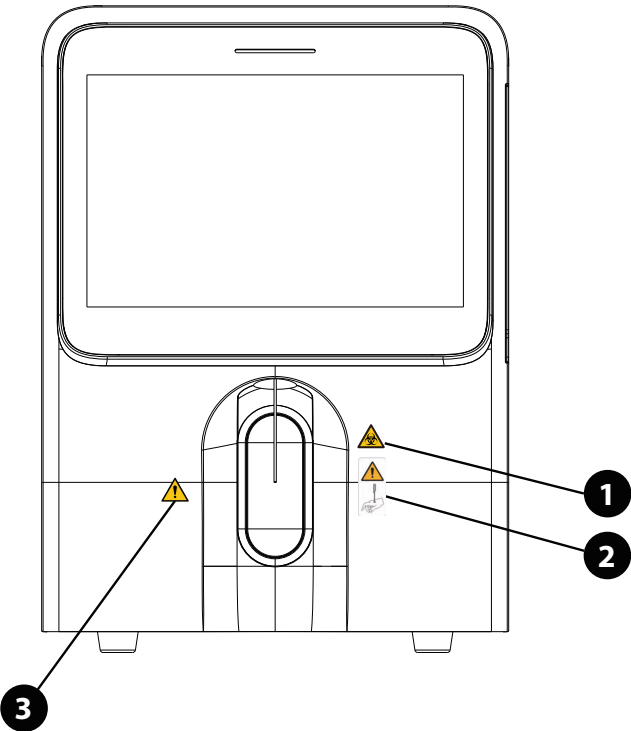
When you see...	It means...
	General warning sign
	Warning; Biological hazard
	Warning; Laser beam

When you see...	It means...
	Protective earth (ground)
	“Off” (Power)
	“ON” (Power)
	USB connection
	Computer network
	Alternating current
	Serial number
	Date of manufacture
	Manufacturer
	Temperature limit
	Humidity limitation

When you see...	It means...
	Atmospheric pressure limitation
	WARNING The sample probe is sharp and potentially biohazardous. Exercise caution when working around it!
 严禁在仪器指示灯闪烁状态下进行更换废液桶操作!  Do not replace the waste container when the power indicator is flickering!	Biological risks (on the tube of the waste container cap assembly) Do not replace the waste container when the power indicator is flickering!
	Fragile, handle with care
	This way up
	Keep dry
	Do not roll
	Stacking limit by number

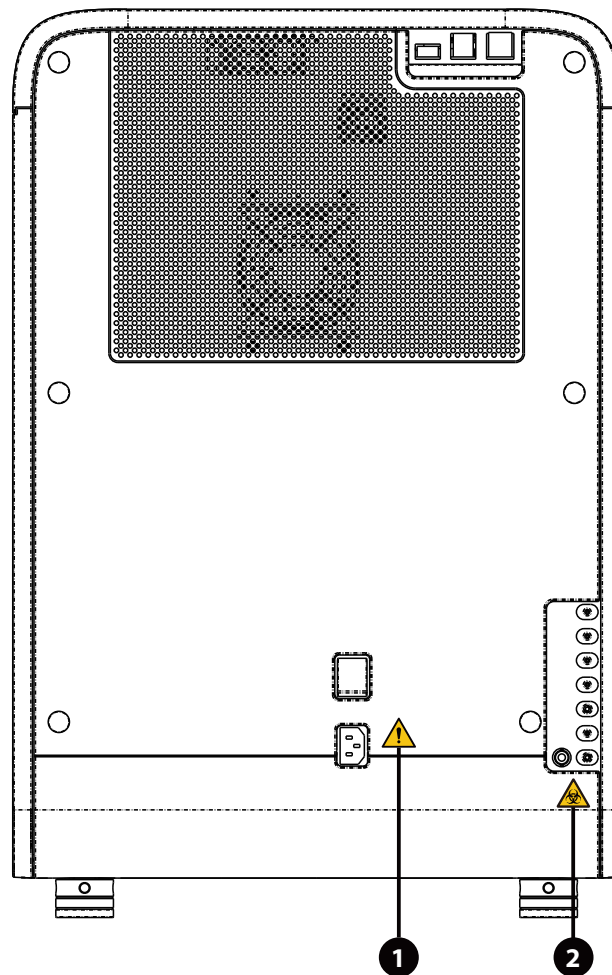
When you see...	It means...
	The following definition of the WEEE label applies to EU member states only: the use of this symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. By ensuring that this product is disposed of correctly, you will help prevent bringing potential negative consequences to the environment and human health. For more detailed information with regard to returning and recycling this product, please consult the distributor from whom you purchased the product.
	CE marking
	NRTL certification mark

Figure 1-1 Warning labels on the front of main unit



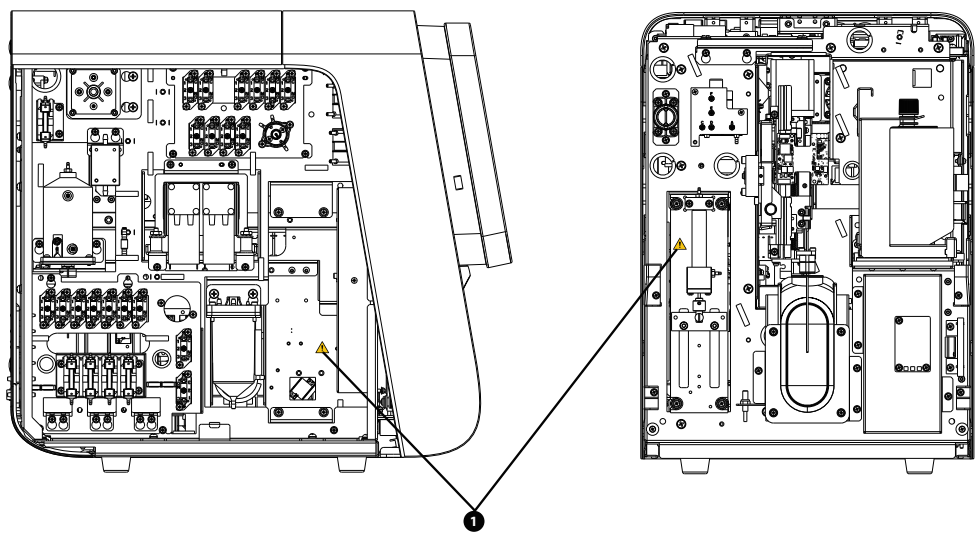
Number	Symbol	Description
1		Biological risk Potentially biohazardous
2		The sample probe is sharp and potentially biohazardous. Exercise caution when working around it!

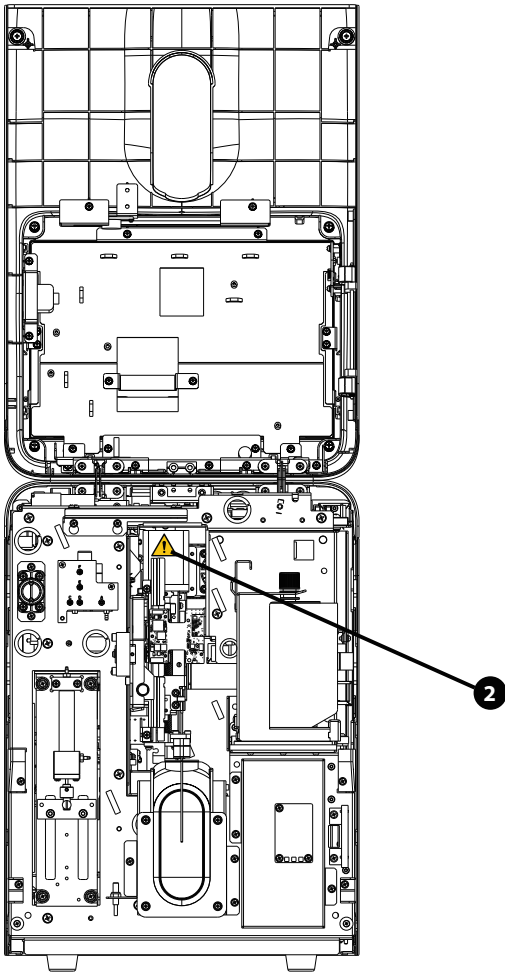
Figure 1-2 Warning labels on the back of main unit



Number	Symbol	Description
1		Warning: • Connect only to a properly earth grounded outlet. • To avoid electrical shock, disconnect power prior to maintenance.
2		Biological risk Potentially biohazardous

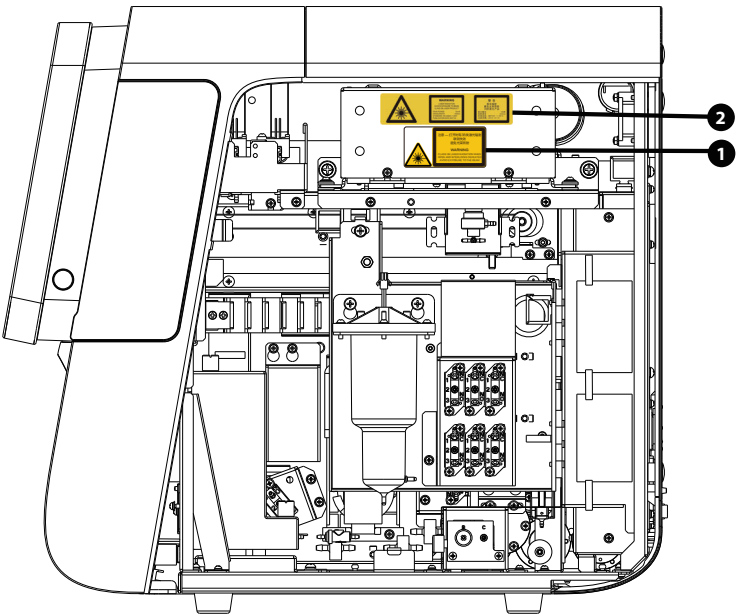
Figure 1-3 Warning labels for moving parts





Number	Symbol	Description
1		Warning To avoid personal injury, do not put your hand under the syringe or inside the slot!
2		Warning To avoid personal injury, do not put your hand under the pipette assembly or inside the moving track!

Figure 1-4 Optical assembly laser warning labels



Number	Symbol	Description
1		Note: • Class 3B laser radiation when open and internal locks defeated • Avoid exposure to the beam
2		Warning: • Laser radiation • Avoid exposure to beam • Class 3B laser product • Peak power: 10mW • Wavelength: 635nm

1.2 Safety-related Symbols and Messages

You will find the following symbols in this manual:

BIOLOGICAL RISK

- Alert you to a potentially biohazardous condition.

** WARNING**

- Alert you to an operating condition that can cause death, serious personnel injury or property damage.
-

** CAUTION**

- Alert you to an operating condition that can cause minor personnel injury, system failure/ damage, and property damage.
-

NOTE:

Alert you to information that requires your attention.

1.2.1 General Safety Messages

** BIOLOGICAL RISK**

- All the samples, controls, calibrators, wastes and areas contacted them are potentially biohazardous. Wear proper personal protective equipment (e.g. gloves, lab coat, goggles, etc.) and follow safety procedures in the laboratory when handling them and the contacted areas in the laboratory.
 - Be sure to dispose of reagents, waste, samples, consumables, etc. according to government regulations.
 - Discard the system according to government regulations.
-

** WARNING**

- The fuse used in the instrument is not a replaceable one. If there is any problem with the fuse, contact Customer Service Department or your local distributor.
 - Any serious incident that has occurred in relation to the device shall be reported to the manufacturer and the competent authority of the country in which the user and/or the animal is established.
-

** CAUTION**

- Be sure to operate the instrument under the situation specified in this manual. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired.
 - Be sure to use the specified external devices only, and keep them away from water.
 - External devices connected to the analyzer and digital interfaces must be authorized and complied with relevant safety and EMC standards (e.g. IEC 62368-1 Safety of Information Technology instrument Standard and CISPR 32 EMC of Information Technology instrument Standard (Class B)). Any persons who connects additional instrument to the signal input or output ports and configures a system, is responsible for ensuring that the system works normally and complies within the safety and EMC requirements. If you have any questions, consult the technical service department of your local representative.
-

- Make sure all the safety measurements are adopted. It is prohibited to disable any safety device or sensor.
 - Keep your clothes, hairs and hands away from the moving parts to avoid injury.
 - Be sure to use the instrument under specified environment in this manual. If not, the instrument may not work properly, the measurement may be unreliable, thus causing damage to the instrument and harm to the body.
 - This instrument is intended to be used by clinical laboratory professionals trained by Mindray Animal Medical or Mindray Animal Medical-authorized distributors.
 - When power cut occurs suddenly, turn off the instrument immediately.
 - The instrument must be within the calibration validity period; otherwise, the measurement results may be inaccurate.
-

1.2.2 Analyzer Transportation and Installation-related Safety Messages

WARNING

- When installing the instrument, ensure that the power switch is in close proximity to the instrument and within your easy access.
 - Before turning on the instrument, make sure the input voltage meets the requirements.
-

CAUTION

- Unpacking, installation or transportation by personnel not authorized or trained by Mindray Animal Medical may cause personal injury or damage your instrument. Do not unpack, transport or install your instrument without the presence of Mindray Animal Medical-authorized personnel.
 - The installation, authorization, upgrade and modification of the system software must be performed by personnel authorized by Mindray Animal Medical. Make sure to install only Mindray Animal Medical-authorized software.
 - Using pinboard may bring electrical interference and the analysis results may be unreliable. Place the analyzer near the electrical outlet to avoid using the pinboard.
 - Use the power cord provided by the manufacturer. Using the power cord other than provided by the manufacturer may lead to system damage or unqualified smear output.
 - When connecting the reagents, make sure the color of the reagent container cap assembly is the same as that of the reagent inlet to which it is connected.
 - Check if the reagent tubes are properly connected before using the system. Otherwise, the results may be inaccurate.
-

1.2.3 Safety Messages Related to Reagents, Controls, and Calibrators

CAUTION

- The reagents are irritating to eyes, skin and airway. Wear proper personal protective equipment (e.g. gloves, lab coat, goggles, etc.) and follow safe laboratory procedures when handling them and the contacted areas in the laboratory. If reagents accidentally spill on your skin or in your eyes, rinse the area with ample amount of clean water, and seek medical attention immediately.

- Use the reagents, controls and calibrators specified by the manufacturer only. Using other reagents, controls and calibrators, may lead to system damage and inaccurate measurement, control and calibration results.
- Pay attention to the expiration dates and open-container stability days of all the reagents. Be sure not to use expired reagents. Otherwise, the results may be inaccurate.
- To ensure measurement accuracy, do not mix the new container of reagent with the residue in the replaced container to ensure accurate measurement, and prevent reagents from pollution following safe laboratory procedures.

1.2.4 Maintenance-related Safety Messages



BIOLOGICAL RISK

- Mindray Animal Medical does not claim the validity of the listed chemicals in infection control. For effective control of infection, please consult the Infection Prevention Department of the hospital or the epidemic professionals.
- Remove the waste container cap and replace the waste container only when the power indicator is not flickering, in order not to make the waste overflow from the container.
- If the waste is discharged using waste container, make sure the pickup tube of the waste container cap assembly is above, and the tube is smooth and not bent.
- After replacing the reagent container/bag, check the tubing connected to the cap assembly and make sure it is not bent over.



CAUTION

- Improper maintenance may damage the analyzer. Operators must follow the instruction of this Operator's Manual to perform maintenance operations. For problems not mentioned in this manual, contact Customer Service Department for service advice.
- Only parts supplied by Mindray Animal Medical can be used for maintenance. For any question, contact Customer Service Department.
- If you accidentally spill hazardous material (for example, reagents or samples) on the instrument, clean the instrument with specified disinfectant. Wear proper personal protective equipment (e.g. gloves, lab coat, etc.) and follow safe laboratory procedures when handling them and the contacted areas in the laboratory.
- The user shall perform regular cleaning and sterilization to the cover of the instrument. Use the specified materials to sterilize the instrument only. For any damage to the instrument or other accidents caused by using materials other than specified, Mindray Animal Medical will not provide any warranty.
- The cleaning and sterilization may damage the instrument to some extent. It is recommended to perform sterilization only when necessary according to your laboratory protocol. Remember to clean the instrument before sterilizing.
- Do not use any decontamination or cleaning agents which could cause a HAZARD as a result of a reaction with parts of the instrument or with material contained in it.
- Only use the accessories and consumables manufactured or recommended by Mindray Animal Medical to achieve the promised system performance and safety. For more information, contact Customer Service Department or your local distributor.
- If any of the pipes or fluidic components are worn out, stop using the analyzer and contact Customer Service Department immediately for inspection or replacement.
- When the power indicator is flickering, it indicates that the sample probe is lowering down. Be sure your hand is away from the sample probe during the process, otherwise, your hand may be hurt.

1.2.5 Laser Warning

Class 1 laser product

NOTE:

- Class 3B laser radiation when open and interlocks defeated.
 - Avoid exposure to the beam
 - Optical density: OD4+
 - Radiation exposure level: 56.77mW/cm²
 - Max. output: 10mW
 - Wavelength: 635nm
 - Standard: IEC 60825-1
 - Publication date: 2007.03
 - Use goggles when necessary
-

WARNING

- **This product is a CLASS 1 embedded laser product. When opened or when the interlock defeated, there is Class 3B laser radiation. Users must not open, disassemble or damage the interlock device; otherwise may be exposed to laser. For any further information or questions, please contact Customer Service Department.**
-

NOTE:

The service and maintenance of the laser product must be handled by professionals. Return the product to Customer Service Department for service and maintenance.

1.2.6 Network Security

WARNING

- **The instrument software uses closed-loop operating system, meaning that the applications of the instrument works in exclusive mode and is free from other application's disturbance. Users can only operate the software interface but cannot directly access the operating system or install software. Therefore, the system is far less vulnerable to viruses, spyware, or malware attacks.**
 - **When the instrument connects to an external computer, install anti-virus software on the computer and scan for viruses and update patches periodically. Do not use it for unintended purposes.**
 - **Data transmission must be performed in a closed-loop network or virtual network. The network must be isolated.**
 - **Users have the responsibility to protect the network authentication information, such as password and user information, from being obtained by unauthorized personnel.**
-

2 Using This Manual

2.1 Overview

This chapter explains how to use your Operator's Manual. The manual is shipped with your product and describes the purpose, functions, and operations of the product. Read this manual carefully before operating your analyzer to ensure that the analyzer can be operated strictly as instructed in this manual to bring its performance to full swing and guarantee operator's safety.

NOTE:

This manual describes the use, functions and operation methods of the product based on the most complete configuration; and some of the content may not be applicable to your product. Contact Mindray Animal Medical if you have any questions.

2.2 Who Should Read This Manual

This manual is intended to be read by clinical laboratory professionals to:

- learn about the analyzer hardware and software;
- set up system parameters;
- perform daily operating task;
- perform system maintenance and troubleshooting.

2.3 How to Find Information

Refer to the table below to find the information you need.

If you want to...	Please...
learn about the safety messages of the analyzer	see "1 Safety Information"
learn about instructions for this manual	see "2 Using This Manual"
learn about the intended use and parameters of the analyzer	see "3 Understanding Your System"
learn about the hardware and software of the analyzer	see "3 Understanding Your System"
learn about how the analyzer works (its measurement principles and processes)	see "3 Understanding Your System"
learn about the installation requirements of the analyzer	see "5 Installing and Connecting the System"
learn about how to define/adjust system settings	see "6 Customizing the Analyzer Software"

If you want to...	Please...
learn about how to collect, prepare, analyze the samples as well as daily operations of the analyzer	see “7 Operating Your Analyzer”
learn about how to review the saved analysis results	see “8 Reviewing Sample Results”
learn about basic requirements of quality control and quality control methods of the hematology analyzers	see “9 Using the QC Program”
learn about how to calibrate the analyzer	see “10 Calibrating Your Analyzer”
learn about how to use the quality control programs of the analyzer	see “11 Printing”
learn about how to maintain/service the analyzer	see “12 Service”
learn about the troubleshooting methods of the analyzer	see “13 Troubleshooting”
learn about the technical specifications of the analyzer	see “B Specification”

2.4 Conventions Used in This Manual

This manual uses certain typographical conventions to clarify meaning in the text:

Format	Meaning
[××]	All capital letters enclosed in [] indicate a key name (either on the pop-up keyboard or the external keyboard), such as [ENTER].
“××”	Letters included in “ ” indicate text you can find on the screen of the analyzer.
“×× > ×× > ××”	Select a submenu item according to the path.

All illustrations in this manual are provided as examples only. They may not necessarily reflect your analyzer setup or data displayed on the screen of the analyzer.

3 Understanding Your System

3.1 Intended Use

This analyzer provides Complete Blood Count, Leukocyte Differential, Hemoglobin Concentration Measurement, and Reticulocyte Measurement for animal blood samples.

3.2 Description

3.2.1 Model Configuration

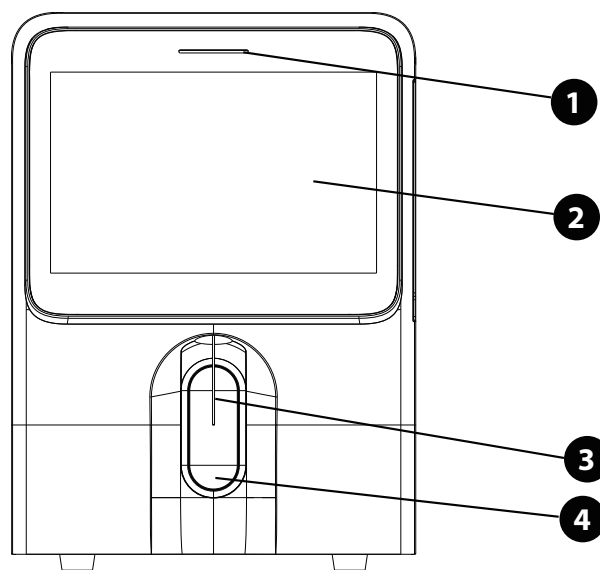
Model	Species difference	RUO parameters	Body fluid sample analysis
LabH 60	Cat, Dog, Horse, Rabbit, Pig, Alpaca, Avian, Fish, Reptile, Amphibian, Ferret, Rat, Mouse, Monkey	×	×
LabH 63/LabH 65	Cat, Dog, Horse, Rabbit, Pig, Alpaca, Avian, Fish, Reptile, Amphibian, Ferret, Rat, Mouse, Monkey, Goat, Cow, Sheep	√	×
LabH 66/LabH 68	Cat, Dog, Horse, Rabbit, Pig, Alpaca, Avian, Fish, Reptile, Amphibian, Ferret, Rat, Mouse, Monkey, Goat, Cow, Sheep, Camel, Llama, Panda	√	√

3.2.2 Structure and Components

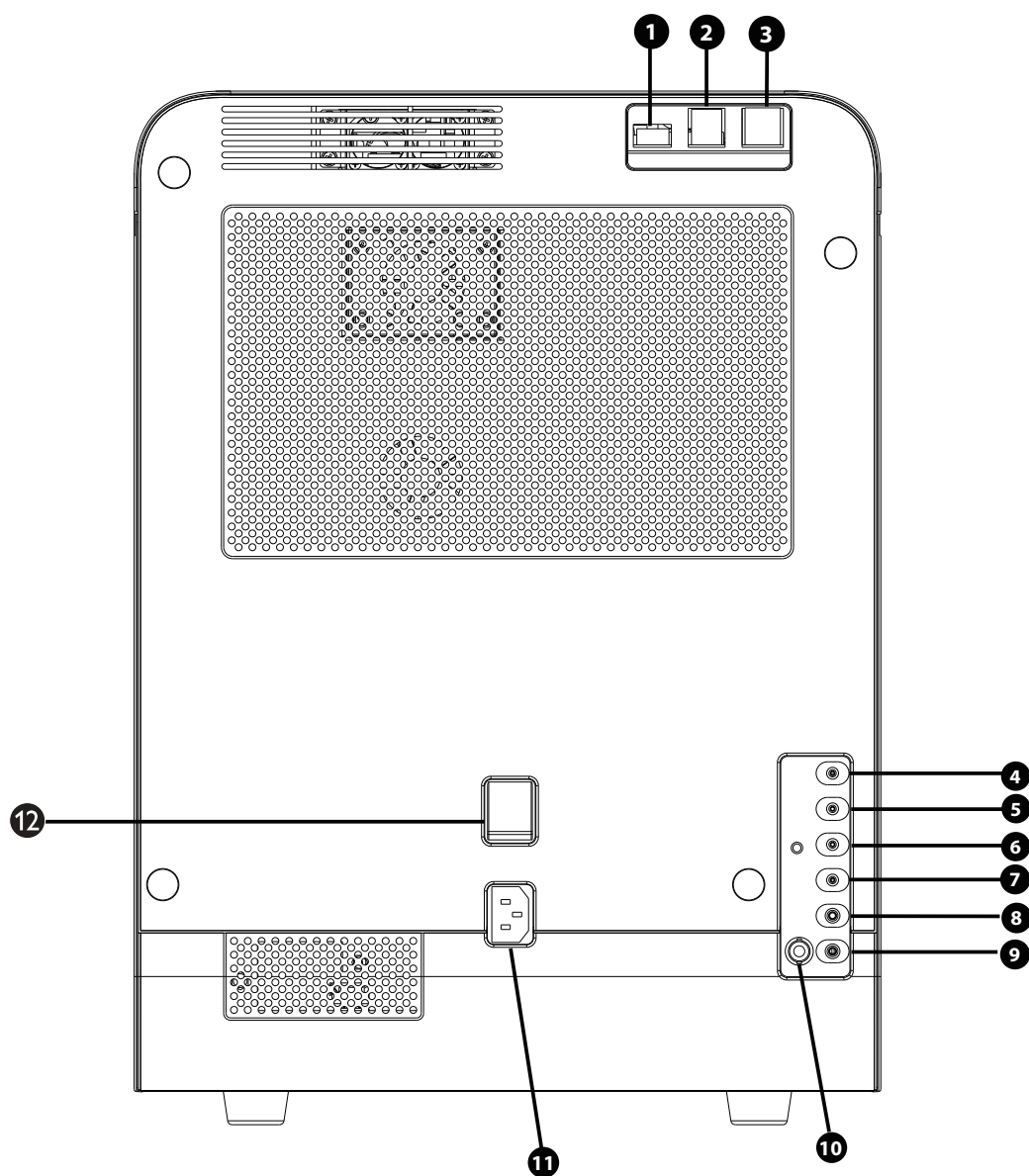
This analyzer consists of the sample processing unit, data management unit, result output unit, and the accessories.

3.2.3 Modules and Components

Figure 3-1 Front of the analyzer



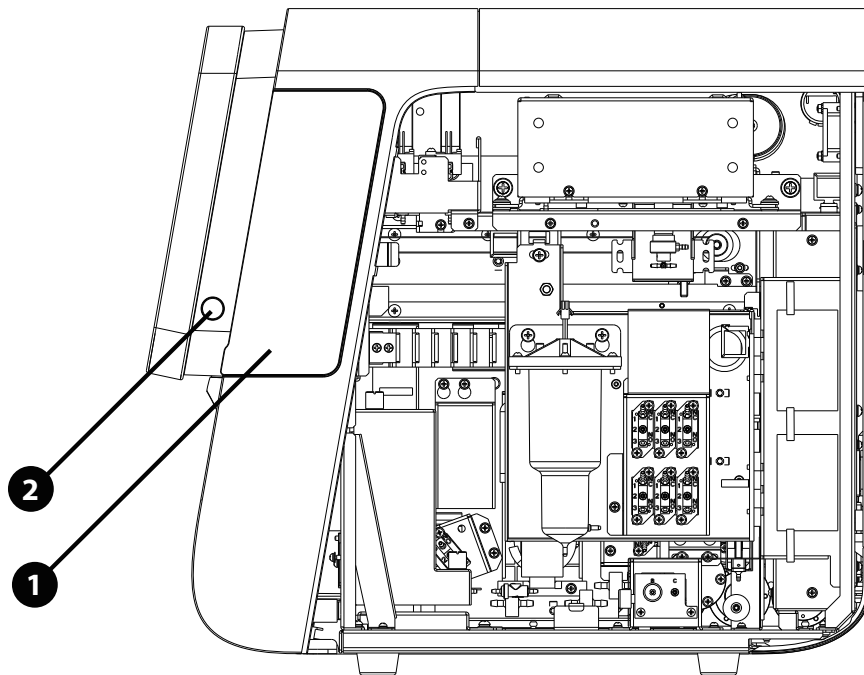
No.	Name	Description	
1.	Status indicator	The indicator locates on the top of the touch screen; and it tells you about the status of the instrument including ready, running, error, standby and on/off, etc.	Ready: indicator stays in green
			Running: indicator flickers in green
			Sample probe piercing: indicator flickers fast
			Error: indicator stays in red
			Sleep: indicator stays in orange
			Off: indicator off
2.	Touch screen	The touch screen locates on the front of the main unit, which can be used to operate the instrument and display information.	/
3.	Sample probe	The sample probe locates on the lower front of the main unit, which aspirates samples and adds diluent.	/
4.	Aspirate button	The [Aspirate] button is behind the sample probe. Press the key to start aspirating and measurement or add diluent	/

Figure 3-2 Back of the analyzer

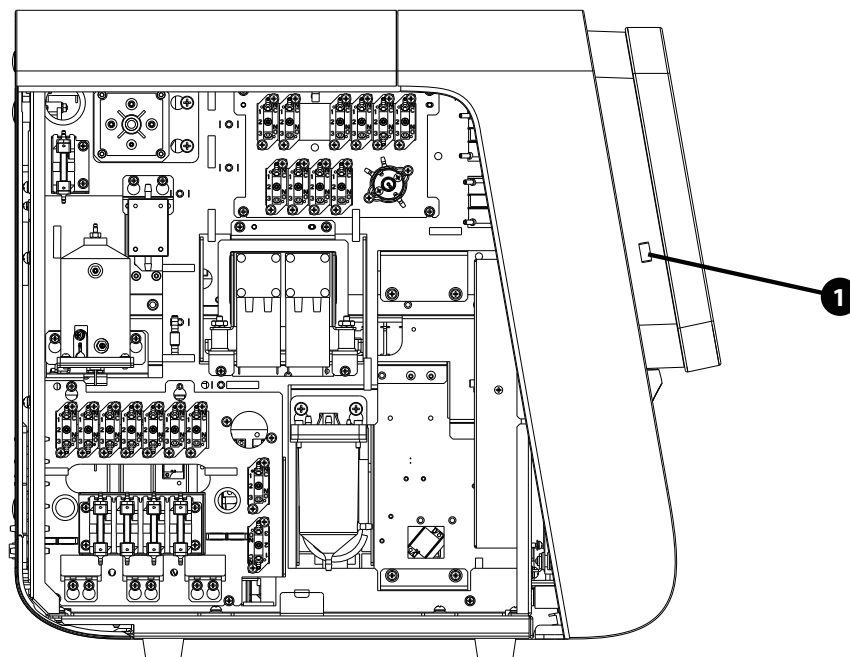
No.	Name
1.	USB port (protocol 3.0)
2.	USB port (protocol 2.0)
3.	Network interface
4.	V-6 DR DILUENT inlet
5.	V-6 LD LYSE inlet
6.	V-6 LH LYSE inlet
7.	V-6 Solution Reagent inlet
8.	V-6 DS DILUENT inlet

No.	Name
9.	Waste outlet
10.	Waste sensor
11.	Power inlet
12.	Power switch

Figure 3-3 Right side of the analyzer (with the cover opened)



No.	Name
1.	Dye compartment door
2.	Standby button

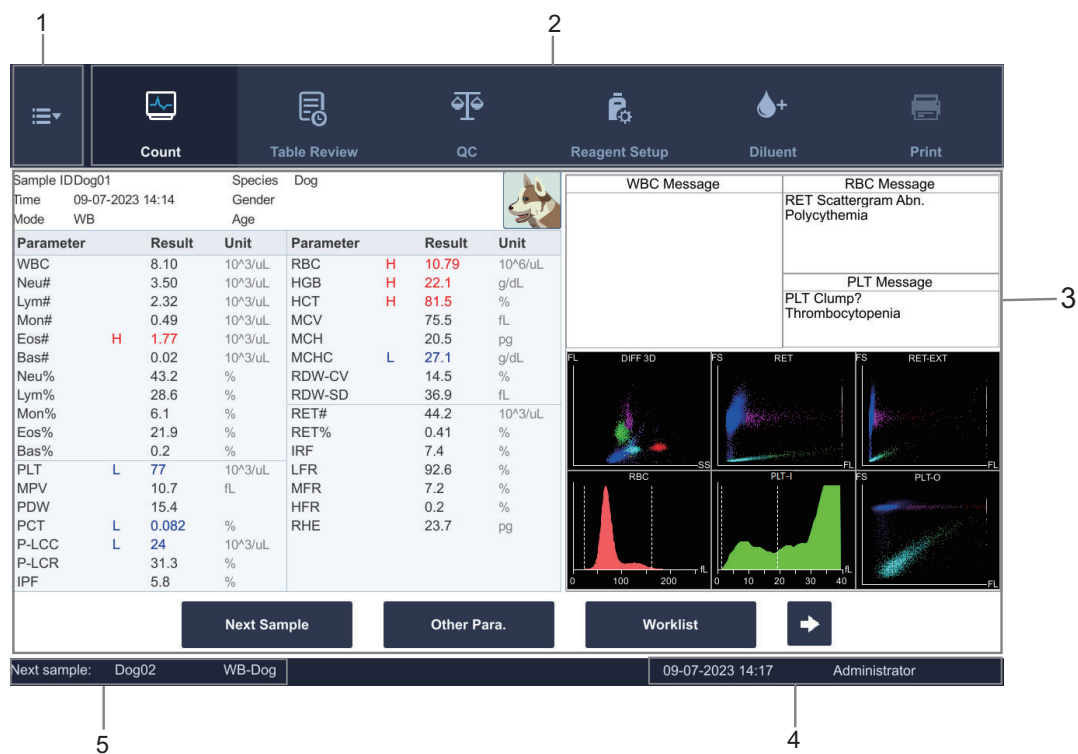
Figure 3-4 Left side of the analyzer (with the cover opened)

No.	Name
1.	USB port (protocol 2.0)

3.2.4 Accessories

For the configured and optional accessories of this analyzer, see “C Accessories and Packing List”.

3.3 Overview of Software Interfaces



1. Menu

Tap the “Menu” button  at the top left of the software screen to display the system menu.

Below describes the software functions and operator access of the analyzer.

No.	Level 1	Level 2	Level 3
1.	Count	/	/
2.	Table Review	/	/
3.	QC	Setup	/
		Count	/
4.	Calibration	Manual	/
		Calibrator (Administrator)	/
		Calibration History (Administrator)	/

No.	Level 1	Level 2	Level 3
5.	Status	Statistics	/
		Temp.&Pressure (Administrator)	/
		Floater Status (Administrator)	/
		Sensor (Administrator)	/
		Voltage & Current (Administrator)	/
		Version Info.	/
6.	Setup	System Setup	Print Setup
			Communication (Administrator)
			Date/Time Setup
			Lab Info. Setup
			Flag Alarm Sensitivity (Administrator)
		User Management	/
		Manage Animal Type	/
		Auxiliary Setup	/
		Para. Setup	Parameter Unit Setup
			Ref. Range Setup
			Microsco. Para. Setup (Administrator)
		Maintenance (Administrator)	/
		Reagent Setup	/
		Gain Setup (Administrator)	/
7.	Service	Debug & Self-Test	Self-Test
		Precise Fault Diagnosis	/
		Maintenance	/
		Screen Cal.	/
		Log	/
8.	Logout	/	/
9.	Shutdown	/	/

NOTE:

When a function is followed by “**Administrator**”, it means the function is only available to operators at administrator's level.

2. Utility Button area

Name	Icon	Functions
Count		Tap to enter the “ Count ” screen.
Table Review		Tap to enter the “ Table Review ” screen.
QC		• Tap to enter to enter the “QC” screen. • When the “QC” button lighted in orange, it means the analyzer is out of quality control.
Reagent Setup		• Tap to enter the “Reagent Setup” screen. • When the “Reagent Setup” button lights in orange, it means some reagent is expired or not sufficient.
Diluent		Tap to add diluent.
Print		• When the analyzer is on the “Count” screen, tap the “Print” button to print the analysis results, histograms and scattergrams of the current sample in accordance with operator-customized print template. • When the analyzer is on the “Table Review” screen, tap the “Print” button to print the analysis results for all or selected samples in the table print or graph print form. • When the analyzer is on the “Graph” screen, tap the “Print” button to print the analysis results, histograms and scattergrams of the current sample in accordance with operator-customized print template. • When the analyzer is on the “QC Table” screen, tap the “Print” button to print all QC results included in the selected QC file. • When the analyzer is on the “QC Graph” screen, tap the “Print” button to print the QC graphs included in the selected QC file. • When the analyzer is on the “Manual” screen, tap “Print” to print the manual calibration factors.

3. Operation area

Displays contents of the screens.

For example, on the “**Count**” screen, the area displays function buttons related to sample analysis as well as the sample analysis results.

4. Other information

- It displays the current system time.
- When error occurs, the area displays the error message.
- When logged in as an administrator, the area displays “**Administrator**”.

5. Auxiliary information area

This area displays auxiliary information of the current screen;

- For example, on the “**Count**” screen, the area displays the ID and analysis mode of the next sample; on the “**Table Review**” or “**Graph**” screen, the area displays position of the current sample and total number of samples.

3.4 Reagents, Controls and Calibrators

As the analyzer, reagents, controls and calibrators are components of a system, performance of the system depends on the combined integrity of all components. You must only use the Mindray Animal Medical-specified reagents, controls, and calibrators which are formulated specifically for the fluidic system of your analyzer in order to provide optimal system performance. Do not use the analyzer with reagents, controls, and calibrators from multiple suppliers. In such case, the analyzer may not meet the performance specified in this manual and may provide unreliable results.

All the reagents, controls, and calibrators mentioned in this manual refer to the reagents, controls, and calibrators specifically formulated for this analyzer. You must buy those reagents, controls, and calibrators from Mindray Animal Medical or Mindray Animal Medical-authorized distributors. When you need to buy reagents and consumables, please contact Customer Service Department.

3.4.1 Reagents

All reagents used with the analyzer are special supporting reagents for Mindray Animal Medical equipment. Use for any other purposes is prohibited. Please use and store each type of reagents correctly according to their instructions.

NOTE:

- For the reagent specification, intended use, test principle, main components, storage conditions, validity period, applicable instruments, and other information, please refer to the reagent IFU.
 - For any questions related to reagents, controls, and calibrators, please consult the Customer Service Department or your local distributor.
-

Table 3-1 Reagents

Applicable Channel	Model	Name
Diluent	V-6 DS	V-6 DS DILUENT
DIFF channel	V-6 LD	V-6 LD LYSE
	V-6 FD	V-6 FD DYE
HGB channel	V-6 LH	V-6 LH LYSE
RET channel	V-6 FR	V-6 FR DYE
	V-6 DR	V-6 DR DILUENT

Table 3-1 Reagents

Applicable Channel	Model	Name
Solution	V-6 SR	V-6 Solution Reagent
Probe cleanser	V-P	V-P Probe Cleanser

3.4.2 Controls and Calibrators

The controls and calibrators are used to verify accurate operation and calibration of the analyzer.

The controls are suspension of simulated animal blood, specifically manufactured to monitor and evaluate the analysis precision of the analyzer. The controls are prepared with three levels, namely low, normal and high. Daily use of all levels verifies the operation of the analyzer and ensures reliable results are obtained. The calibrators are commercially prepared whole-blood products used to calibrate some parameters (WBC, RBC, HGB, MCV and PLT etc.) of analyzer to build the metrological traceability of analysis results. For the use and storage of controls and calibrators, please refer to the Instruction for Use of each product.

All references related to controls in this manual refer to the “controls” and “calibrators” specifically formulated for this analyzer by Mindray Animal Medical. You must buy those controls and calibrators from Mindray Animal Medical or Mindray Animal Medical-authorized distributors.

The following models of controls and calibrators are used with the analyzer:

Table 3-2 Information on Controls and Calibrators

Name	Model
Control	BC-6D
	BR60
	BC-RET
Calibrator	SC-CAL PLUS

NOTE:

For the specific test parameters and reference values of parameters, see the reference value sheets of controls and calibrators.

4 Understanding the System Principles

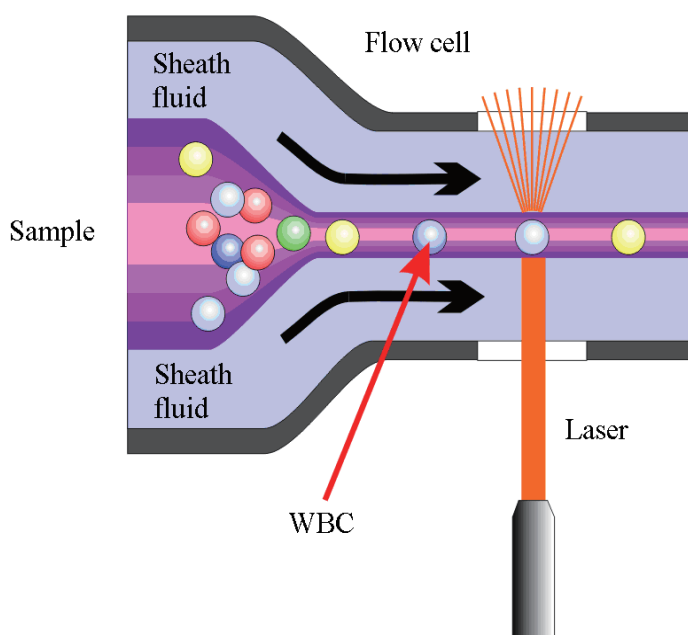
4.1 Overview

The analyzer uses sheath flow impedance method, laser scatter method, and SF Cube cell analysis technology for cell differentiation and counting. Colorimetric method is adopted for HGB measurement. Based on the above data, the analyzer calculates other parameters.

4.2 WBC Measurement

4.2.1 SF CUBE Cell Analysis Technology

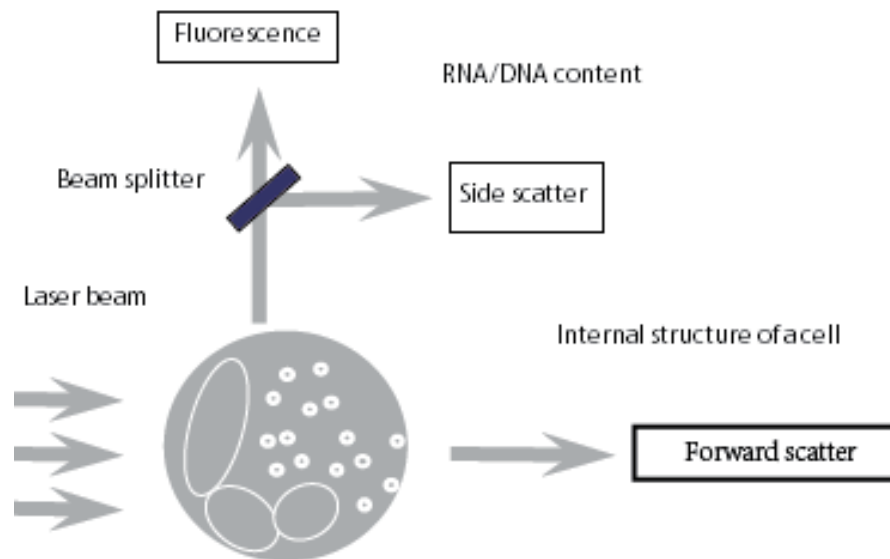
Figure 4-1 Laser Flow Cytometry



In normal peripheral blood, white blood cells can be classified into five categories: lymphocytes, monocytes, neutrophils, eosinophils and basophils. Analyzing all types of white blood cells will provide a great deal of useful information for the clinical diagnosis of diseases. Under the influence of certain diseases, the peripheral blood may contain various abnormal cells apart from the five subpopulations of normal cells, such as atypical lymphocytes, immature cells, etc. Most of these abnormal cells are different kinds of immature cells in the cell generation process. But what they have in common is they contain a great deal of nucleic acid (DNA and RNA), the content of which decreases as the cell gets maturer. Therefore, normal cells and immature cells can be differentiated by detecting the content of nucleic acid in the cells.

The analyzer adopts the SF Cube cell analysis technology to accurately recognize and detect the immature cells in blood based on WBC 5-part differentiation.

Figure 4-2 SF Cube Technology

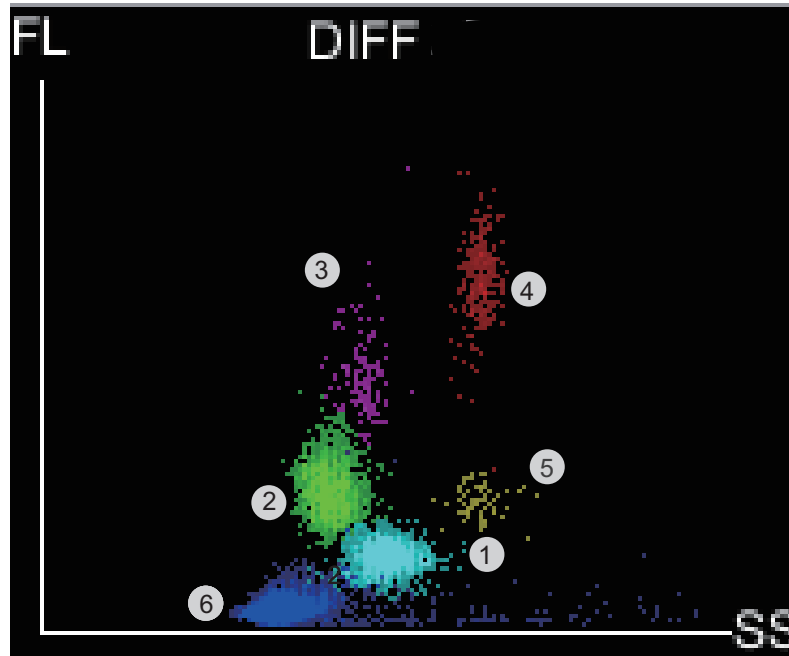


The analyzer adopts the fluorescent staining technology in its DIFF channel. The RBCs are lysed and the WBC subpopulations are made different in size and complexity by the lyse; the nucleic acid substances in WBCs are marked by the new asymmetric cyanine fluorescent substance. Due to the different content of nucleic acid in different WBC subpopulations, maturity stages or abnormal development status, the volume of fluorescent dye staining the nucleic acid substances is different; the front scatter reflects the cell size, the side scatter reflects the intracellular granularity, and the intensity of fluorescent signal reflects the degree that the cell is stained. By sensing the difference in signal in three dimensions of the cells processed with lyse, the DIFF channel differentiates the subpopulations of WBCs (lymphocytes, monocytes, neutrophil, eosinophils and basophils), and provides flags for suspected band cells, atypical lymphocytes, immature granulocytes and nucleated red blood cells.

The lymphocytes are smaller in size with the nucleus taking most part of them. Lymphocytes have a high nucleus-to-cytoplasm ratio, but their nucleic acid content is low. Therefore, they are at a lower position in the direction of fluorescence and side scatter. The monocytes are larger in size, with high nucleus-to-cytoplasm ratio and high nucleic acid content, and less complex in structure. Therefore, they are at a higher position in the direction of fluorescence, and have stronger side scatter. The neutrophils and basophils are larger in size, and have medium nucleus-to-cytoplasm ratio and low nucleic acid content. Therefore, they are at a lower position in the direction of fluorescence, but they have stronger side scatter. The volume and nucleus-to-cytoplasm ratio of the eosinophils are similar to those of the neutrophils. Eosinophils have a relatively low nucleic acid content, but they contain a lot of alkaline grains, so they have very strong side scatter.

4.2.2 Derivation of WBC-Related Parameters

Figure 4-3 DIFF scattergram



1. Neu region
2. Lym region
3. Mon region
4. Eos region
5. Bas region
6. Ghost region

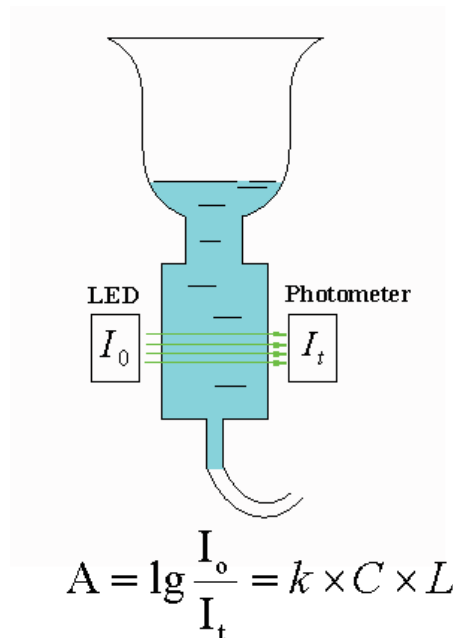
Parameters	Name	Formula/Test Methods	Unit
WBC	White blood cell count	WBC = Sum of all particles in the DIFF channel except the ghost cell area	$10^9/L$
Bas#	Basophil count	Bas# = Particles in the Bas region in the DIFF channel	$10^9/L$
Bas%	Basophil percentage	$\text{Bas}\% = \frac{\text{Bas}\#}{\text{WBC}} \times 100\%$	%
Neu#	Neutrophil count	Neu# = Particles in the Neu region in the DIFF channel	$10^9/L$
Neu%	Neutrophil percentage	$\text{Neu}\% = \frac{\text{Neu}\#}{\text{WBC}} \times 100\%$	%
Eos#	Eosinophil count	Eos# = Particles in the Eos region in the DIFF channel	$10^9/L$
Eos%	Eosinophil percentage	$\text{Eos}\% = \frac{\text{Eos}\#}{\text{WBC}} \times 100\%$	%
Lym#	Lymphocyte count	Lym# = Particles in the Lym region in the DIFF channel	$10^9/L$
Lym%	Lymphocyte percentage	$\text{Lym}\% = \frac{\text{Lym}\#}{\text{WBC}} \times 100\%$	%

Parameters	Name	Formula/Test Methods	Unit
Mon#	Monocyte count	Mon# = Particles in the Mon region in the DIFF channel	$10^9/L$
Mon%	Monocyte percentage	$\text{Mon}\% = \frac{\text{Mon}\#}{\text{WBC}} \times 100\%$	%

4.3 Hemoglobin Concentration Measurement

4.3.1 A Test Model Using the Colorimetric Method

Figure 4-4 Colorimetric method



According to the Lambert-Beer Principle, when a beam of monochromatic light passes through a well-proportioned non-scattering light-absorbing solution, the absorbance A is proportional to the product of the thickness L and the concentration C . The sample in the HGB channel acts as the light absorbing substance after being treated by reagent, therefore the HGB concentration can be measured by measuring the absorbance.

4.3.2 Derivation of HGB

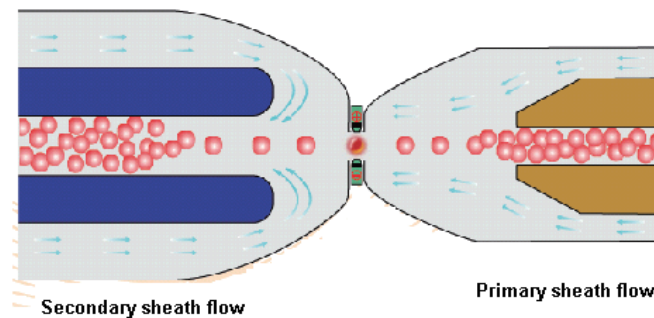
Hemoglobin Concentration (HGB) is calculated using the following equation and expressed in g/L.

Parameters	Name	Formula/Test Methods	Unit
HGB	Hemoglobin Concentration	$\text{HGB} = \text{Constant} \times \text{Ln} \left(\frac{\text{Blank Photocurrent}}{\text{Sample Photocurrent}} \right)$	g/L

4.4 RBC/PLT Measurement

4.4.1 Sheath Flow Impedance Method

Figure 4-5 Sheath flow impedance method



RBCs/PLTs are counted by the sheath flow impedance method. A sensor is designed to enable the RBCs and PLTs to pass through the aperture one by one in a queue under the “focusing” effect of fluid, during which process pulses will be generated according to the Coulter Principle. The backend processor amplifies the pulses and compares them with the voltage thresholds of the RBC/PLT channel, and then the number of pulses in the RBC/PLT channel is calculated. That is to say, the pulses collected are sorted per the voltage thresholds of different channels, the number of pulses falling in the range of the RBC/PLT channel is the number of RBC/PLT. The number of cells in each channel defines the volume distribution of cells. The analyzer presents the RBC/PLT histogram, whose x-coordinate represents the cell volume (fL) and y-coordinate represents the number of the cells.

Compared with the common impedance method, the sheath flow impedance method is featured by higher efficiency, better signal quality, more accurate analysis results and lower consumption of reagents.

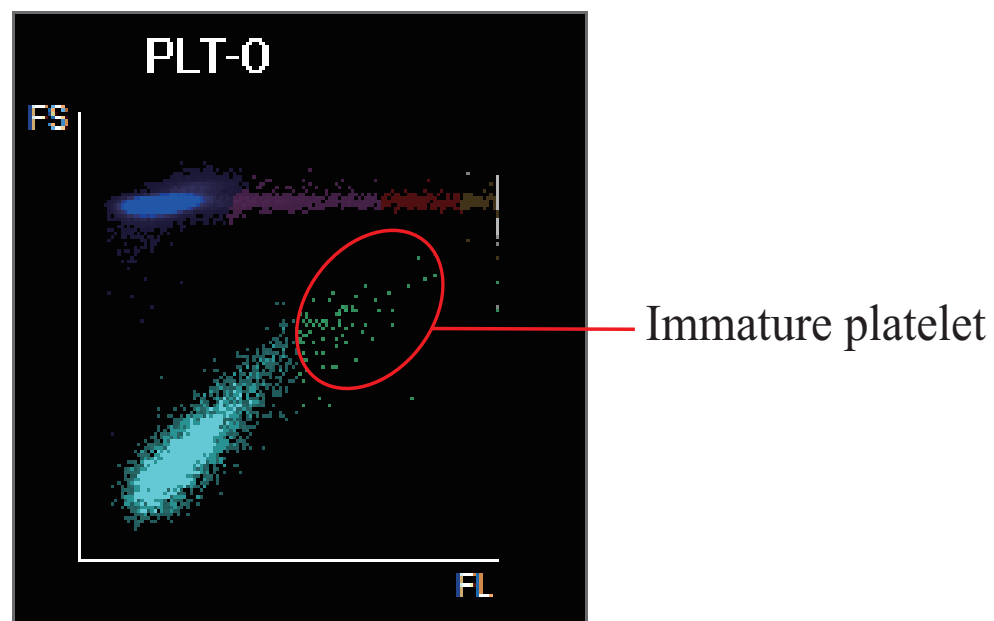
4.4.2 SF CUBE Cell Analysis Technology

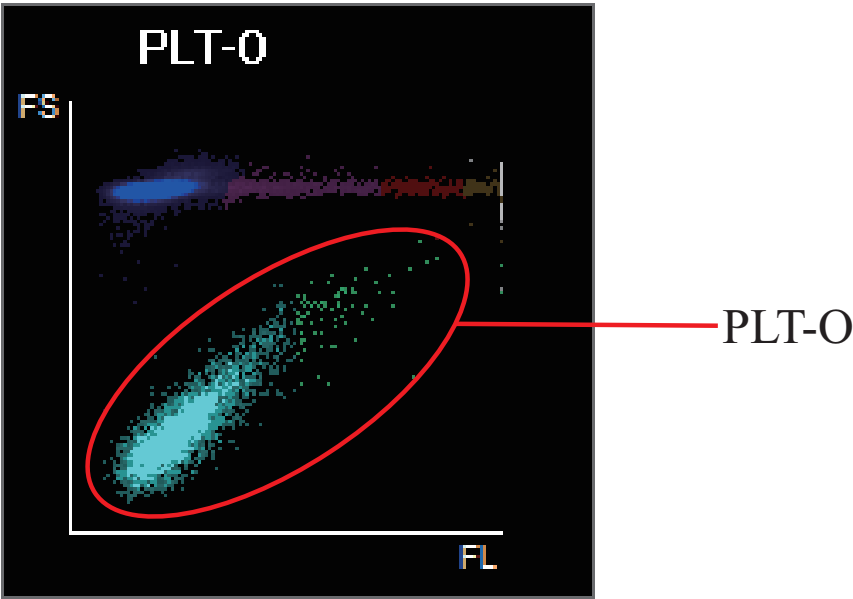
The RET channel also adopts the SF CUBE Cell Analysis Technology. The general measurement principle in RET channel is similar to that of DIFF channel, only that in the RET channel, the RBCs are not lysed, but are spherized by RET diluent. Then the nucleic acid of the spherized RBCs and the PLTs are stained by fluorescent dyes.

4.4.3 RBC-Related Parameters

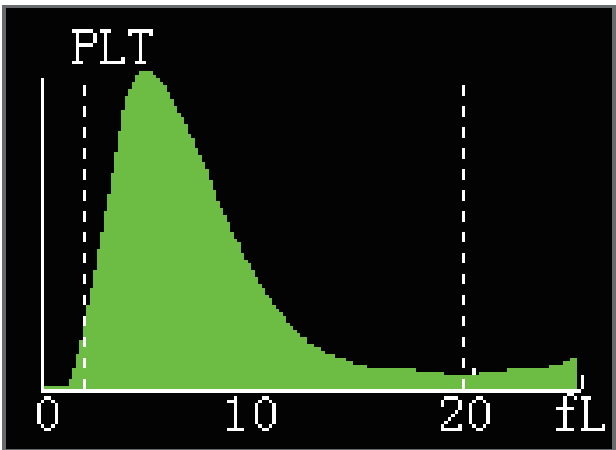
Parameters	Name	Formula/Test Methods	Unit
RBC	Red Blood Cell count	Red blood cell (RBCs) number is measured directly by the number of pulse in RBC channel	$10^{12}/L$
MCV	Mean Corpuscular Volume	Calculated based on the red blood cell histogram	fL
HCT	Hematocrit	$HCT = \frac{RBC \times MCV}{10}$	%
MCH	Mean Corpuscular Hemoglobin	$MCH = \frac{HGB}{RBC}$	pg
MCHC	Mean Corpuscular Hemoglobin Concentration	$MCHC = \frac{HGB}{HCT} \times 100$	g/L
RDW-CV	Red Blood Cells Distribution Width - Coefficient of Variation	RBC Histogram	%
RDW-SD	Red Blood Cells Distribution Width - Standard Deviation	Derived based on the standard deviation of red blood cell volume distribution	fL

4.4.4 PLT-Related Parameters





From RET channel



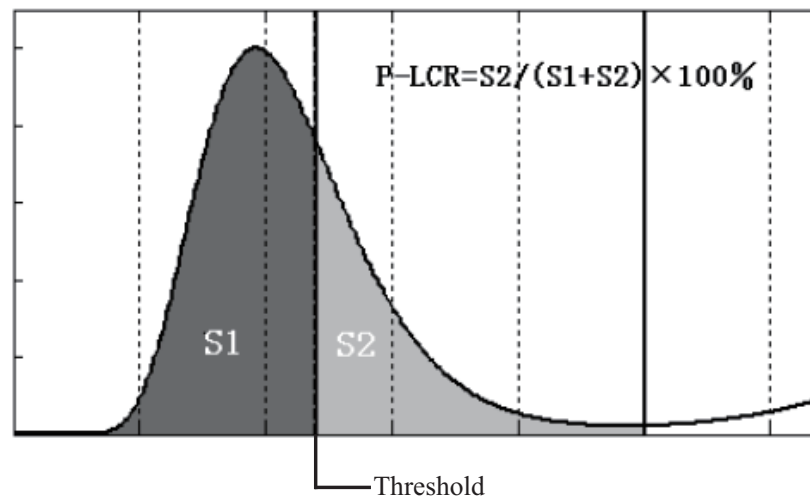
From sheath flow impedance channel

Parameters	Name	Formula/Test Methods	Unit
PLT	PLT count	The analyzer directly measures the number from RET channel (for dog, cat, horse, rabbit, monkey, and pig) or sheath flow impedance channel (for rat, mouse, camel, alpaca, and llama)	$10^9/L$
MPV	Mean Platelet Volume	Mean Platelet Volume (MPV) is calculated based on the PLT histogram	fL

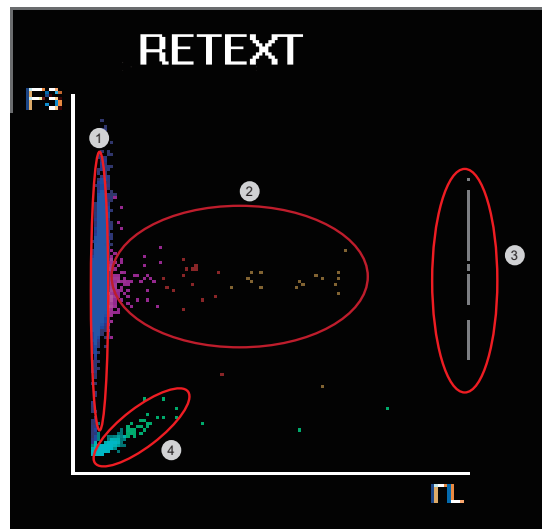
Parameter s	Name	Formula/Test Methods	Unit
PDW	Platelet Distribution Width	Platelet distribution width is derived from the platelet histogram, and is reported as 10 geometric standard deviation (10 GSD)	/
PCT	Plateletcrit	$PCT = \frac{PLT \times MPV}{10000}$	%
P-LCR	Platelet-large cell ratio	P-LCR is derived from the platelet histogram	%
P-LCC	Platelet-large cell count	$P-LCC = PLT \times P-LCR$	$10^9/L$
IPF	Immature Platelet Fraction	The parameter is derived based on PLT-O scattergram: $IPF = \frac{\text{Immature platelet number in the optical channel}}{\text{Sum of all platelet particles in the optical channel}} \times 100\%$	%

NOTE:

Platelet-Large Cell Ratio (P-LCR) is derived from the platelet histogram. It represents the ratio of the number of platelets with a size over a threshold to the total platelets number (the threshold differs in different species). The ratio is represented in %. In the following figure, S2 represents the number of larger platelet cells, and S1+S2 represents the total PLT count.



4.4.5 Reticulocyte Parameters



- 1.Mature RBC
- 2.RET cell
- 3.WBC-O
4. PLT-O

Parameters	Name	Formula/Test Methods	Unit
RET%	Reticulocyte percentage	$\text{RET}\% = \frac{\text{Number of cells in RET region}}{\text{Number of cells in mature RBC region} + \text{Number of cells in RET region}} \times 100\%$	%
RET#	Reticulocyte number	$\text{RET}\# = \text{RBC-I} \times \text{RET}\%$	$10^9/\text{L}$
HFR	High fluorescent ratio	$\text{HFR}\% = \frac{\text{Number of cells in HFR region}}{\text{Number of cells in RET region}} \times 100\%$	%
MFR	Middle fluorescent ratio	$\text{MFR}\% = \frac{\text{Number of cells in MFR region}}{\text{Number of cells in RET region}} \times 100\%$	%
LFR	Low fluorescent ratio	$\text{LFR}\% = \frac{\text{Number of cells in LFR region}}{\text{Number of cells in RET region}} \times 100\%$ NOTE: Sum of all particles in the reticulocyte region = Sum of all particles in the LFR region + Sum of all particles in the MFR region + Sum of all particles in the HFR region	%
IRF	Immature Reticulocyte Fraction	$\text{IRF} = \text{MFR} + \text{HFR}$	%
RHE	Reticulocyte Hemoglobin Expression	Calculated based on the light scatter information of RET	pg

4.5 Wash

After each analysis cycle, all elements of the analyzer that the sample runs through are washed to ensure no residue is left.

5 Installing and Connecting the System

5.1 Notes for Analyzer Installation

CAUTION

- The installation, authorization, upgrade and modification of the system software must be performed by personnel authorized by Mindray Animal Medical. Make sure to install only Mindray Animal Medical-authorized software.
 - Unpacking, installation or transportation by personnel not authorized or trained by Mindray Animal Medical may cause personal injury or damage your instrument. Do not unpack, transport or install your instrument without the presence of Mindray Animal Medical-authorized personnel.
-

NOTE:

- The safety of any system incorporating the equipment is the responsibility of the assembler of the system.
 - The equipment is tested and packed with care before it is shipped from the factory. When you receive your analyzer, carefully inspect the carton. If you see any signs of mishandling or damage, contact Customer Service Department or your local distributor immediately.
 - After you open the package, check the integrity of the product according to the packing list. If you find any part missing, contact the Customer Service Department or your local distributor.
-

5.1.1 Space Requirements

For the dimensions and weight of the analyzer, see “B.10 Dimensions and Weight”.

Check the site for proper space allocation. In addition to the space required for the system itself, arrange for:

- Proper height to place the analyzer;
- At least 500 mm on each side of the analyzer, which is the preferred access to perform service procedures;
- At least 600 mm above the analyzer;
- At least 250 mm behind the analyzer;
- The diluent container must be placed within 1.0 meter's reach under the main unit, the lyse container must be placed on a plane of the same level with the main unit.
- Desktop or platform must be capable to bear the weight of the analyzer.

5.1.2 Power Requirements

CAUTION

- Using pinboard may bring electrical interference and the analysis results may be unreliable. Place the analyzer near the electrical outlet to avoid using the pinboard.
- Use the power cord provided by the manufacturer. Using the power cord other than provided by the manufacturer may lead to system damage or unqualified smear output.

	Voltage	Frequency	Input power
Main Unit (Analyzer)	100–240V~ ($\pm 10\%$)	50Hz/60Hz ($\pm 1\text{Hz}$)	300VA

5.1.3 Environment Requirements

	Normal Operation Environment	Storage and Transportation Environment	Operation Environment
Ambient temperature	10°C~30°C	-10°C ~ 40°C	10°C ~ 40°C
Relative Humidity	30% ~ 85%	10% ~ 90%	10% ~ 90%
Atmospheric Pressure	70.0 kPa ~ 106.0 kPa	50.0 kPa ~ 106.0 kPa	70.0 kPa ~ 106.0 kPa

The altitude requirement for normal operation: -400m ~ 3,000m.

NOTE:

- Install the instrument at a position not exposed to splashing water.
- The environment should be as free as possible from dust, mechanical vibrations, loud noises and electrical interference;
- It is advisable to evaluate the electromagnetic environment prior to operation of this analyzer.
- Do not use this instrument in close proximity to sources of strong electromagnetic radiation;
- Do not place the analyzer near brush-type motors, flickering fluorescent lights, and electrical contacts that regularly open and close;
- Do not place the analyzer in direct sunlight or in front of a source of heat or drafts;
- Do not use the instrument in a working environment with conductive or combustible gases.
- The environment shall be well ventilated;
- Do not place the analyzer on a slope;
- Connect only to a properly earth grounded outlet;
- Only use this analyzer indoors.

WARNING

- When installing the system, ensure that the power switch is in close proximity to the equipment and within easy reach of you.

5.1.4 Fuse Requirement

WARNING

The fuse used in the instrument is not a replaceable one. If there is any problem with the fuse, contact Customer Service Department or your local distributor.

5.1.5 Moving and Installing the Analyzer

Moving and installation of the analyzer shall be conducted by Mindray Animal Medical-authorized personnel. Do not move or install your analyzer without the presence of Mindray Animal Medical-authorized personnel.

5.2 Connecting the Analyzer System

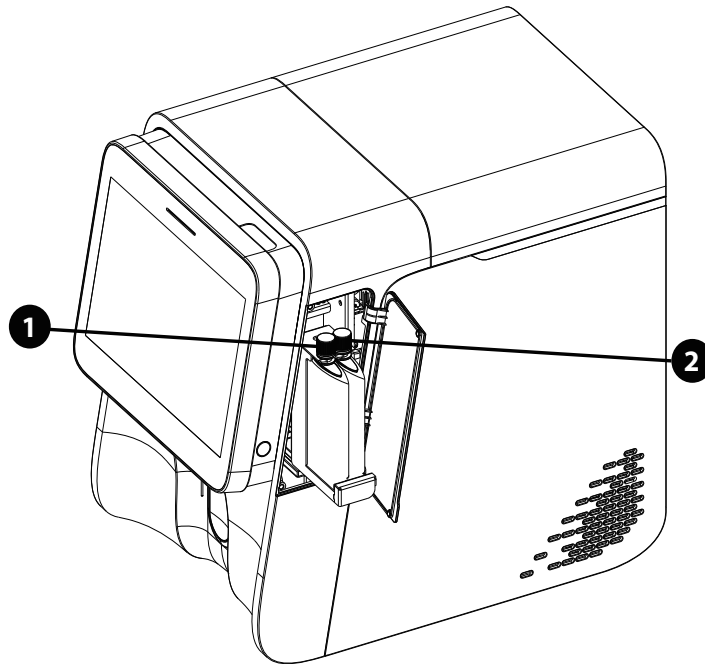
5.2.1 Connecting the Reagents

CAUTION

When connecting the reagents, make sure the color of the reagent container cap assembly is the same as that of the reagent inlet to which it is connected.

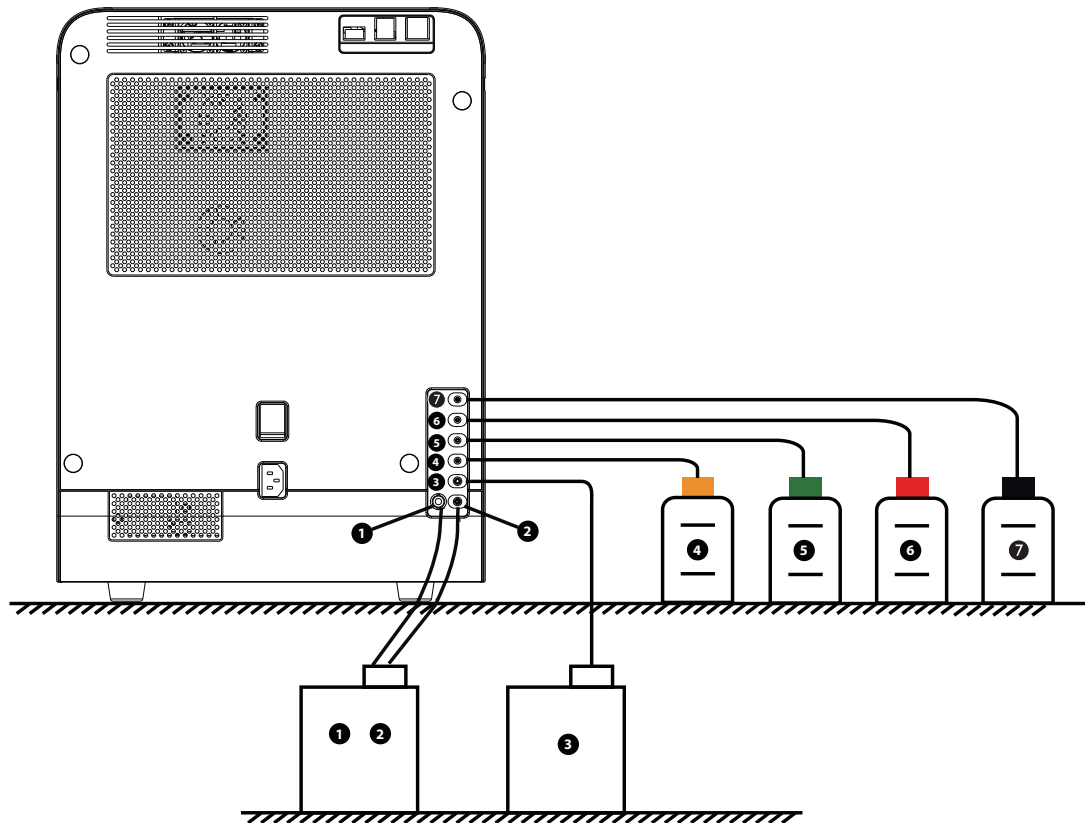
Connect the reagent containers to the analyzer as shown in the following figure.

Figure 5-1 Reagent connection - connecting fluorescent dyes



Interface No.	Type	Description
1	V-6 FD DYE	/
2	V-6 FR DYE	/

Figure 5-2 Connecting reagents - lyse, diluent, and waste

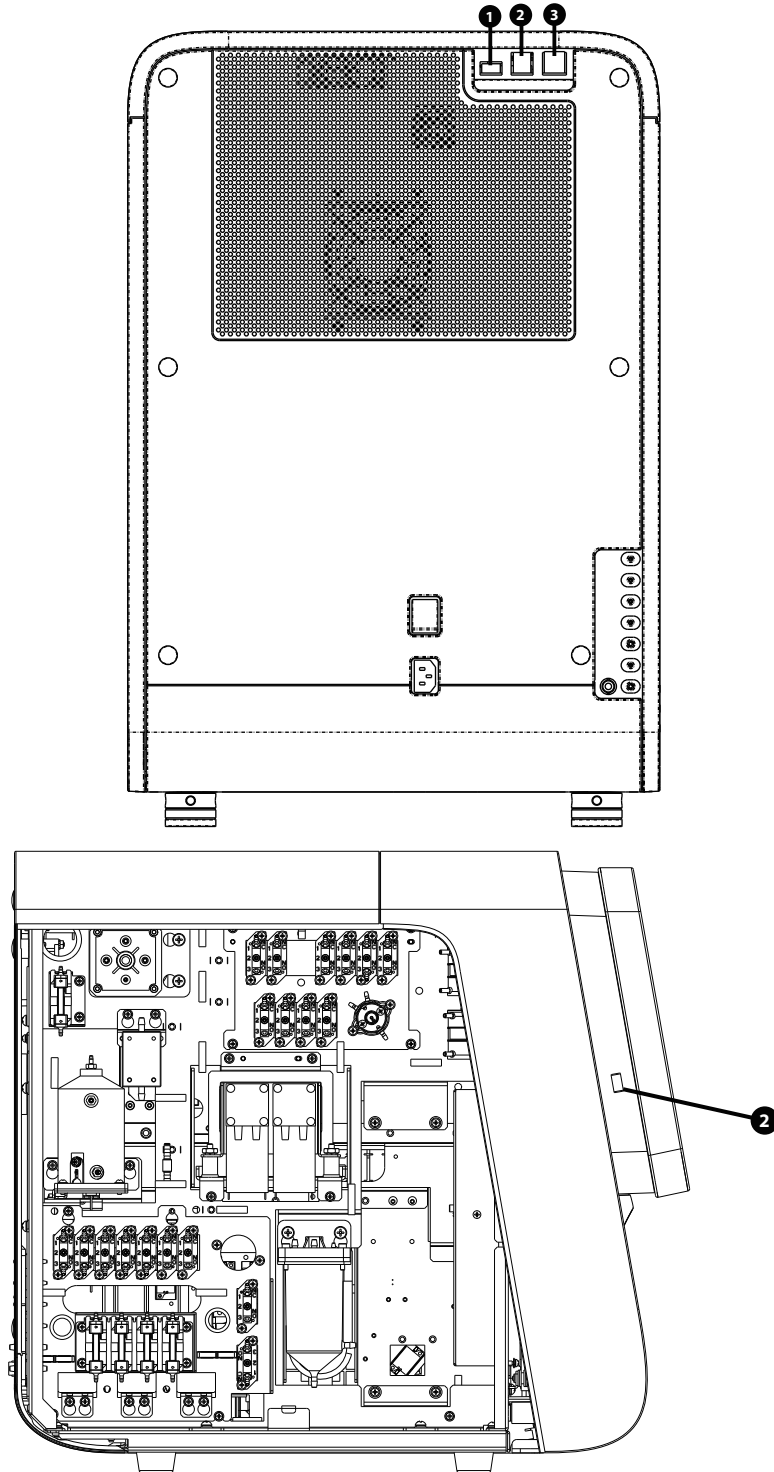


Interface No.	Type of Connected Reagent	Description
1	Waste container	Interface 2 is used to connect the waste container, and interface 1 connects to the waste floater sensor to detect whether the waste container is full
2		
3	V-6 DS DILUENT	/
4	V-6 Solution Reagent	/
5	V-6 LH LYSE	/
6	V-6 LD LYSE	/
7	V-6 DR DILUENT	/

5.2.2 Connecting to the Peripherals

Make sure that the connections are correct and firm.

Figure 5-3 Connecting to the peripherals



Interface No.	Interface	Connection
1	USB port	Supporting USB3.0
2	USB port	Supporting USB2.0
3	Network interface	Connecting to optional accessories (printers, scanners etc.) based on requirements.

** CAUTION**

Be sure to use the specified external devices only, and keep them away from water.

NOTE:

- The user should ensure the data safety of the USB devices connecting to the analyzer.
 - When the analyzer connects to an external computer, install anti-virus software on the computer and scan for viruses and update patches periodically to prevent the analyzer from infecting computer virus. Do not use it for unintended.
-

6 Customizing the Analyzer Software

6.1 Introduction

The analyzer is a flexible laboratory instrument that can be tailored to your work environment. You can customize the software options as introduced in this chapter.

For the security of the settings and data, two access levels are provided to the operator of the analyzer: “**General User**” and “**Administrator**”. The administrator access level provides the operator with access to more functions or settings, some of which can be configured to be accessible to operators.

The following tables list the users’ access by the access levels

Item			Administrator’s Level	General User’s Level
System Setup	Print Setup		√	Partly
	Communication		√	
	Date/Time Setup		√	Review only
	Lab Info. Setup		√	Review only
	Flag Alarm Sensitivity		√	
User Management	New		√	
	Delete		√	
	Modify Password		√	√
	Grant Perms.		√	
Manage Animal Type	Add		√	√
	Delete		√	√
Auxiliary Setup	Get Sample Information		√	√
	Other Settings	Predilute mode prompt	Review only	Review only
		Pop-up keyboard	√	√
		Enable fluorescent reagent detect sensor	√	√
		Enable waste direct discharge	√	√
		Flags	√	
		Alarm Volume	√	

Item		Administrator's Level	General User's Level
Parameter Setting	Parameter Unit Setup	√	Review only
	Ref. Range Setup	√	Review only
	Microsco. Para. Setup	√	
Maintenance	/	√	
Reagent Setup	/	√	√
Gain Setup	/	√	

6.2 Saving Settings after Changes

After you have changed or modified analyzer settings, perform the following procedure to save the changes.

1. Tap **“Menu > Setup”** and select the setting item you want to change.
2. Make necessary changes on the setting screen.
3. Tap another button on the software screen.

A dialog box displays asking if you want to save the change.

4. Tap **“Yes”**.

The new setting is saved.

6.3 Analyzer Settings

6.3.1 System Setup

Print Setup

Users can perform print setup in the **“Print Setup”** screen.

Perform the following procedure:

1. Tap **“Menu > Setup > System Setup > Print Setup”** to enter the **“Print Setup”** screen.
2. Tap the **“Print Setup”**, **“Printing Content”**, and **“Auto print after sample analysis”** tabs as needed to perform print settings as needed.

See below for setting descriptions

Item	Description	
Print device	Select a print device on the network from the pull-down list:	For questions about the print device and print drive settings, contact the customer service personnel of your print device supplier. (administrators)
Printer driver	Select a proper print drive from the pull-down list: • Auto Identification • PCL6 • Raster print	

Item	Description	
Paper	Select the desired paper type from the pull-down list. The analyzer supports the following paper types: • A4 • Letter paper	/
Blood Sample Report Title	• Enter the desired title in the edit box. • The report titles set up here will display on the printed analysis reports.	/
Blood Sample Report Template	Select the desired template format from the pull-down list: • One page with graph • One page without graph	• When “One page with graph” is selected, the print results include the parameter results and graphs. • When “One page without graph” is selected, the print results include only the parameter results.
Para. Language	Select a parameter language from the pull-down list: • English abbreviation	When “ English abbreviation ” is selected, the printed report displays the English parameter names.
Copies	Enter the number of report copies to be printed when you tap “Print”. The default value is 1 copy, and the setting range is [1 to 20].	/
Printing Content	Check the options you want to display on the printed report: • Print flags of edited result • Print high/low result flags • Print suspect flags • Print flags • Print reference range • Monochrome Print	• For the description of setting up high/low results as well as suspect results flags, see “6.3.4 Auxiliary Setup” for other settings • For the description of setting up reference ranges, see “6.3.5 Para. Setup (Administrators)”
Auto print after sample analysis	Check to enable one or more desired auto print settings: • Auto print after analysis • Auto print after validating • Auto print after QC count	• When “Auto print after analysis” is selected, the analyzer automatically print the sample results after each analysis. • When “Auto print after validating” is selected, the analyzer automatically print the validated sample results. • When “Auto print after QC count” is selected, the analyzer automatically print the results of QC count results after each QC count ends.

Communication (Administrators)

Before you set up the communication settings, make sure that:

- you have logged in as an administrator.
- the network wire is firmly connected to the analyzer.

Tap “**Menu > Setup > System Setup > Communication**” to enter the “**Communication**” screen. Administrators can configure the following communication settings

- **Network Device**
- **Protocol Setup**
- **Transmission Mode**

Table 6-1 Network Device

Item	Description
Network Type	Wired
	Wireless

Table 6-2 Protocol Setup

Item	Description	
IP Address	Enter the correct IP address	For correct network settings, consult Mindray Animal Medical Customer Service Department or your network administrator.
Subnet Mask	Enter the correct subnet mask	
Default Gateway	Enter the correct gateway	
ACK Synchronous Transmission	Check “ ACK Synchronous Transmission ” to enable the ACK synchronous transmission function.	When “ ACK Synchronous Transmission ” is enabled, enter the ACK overtime in the “ ACK Overtime ” field (10 seconds by default)

Table 6-3 Transmission Mode

Item	Description	
Transmission Mode	When you select LIS as a data channel, check to enable one or more transmission functions: • Auto Retransmit • Auto Communicate • Transmit as Print Bitmap Data • Communicate QC results as sample results	Only when “ ACK Synchronous Transmission ” is enabled, can you enable the “ Auto Retransmit ” function.
Data channel	The default data channel is vetXpert.	

Table 6-3 Transmission Mode

Item	Description	
Scattergram transmitted as/ Histogram transmitted as	When you select LIS as a data channel, you can select the following options from the pull-down list: • Not to be transmitted • Bitmap • Data	/

Date/Time

Tap “**Menu > Setup > System Setup> Date/Time Setup**” to enter the “**Date/Time Setup**” screen. You can set up date and time on this screen.

Item	Description	
Date	Enter the current date	/
Time	Enter the current time	The analyzer uses the 24-hour clock system
Date Format	Select a date format from the pull-down list	/

Lab Info. Setup

Tap “**Menu > Setup > System Setup> Lab Info. Setup**” to enter the “**Lab Info. Setup**” screen. Users may enter necessary laboratory information on this screen.

Flag Alarm Sensitivity (Administrators)

Tap “**Menu > Setup > System Setup > Flag Alarm Sensitivity**” to enter the “**Flag Alarm Sensitivity**” screen. The analyzer provides the following flags for abnormal blood cell morphology.

Flag Message	Meaning	Condition
Immature Gran?	Possible presence of immature granulocytes	Presence of excessive dots in immature granulocyte sensitive region of the scattergram
RBC Lyse Resistance?	Possible presence of RBC lyse resistance	Presence of abnormally distributed dots in the WBC sensitive region of the DIFF scattergram
Band cell suspected?	Possible presence of Band Cell	Presence of excessive dots in Band Cell sensitive region of the scattergram
Atypical Lymph?	Possible presence of atypical lymphocytes	Presence of excessive dots in atypical lymphocyte sensitive region of the scattergram
PLT Clump?	Possibility of PLT clump	Calculate and compare special parameters
Lipid Particles?	Possible presence of lipid particles	Presence of excessive dots in lipid particle sensitive region of the scattergram

During sample analysis, the analyzer evaluates and scores the possibility of the presence of all types of abnormal blood cell morphology. When the score for a certain type of abnormal blood cell morphology exceeds the set threshold, the analyzer reports the flag accordingly.

Administrators may set up the flag alarm threshold values on this screen. The higher the threshold value, the lower the alarm sensitivity of the flag.

Define the flag alarm threshold values in the “**Value (0-100)**” edit boxes as needed.

NOTE:

- The allowed range for all flag alarm threshold values is [0-100].
 - The flag alarm items vary with the models with different configurations. For details, see the screen of the model you purchase.
 - The default thresholds for all flags are 40.
-

6.3.2 User Management

Tap “**Menu > Setup > User Management**” to enter the “**User Management**” screen. The screen displays all the user accounts registered on the analyzer.

Adding new account

NOTE:

- The user ID is required and up to 12 characters can be entered.
 - The password is required and up to 12 characters can be entered.
 - The name is required and up to 20 characters can be entered.
-

Administrators can create new users on the “**User Management**” screen.

1. Tap “**Menu > Setup > User Management**” to enter the “**User Management**” screen.
2. Tap “**New**” to go to the “**Add User**” screen.
3. Select “**Access Level**”:
 - a. **General User**
 - b. **Administrator**
4. Enter the “**User ID**”, “**Name**”, and “**Password**” in turn.
5. Tap “**OK**” to save the settings.

The new user account is activated.

Granting permissions

NOTE:

- For built-in user accounts, granting permissions is not supported
 - For newly added user accounts, users are allowed to operate the analyzer with specified permissions after permission granting.
-

Administrators can grant permissions for general users on the “**User Management**” screen.

1. Tap “**Menu > Setup > User Management**” to enter the “**User Management**” screen.
 2. Select the newly added user, and tap “**Grant Perms.**”.
 3. Check the check box before the setting item to set user permissions.
-

4. Tap **“OK”** to save the settings.

Changing password

NOTE:

Users at either administrator's or operator's level can only change the passwords for the users currently logged in.

-
1. Tap **“Menu > Setup > User Management”** to enter the **“User Management”** screen.
 2. Select the current user, and tap **“Modify Password”**.
 3. In the **“Modify Password”** dialog box, enter **“Old Password”**, and then enter the new password in the **“New Password”** and **“Confirm Password”** edit boxes.
 4. Tap **“OK”** to save the new password.

The new password is activated.

Deleting account

NOTE:

You cannot delete a built-in user!

An administrator can delete any users registered under his/her own account.

1. Tap **“Menu > Setup > User Management”** to enter the **“User Management”** screen.
2. Select an user and tap **“Delete”** to delete it.
A confirmation box displays.
3. Tap **“Yes”**.

The selected user is deleted.

6.3.3 Manage Animal Type

Tap **“Menu > Setup > Manage Animal Type”** to enter the **“Manage Animal Type”** screen. You can add or delete animal type in this screen.

Adding custom species

Perform the following procedure:

1. On the **“Manage Animal Type”** screen, tap **“Add”**.
2. Enter custom species and select source species in the pop-up **“Custom Species”** dialog box.
3. Tap **“OK”** to save the newly added custom species.

Deleting custom species

Perform the following procedure:

1. On the **“Manage Animal Type”** screen, select the desired custom species, tap **“Delete”**.
A dialog box pops up.
2. Tap **“Yes”** in the dialog box.
The selected custom species is deleted.

6.3.4 Auxiliary Setup

Tap **“Menu > Setup > Auxiliary Setup”** to enter the **“Auxiliary Setup”** screen. You can set up the following contents:

- **Get Sample Information**
- **Other Settings**

Getting sample information

Tap **“Menu > Setup > Auxiliary Setup > Get Sample Information”** to enter the **“Get Sample Information”** screen. You can set the following options:

Item		Description
Setting of the next sample	Entry of next sample ID	• When “Auto Increase” is selected for “Entry of next sample ID”, after you manually enter the first sample ID, the subsequent sample IDs of the same batch automatically increase. • When “Manual entry” is selected for “Entry of next sample ID”, you need to enter each sample ID manually.
	Prefix Length	• When “Auto Increase” is selected for “Entry of next sample ID”, this edit box is activated. • Enter a number (n) into the edit box of “Prefix Length”, the first n characters in the sample ID will not be auto increased.
Setting of the first sample after startup	First sample after startup	• The default setting is “Run the suspended sample after restart”.
	Sample ID	• The default setting is “1”.

Other settings

1. Tap “**Menu > Setup > Auxiliary Setup > Other Settings**” to enter the “**Other Settings**” screen. Define the settings as needed.

Item	Description	
Predilute mode prompt	A prompt pops up before predilute samples are analyzed.	• Check the check box to activate the corresponding function. • Uncheck the check box to disable the corresponding function.
Pop-up keyboard	Check “ Pop-up keyboard ” to enable the pop-up keyboard. Tap on the edit area on each screen, the pop-up keyboard will display for you to input information. When you are using an external keyboard, you can uncheck “ Pop-up keyboard ” to disable the function.	
Enable waste direct discharge	When “ Enable waste direct discharge ” is checked, a dialog box will pop up to remind you to make sure all tubes are properly connected.	
Enable fluorescent reagent detect sensor	When “ Enable fluorescent reagent detect sensor ” is checked, if the fluorescent reagents are not sufficient, the analyzer will send an alarm.	
Monitor reagent expiration date	When “ Monitor reagent expiration date ” is checked, if the reagent exceeds the expiration date, the analyzer will send an alarm.	
Flags (Administrators)	Select from the pull down list to define the suspect, high and low flags (default: “R” for suspect, “H” for high and “L” for low).	Suspect: R, r
		High: H, h, ↑
		Low: L, ↓
Alarm Volume (Administrators)	Set alarm volume	Low, Medium, High, Max

6.3.5 Para. Setup (Administrators)

Parameter unit setup

Administrators may set up unit systems and parameter units.

1. Tap “**Menu > Setup > Para. Setup > Parameter Unit Setup**” to enter the “**Parameter Unit Setup**” screen.
2. (Optional) When necessary, select the unit system from the “**Unit System:**” pull-down list.
3. Tap the “**Unit**” column of the parameter for which you want to change the unit.
The available units for the parameter displays on the right side of the screen.
4. Check the desired unit for the parameter in the “**Unit System:**” area.
The parameter unit refreshes.

NOTE:

- Users at operator's level can only review the unit system and the parameter units.

- Tap “**Default**” to restore the default units for all parameters.

Reference range setup

Users at administrator’s level may select and customize reference ranges and reference groups.

1. Tap “**Menu > Setup > Ref. Range Setup**” to enter the “**Ref. Range Setup**” screen.
2. Add, edit or delete custom reference groups, or set default reference groups as needed.

Perform the following procedure:

Item	Description
New	1. Tap “New” to add a custom reference group. 2. On the custom reference group setup screen, set up the species, the group name, lower and upper limits for the custom reference group.
Edit	• Select a reference group, and tap “Edit”. • For the default and custom reference group, the “Upper” and “Lower” limits of the parameters can be edited for operator with an administrator account.
Delete	• Select a custom reference group, and tap “Delete”. • The default reference group cannot be deleted.
Default	Select a reference group, and tap “ Default ” to restore the lower and upper limits of all parameters to default values.

Microscopic parameters setup (administrators)

In the default mode, the “**Microsco. Para. Setup**” screen displays microscopic parameters of hematology analysis.

Administrators may add new parameters, edit or delete existing microscopic parameters on the “**Microscopic Para. Setup**” screen.

1. Tap “**Menu > Setup > Para. Setup > Microsco. Para. Setup**” to enter the “**Microsco. Para. Setup**” screen.
2. Add new microscopic parameters, or edit or delete existing microscopic parameters as needed.

Perform the following procedure:

Item	Description
Add a new microscopic parameter	Tap “ New ” to add a row in the microscopic parameter name area. Enter the new parameter name in the “ Microscopic Parameter Name ” column.
Edit a microscopic parameter	Tap a parameter name in the table to edit the name.
Delete a microscopic parameter	Select a row in the table, and tap the “ Delete ” button to delete the parameter.

NOTE:

The analyzer can save at most 40 microscopic parameters.