BS-200

Chemistry Analyzer

Operation Manual

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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.

NOTE:

This equipment is to be operated only by medical professionals trained and authorized by Mindray or Mindray-authorized distributors.

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3 Return address: Please send the part(s) or equipment to the address offered by Customer Service department

Company Contact

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Preface

Before using the BS-200 Chemistry Analyzer, please read this operation manual thoroughly for relevant operation instructions.

Who Should Read This Manual

This manual is written for clinical laboratory professionals to

- perform daily operating tasks;
- perform system maintenance and troubleshooting;
- learn about the BS-200 hardware and software.

WARNING:

The BS-200 Chemistry Analyzer is to be operated only by medical professionals trained and authorized by Mindray or Mindray-authorized distributors.

What Can You Find in This Manual

This operation manual covers principles, operations, daily maintenance and troubleshooting of the system. Please operate and service the system strictly as instructed by this manual.

Conventions Used in This Manual

This manual uses certain typographical conventions to clarify meanings in the text.

Bold font indicates a chapter title, such as **4 Maintenance**

Bold and Italic font indicates text displayed on the screen, such as ***Sample Request***.

Safety Symbols

This chart explains the symbols used in this manual.

When you see …	Then …
WARNING:	Read the statement following the symbol. The statement is alerting you to an operating hazard that can cause personal injury.
BIOHAZARD:	Read the statement following the symbol. The statement is alerting you to a potentially biohazardous condition.

When you see …	Then …
CAUTION:	Read the statement following the symbol. The statement is alerting you to a possibility of system damage or unreliable results.
NOTE:	Read the statement following the symbol. The statement is alerting you to information that requires your attention.

Labels Used on the System

The labels attached to the panels of the system use symbols with the text to clarify the meaning of the text. The chart below explains the symbols on the labels.

SN	Serial Number
	Date of Manufacture
	Manufacturer
CE	The device is fully in conformance with the Council Directive Concerning In Vitro Diagnostic Medical Devices 98/79/EC.
	The following definition of the WEEE label applies to EU member states only: The use of this symbol indicates that this product should not be treated as household waste. 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.
IVD	In Vitro Diagnostic equipment
	Biohazard Warning: risk of potentially biohazardous infection
	Warning: risk of personal injury or equipment damage
	Warning: risk of electric shock
	Warning: risk of burn
~	Alternating current (AC)
|	ON (MAIN POWER)
○	OFF (MAIN POWER)

ON (Power)

OFF (Power)

Graphics

All graphics, including screens and printout, are for illustration purpose only and must not be used for any other purposes.

EC Representative

Name:	Shanghai International Holding Corp. GmbH (Europe)
Address:	Eiffestrasse 80 D-20537 Hamburg Germany
Phone:	+49 40 2513174
Fax:	+49 40 255726

Safety Precautions

Observe the following safety precautions when using the BS-200 Chemistry Analyzer. Ignoring any of these safety precautions may lead to personal injury or equipment damage.

WARNING:

If the system is used in a manner not specified by Mindray, the protection provided by the system may be impaired.

Preventing Electric Shock

Please observe the following instructions to prevent electric shock.

WARNING:

When the MAIN POWER is on, users must not open the rear cover or side cover.

Liquid ingression may lead to electric shock or equipment damage. In case of liquid ingression, shut off the power supply and contact Mindray Service Department or your local distributor.

Preventing Personal Injury Caused by Moving Parts

Please observe the following instructions to prevent personal injury caused by moving parts.

WARNING:

Do not touch such moving parts as probe and mixing bar, when the system is in operation.

Do not put your finger or hand into any open part when the system is in operation.

Preventing Personal Injury Caused by Photometer Lamp

Please observe the following instructions to prevent personal injury caused by photometer lamp.

WARNING:

Light sent by the photometer lamp may hurt your eyes. Do not stare into the lamp when the system is in operation.

If you want to replace the photometer lamp, first switch off the MAIN POWER and then wait at least 30 minutes for the lamp to cool down before touching it. Do not touch the lamp before it cools down, or you may get burned.

Preventing Infection

Please observe the following instructions to protect against the biohazardous infection.

BIOHAZARD:

Inappropriately handling samples may lead to biohazardous infection. Do not touch the sample, mixture or waste with your hands. Wear gloves and lab coat and, if necessary, goggles.

In case your skin contacts the sample, follow standard laboratory safety procedure and consult a doctor.

Certain reagents are strongly acid or alkaline. Exercise caution when using the reagents. In case your skin or clothes contact the reagents, wash them off with soap and clean water. In case the reagents spill into your eyes, rinse them with much water and consult an oculist.

Treating Waste

Please observe the following instructions to prevent environmental pollution and personal injury caused by waste.

BIOHAZARD:

Dispose of the waste in accordance with your local or national guidelines for biohazard waste disposal and consult the manufacturer or distributor of the reagents for details.

Preventing Fire or Explosion

Please observe the following instructions to prevent fire and explosion.

WARNING:

Do not use flammable substance around the system.

Precautions on Use

To use the BS-200 Chemistry Analyzer safely and efficiently, please pay attention to the following operation notes.

Intended Use

WARNING:

The BS-200 Chemistry Analyzer is a chemistry system that is designed for the in vitro quantitative determination of clinical chemistries in serum, plasma, urine or CSF samples. Please consult Mindray first if you want to use the system for other purposes.

To draw a clinical conclusion, please also refer to the patient's clinical symptoms and other test results.

Operator

WARNING:

The BS-200 Chemistry Analyzer is to be operated only by medical professionals trained and authorized by Mindray or Mindray-authorized distributors.

Environment

CAUTION:

Please install and operate the system in an environment specified by this manual. Installing and operating the system in other environment may lead to unreliable results and even equipment damage.

To relocate the system, please contact Mindray Service Department or your local distributor.

Preventing Interference by Electromagnetic Noise

CAUTION:

Electromagnetic noise may interfere with operations of the system. Do not install devices generating excessive electromagnetic noise around the system. Do not use such devices as mobile phones or radio transmitters in the room housing the system. Do not use other CRT displays around the system.

Do not use other medical instruments around the system that may generate electromagnetic noise to interfere with their operations.

Operating the System

CAUTION:

Operate the system strictly as instructed by this manual. Inappropriate use of the system may lead to unreliable test results or even equipment damage or personal injury.

Before using the system for the first time, run the calibration program and QC program to make sure the analyzer is in proper state.

Be sure to run the QC program every time you use the system, otherwise the result may be unreliable.

Do not open the cover of the sample/reagent disk when the system is in operation.

The RS-232 port on the analyzing unit is to be used for connection with the operation unit only. Do not use it for other connections. Only use the supplied cable for the connection.

The operation unit is a personal computer with the control software installed. Installing other software or hardware on this computer may interfere with the system operation. Do not run other software when the system is working.

Do not use this computer for other purposes. Inappropriate use of it will probably introduce computer virus, which may spread into the system through floppy disks, software or network.

Do not touch the display, mouse or keyboard with wet hands or hands with chemicals.

Don't place the MAIN POWER to ON again within 10 seconds since placing it to OFF; otherwise the system may enter the protection status. If it does so, place the MAIN POWER to OFF and place it to ON again.

Maintaining the System

CAUTION:

Maintain the system strictly as instructed by this manual. Inappropriate maintenance may lead to unreliable results or equipment damage or personal injury.

To wipe off dust from the system surface, use a soft, clean and wet (not too wet) cloth, soaked with soap water if necessary, to clean the surface. Do not use such organic solvents as ethanol for cleaning. After cleaning, wipe the surface dry with dry cloth.

Switch off all the powers and disconnect the power plug before cleaning. Take necessary measures to prevent water ingression into the system, otherwise it may lead to equipment damage or personal injury.

Replacement of such major parts as photometer, probe, mixing bar and syringe plunger assembly must be followed by a calibration.

Samples

CAUTION:

Use serum samples that are completely separated from blood clots or urine samples that are free from suspended matter. If fibrin exists in the serum samples or suspended matter exists in the urine samples, the probe may be blocked.

Medicines, anticoagulants or preservative in the samples may lead to unreliable results.

Hemolysis, jaundice or chylomicron in the samples may lead to unreliable test results, so sample blanks are recommended.

Store the samples properly. Improper storage may change the compositions of the samples and lead to unreliable results.

Sample volatilization may lead to unreliable results. Do not leave the sample open for a long period.

Not all the tests the reagents claim capable of analyzing can be analyzed on the system. Consult the reagent suppliers for details.

Certain samples need to be processed before being analyzed by the system. Consult the reagent suppliers for details.

The system has a specific requirement on the sample volume. Refer to this manual for proper sample volume.

Load the sample to proper tube position on the sample disk before the analysis begins; otherwise you will not obtain correct results.

Reagents, Calibrators and Controls

CAUTION:

Use proper reagents, calibrators and controls in the system.

Select appropriate reagents according to performance characteristics of the system. Consult the reagent suppliers, Mindray or Mindray-authorized distributor for details, if you are not sure about your reagent choice.

Store and use the reagents, calibrators and controls strictly as instructed by the suppliers. Otherwise, you may not obtain reliable results or best performance of the system.

Perform calibration after changing the reagents. Otherwise, you may not obtain reliable results.

Contamination caused by carryover among reagents may lead to unreliable test results. Consult the reagent suppliers for details.

Setting up the System

CAUTION:

To define such parameters as sample volume, reagent volume and wavelength, follow the instructions in this manual and the instructions of reagents.

Backing up Data

NOTE:

The system automatically stores the data to the built-in hard disk. However, data loss is still possible due to mis-deletion or physical damage of the hard disk. Mindray recommends you to regularly back up the data to such medium as CDs.

Computer and Printer

NOTE:

Refer to their operation manuals for details.

External Equipment

WARNING:

External equipment connected to the system, such as PC and printer, shall be consistent with IEC 60950 or EN 60950.

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1 System Description

This chapter includes the following two sections:

- Hardware Introduction
- Software Introduction

The BS-200 Chemistry Analyzer is a chemistry system that is designed for the in vitro quantitative determination of clinical chemistries in serum, plasma, urine or CSF samples.

NOTE:

Not all the tests the reagents claim capable of analyzing can be analyzed on the system. Consult the reagent suppliers for details.

1.1 Hardware Introduction

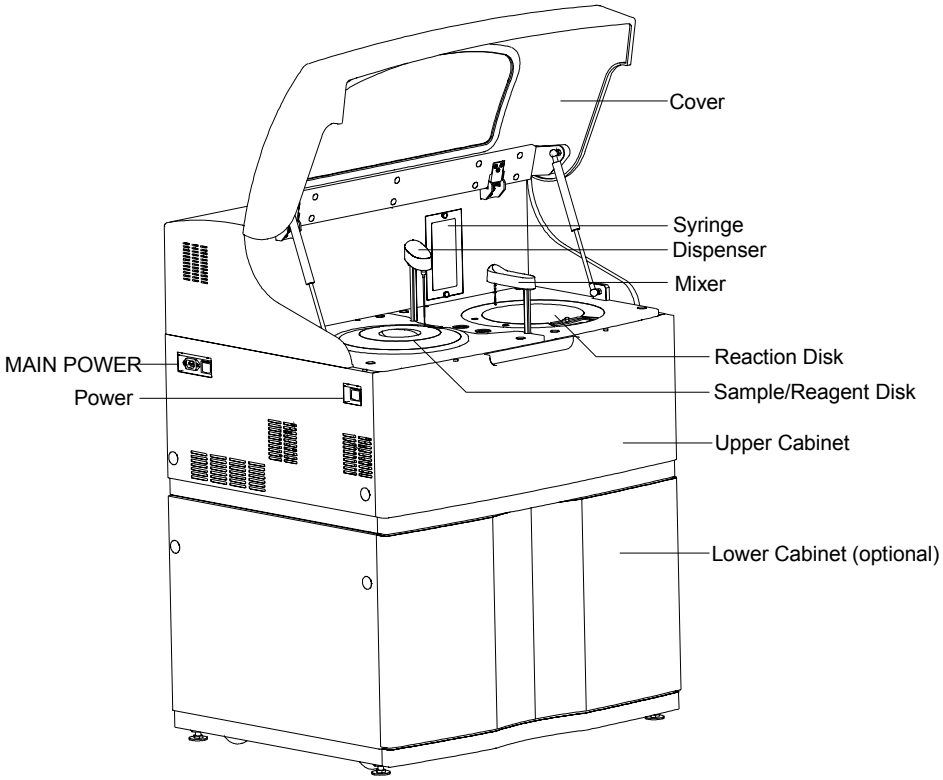
The system consists of the following three units – the analyzing unit, operation unit and output unit.

1.1.1 Analyzing Unit

The analyzing unit consists of the following major parts:

- Sample/Reagent Disk
- Dispenser
- Mixer
- Reaction Disk
- Photometric System

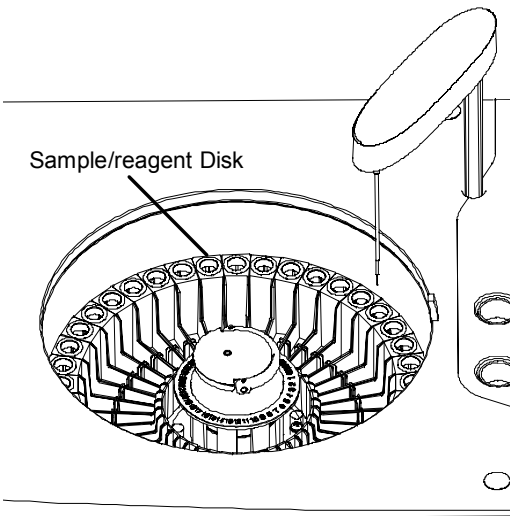
Figure 1-1 Analyzing unit



1.1.1.1 Sample/Reagent Disk

The sample/reagent disk holds sample tubes and reagent bottles.

Figure 1-2 Sample/Reagent disk



The disk is composed of two circles – sample disk on the outer circle and reagent disk on the inner circle.

The sample disk provides 40 sample tube positions and the reagent disk provides 40 reagent bottle positions. On the reagent disk, No. 39 is for detergent and No. 40 is for distilled water.

NOTE:

Mindray recommends you to use the following detergents:

Acid: 0.1mol/l hydrochloric acid; Alkaline: 0.5% (V/V) javel water。

The sample disk can hold the following sample tubes:

- Micro sample cup and centrifugal tube
- Collection tube: Φ12×68.5, Φ12×99, Φ12.7×75 and Φ12.7×100
- Plastic tube

The reagent disk can only hold Mindray bottles, which are available in two types, 40ml and 20ml.

The sample/reagent disk is located in the sample/reagent compartment, which has a refrigerator to keep the temperature at 4-15 ˚C.

WARNING:

Make sure the disk cover is closed; otherwise it may degrade the refrigeration and damage the probe.

Before running the analyzing unit, make sure that the disk cover is closed and the round red mark on the cover is aligned with its counterpart on the panel. Otherwise the probe may be damaged.

NOTE:

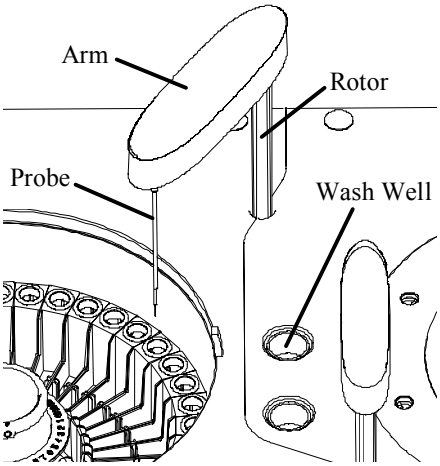
The refrigerator will be put into service once the MAIN POWER is turned on.

Do not use sample tubes and reagent bottles other than the specified ones.

1.1.1.2 Dispenser

The dispenser is composed of a probe, arm and rotor.

Figure 1-3 Dispenser



The probe aspirates certain amount of sample from the designated sample tube, or reagent from the designated reagent bottle, and then dispenses them into the designated cuvette on the reaction disk.

After dispensing the sample or the reagent, the probe moves to the wash well for cleaning.

- Sample volume: 3μl-45μl; precision: 0.5μl.
- Reagent volume: 30μl -450μl; precision: 1μl.

The dispenser is capable of preheating the reagent, detecting the sample/reagent level, capable of tracking level and protecting against collision in the vertical direction.

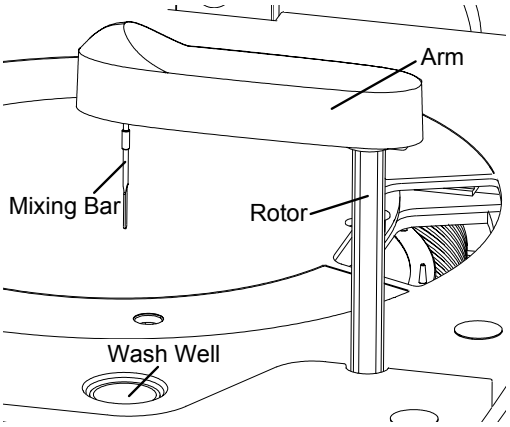
WARNING:

When the analyzing unit is in operation, do not place any part of your body or any obstacle in the route the arm moves. Otherwise, it may lead to personnel injury or equipment damage.

1.1.1.3 Mixer

The mixer is composed of a mixing bar, arm and rotor.

Figure 1-4 Mixer



The mixing bar thoroughly stirs the reaction mixture (reagent and sample) in the cuvette. After stirring, it moves to the wash well for cleaning.

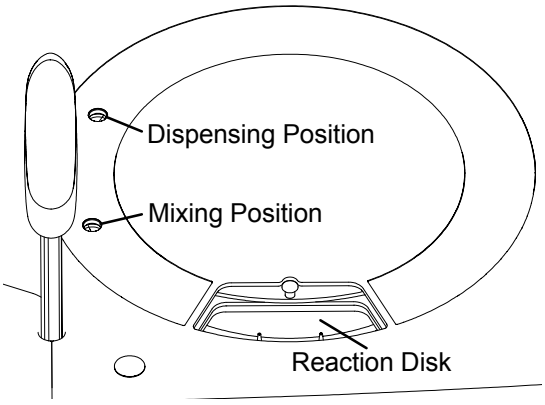
For the single-reagent test, the mixer starts to work after the sample is dispensed into the cuvette.

For the double-reagent test, the mixer starts to work after the sample or the second reagent is dispensed into the cuvette.

1.1.1.4 Reaction Disk

The reaction disk holds the cuvettes, in which the sample reacts with the reagent(s) and colorimetric readings are taken.

Figure 1-5 Reaction disk



The reaction disk can hold 8 cuvette segments (80 cuvettes).

During the analyzing process, the reaction disk rotates to dispensing position or mixing position as needed. The colorimetric readings are taken when the specified cuvette passes through the optical axis.

The cuvettes adopted are

- Disposable;
- 5mm×6mm×30mm (5mm optical path);
- 900μl (capable of holding 180-500μl of the reaction mixture).

The reaction disk is placed in the temperature-controlled chamber, which keeps a constant temperature at 37±0.3˚C.

BIOHAZARD:

Be sure to dispose of the used cuvettes in compliance with the local regulations.

CAUTION:

The cuvettes should not be re-used. Otherwise, the system performance may be degraded.

1.1.1.5 Photometric System

The photometric system, which locates in the analyzing unit, measures the absorbance of the reaction mixture in the cuvette.

The photometric system provides 8 wavelengths: 340nm, 405nm, 450nm, 510nm, 546nm, 578nm, 630nm, 670nm, 700nm (optional).

1.1.2 Operation Unit

The operation unit is a computer with the control software of BS-200 Chemistry Analyzer installed. It manages running of the analyzing unit, as well as operation and data processing.

1.1.3 Output Unit

The output unit is a printer that prints out the test results and other data.

1.2 Software Introduction

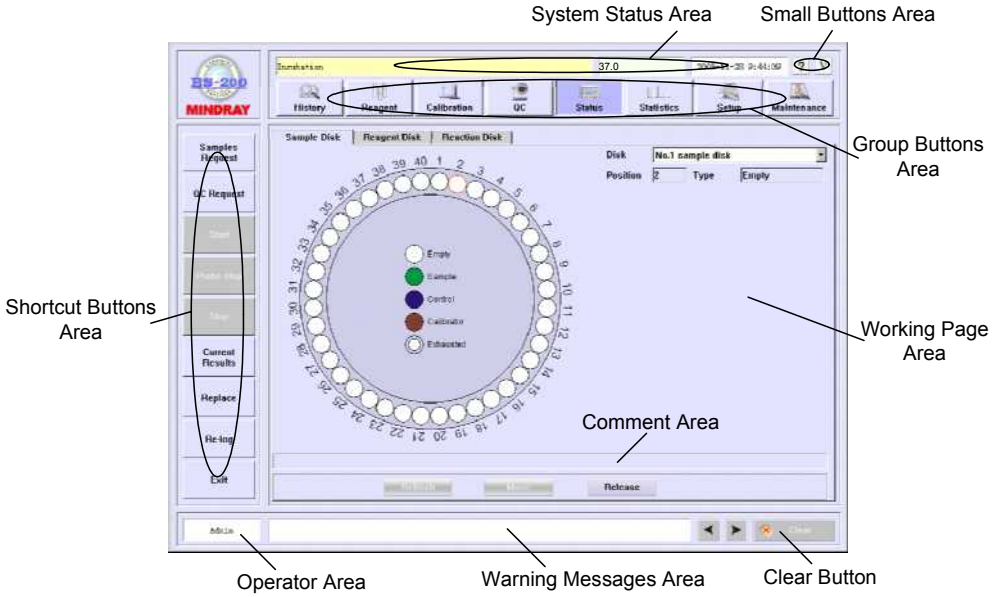
NOTE:

In this manual, “click” refers to moving the pointer of the mouse to the desired item and click the left button of the mouse.

1.2.1 Software Interface

The interface of the control software is shown in Figure 1-6.

Figure 1-6 Interface of the control software



■ System status area

This area displays the system status, current temperature of the reaction disk and current time.

■ Small buttons area

Click the small button ?, and the BS-200 Operation Manual will be displayed.

Click the small button V, and the version of software will be displayed.

■ Group buttons area

Displays group buttons which include ***History***, ***Reagent***, ***Calibration***, ***QC***, ***Status***, ***Statistics***, ***Setup*** and ***Maintenance***.

Click a group button, and a relevant working page will be displayed.

■ Shortcut buttons area

Displays shortcut buttons which include ***Sample Request***, ***QC Request***, ***Start***, ***Probe Stop***, ***Stop***, ***Current Results***, ***Replace***, ***Re-log*** and ***Exit***.

Click a shortcut button, and corresponding operation will be performed.

■ Working page area

Displays values and graphs for parameters, procedures and results.

When the pointer of the mouse points to an element in current working page, the comment area on the lower part of the working page will display the explanation of the element.

■ Operator area

Displays the name of the current operator.

■ Warning messages area

Displays the warning and error messages.

Click the button ◄ to view the previous message, and click the button ► to view the next one.

■ Clear button

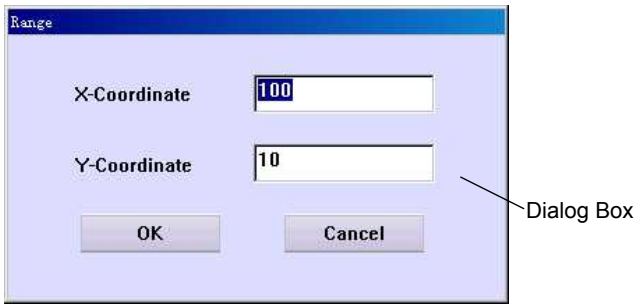
Click the button

to clear contents displayed in the warning messages area.

1.2.2 Main Interface Components

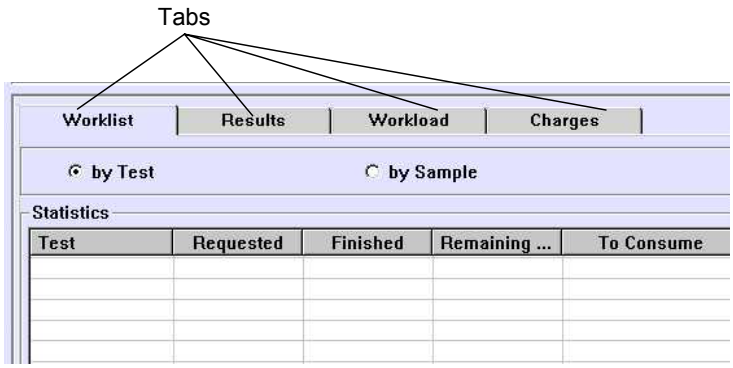
■ Dialog box

The dialog box is one of the most common components. See the following example:



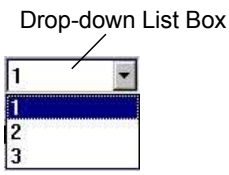
■ Tab

See the figure below for an example. Click a tab and you can access the working page that it indexes.



■ Drop-down list box

Click and a list will display, as the figure below shows. Click the desired item to select it.



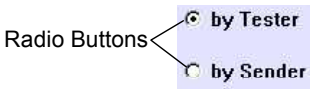
■ Button

Click a button and you can access the function it indexes, as the figure below shows.

■ Radio button

Click a radio button to select the option it represents.

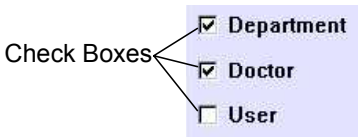
Note that for a given group of radio buttons, you can only select one of them. See the figure below.



■ Check box

Click a check box to select the option it represents and click it again to deselect it.

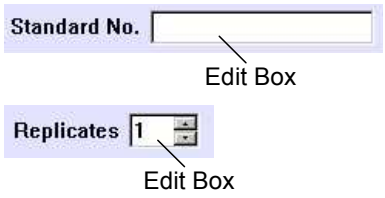
Note that for a given group of check boxes, you can choose more than one of them at one time. See the figure below.



■ Edit box

You can enter characters in the edit box from keyboard. See the figure below.

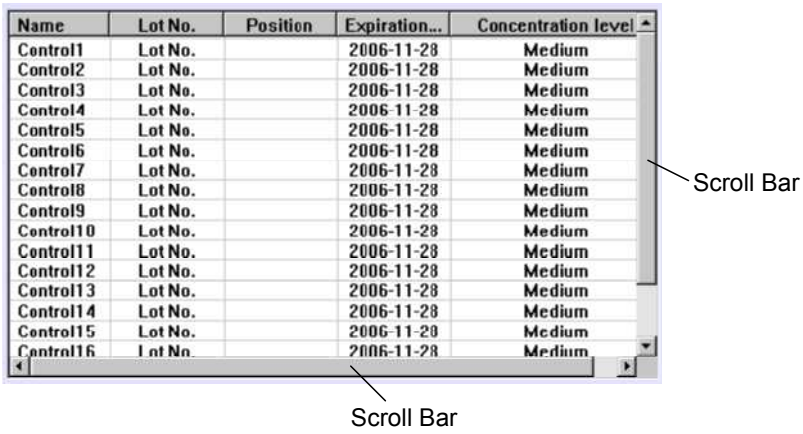
There're two types of edit boxes, one can only accept characters input from the keyboard, while the other can accept characters not only input from the keyboard but also selected by clicking ▲ or ▼.



■ Scroll bar

When the contents to be displayed are too many for one screen, the scroll bar will appear to help you see the hidden contents.

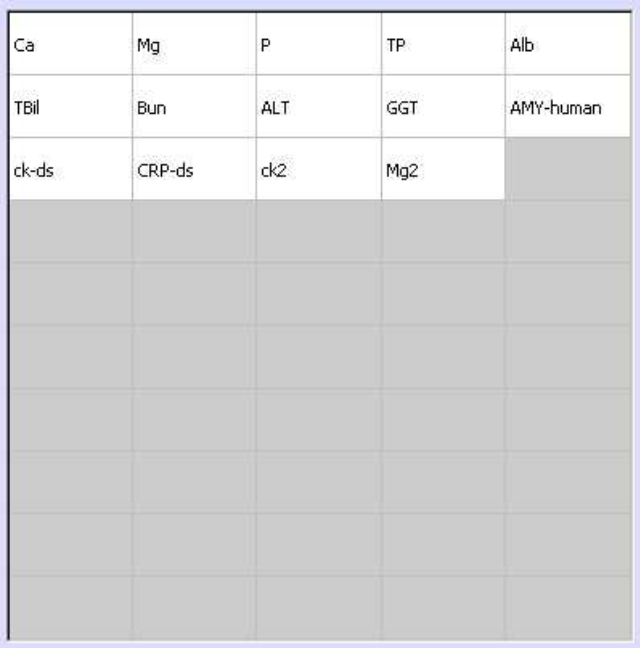
Move the pointer to the scroll bar, press left button of the mouse and hold it, then you can drag the scroll bar left/right or up/down to see the hidden contents.



■ List

The list can list the names of tests, profiles or others, as the figure below shows.

Click a test to select it, and click it again to deselect.



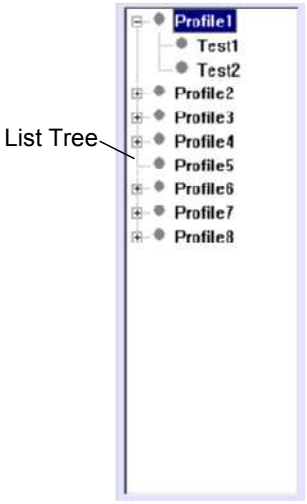
■ List tree

List tree can list the affiliation among options, as the figure below shows.

Click the “-” to hide the subordinate options, and the “-” becomes “+”.

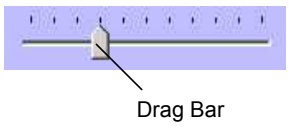
Click the “+” to expand the subordinate options and display their affiliation, then “+” turns to be “-”.

If an option has no subordinate options, there is no “+” or “-” to the left of it.



■ Drag bar

Drag bar is used to select a level continuously, as the figure below shows. Click the drag bar and hold it, then you can drag it to the position needed.



2 Installation

WARNING:

The system should be installed by Mindray-authorized personnel only.

The system should be installed by Mindray-authorized personnel only, and you should prepare a proper site for installation.

If you need to move the system to another site, please contact Mindray Service Department or your local distributor, who are the appropriate people for the moving job.

2.1 Unpacking

When you receive the system, carefully inspect the package. If you see any signs of mishandling or damage, file a claim immediately with Mindray Service Department or your local distributor.

After opening the package, check the delivered goods against the packing list as well as the appearance of the system. If you find anything missing or damaged, alert Mindray Service Department or your local distributor immediately.

2.2 Installation Requirements

CAUTION:

Make sure the system is installed in a place meeting the following requirements. Otherwise, it will not perform as promised.

2.2.1 Installation Environment Requirements

- This system is for indoor use only.
- The bearing platform (or ground) should be level (gradient less than 1/200).
- The bearing platform (or ground) should be able to bear 100Kg weight.
- The installation site should be well ventilated.

CAUTION:

The system radiates heat when operating. A well-ventilated environment helps keep the room temperature stable. Use ventilation equipment if necessary. But if so, be sure not to expose the system to the direct draft that may lead to unreliable results.

- The site should be free of dust as much as possible.
- The site should not be in direct sun.
- The site should not be near a heat or draft source.
- The site should be free of corrosive gas and flammable gas.
- The bearing platform (or ground) should be free of vibration.
- The site should not be disturbed by large noise or power supply.
- The system should not be placed near brush-type motors and electrical contacts that are frequently turned on and off.
- Do not use such devices as mobile phones or radio transmitters near the system. Electromagnetic waves generated by those devices may interfere with operation of the system.
- The altitude height of the site should be lower than 2000 meters.

WARNING:

When the forward or backward gradient is more than 8 degrees, the system may tip over. Be sure to take proper measures when transporting and storing it.

2.2.2 Power Requirements

- Power supply: AC 110-130V/200-240V±10%, 50/60Hz, three-wire power cord and properly grounded.
- The system should be connected to a properly grounded power socket.
- The distance between the power socket and the system should be less than 3 meters.

WARNING:

Make sure the power socket is grounded correctly. Improper grounding may lead to electric shock and/or equipment damage.

Be sure to connect the system to a power socket that meets the above-mentioned requirements and has a proper fuse installed.

2.2.3 Temperature and Humidity Requirements

Storage temperature and humidity

- The system should be stored in a 0˚C-40˚C environment with fluctuation less than ±2˚C /H.
- The relative humidity should be between 30%RH-80%RH and with no condensation.

CAUTION:

Storing the system in an environment other than the specified may damage the system.

Operating temperature and humidity

- When the system is running, be sure to fix the ambient temperature between 15˚C -30˚C with fluctuation less than ±2˚C /H.
- The ambient humidity should be between 35%RH-80%RH and with no condensation.

CAUTION:

Operating the system in an environment other than the specified may lead to unreliable test results.

If the temperature or relative humidity does not meet the above-mentioned requirements, be sure to use air-conditioning equipment.

2.2.4 Water Supply and Drain Requirements

- The water must meet requirements of the CAP Type II water.
- The water temperature should be between 5-50˚C.
- If water-purifying equipment is used, the pressure at the source should be between 49kPa-392kPa.

BIOHAZARD:

Be sure to dispose of the waste according to the local regulations.

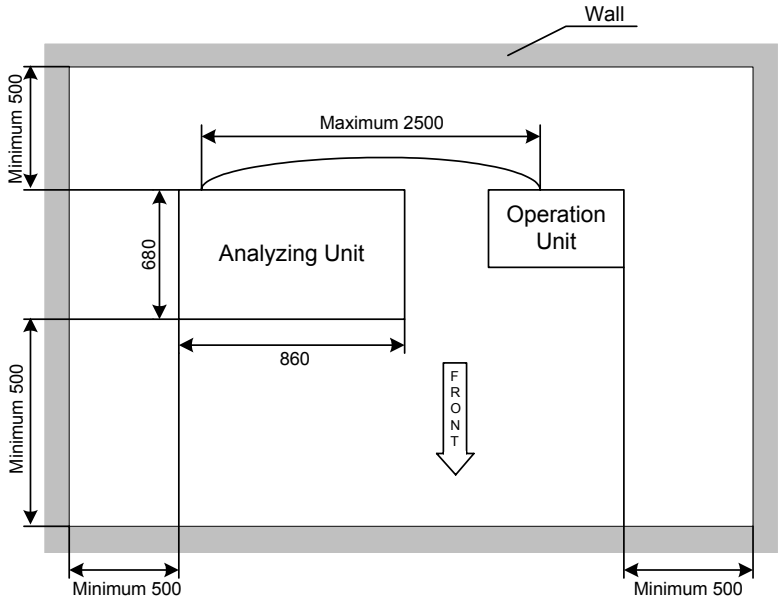
CAUTION:

The water must meet requirements of the CAP Type II water, otherwise insufficiently purified water may result in misleading measurement.

2.2.5 Space and Accessibility Requirements

The system should be installed and used meeting the space and accessibility requirements as shown below.

Figure 2-1 Space and accessibility requirements



2.3 Connecting Deionized Water Tank

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

CAUTION:

When placing the deionized water tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the deionized water pickup tube is not blocked, bent, or twisted.

1 Place the Power to OFF.

2 Put the pickup tubes and the sensor into the deionized water tank, and then turn the cap of the deionized water tank clockwise.

3 Put the deionized water tank on an appropriate place.

4 Plug the red and the green connectors to their counterparts marked DEIONIZED WATER on the rear side of the analyzing unit and turn the connectors clockwise until secure.

5 Plug the sensor connector to its counterpart marked D-SENSOR on the rear side of the analyzing unit and turn it clockwise until secure.

2.4 Connecting Waste Tank

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

CAUTION:

When placing the waste tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the waste tube is over the tank and not blocked, bent, or twisted. A blocked, bent or twisted waste tube may lead to wastewater overflow that may damage the analyzer.

1 Place the Power to OFF.

2 Put the waste tube and the sensor into the waste tank, then turn the cap of the waste tank clockwise.

3 Put the waste tank on an appropriate place.

4 Keep pressing the pin on the waste connector marked WASTE on the rear side of the analyzing unit and grab the waste tap and insert it to the connector.

5 Plug the sensor connector to its counterpart marked W-SENSOR on the rear side of the analyzing unit and turn it clockwise until secure.

2.5 Installing/Removing Sample/Reagent Disk

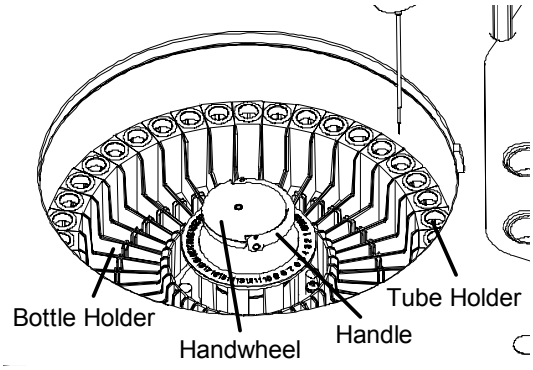
WARNING:

Before installing/removing the sample/reagent disk, make sure the Power is placed to OFF and the sample/reagent disk has been stopped.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Figure 2-2 Structure of the sample/reagent disk



To install the sample/reagent disk, keep the handle at the vertical position, align the hole of the handwheel to the pin of the rotor, gently lower the sample/reagent disk all the way down and move the handle back to the horizontal position to secure the disk to the rotor.

To remove the sample/reagent disk, first shift the handle from the horizontal position to the vertical position. Then grab the handle or handwheel and pull the disk upward to remove it from the rotor.

CAUTION:

Make sure the sample/reagent disk cover is closed, otherwise cooling effect of the refrigerator will be degraded and the sample probe may be damaged.

Before running the system, make sure that the sample/reagent disk cover is closed and the round red mark on the cover is aligned with its counterpart on the panel. Otherwise the sample probe may be damaged.

NOTE:

The sample/reagent compartment and the sample/reagent disk may be contaminated when being used. If samples spill in the compartment or on the disk, wipe them with cloth soaked with water or disinfector after placing the Power to OFF.

2.6 Installing/Removing Sample Tubes

WARNING:

Before installing/removing the sample tubes, make sure the sample/reagent disk and the probe have been stopped.

Do not use sample tubes other than the specified ones.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

To load sample tubes, insert the tube into the tube holder until the bottom of the tube contacts the groove of the tube rack.

To remove sample tubes, grab the tube and pull it upward to remove it from the tube holder.

2.7 Installing/Removing Reagent Bottles

WARNING:

Before installing/removing the reagent bottles, make sure the sample/reagent disk and the probe have been stopped.

Do not use reagent bottles other than the specified.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

To load reagent bottles, insert the bottle into the bottle holder until the bottom of the bottle contacts the groove of the holder.

To remove the reagent bottles, grab the bottle and pull it upward to remove it from the bottle holder.

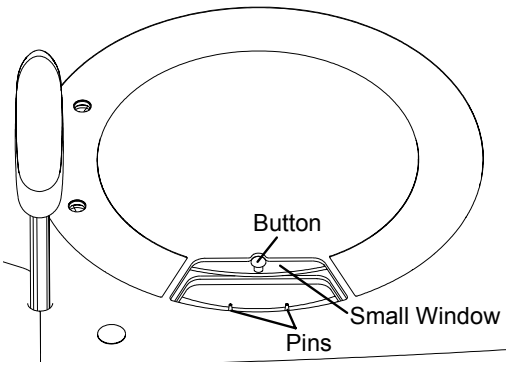
2.8 Installing/Removing Cuvettes

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Be sure to dispose of the used cuvettes in compliance with the local regulations.

Figure 2-3 Reaction disk assembly



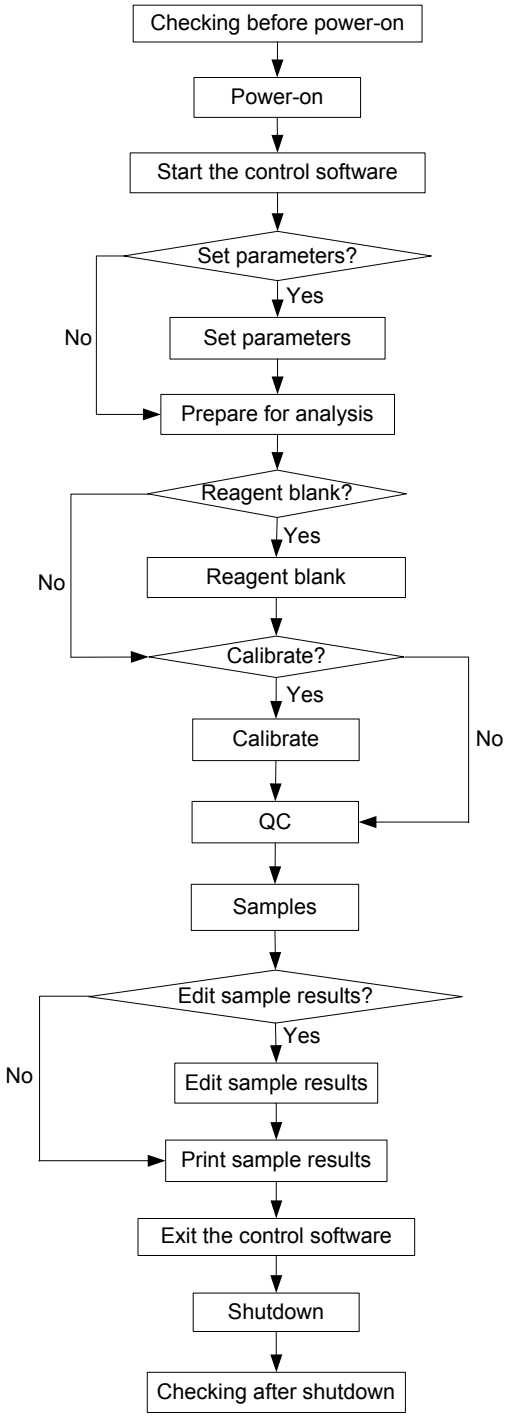
To install cuvettes, push forward the button on the small window of the reaction disk to open it, then align the holes on the cuvette segment to the pins on reaction disk and put the segment on the disk. After installing, close the small window.

To remove cuvettes, push forward the button on the small window of the reaction disk to open it, and then take out cuvette segments.

3 Basic Operations

This chapter provides step-by-step procedures to operate the analyzer for basic tasks.

3.1 Daily Procedure



3.2 Preparing for Analysis

3.2.1 Checking before Startup

You should do the following operations before starting the analyzer.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles when performing the following operations.

1 Check the power supply and make sure it can supply proper voltage for the analyzer.

2 Check the connections among the analyzing unit, operation unit and printer. Make sure the connections are right and secure. Check the power cords of the analyzing unit, operation unit and printer and make sure they are well connected to the power sockets.

3 Check and make sure sufficient printing paper is prepared for the printer.

4 Ensure a detergent is in position 39 on the reagent disk and sufficient distilled water is in position 40 on the reagent disk.

NOTE:

Mindray has specified the following detergents:

Acid: 0.1mol/l hydrochloric acid;

Alkaline: 0.5% (V/V) javel water.

Do not mix the acid detergent with the alkaline one.

Be sure to use the detergent recommended by Mindray. Otherwise, proper result may not be obtained.

Mindray recommends the acid and alkaline detergents be used alternately. For instance, if the acid detergent has been used for the last time, the alkaline one had better be used for this time.

5 Refer to **5.2.3 Checking Connection of Deionized Water** for instructions of checking connection of deionized water.

6 Refer to **5.2.4 Checking Connection of Wastewater** for instructions of checking connection of wastewater.

7 Refer to **5.2.5 Checking Syringe** for instructions of checking the syringe.

8 Refer to **5.2.6 Checking Probe** (step 1- 5) for instructions of checking the probe.

9 Refer to **5.2.7 Checking Mixing Bar** (step 1- 3) for instructions of checking the mixing bar.

10 Refer to **5.2.1 Checking Remaining Deionized Water** for instructions of checking the deionized water tank.

11 Ensure the waste tank is empty. If it is not empty, refer to **5.2.2 Emptying Waste Tank** for instructions of emptying the waste tank.

3.2.2 Power-on

Power on the analyzer in the sequence presented below:

1 Place the MAIN POWER to ON.

2 Place the Power to ON.

3 Press the power button on the monitor of the operation unit.

4 Press the power button on the computer of the operation unit.

5 Press the power button of the printer.

3.2.3 Starting the Control Software

1 After you have logged on the Windows operating system, double-click the shortcut icon of the control software on the desktop or select the program of the control software from [Start] to startup the control software.

After startup, the analyzer will check automatically the operation system and resolution of the screen, close screen saver, check color configuration, initialize database and examine the printer.

When checking is finished, the following dialog box will pop up to ask you to enter the username and password, and then click ***OK***.

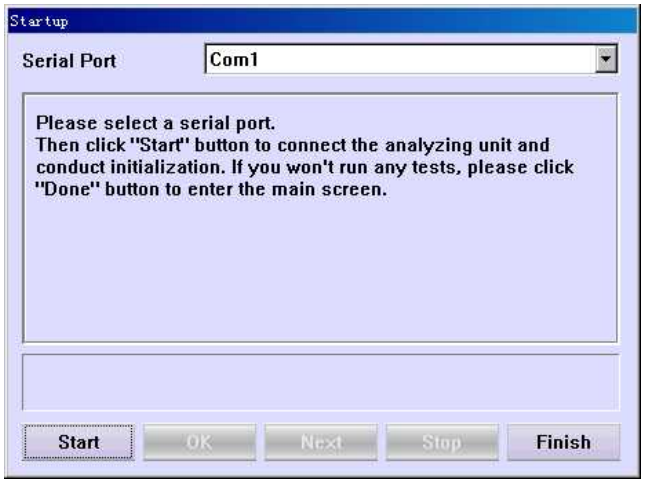
NOTE:

The resolution of the screen must be 1024x768.

The color configuration must be at least 8 bits.

The username of the system administrator is “Admin” which is same as the initial password.

2 Select a serial port from ***Serial Port*** in the ***Startup*** dialog box, then click ***Start*** to initialize the system. After that, operate according to the screen prompt until the main screen of the control software is displayed.



CAUTION:

You may not start the analysis until the system status area of the screen displays "***Standby***" and the analyzer has been turned on for at least 30 minutes.

NOTE:

Refer to **5.2.6 Checking Probe** (step 6 - 9) for instructions of checking the probe.

Refer to **5.2.7 Checking Mixing Bar** (step 4 - 5) for instructions of checking the mixing bar.

3.2.4 Setting Up the Analyzer

The analyzer will not function properly unless it is properly set up.

You must complete all the following settings if this is the first time the analyzer being used.

Before requesting the tests, you must finish the following settings:

- To set the options regarding the basic parameters of the system and data dictionaries, refer to **4.16.6 System**.
- To set the options regarding the hospital information, refer to **4.16.7 Hospital**.
- To set the options regarding parameters of calibrators, refer to **4.12.3 Calibrator**.
- To set the options regarding parameters of controls, refer to **4.13.4 Control**.
- To set the options regarding test parameters, reference, calibration rule and quality control (QC) rule, refer to **4.16.1 Test**.
- To set the options regarding the reagent parameters, refer to **4.11 Reagent**.
- To set the options regarding the carryover information among tests, refer to **4.16.5 Carryover**.
- To set the options regarding the printing parameters, refer to **4.16.9 Print**.

3.2.5 Preparing Reagents

Load reagent bottles to their assigned positions on the reagent disk, and then open the bottles.

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

3.3 Starting Analysis

3.3.1 Reagent Blank

CAUTION:

The reagent blank is vital to obtaining correct analysis results. The blank results can assist in determining whether the reagents have expired, or whether the reaction background should be deducted, and in eliminating the absorbance changes caused by the reagents themselves. Mindray recommends the reagent blank be run on a daily base.

The analyzer will use the result of the previous reagent blank run for double-reagent tests that use endpoint method if no new reagent blank result is available.

To request reagent blanks, refer to **4.12.1 Calibration Request**.

To run reagent blanks, refer to **4.3 Start**.

To view reagent blank results, refer to **4.12.2 Results**.

3.3.2 Calibration

CAUTION:

You need to run the calibration again when you change reagent lots, test parameters, lamp or other analysis conditions.

To request calibrations, refer to **4.12.1 Calibration Request**.

After requesting calibrations, you should load corresponding calibrators to their assigned positions on the sample disk.

To run calibrations, refer to **4.3 Start**.

To view calibration results, refer to **4.12.2 Results**.

3.3.3 QC

CAUTION:

If ***Auto QC*** on the ***System*** screen is selected and ***Interval for QC*** on the ***Test screen*** is not 0, the analyzer will automatically insert QC tests among sample tests.

To request QCs, refer to **4.2 QC Request**.

After requesting QCs, you should load corresponding controls to their assigned positions on the sample disk.

To run QCs, refer to **4.3 Start**.

To check QC results, refer to **4.13.1 Real-time QC**, **4.13.2 Daily QC** and **4.13.3 Day to Day QC**.

3.3.4 Samples

To request samples, refer to **4.1 Sample Request**.

NOTE:

STAT samples are requested in the same way as routine ones except that ***STAT*** on the ***Sample Request*** screen should be selected when requesting.

After requesting, you should load corresponding samples to their assigned positions on the sample disk.

CAUTION:

Ensure the samples are loaded to correct positions. Otherwise, you cannot acquire correct results.

To run samples, refer to **4.3 Start**.

To check sample results, refer to **4.6 Current Results** or **4.10 History**.

3.4 Processing Results

3.4.1 Editing Results of Samples

CAUTION:

Sample results can only be edited by authorized personnel.

To edit results of one or more sample runs, refer to **4.10.4 Edit Results**.

To make linear transform or calibration transform to the results of one or more tests, refer to **4.10.3 Compensate Results**.

3.4.2 Printing Results of Samples

To print sample results, refer to **4.10.7 Print Results**.

3.5 Finishing Analysis

3.5.1 Exiting the Control Software

When you have finished all analyses and the system is in standby status, you can exit the control software as instructed by **4.9 Exit**.

3.5.2 Shutdown

After exiting the Windows operating system, switch off the following powers in the presented order:

1 Turn off the printer.

2 Turn off the monitor of the operation unit.

3 Place the Power to OFF.

NOTE:

The refrigerator still functions after the Power is placed to OFF. To shut down the refrigerator, place the MAIN POWER to OFF.

3.5.3 Operations after Shutdown

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles when performing the following operations.

1 Cover every reagent bottle on the sample/reagent disk.

NOTE:

If the MAIN POWER is placed to OFF, take the reagents from the reagent disk and put them into an external refrigerator.

2 Remove the calibrators, controls and samples from the sample/reagent disk.

3 Empty the waste tank. Refer to **5.2.2 Emptying Waste Tank** for details.

4 Check the surface of the analyzing unit for stains and wipe them off with clean soft cloth, if any.

4 Advanced Operations

The chapter presents an introduction of the control software of the analyzer by shortcut buttons and group buttons.

4.1 Sample Request

Click the ***Samples Request*** button to enter the ***Sample Request*** screen, as shown in Figure 4-1, where you can check the requested samples and request new ones.

Figure 4-1 Sample Request Screen

NOTE:

In the ***Tests*** field, different background colors of the test refer to different meanings:

Blue means the test is selected;

White means the test is selectable;

Gray means the test is unselectable, and if the pointer of the mouse is stopped on it for a while, the system will remind you of the reason why it is unselectable.

The ***Profiles*** field and the ***Off-system Tests*** field are the same as the ***Tests*** field.

The following table explains the parameters on the screen.

Parameter	Description
Sample Disk	To select a virtual sample disk on which the sample locates.
Samples	It refers to the requested samples or the ones being requested on the selected sample disk. ”Tests” refers to multiplication of No. of tests for the sample and No. of replicates.
No.	It refers to the sample ID, which includes the starting No. and ending No. The No. can be assigned by the system automatically, or entered by the operator manually. You should enter the starting No. in the first edit box and the ending No. in the second one. If the starting No. is same as the ending No., the system will consider it as one sample by default. When the latter is greater than the former, it indicates a batch of samples. You must use different No. for different samples within one day.
Position	It refers to position of the sample on the selected virtual sample disk. The position can be assigned by the system automatically, or selected from the drop-down list box by the operator manually. For single sample, it refers to the position of this sample; for a batch of samples, it refers to the position of the sample with starting No., and positions of other samples will be assigned by the system accordingly.
Replicates	It refers to times of the same sample run. 1 is default, which means once only.
Samp. Type	It includes Serum, Plasma, Urine and Other.
Barcode	Barcode information of the selected sample.
STAT	When selected, it means that the sample(s) currently requested are stat sample(s).
Samp. Blank	When selected, it refers to running a sample blank before starting analysis. The system tests the mixed absorbance (endpoint) or the absorbance change rate (non-endpoint) of the mixture of the sample and the distilled water instead of reagent.

The following table introduces the buttons on the screen.

Button	Function
Details	After selecting a sample from ***Samples***, click this button to pop up the ***Sample Information*** dialog box, where you can check and edit the detailed information of the sample. For more information about the ***Sample Information*** dialog box, refer to **4.1.1 Sample Information**.
Delete	After selecting a sample from ***Samples***, click this button to pop up the ***Delete Sample*** dialog box, where you can delete the sample or release its position. This button is not available for the sample being requested. For more information about the ***Delete Sample*** dialog box, refer to **4.1.2 Delete a Sample**.
Change Position	Click this button to pop up the ***Exchange Positions*** dialog box, where you can change positions of samples. For more information about the ***Exchange Positions*** dialog box, refer to **4.1.3 Change Position**.
Previous	Click this button to display the information of the previous sample (in requesting order).
Next	Click this button to display the information of the next sample (in requesting order).
Cancel	After requesting new samples or modifying the information of a requested sample, click this button to cancel the requests or modification. Refer to **4.1.4 Requesting Samples or Modifying Information** for detailed operations.
OK	After requesting new samples or modifying the information of a requested sample, click this button to finish requesting or save modification. Refer to **4.1.4 Requesting Samples or Modifying Information** for detailed operations.

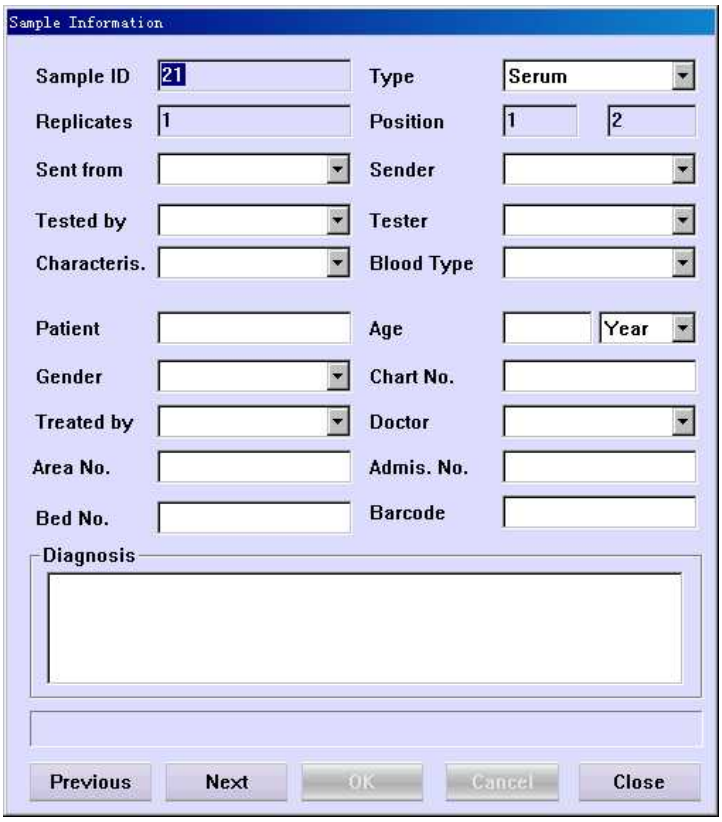
NOTE:

When re-requesting tests for the requested sample, the tests which have been requested for the sample and are not requested this time will be invalidated, no matter the tests which have been requested for the sample have been run or not.

4.1.1 Sample Information

At the ***Sample Request*** screen, click ***Details*** to pop up the ***Sample Information*** dialog box, as shown in Figure 4-2, where you can check and edit the detailed information of the sample.

Figure 4-2 Sample Information Dialog Box



The following table explains the parameters of the ***Sample Information*** dialog box.

Parameter	Description
Sample ID	No. of the sample. It cannot be edited.
Type	It includes Serum, Plasma, Urine and Other.
Replicates	It refers to times of sample run. It cannot be edited.
Position	The first edit box is No. of virtual sample disk, and the second is the sample position. Both of them cannot be edited.
Sent from	The department to which the sender belongs.
Sender	Name of the sender.
Tested by	The department to which the tester belongs.
Tester	Name of the tester.
Characteris.	Characteristic of the sample. It includes blank (none), Hemolysis and Jaundice.
Blood Type	Blood type of the sample.
Patient	Name of the patient.
Age	Age of the patient.
Gender	Gender of the patient.

Parameter	Description
Chart No.	Chart No. of the patient.
Treated by	The department where the patient is treated.
Doctor	The doctor in charge for the patient.
Area No.	No. of the area where the patient stays.
Admis. No.	Admission No. of the patient
Bed No.	No. of the bed where the patient stays.
Barcode	The barcode information of the sample.
Diagnosis	The clinical diagnosis to the patient's disease.

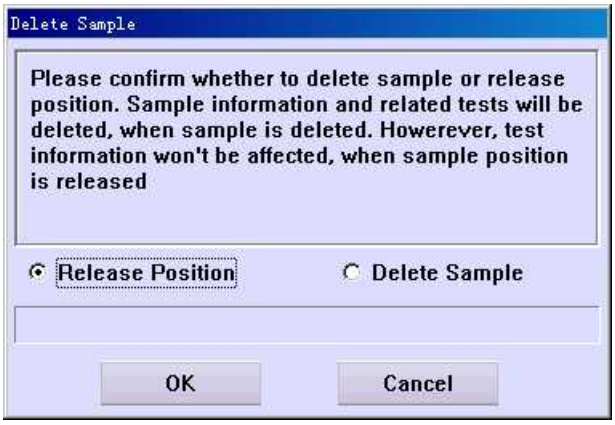
The following table introduces the buttons of the ***Sample Information*** dialog box.

Button	Function
Previous	Click this button to display the information of the previous sample.
Next	Click this button to display the information of the next sample.
OK	Click this button to save modification to the sample information in this dialog box.
Cancel	Click this button to cancel modification to the sample information in this dialog box.
Close	Click this button to close the ***Sample Information*** dialog box.

4.1.2 Delete a Sample

At the ***Sample Request*** screen, after selecting a sample in ***Samples***, click ***Delete*** to pop up the ***Delete Sample*** dialog box, as shown in Figure 4-3, where you can delete the selected sample or release its position.

Figure 4-3 Delete Sample Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Release Position	Release the sample position without deleting all tests related to this sample. It is available for the tested samples only.
Delete Sample	Delete the sample as well as the related tests.

The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to release the selected sample position or delete the sample.
Cancel	Click this button to cancel the releasing or deletion.

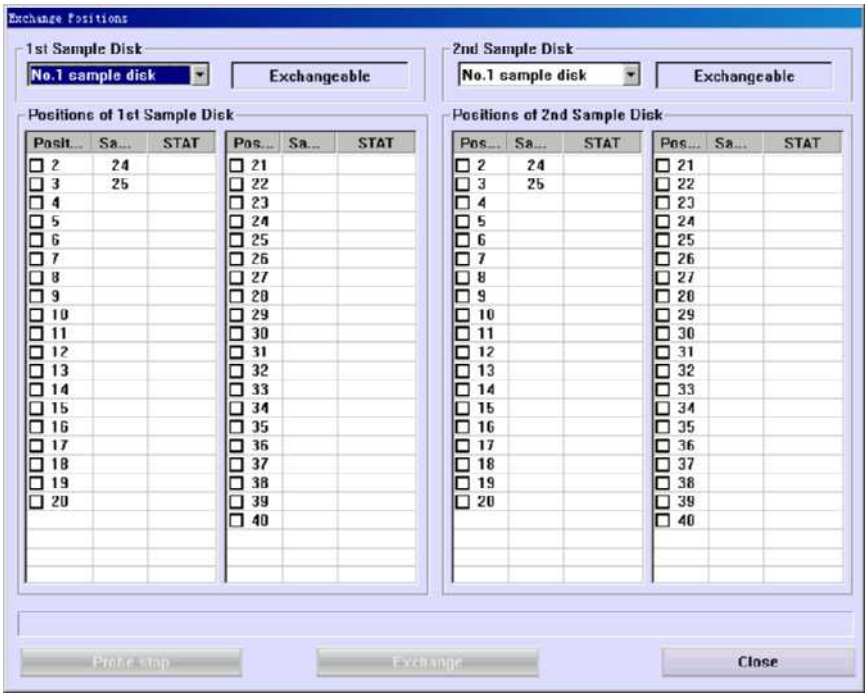
CAUTION:

Deleting a sample will invalidate all tests related to the sample.

4.1.3 Change Position

At the ***Sample Request*** screen, click ***Change Position*** to pop up the ***Exchange Positions*** dialog box, where you can change sample positions on the sample disk.

Figure 4-4 Exchange Positions Dialog Box



The following table introduces the buttons of the dialog box.

Button	Function
Probe stop	If the system is in testing status, and the sample position to be changed or the target position is on the sample disk currently running, you should first stop the probe, the mixing bar and the sample/reagent disk. Click this button to stop the probe, the mixing bar and the sample/reagent disk, and the button will change into ***Resume***. After exchanging the positions, click ***Resume*** to continue.
Exchange	Select the current and target sample disks the sample locates from the ***1st Sample Disk*** and ***2nd Sample Disk***, and select the current and target positions of the sample from the ***Positions of 1st Sample Disk*** and ***Positions of 2nd Sample Disk***. Then click this button to change the position.
Close	Click this button to exit the ***Exchange Positions*** dialog box.

CAUTION:

Do not put the probe, the mixing bar and the sample/reagent disk on hold for a long time. Otherwise, certain analyses may be affected.

4.1.4 Requesting Samples or Modifying Information

1 Select a sample that is being requested (the samples with "#" in the front) or has been requested from ***Samples***.

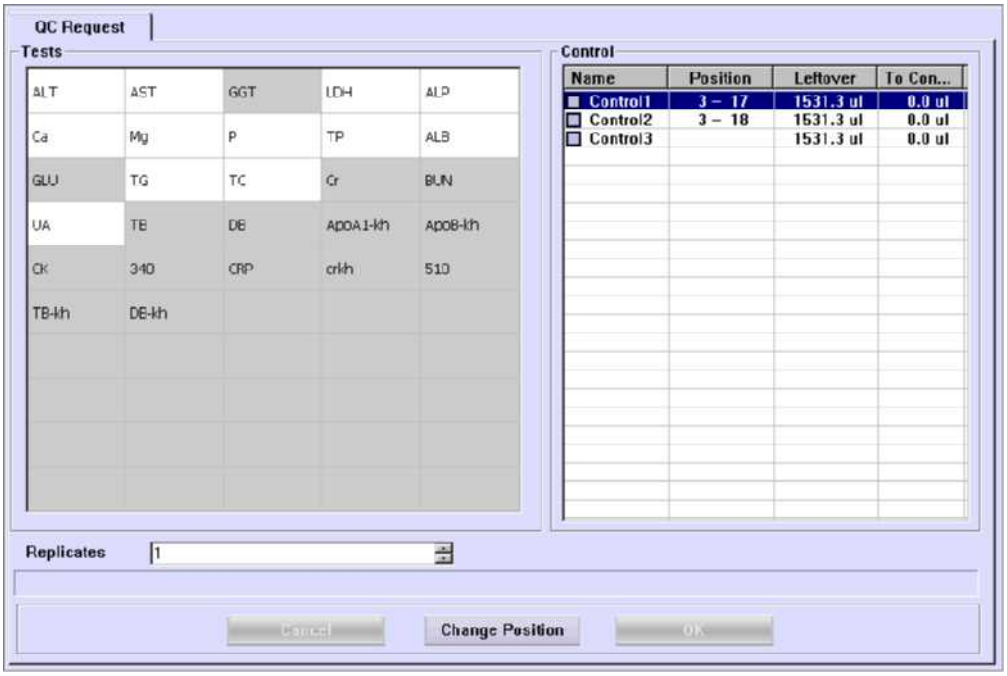
2 You can set sample information and tests for the newly requested samples, or modify the sample information for the requested sample.

3 If you want to finish requesting or save the modification, click ***OK***; otherwise click ***Cancel***.

4.2 QC Request

Click the ***QC Request*** button to enter the ***QC Request*** screen, as shown in Figure 4-5, where you can request QC.

Figure 4-5 QC Request Screen



NOTE:

In the ***Tests*** field, different background colors of the test refer to different meanings:

Blue means the test is selected;

White means the test is selectable;

Gray means the test is unselectable, and if the pointer of the mouse is stopped on it for a while, the system will remind you of the reason why it is unselectable.

The following table explains the parameters on the screen.

Parameter	Description
Replicates	Times of QC requesting. Default setting is 1, which means once only. The maximum is 10.

The following table introduces the buttons on the screen.

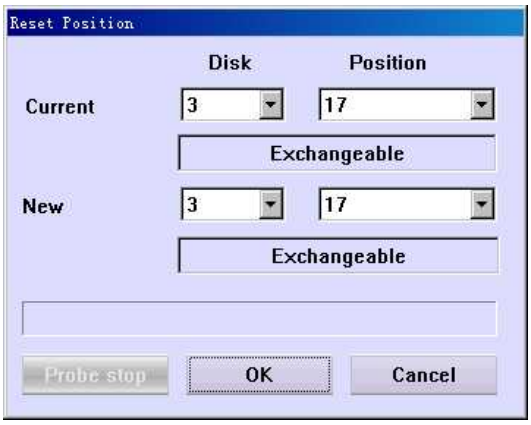
Button	Function
Change Position	After selecting a control, click this button to pop up the ***Reset Position*** dialog box, where you can reset the position of the selected control on the sample disk. For more information about the ***Reset Position*** dialog box, refer to the following text **To Reset Position of a Control**.

Button	Function
OK	After selecting a test(s) in the ***Tests*** and setting the ***Replicates***, click this button to finish requesting.
Cancel	After selecting a test(s) in the ***Tests*** and setting the ***Replicates***, click this button to cancel requesting.

To Reset Position of a Control

At the ***QC Request*** screen, after selecting a control, click ***Change Position*** to pop up the ***Reset Position*** dialog box, as shown in Figure 4-6, where you can reset the position of the selected control on the sample disk.

Figure 4-6 Reset Position Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Current	Current position of the selected control.
New	New position of the selected control.
Disk	No. of the virtual sample disk. Void means that the selected control is not on the sample disk.
Position	Position on the selected virtual sample disk. Void means that the selected control is not on the sample disk.

The following table introduces the buttons of the dialog box.

Button	Function
Probe Stop	If the system is in testing status, and the control position to be changed or the target position is on the sample disk currently running, you should first stop the probe, the mixing bar and sample/reagent disk. Click this button to stop the probe, the mixing bar and the sample/reagent disk, and the button will change into ***Resume***. After exchanging the positions, click ***Resume*** to continue.
OK	After setting a new sample position, click this button to save the setting.
Cancel	After setting a new sample position, click this button to cancel the setting.

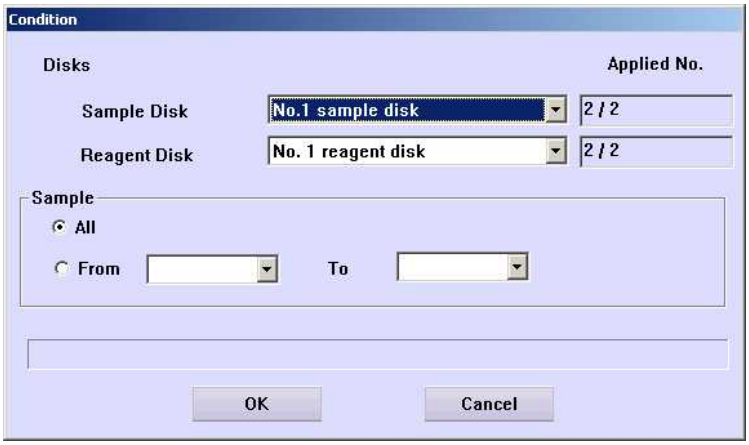
CAUTION:

Do not put the probe, the mixing bar and the sample/reagent disk on hold for a long time. Otherwise, certain analyses may be affected.

4.3 Start

After requesting, click ***Start*** to pop up the ***Condition*** dialog box, as shown in Figure 4-7, where you can select the virtual sample disk, virtual reagent disk and samples to be tested.

Figure 4-7 Condition Dialog Box



The numbers in the ***Applied No.*** field refer to “number of tests to be run/ number of tests applied” on current sample or reagent disk.

The following table introduces the buttons on the screen.

CAUTION:

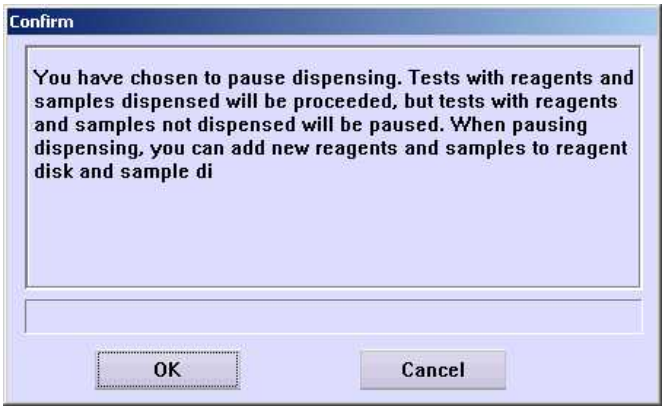
Before clicking ***OK***, confirm samples, calibrators, controls and reagents have been placed in correct positions.

Button	Function
OK	After selecting the virtual sample disk, virtual reagent disk and the samples to be tested, click this button to start analysis.
Cancel	After selecting the virtual sample disk, virtual reagent disk and the samples to be tested, click this button to cancel selection and no analysis will be started.

4.4 Probe Stop

When you need to add samples or reagents without stopping current analysis, click ***Probe Stop*** to pop up the dialog box, as shown in Figure 4-8, where you can pause the probe, the mixing bar and the sample/reagent disk.

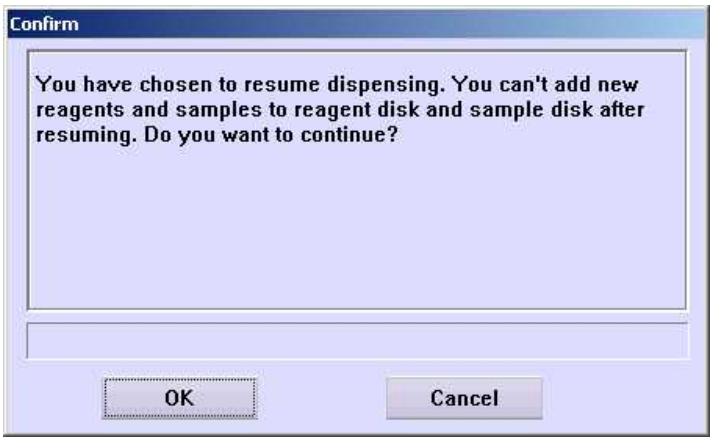
Figure 4-8 Confirm Dialog Box 1



The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to pause the sample probe, the mixing bar and the sample/reagent disk. On the reaction disk, the tests that have finished dispensing sample and reagent(s) will continue and the remaining ones will be paused. Then the ***Probe Stop*** button changes to ***Resume***, click it to pop up the screen as shown in Figure 4-9. Click ***OK*** to resume the sample probe, the mixing bar and the sample/reagent disk, or click ***Cancel*** to stay.
Cancel	Click this button to cancel pausing the sample probe, mixing bar and the sample/reagent disk without affecting the analysis.

Figure 4-9 Confirm Dialog Box 2



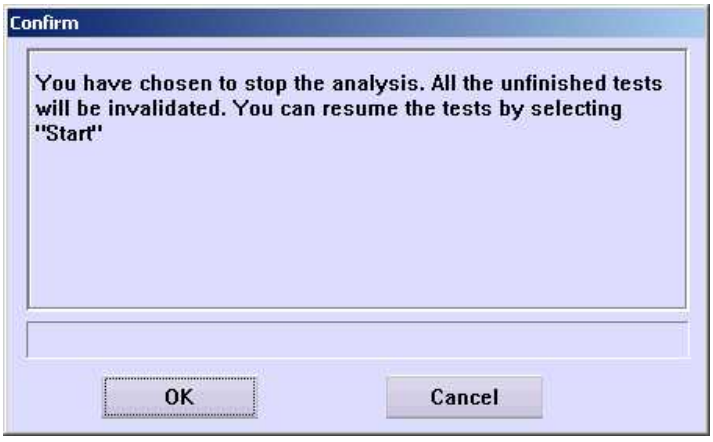
CAUTION:

Do not put the probe, the mixing bar and the sample/reagent disk on hold for a long time. Otherwise, certain analyses may be affected.

4.5 Stop

To stop analysis, click ***Stop*** to pop up the dialog box, as shown in Figure 4-10.

Figure 4-10 Confirm Dialog Box 3



The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to stop current analysis.
Cancel	Click this button to cancel stopping.

CAUTION:

Mindray recommends this stop function not be used unless it is necessary (for instance the analyzer is experiencing problems).

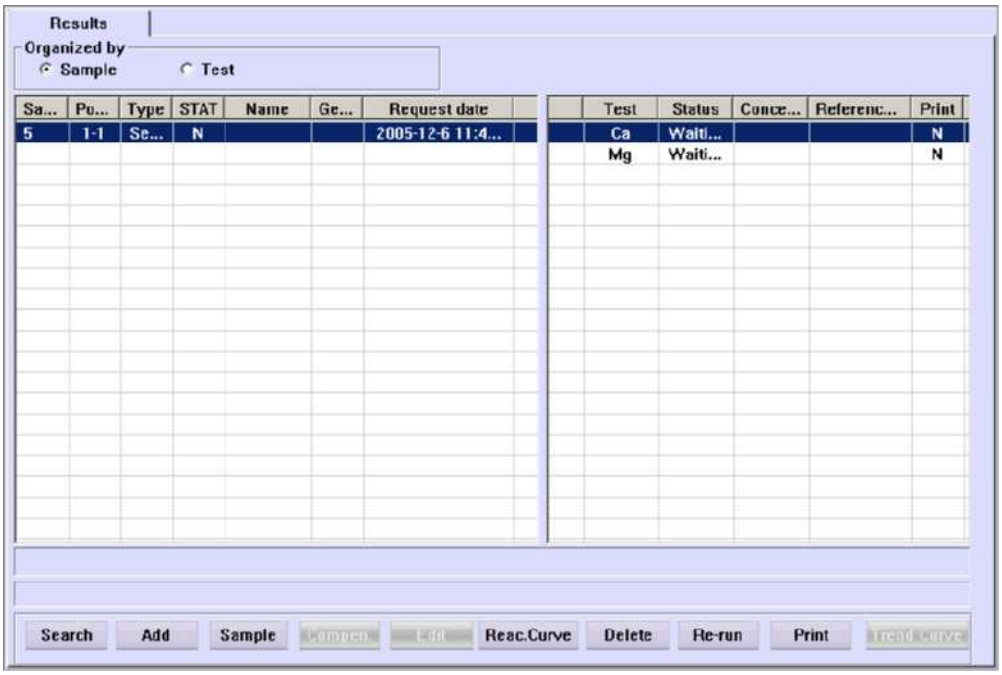
After the analyzer is stopped, all the tests that have not been finished will be invalidated.

However, you can continue the requested tests that have not been finished by clicking the ***Start*** button.

4.6 Current Results

Click ***Current Results*** to enter the ***Results*** screen, as shown in Figure 4-11, where you can view and process the sample results of current day since powering on.

Figure 4-11 Results Screen



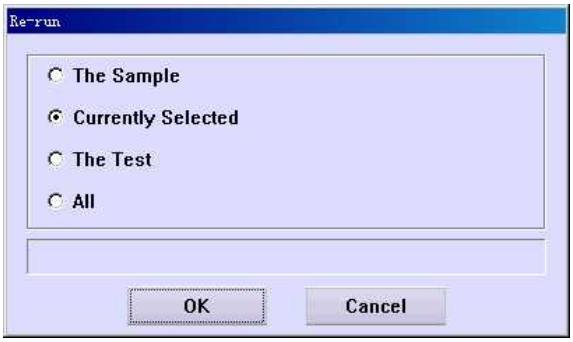
Operations of this screen are similar to that in **4.10 History**, except that you can only view and process the sample results of current day since powering on and can re-run tests. For other operations, refer to **4.10 History**.

Button	Function
Re-run	After selecting a test and a sample, click this button to pop up the ***Re-run*** dialog box, where you can re-run corresponding sample test(s). For more information about the ***Re-run*** dialog box, refer to the following text **Re-run**.

Re-run

At the ***Results*** screen, after selecting a test and a sample, click ***Re-run*** to pop up the ***Re-run*** dialog box, as shown in Figure 4-12, where you can re-request corresponding sample tests of current day since powering on.

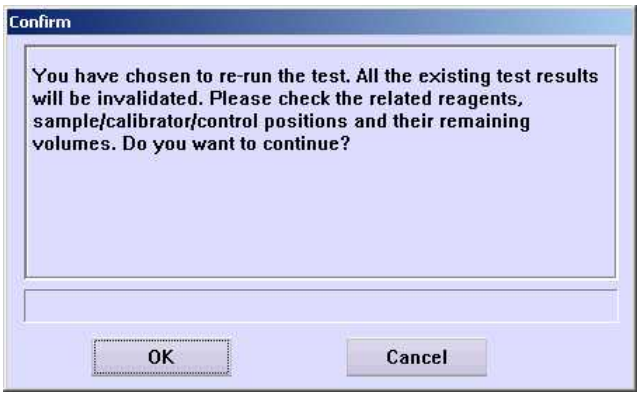
Figure 4-12 Re-run Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
The Sample	Re-run all sample tests of the selected sample that have been finished or have no results.
Currently Selected	Re-run the selected sample test for the selected sample only. It's only available for the test that has been finished or has no result.
The Test	Re-run the selected sample test for all samples that have been finished or have no results.
All	Re-run all the sample tests that have been finished or have no results.

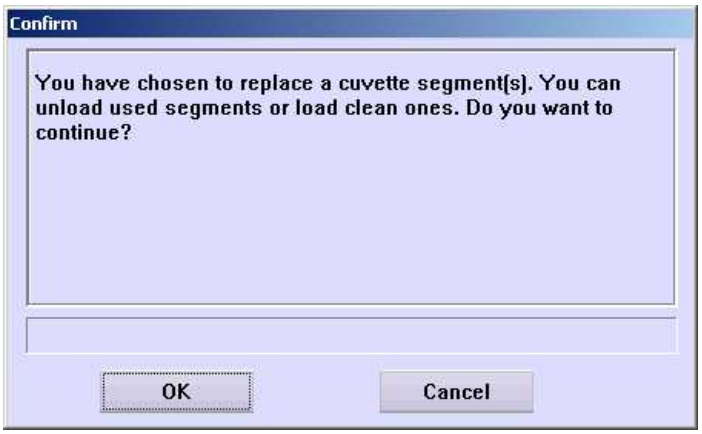
The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to pop up the following dialog box.  In this dialog box, click ***OK*** to re-run the selected test(s), or click ***Cancel*** to abort re-requesting.
Cancel	Click this button to cancel re-requesting.

4.7 Replace

To replace the cuvettes, click ***Replace*** to pop up the dialog box, as shown in Figure 4-13.

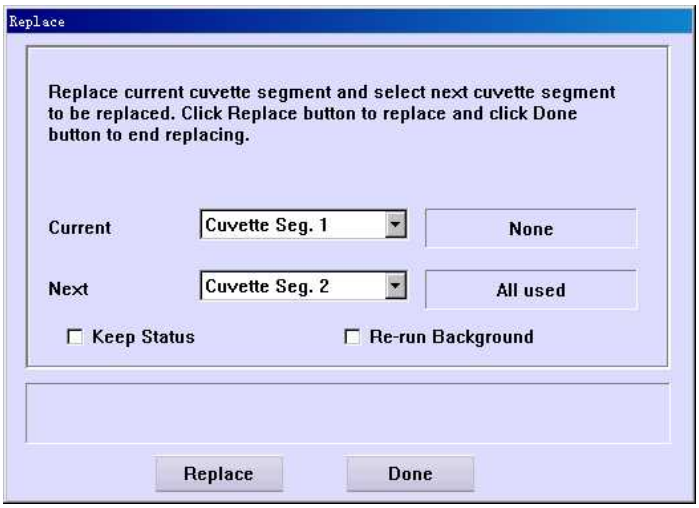
Figure 4-13 Confirm Dialog Box 4



The following table introduces the buttons of the dialog box, as shown in Figure 4-13.

Button	Function
OK	Click this button to pop up the dialog box, as shown in Figure 4-14.
Cancel	Click this button to cancel replacing.

Figure 4-14 Replace Dialog Box



The following table explains the parameters of the dialog box, as shown in Figure 4-14.

Parameter	Description
Current	You can load/unload a cuvette segment at this position on the reaction disk. It cannot be edited.
Next	You will load/unload a cuvette segment at this position on the reaction disk for the next time.
Keep Status	Select to rotate the reaction disk without loading/unloading the current cuvette segment, and the status of current cuvette segment will not be changed.
Re-run Background	Select to re-test the background after unloading the Cuvette Segment 1. Ensure the Cuvette Segment 1 has been unloaded before selecting.

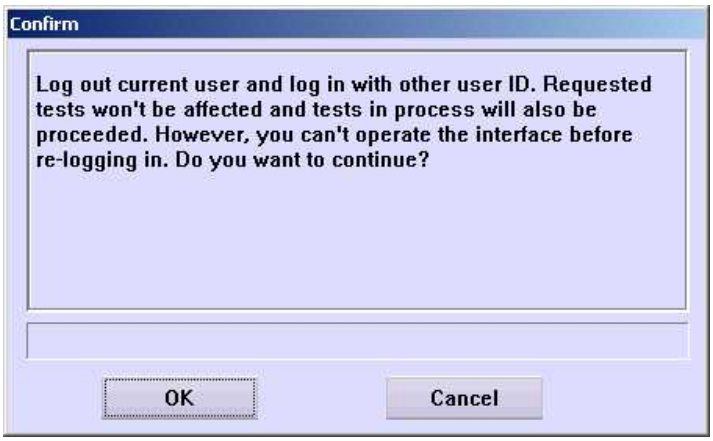
The following table introduces the buttons of the dialog, as shown in Figure 4-14.

Button	Function
Replace	After setting the parameters, if you have selected ***Keep Status***, click this button to announce the analyzing unit to execute the replacing operation. After setting the parameters, if you have not selected ***Keep Status***, replace the cuvette segment manually, and then click this button to announce the analyzing unit to execute the replacing operation.
Done	Click this button to finish replacing.

4.8 Re-log

If you need to log on the control software with other username, click this button to pop up the dialog box, as shown in Figure 4-15.

Figure 4-15 Confirm Dialog Box 5



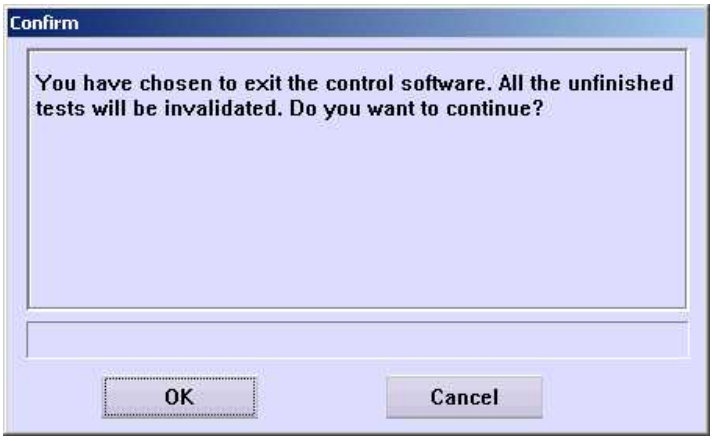
The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to pop up the dialog box to enter the username and password, and then you can log on as the user.
Cancel	Click this button to cancel re-logging.

4.9 Exit

Click ***Exit*** to pop up the dialog box, as shown in Figure 4-16.

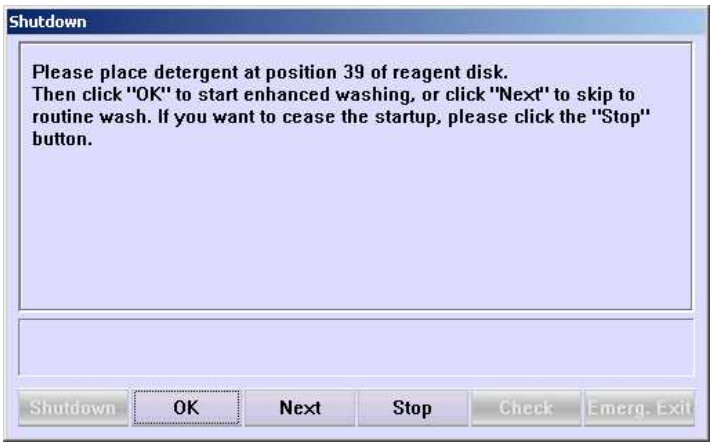
Figure 4-16 Confirm Dialog Box 6



The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to prepare for exiting the control software and pop up the dialog box, as shown in Figure 4-17. Then you can operate according to the dialog box and following ones until exiting the control software.
Cancel	Click this button to cancel exiting.

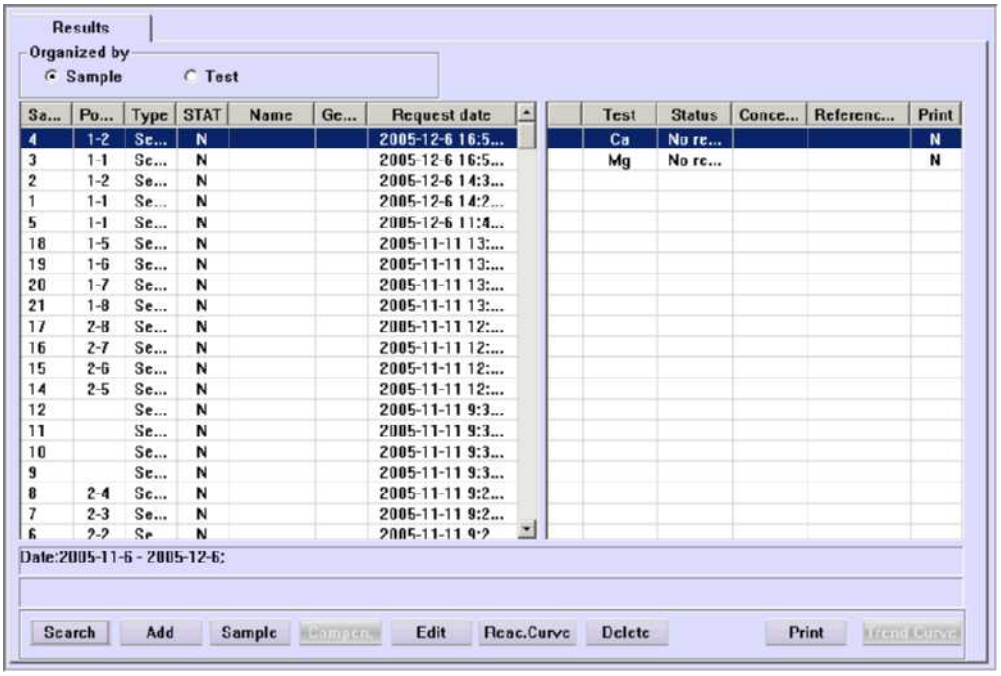
Figure 4-17 Shutdown Dialog Box



4.10 History

Click ***History*** to enter the ***Results*** screen, as shown in Figure 4-18, where you can view and edit sample results.

Figure 4-18 Results Screen



At the ***Results*** screen, (***Organized by***) ***Sample*** refers to displaying the results by sample; (***Organized by***) ***Test*** refers to displaying the results by test.

The following table introduces the buttons on the screen.

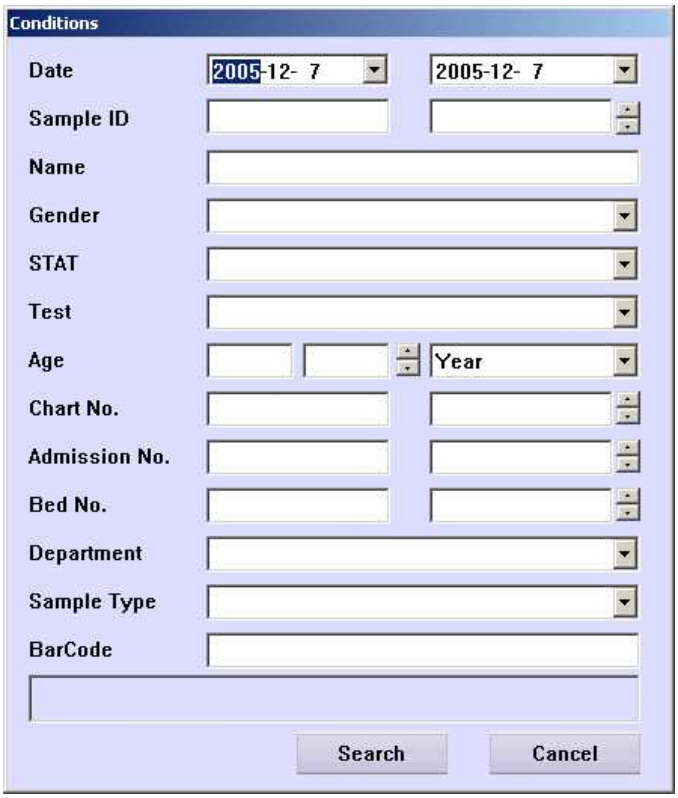
Button	Function
Search	Click this button to pop up the ***Conditions*** dialog box, where you can set the searching conditions. For more information about the ***Conditions*** dialog box, refer to **4.10.1 Conditions**.
Add	Click this button to pop up the ***Add Off-system Test Result*** dialog box, where you can add off-system test results to samples. For more information about the ***Add Off-system Test Result*** dialog box, refer to **4.10.2 Add Off-system Test Results**.
Sample	After selecting a sample, click this button to pop up the ***Sample Information*** dialog box, where you can view and edit the information of the selected sample. For more information about the ***Sample Information*** dialog box, refer to **4.1.1 Sample Information**.

Button	Function
Compen.	This button is only available when you select (***Organized by***) ***Test***. After selecting a test, click this button to pop up the ***Compensate*** dialog box, where you can edit (including Linear Transform and Calibration Transform) the searched results of the selected test. For more information about the ***Compensate*** dialog box, refer to **4.10.3 Compensate Results**.
Edit	After selecting a test, click this button to pop up the ***Edit Result*** dialog box, where you can edit the result of the selected test. For more information about the ***Edit Result*** dialog box, refer to **4.10.4 Edit Results**.
Reac. Curve	After selecting a test, click this button to pop up the ***Reaction Curve*** dialog box that displays the reaction curve of the selected test. For more information about the ***Reaction Curve*** dialog box, refer to **4.10.5 Reaction Curve**.
Delete	After selecting a test, click this button to pop up the ***Delete*** dialog box, where you can delete relevant results. For more information about the ***Delete*** dialog box, refer to **4.10.6 Delete Results**.
Print	After selecting a test, click this button to pop up the ***Print*** dialog box, where you can print relevant results. For more information about the ***Print*** dialog box, refer to **4.10.7 Print Results**.
Trend Curve	This button is only available when you select (***Organized by***) ***Test***. After selecting a test, click this button to pop up the ***Result Trend Curve*** dialog box, where you can view the result trend curve of the selected test. For more information about the ***Result Trend Curve*** dialog box, refer to **4.10.8 Result Trend Curve**.

4.10.1 Conditions

At the ***Results*** screen, click ***Search*** to pop up the ***Conditions*** dialog box, as shown in Figure 4-19, where you can enter the conditions to search the results you want.

Figure 4-19 Conditions Dialog Box



The following table explains the parameters of the dialog box.

The parameters of this dialog box constitute the searching conditions. Void means the parameter is exclusive.

Parameter	Description
Date	It refers to the date when the test was run. The first drop-down list box is starting date and the second is ending date.
Sample ID	No. of the sample. The first edit box is starting No. and the second is ending No.
Name	Name of the patient.
Gender	Gender of the patient.
STAT	Whether the sample results to be searched are STAT or not.
Test	Name of the test.
Age	Age of the patients. You must select the unit of the age.
Chart No.	Chart No. of the patients. The first edit box is starting No. and the second is ending No.

Parameter	Description
Admission No.	Admission No. of the patients. The first edit box is starting No. and the second is ending No.
Bed No.	Bed No. of the patients. The first edit box is starting No. and the second is ending No.
Department	The department by which the samples are sent.
Sample Type	The type of the samples.
BarCode	The barcode information of the sample.

The following table introduces the buttons of the dialog box.

Button	Function
Search	After setting the conditions, click this button, and then the system will search results according to the conditions and display the qualified ones on the ***Results*** screen.
Cancel	Click this button to exit this dialog box without searching.

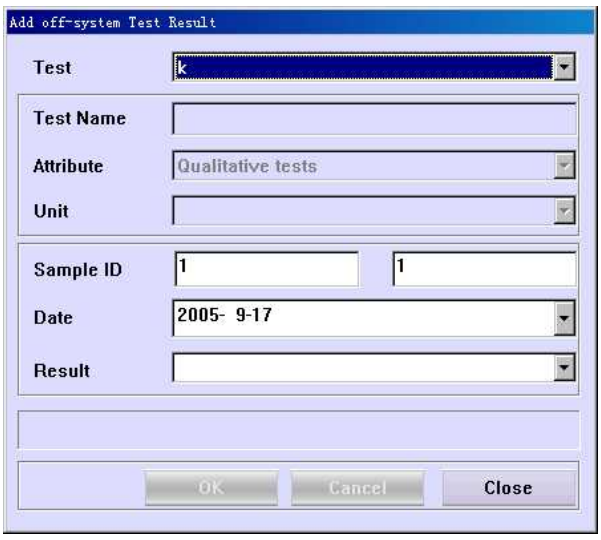
4.10.2 Add Off-system Test Results

At the ***Results*** screen, click ***Add*** to pop up the ***Add Off-system Test Result*** dialog box, as shown in Figure 4-20, where you can set off-system test results for samples.

NOTE:

The test that is not run on this analyzer is considered as off-system test, which can be printed out in the patient report.

Figure 4-20 Add Off-system Test Result Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Test	Name of the off-system test.
Test Name	Full name of the off-system test. It cannot be edited.
Attribute	Property of the off-system test. It cannot be edited.
Unit	Unit of the off-system test result. It cannot be edited. It's only available for quantitative off-system test.
Sample ID	No. of the samples. The first edit box is starting No. and the second is ending No.
Date	The date when the off-system test was run.
Result	Result of the off-system test. For a qualitative test, it is a drop-down list box; for a quantitative test, it is an edit box.

NOTE:

If some samples in the range of ***Sample ID*** either are inexistent or have results of the selected off-system test, the analyzer will ignore these samples and only set results for others in the range of ***Sample ID***.

The following table introduces the buttons of the dialog box.

Button	Function
OK	After setting the off-system test result for the selected sample, click this button to save settings.
Cancel	After setting the off-system test result for the selected sample, click this button to cancel settings.
Close	Click this button to exit the ***Add Off-system Test Result*** dialog box.

4.10.3 Compensate Results

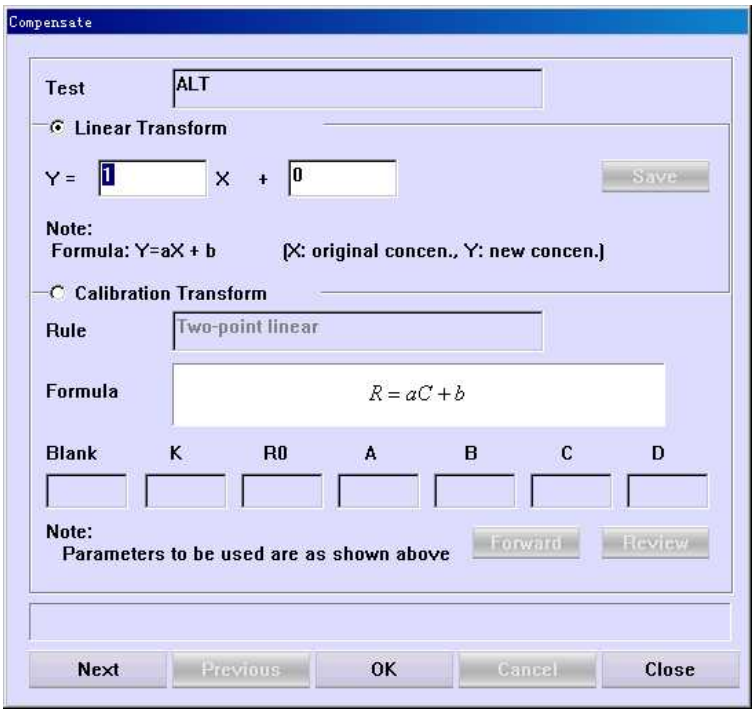
At the ***Results*** screen, after selecting (***Organized by***) ***Test*** and a test, click ***Compen.*** to pop up the ***Compensate*** dialog box, as shown in Figure 4-21, where you can edit (including Linear Transform and Calibration Transform) the searched sample results of the selected test.

NOTE:

Compensation is not available for calculation tests and off-system tests.

If the compensated test is also a part of a calculation test, the analyzer will automatically re-calculate the calculation test with the latest test result.

Figure 4-21 Compensate Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Test	Name of the test, which means to transform the searched results of this test.
Linear Transform	Select to transform all searched results of the selected test in linear way with the formula Y＝aX+b. Where, X – The result before being transformed. Y – The result after being transformed. a, b – Coefficients of the linear transform, which can be entered in the edit box.
Calibration Transform	Select to transform all searched results of the selected test through calibration, which means to re-calculate the results with the default calibration parameters.

Parameter	Description
Rule	The calibration rule used to obtain the default calibration parameters.
Formula	The calibration formula used to obtain the default calibration parameters.
Blank	Reagent blank.
K	Parameter K.
R0	Parameter R0.
A	Parameter A.
B	Parameter B.
C	Parameter C.
D	Parameter D.

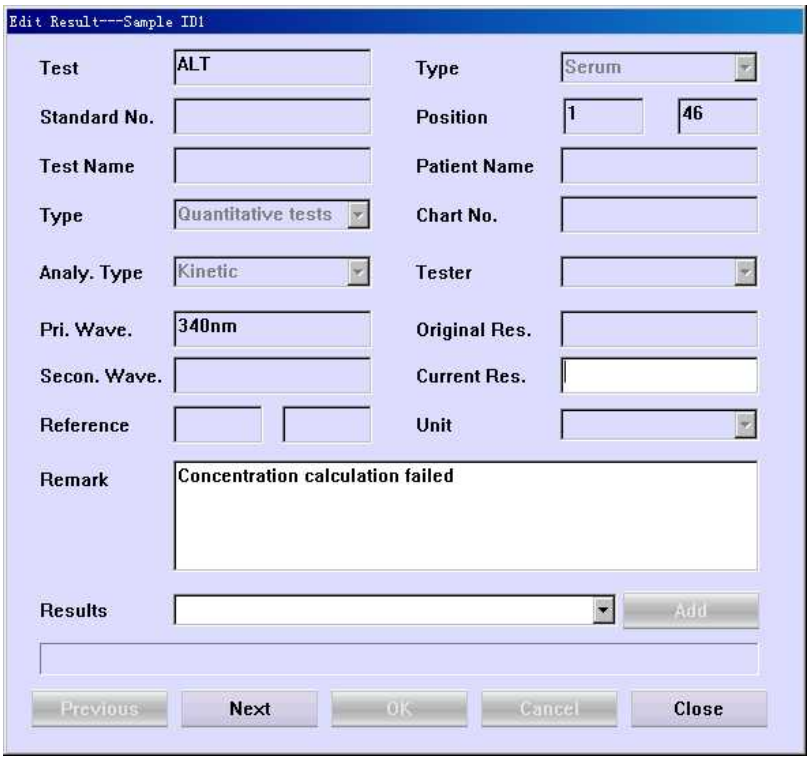
The following table introduces the buttons of the dialog box.

Button	Function
Save	Click this button to save modification to the coefficients without re-calculating the results.
Forward	Click this button to display the next SPLINE parameter. It is available for the SPLINE method only.
Review	Click this button to display the previous SPLINE parameter. It is available for the SPLINE method only.
Next	Click this button to select next test.
Previous	Click this button to select previous test.
OK	Click this button to start transforming all searched results of the selected test in linear way or through calibration.
Cancel	Click this button to cancel the linear or calibration transform.
Close	Click this button to close the ***Compensate*** dialog box.

4.10.4 Edit Results

At the ***Results*** screen, after selecting a test that is finished or has no result or selecting an off-system test, click ***Edit*** to pop up the ***Edit Result*** dialog box, as shown in Figure 4-22, where you can edit result of the selected test.

Figure 4-22 Edit Result Dialog Box



The following table explains some parameters of the dialog box.

Parameter	Description
Original Res.	Result of the test calculated by the system. It cannot be edited.
Current Res.	Default result of the test. If the test has not been edited, the result is the original one; otherwise, the result is the latest one.
Remark	Remarks on the test.
Results	Description of the test result.

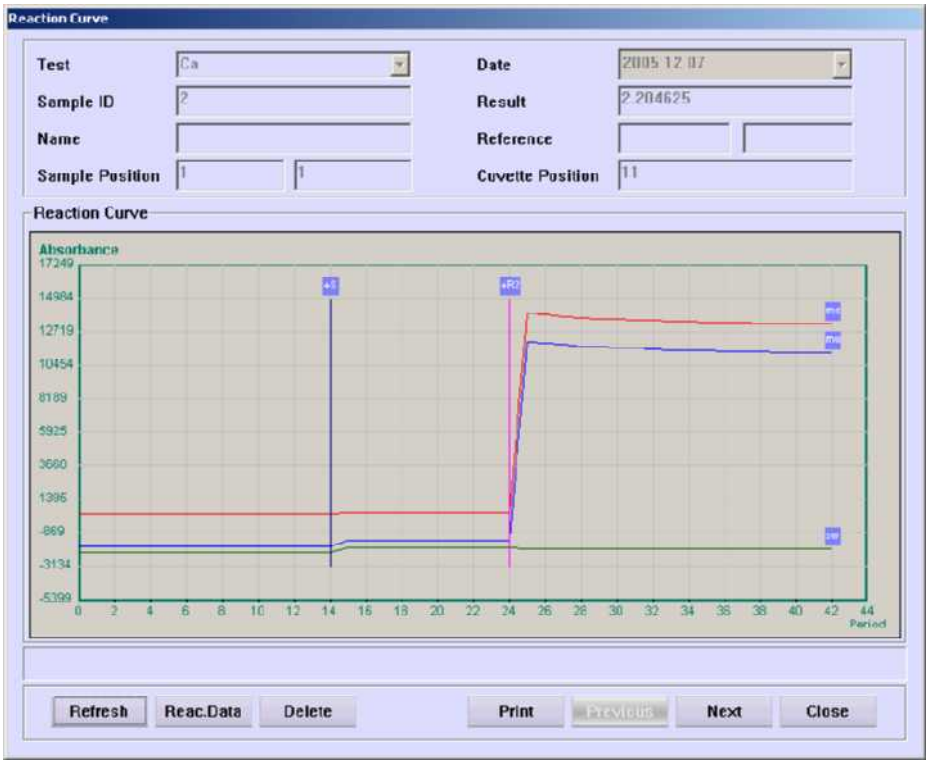
The following table introduces the buttons of the dialog box.

Button	Function
Add	Click this button to add the selected ***Results*** to ***Remark***.
Previous	Click this button to display the previous test result for the current sample.
Next	Click this button to display the next test result for the current sample.
OK	Click this button to save modification to the test result.
Cancel	Click this button to cancel modification to the test result.
Close	Click this button to exit the ***Edit Result*** dialog box.

4.10.5 Reaction Curve

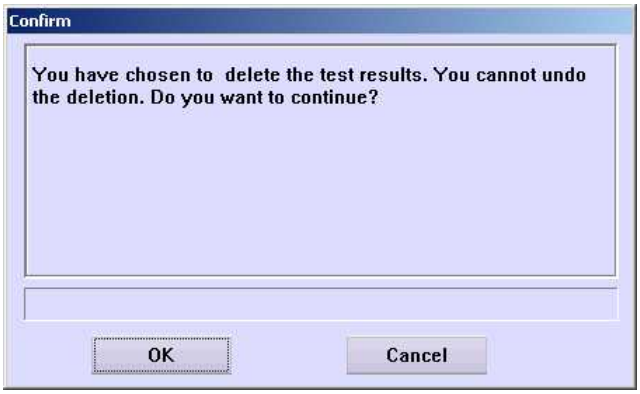
At the ***Results*** screen, after selecting a test, click ***Reac. Curve*** to pop up the ***Reaction Curve*** dialog box, as shown in Figure 4-23, where you can view the reaction curve of the test.

Figure 4-23 Reaction Curve Dialog Box



The following table introduces the buttons of the dialog box.

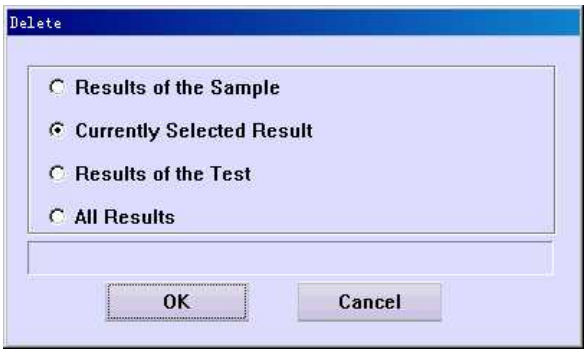
Button	Function
Refresh	Click this button to refresh the current reaction curve.
Reac. Data	Click this button to pop up a dialog box to display the reaction data of current curve.

Button	Function
Delete	Click this button to pop up the dialog box as shown below.  Click ***OK*** to delete the selected test, click ***Cancel*** to abort the deletion.
Print	Click this button to print the current reaction curve.
Previous	Click this button to display the reaction curve of the previous test for the current sample.
Next	Click this button to display the reaction curve of the next test for the current sample.
Close	Click this button to close the ***Reaction Curve*** dialog box.

4.10.6 Delete Results

At the ***Results*** screen, after selecting a sample and a test, click ***Delete*** to pop up the ***Delete*** dialog box, as shown in Figure 4-24, where you can delete relevant test results.

Figure 4-24 Delete Dialog Box

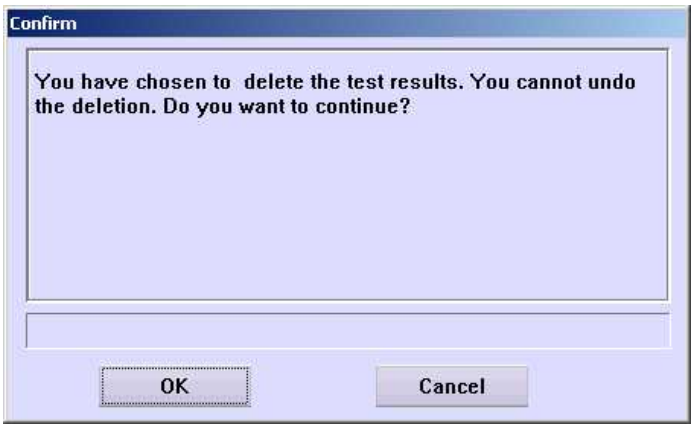


The following table explains the parameters of the dialog box.

Parameter	Description
Results of the Sample	Delete all searched results of the selected sample.

Parameter	Description
Currently Selected Result	Delete the test result currently selected.
Results of the Test	Delete all searched results of the selected test.
All Results	Delete all results currently searched.

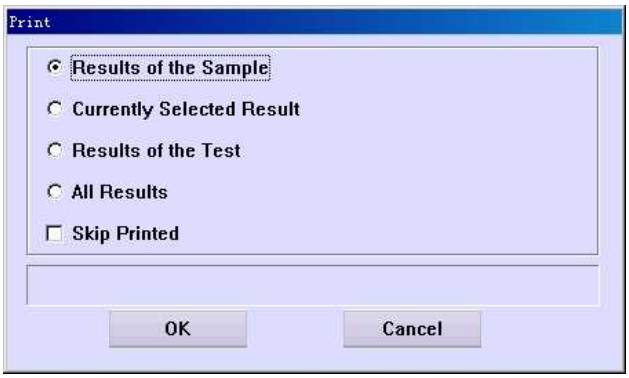
The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to pop up the following dialog box.  Click ***OK*** to delete the specified result(s); click ***Cancel*** to abort the deletion.
Cancel	Click this button to cancel the deletion.

4.10.7 Print Results

At the ***Results*** screen, after selecting a test, click ***Print*** to pop up the ***Print*** dialog box, as shown in Figure 4-25, where you can print relevant results.

Figure 4-25 Print Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Results of the Sample	Print all searched results of the selected sample.
Currently Selected Result	Print the test result currently selected.
Results of the Test	Print all searched results of the selected test.
All Results	Print all results currently searched.
Skip Printed	Select to skip the results that have been printed.

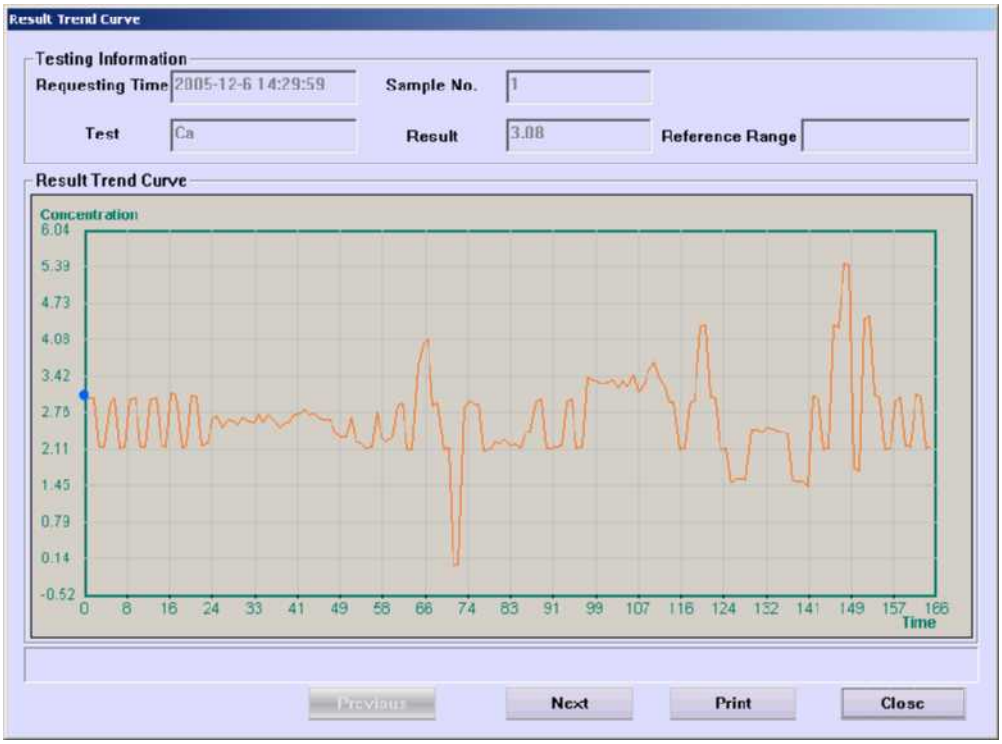
The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to print the specified result(s).
Cancel	Click this button to cancel printing.

4.10.8 Result Trend Curve

At the ***Results*** screen, after selecting (***Organized by***) ***Test*** and a test, click the ***Trend Curve*** button to pop up the ***Result Trend Curve***, as shown in Figure 4-26, where you can view the result trend curve of the selected test.

Figure 4-26 Result Trend Curve Screen



The following table explains the parameters of the dialog box.

Parameter	Description
Requesting Time	The requesting time of the run which is corresponding to the blue point on the result trend curve.
Sample No.	The sample No. of the run which is corresponding to the blue point on the result trend curve.
Test	The test that is corresponding to the result trend curve.
Result	The result of the run that is corresponding to the blue point on the result trend curve.
Reference Range	The reference range of the run that is corresponding to the blue point on the result trend curve.

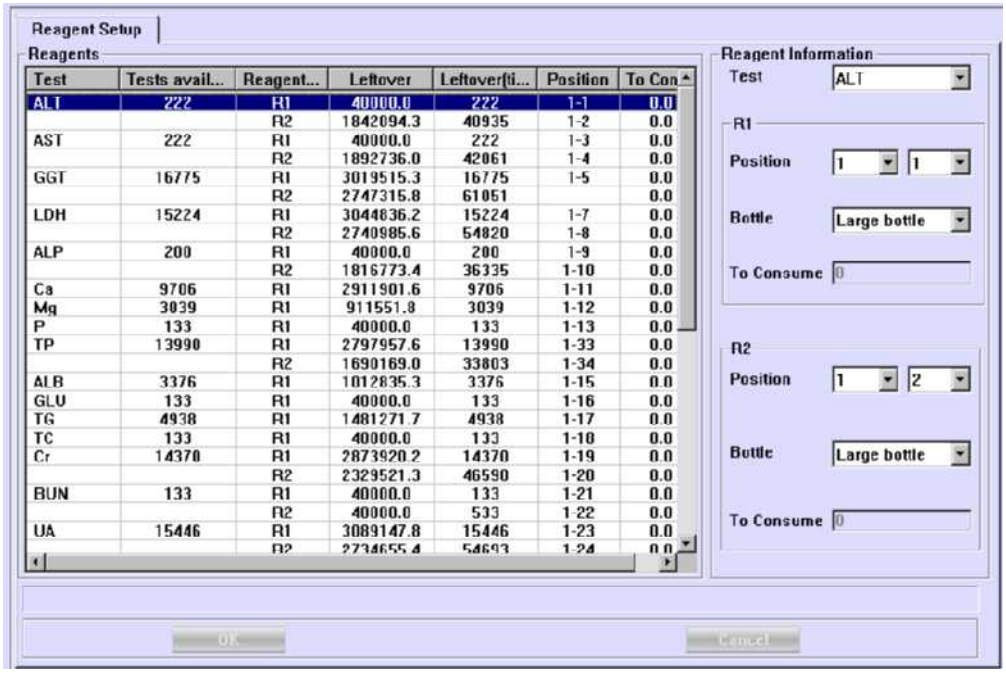
The following table introduces the buttons of the dialog box.

Button	Function
Previous	Click this button to display the testing information of the previous run, which is corresponding to the blue point on the curve.
Next	Click this button to display the testing information of the next run, which is corresponding to the blue point on the curve.
Print	Click this button to print the current curve.
Close	Click this button to close the ***Result Trend Curve*** dialog box.

4.11 Reagent

Click ***Reagent*** to enter the ***Reagent Setup*** screen, as shown in Figure 4-27, where you can edit the reagent information.

Figure 4-27 Reagent Setup Screen



The ***Reagents*** list displays the reagent information of all tests.

The following table explains the parameters on the screen.

Parameter	Description
Test	Select a test to edit the reagent information.
Position	Position of the reagent bottle on the reagent disk. The first drop-down list box is the No. of virtual reagent disk, and the second is the position on the reagent disk.
Bottle	Types of reagent bottle include Large bottle and Small bottle.
To Consume	Estimated volume of the reagent to consume. The unit is μl. The volume cannot be edited.

The following table introduces the buttons on the screen.

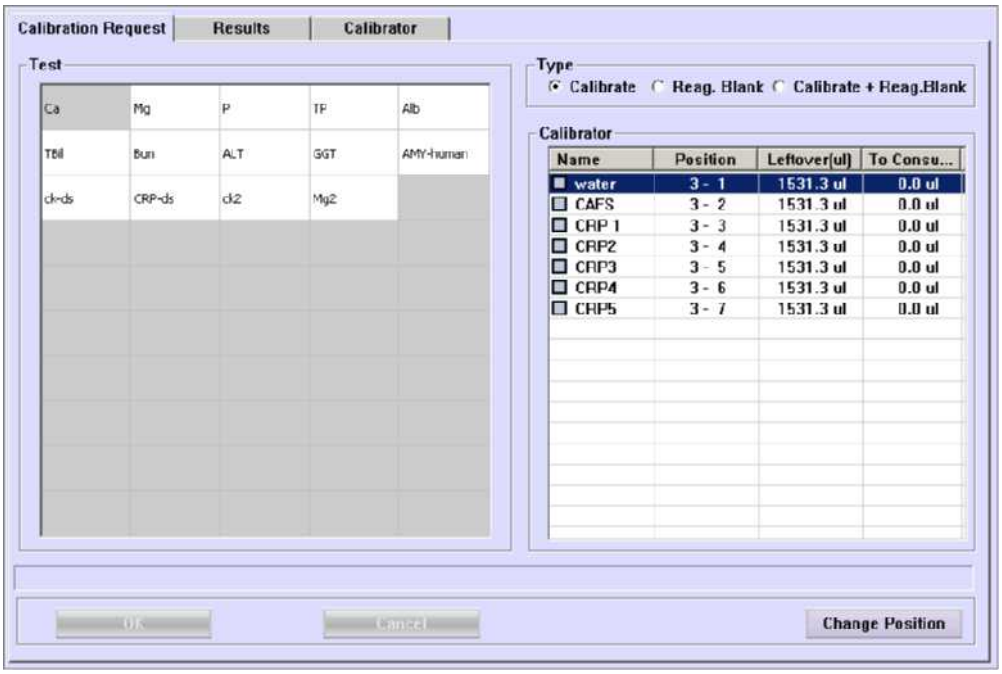
Button	Function
OK	Click this button to save the reagent information set for the selected test.

Button	Function
Cancel	Click this button to cancel the reagent information set for the selected test.

4.12 Calibration

Click ***Calibration*** to enter the screen as shown in Figure 4-28, where you can request calibration, view calibration results and set calibrator information.

Figure 4-28 Calibration Screen

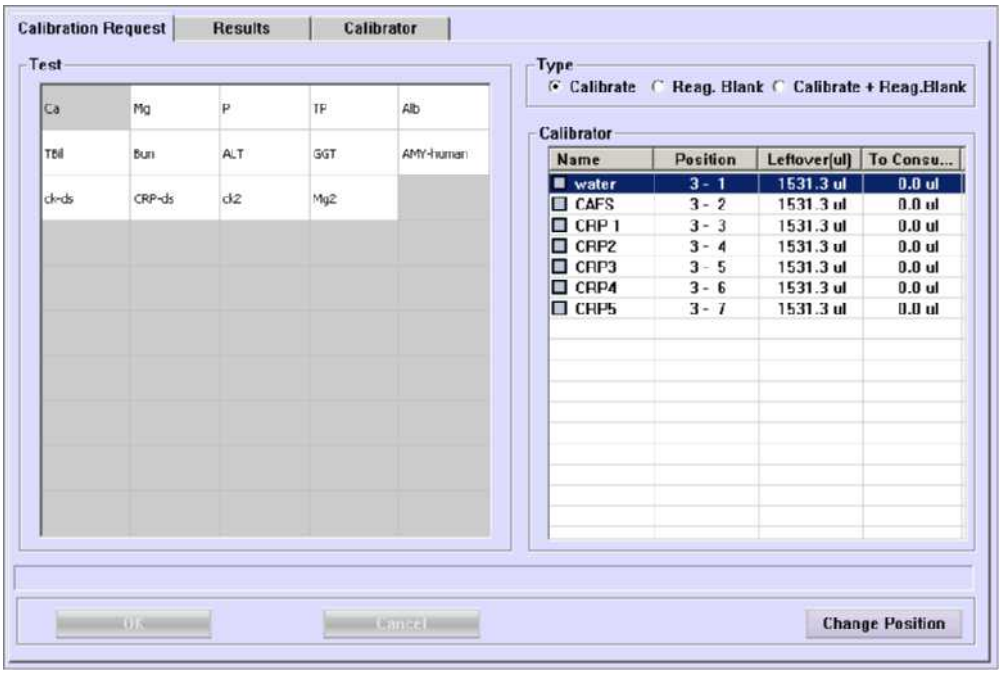


The following sections introduce the ***Calibration*** screen by tab.

4.12.1 Calibration Request

The ***Calibration Request*** screen, as shown in Figure 4-29, is where you can request calibration.

Figure 4-29 Calibration Request Screen



CAUTION:

You need to run the calibration again when you change reagent lots, test parameters, lamp or other analysis conditions.

The reagent blank is vital to obtaining correct analysis results. The blank results can assist in determining whether the reagents have expired, or whether the reaction background should be deducted, and in eliminating the absorbance changes caused by the reagents themselves. Mindray recommends the reagent blank be run on a daily base.

The analyzer will use the result of the previous reagent blank run for double-reagent tests that use endpoint method if no new reagent blank result is available.

NOTE:

In the ***Tests*** field, different background colors of the test refer to different meanings:

Blue means the test is selected;

White means the test is selectable;

Gray means the test is unselectable, and if the pointer of the mouse is stopped on it for a while, the system will remind you of the reason why it is unselectable.

The following table introduces the buttons on the ***Calibration Request*** screen.

Button	Function
OK	After selecting calibration tests, click this button to finish requesting. Refer to the following text **To Request Calibration** for specific operations.
Cancel	After selecting calibration tests, click this button to cancel requesting. Refer to the following text **To Request Calibration** for specific operations.
Change Position	After selecting a calibrator in the ***Calibrator*** area, click this button to pop up the ***Reset Position*** dialog box. For more information about the ***Reset Position*** dialog box, refer to the following text **To Reset Position of a Calibrator**.

To Request Calibration

1 Select a type in the ***Type*** area.

Where,

Calibraterefers to running calibration directly without testing the reagent blank;

Reag. Blank refers to testing the reagent blank only.

Calibrate+Reag.Blank refers to testing the reagent blank and then calibrating.

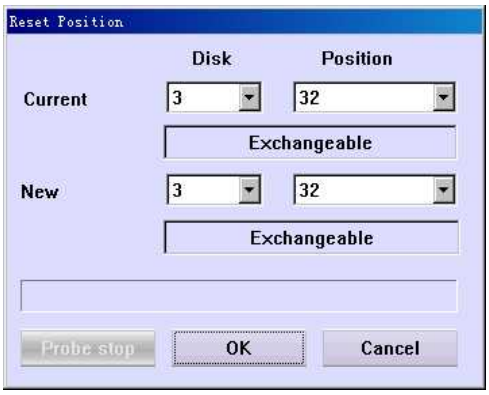
2 Select a test(s) in the ***Test*** list.

3 If you confirm to calibrate the selected tests, click ***OK***; otherwise click ***Cancel***.

To Reset Position of a Calibrator

At the ***Calibration Request*** screen, after selecting a calibrator, click ***Change Position*** to pop up the ***Reset Position*** dialog box, as shown in Figure 4-30, where you can reset position of the selected calibrator on the sample disk.

Figure 4-30 Reset Position Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Current	Current position of the selected calibrator on the sample disk.
New	New position of the selected calibrator on the sample disk.
Disk	No. of virtual sample disk. Void means that the selected calibrator is not on the sample disk.
Position	Position of the calibrator on the selected virtual sample disk. Void means that the selected calibrator is not on the sample disk.

The following table introduces the buttons of the dialog box.

Button	Function
Probe Stop	If the system is in testing status, and the calibrator position to be changed or the target position is on the sample disk currently running, you should first stop the probe, the mixing bar and the sample/reagent disk. Click this button to stop the probe, the mixing bar, the sample/reagent disk, and the button will change into ***Resume***. After exchanging the positions, click ***Resume*** to continue.
OK	Click this button to save the new position you have set.
Cancel	Click this button to cancel the new position you have set.

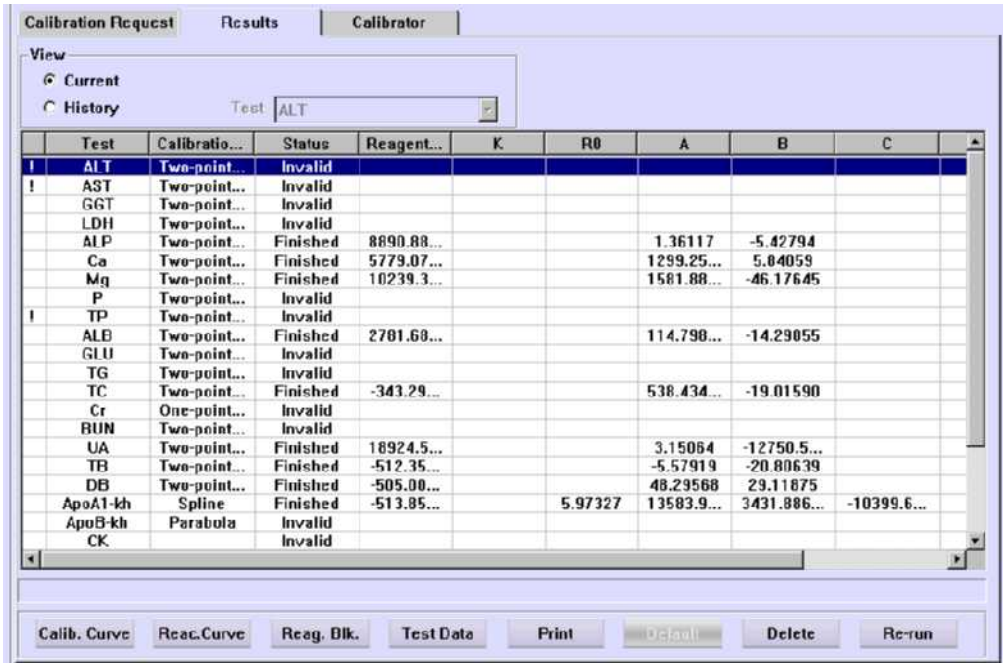
CAUTION:

Do not put the probe, the mixing bar and the sample/reagent disk on hold for a long time. Otherwise, certain analyses may be affected.

4.12.2 Results

The ***Results*** screen, as shown in Figure 4-31, is where you can view the calibration results.

Figure 4-31 Results Screen



In the ***View*** area, ***Current*** refers to the default calibration parameters of each test, and ***History*** refers to all calibration results. The ***Test*** drop-down list box is only available when ***History*** is selected.

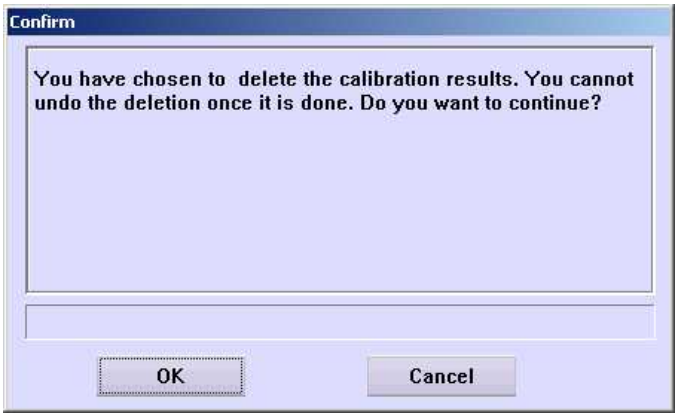
NOTE:

This analyzer uses the default calibration parameters to calculate the sample concentrations.

This analyzer will automatically set the latest parameters (including the parameters obtained through calibration run, editing, calculation) as the default.

The middle of the screen displays the tests, status and calibration parameters, etc. An "!" showed on the left of the test name means that after you click the ***Test Data*** button there is remark in the dialog box popped up.

The following table introduces the buttons on the screen.

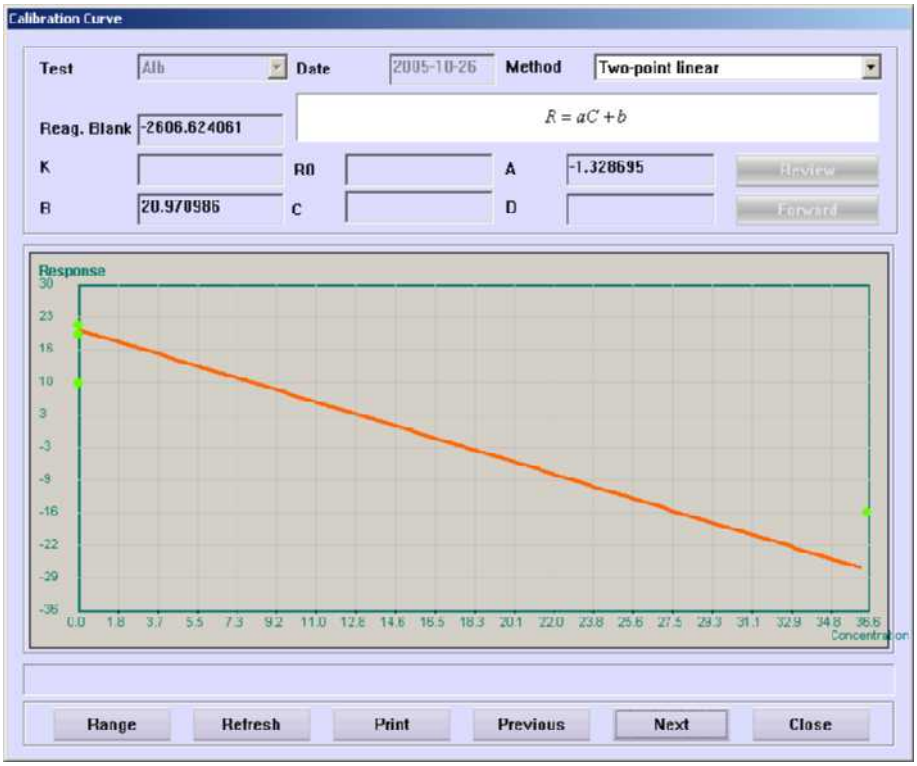
Button	Function
Calib. Curve	Click this button to pop up the ***Calibration Curve*** dialog box, where you can view a calibration curve. For more information about the ***Calibration Curve*** dialog box, refer to the following text **Calibration** Curve.
Reac. Curve	Click this button to pop up the ***Calibration Reaction Curve*** dialog box, where you can view a reaction curve. For more information about the ***Calibration Reaction Curve*** dialog box, refer to the following text **Calibration** Reaction Curve.
Reag. Blk.	After selecting a result, click this button to pop up the ***Reagent Blank Trend Curve*** dialog box, where you can view the reagent blank curve for the selected result. For more information about the ***Reagent Blank Trend Curve*** dialog box, refer to the following text **Reagent Blank Trend Curve**.
Test Data	After selecting a result, click this button to pop up the ***Calibration Data*** dialog box, where you can view all the calibration data of the selected result. For more information about the ***Calibration Data*** dialog box, refer to the following text **Test Data**.
Print	Click this button to print the list in the middle of the ***Results*** screen.
Default	This button is available only when ***History*** is selected in the ***View*** area. Click this button to set the selected calibration result as the default calibration parameters of this test.
Delete	After selecting a calibration result, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected calibration result or click ***Cancel*** to abort the deletion.

Button	Function
Re-run	This button is available only when ***Current*** is selected in the ***View*** area. After selecting a calibration result, click this button to re-request calibration for the test and the current result is saved.

Calibration Curve

At the ***Results*** screen, click ***Calib. Curve*** to pop up the ***Calibration Curve*** dialog box, as shown in Figure 4-32, which is used to display a calibration curve.

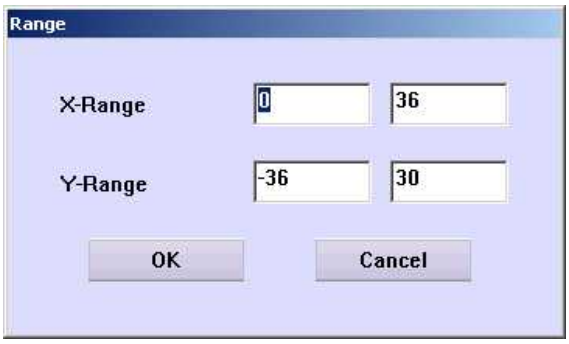
Figure 4-32 Calibration Curve Dialog Box



In the ***Calibration Curve*** dialog box, select a test in the ***Test*** drop-down list box to view its calibration curve.

The following table introduces the buttons of the dialog box.

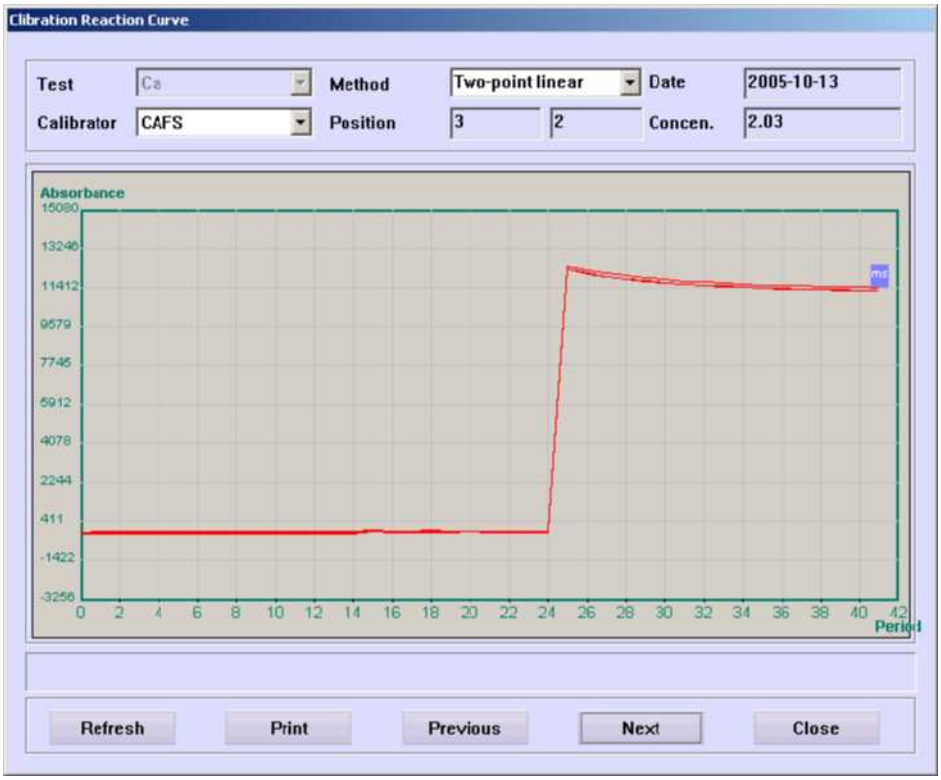
Button	Function
Review	Click to view the parameters of the previous segment of SPLINE calibration curve.
Forward	Click to view the parameters of the next segment of SPLINE calibration curve.

Button	Function
Range	Click this button to pop up the following dialog box, where you can set the X/Y-coordinate ranges of the current calibration curve. 
Refresh	Click this button to refresh the current calibration curve.
Print	Click this button to print the current calibration curve.
Previous	Click this button to display the calibration curve of the previous result.
Next	Click this button to display the calibration curve of the next result.
Close	Click this button to close the ***Calibration Curve*** dialog box.

Calibration Reaction Curve

At the ***Results*** screen, click ***Reac. Curve*** to pop up the ***Calibration Reaction Curve*** dialog box, as shown in Figure 4-33, which is used to display a calibration reaction curve.

Figure 4-33 Calibration Reaction Curve Dialog Box



In the ***Calibration Reaction Curve*** dialog box, after selecting a test in the ***Test*** drop-down list box and a calibrator in the ***Calibrator*** drop-down list box, you can view the reaction curve of the selected test with the selected calibrator.

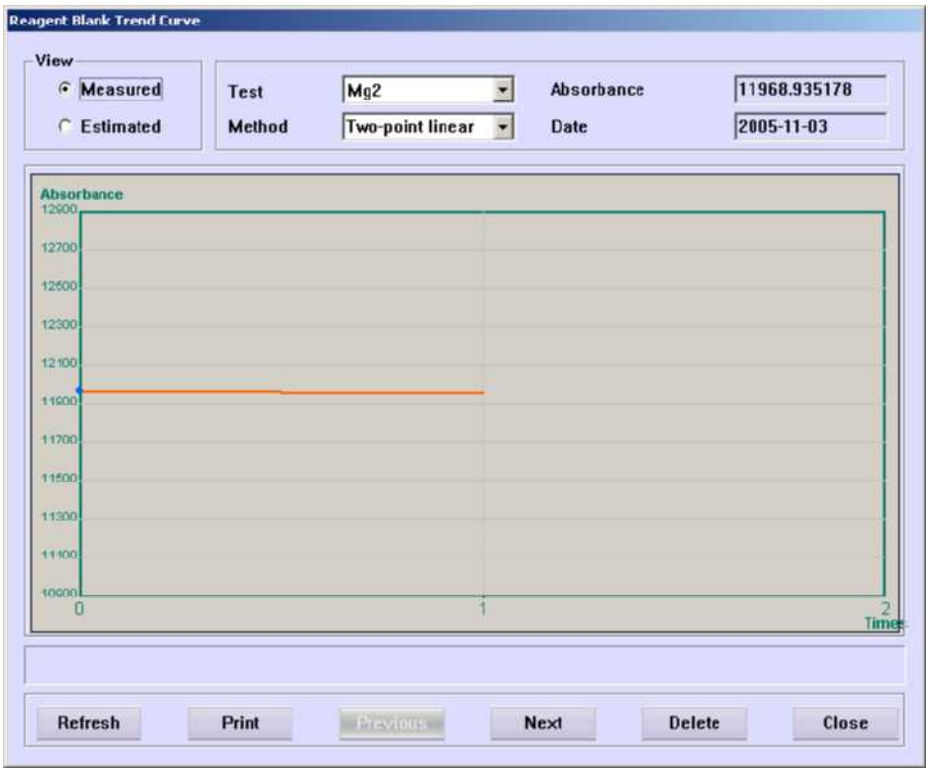
The following table introduces the buttons of the dialog box.

Button	Function
Refresh	Click this button to refresh the current reaction curve.
Print	Click this button to print the current reaction curve.
Previous	Click this button to display the reaction curve of current test with the previous calibrator.
Next	Click this button to display the reaction curve of current test with the next calibrator.
Close	Click this button to close the ***Calibration Reaction Curve*** dialog box.

Reagent Blank Trend Curve

At the ***Results*** screen, click ***Reag. Blk*** to pop up the ***Reagent Blank Trend Curve*** dialog box, as shown in Figure 4-34, which is used to display the reagent blank trend curve of the selected calibration result.

Figure 4-34 Reagent Blank Trend Curve Dialog Box

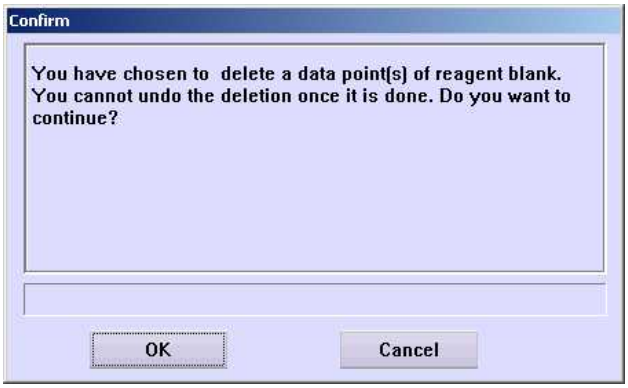


The following table explains some parameters of the dialog box.

Parameter	Description
View	There are two options as ***Measured*** and ***Estimated***. The former refers to displaying the measured values and the latter refers to displaying the estimated values.

The following table introduces the buttons of the dialog box.

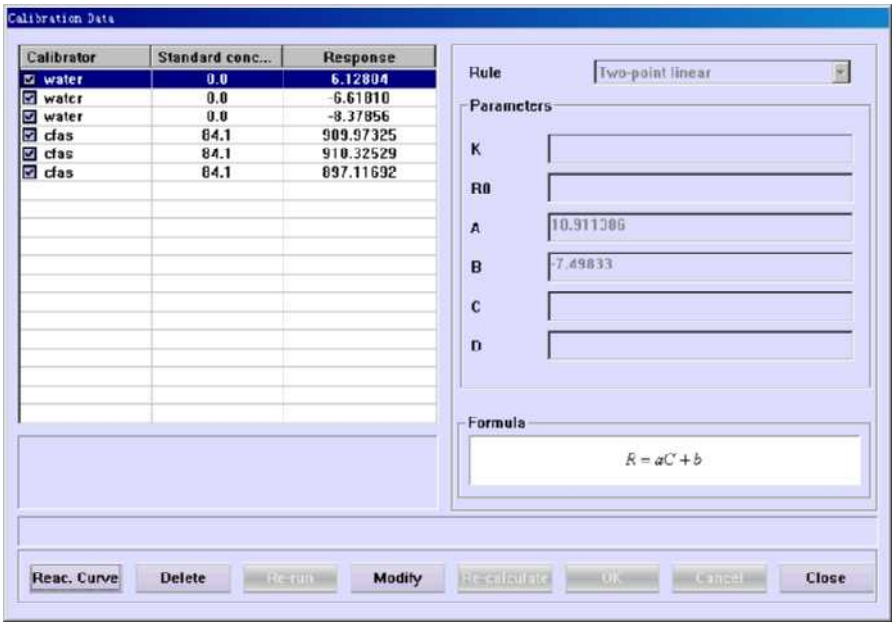
Button	Function
Refresh	Click this button to refresh the current reagent blank trend curve.
Print	Click this button to print the current reagent blank trend curve.
Previous	Click this button to display the reagent blank value of previous point.
Next	Click this button to display the reagent blank value of next point.

Button	Function
Delete	Click this button to pop up the following dialog box.  Click ***OK*** to delete the reagent blank value of current point; click ***Cancel*** to abort the deletion.
Close	Click this button to close the ***Reagent Blank Trend Curve*** dialog box.

Test Data

At the ***Results*** screen, after selecting a calibration result, click ***Test Data*** to pop up the ***Calibration Data*** dialog box, as shown in Figure 4-35, which is used to display the calibration data of the selected result, and re-calculate or modify the calibration parameters.

Figure 4-35 Calibration Data Dialog Box

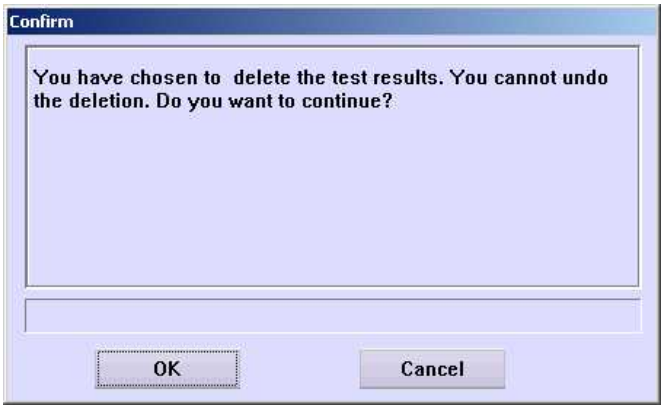


The following table introduces the buttons of the dialog box.

Button	Function
Reac. Curve	Click this button to pop up the ***Reaction Curve*** dialog box as shown below.

In the ***Reaction Curve*** dialog box, click ***Previous*** or ***Next*** to display the previous or the next reaction curve; click ***Reac. Data*** to pop up a dialog box to display the reaction data of the curve; click ***Print*** to print current reaction curve; click ***Close*** to close the ***Reaction Curve*** dialog box.

Delete — After selecting a calibrator, click this button to pop up the following dialog box.



Click ***OK*** to delete the selected test data; click ***Cancel*** to abort the deletion.

Re-run — Click this button to re-request the calibration test. This button is only available for the calibration runs of current day since powering on which have been finished or have no results. Current calibration test data will be deleted.

Modify — Click this button to enable re-calculating or modifying calibration parameters.

Re-calculate — After clicking the ***Modify*** button and selecting the calibrator and calibration rule, click this button to re-calculate the parameters with the new calibration rule.

You can modify the calibration parameters directly only after you have re-calculated them successfully.

Button	Function
OK	After successful re-calculation or calibration parameters modification, click this button to save the change. Refer to the following text **To Re-calculate or Modify Calibration Parameters** for details.
Cancel	After successful re-calculation or calibration parameters modification, click this button to abort the change. Refer to the following text **To Re-calculate or Modify Calibration Parameters** for details.
Close	Click this button to close the ***Calibration Data*** dialog box.

To Re-calculate or Modify Calibration Parameters

1 Click ***Modify***.

2 Select a rule in the ***Rule*** drop-down list box.

3 Select test data according to the selected rule.

4 Click ***Re-calculate*** to re-calculate the calibration parameters with selected rule and calibrators.

5 If you do not want to modify the calibration parameters after re-calculating, go to step 7;

Otherwise, go directly to the next step.

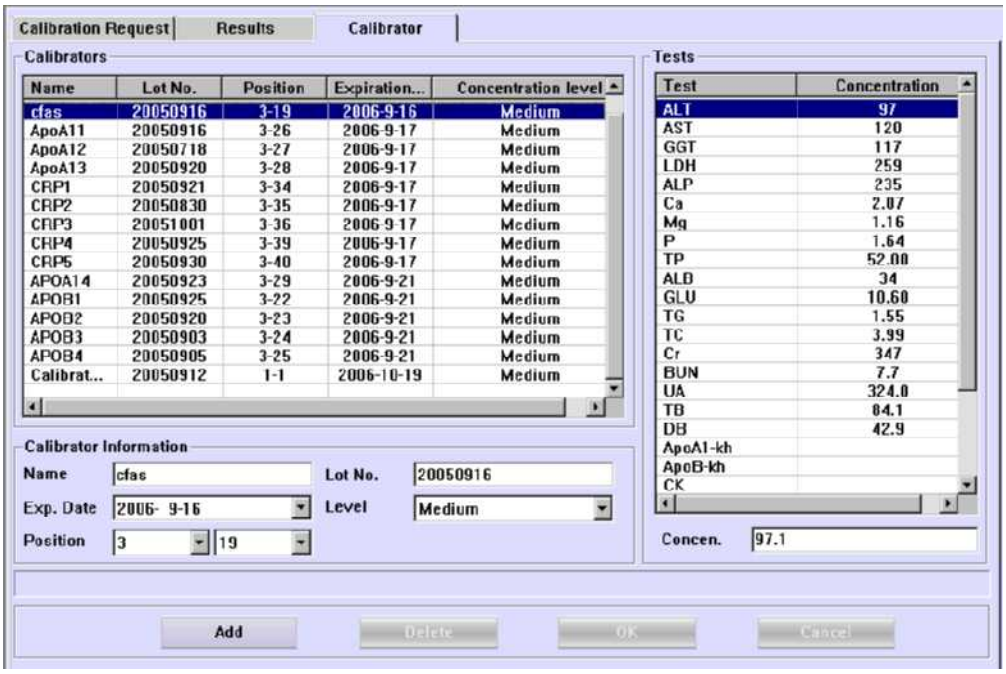
6 Modify the parameters in the ***Parameters*** area.

7 Click ***OK*** to save the change; or click ***Cancel*** to ignore the change.

4.12.3 Calibrator

The ***Calibrator*** screen, as shown in Figure 4-36, is where you can set the basic information and concentration of calibrators.

Figure 4-36 Calibrator Screen



The following table explains the parameters on the screen.

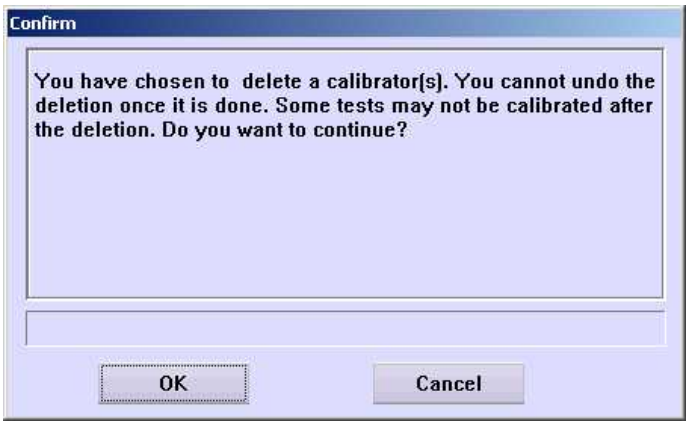
Parameter	Description
Name	Name of the calibrator.
Lot No.	Lot No. of the calibrator.
Exp. date	The calibrator is effective before this date.
Level	Concentration level of the calibrator. It includes High, Medium and Low.
Position	Position of the calibrator on the sample disk. The first drop-down list box is the No. of virtual sample disk, and the second is the position on the sample disk.
Concen.	It refers to concentration of the selected calibrator for the selected test.

NOTE:

Ensure the right expiration date is set so that the analyzer can correctly judge whether the calibrator has expired.

The following table introduces the buttons on the screen.

Button	Function
Add	Click this button to add new calibrators to the ***Calibrators*** list.

Button	Function
Delete	After selecting a calibrator in the ***Calibrators*** list, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected calibrator; click ***Cancel*** to abort the deletion.
OK	Click this button to save modification to calibrator information. Refer to the following text **To Modify Calibrator Information** for detailed operations.
Cancel	Click this button to cancel modification to calibrator information. Refer to the following text **To Modify Calibrator Information** for detailed operations.

To Modify Calibrator Information

1 Select a calibrator in the ***Calibrators*** list.

2 If you don't need to modify the basic information of the selected calibrator, proceed to the next step.

Otherwise, modify the basic information in the ***Calibrator Information*** area.

3 If you don't need to modify the concentration of the selected calibrator, proceed to the next step.

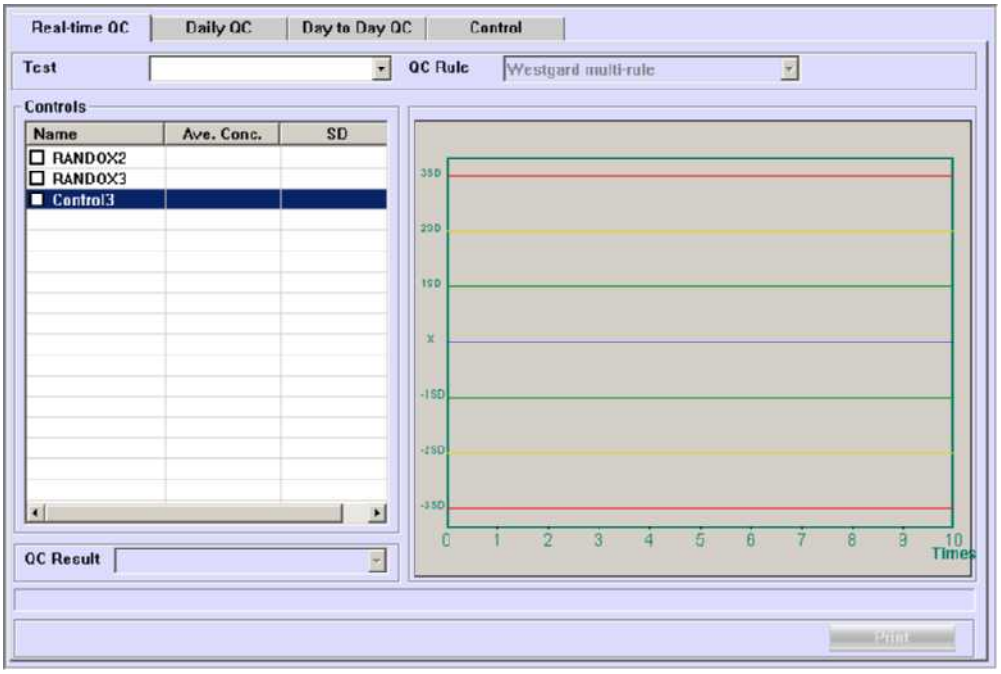
Otherwise, after selecting a test in the ***Tests*** list, enter concentration in the ***Concen.*** edit box.

4 If you want to save the modification, click ***OK***; otherwise click ***Cancel***.

4.13 QC

Click ***QC*** to enter the screen as shown in Figure 4-37, which is used to display results of real-time QC, daily QC and day-to-day QC and set controls.

Figure 4-37 QC Screen

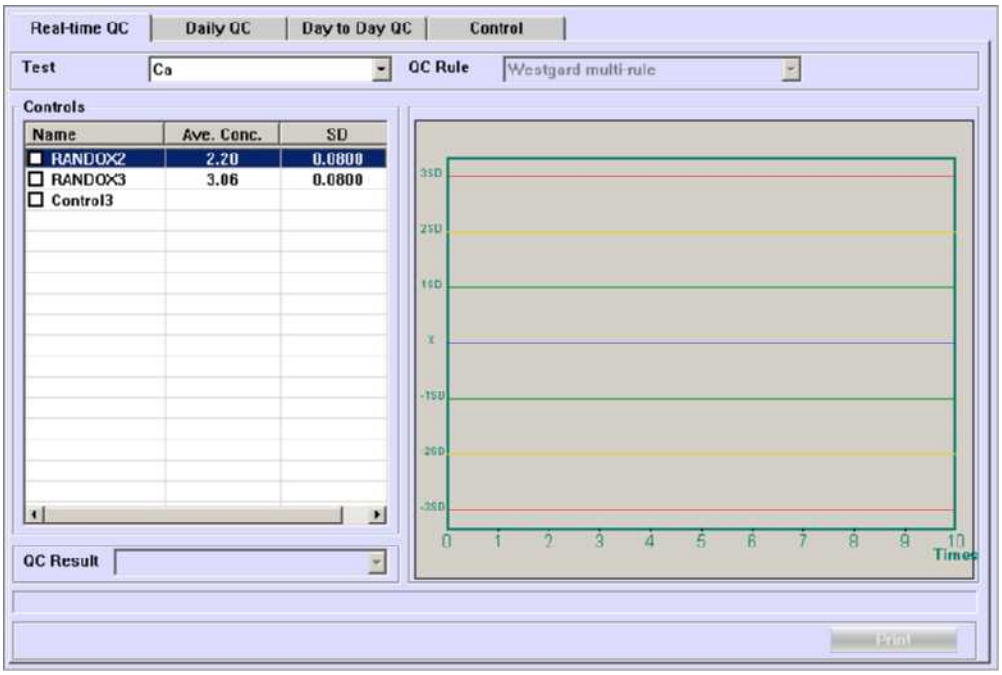


The following sections introduce the ***QC*** screen by tab.

4.13.1 Real-time QC

The ***Real-time QC*** screen, as shown in Figure 4-38, is used to display the Westgard Multi-rule QC plot for the recent 10 QCs of the current day.

Figure 4-38 Real-time QC Screen



The following table explains the parameters on the screen.

Parameter	Description
Test	Select the test you need to view.
QC Rule	It refers to the Westgard Multi-rule and cannot be edited.
Controls	It displays the calibrators, concentration levels and SDs of the selected test.
QC Result	It displays the QC result of the selected test.

The following table introduces the button on the screen.

Button	Function
Print	Click this button to print the real-time QC plot currently displayed.

4.13.2 Daily QC

The ***Daily QC*** screen, as shown in Figure 4-39, is used to display the QC results of the selected test within one day.

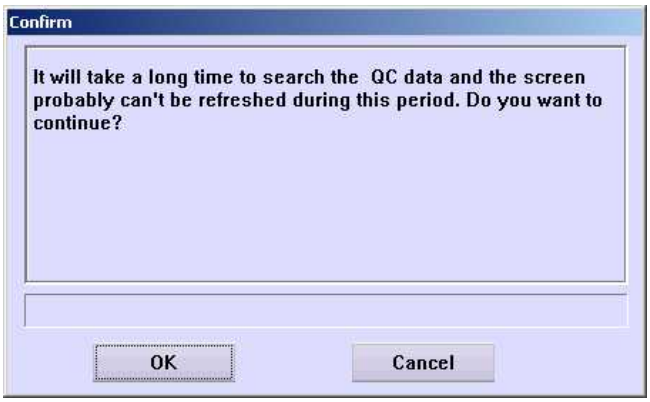
Figure 4-39 Daily QC Screen

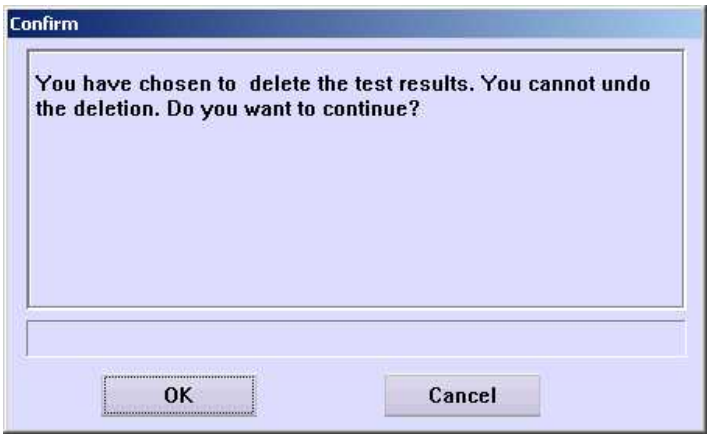
The following table explains the parameters on the screen.

Parameter	Description
QC Data	Select to display QC data on the screen.

Parameter	Description
QC Plot	Select to display QC plot on the screen.
Test	Select the test you need to view.
Date	Select the testing date of the QC results that you need to view.
QC Rule	It includes Westgard multi-rule, Cumulative Sum Check and TWIN-PLOT rule.
Control 1	Select the first control.
Control 2	Select the second control.

The following table introduces the buttons on the screen.

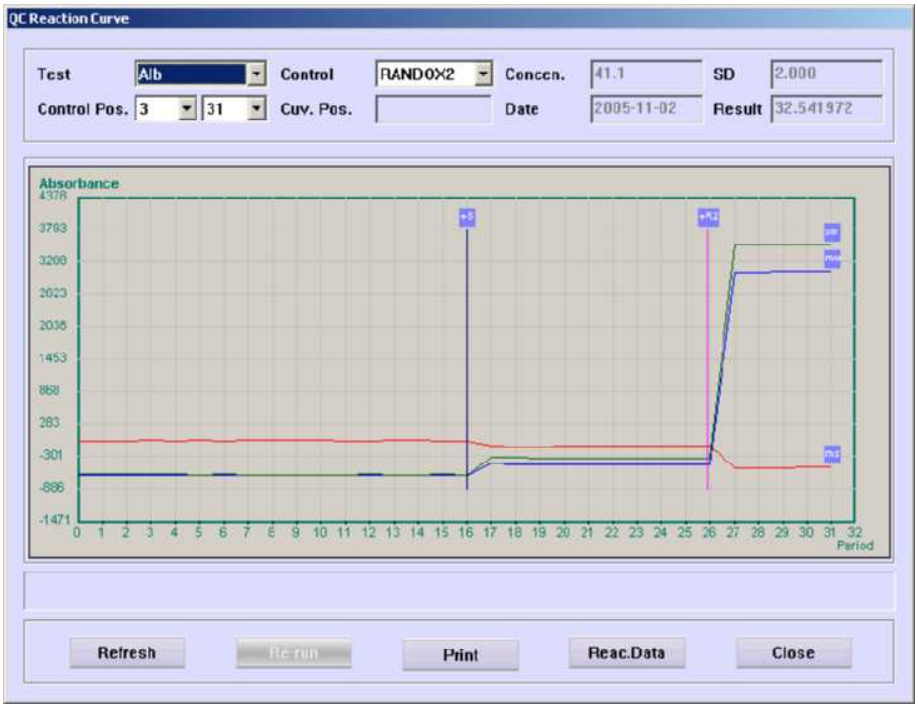
Button	Function
Refresh	After setting or changing searching conditions, the system will not refresh the searching results automatically. You need to click this button to refresh and display the latest results. Click this button to pop up the following dialog box.  Click ***OK*** to display the latest searching results; click ***Cancel*** to abort refreshing.
Print	Click this button to print the QC data or QC plot currently displayed.

Button	Function
Delete	After selecting one of the searched QC results, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected result; click ***Cancel*** to abort the deletion.
Reaction Curve	After selecting a QC result, click this button to pop up the ***QC Reaction Curve*** dialog box, which is used to display the reaction curve of the selected QC result. For more information about the ***QC Reaction Curve*** dialog box, refer to the following text **QC** Reaction Curve.

QC Reaction Curve

At the ***Daily QC*** screen, after selecting a QC result, click ***Reaction Curve*** to pop up the ***QC Reaction Curve*** dialog box, as shown in Figure 4-40, where you can view the reaction curve of the selected QC result.

Figure 4-40 QC Reaction Curve Dialog Box



The following table introduces the buttons of the dialog box.

Button	Function
Refresh	Click this button to refresh the current reaction curve.
Re-run	Click this button to re-request the current QC run. It is only available for the QC runs of current day since powering on which have been finished or have no results.
Print	Click this button to print the current reaction curve.
Reac. Data	Click this button to pop up a dialog box to display the reaction data of the curve.
Close	Click this button to close the ***QC Reaction Curve*** dialog box.

4.13.3 Day to Day QC

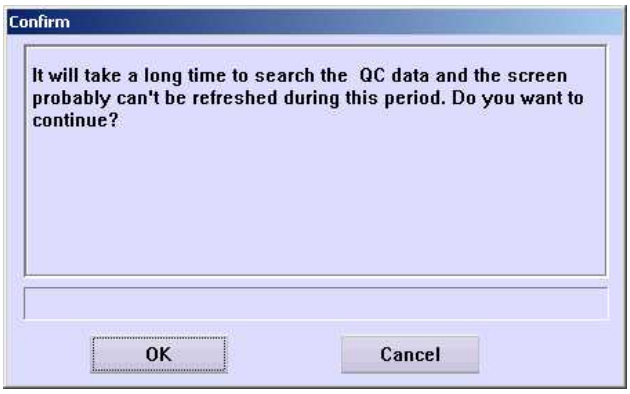
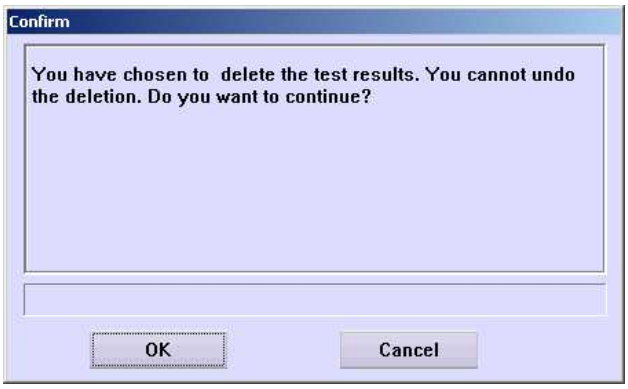
The ***Day to Day QC*** screen, as shown in Figure 4-41, is used to display the QC results of the selected test among days.

Figure 4-41 Day to Day QC Screen

The following table explains the parameters on the screen.

Parameter	Description
QC Data	Select to display QC data on the screen.
QC Plot	Select to display QC plot on the screen.
Test	Select the test you need to view.
Date	Select the starting date and ending date of the QC results you need to view. The first drop-down box is starting date, and the second one is the ending date.
QC Rule	It includes Westgard multi-rule, Cumulative Sum Check and TWIN-PLOT rule.
Control 1	Select the first control.
Control 2	Select the second control.

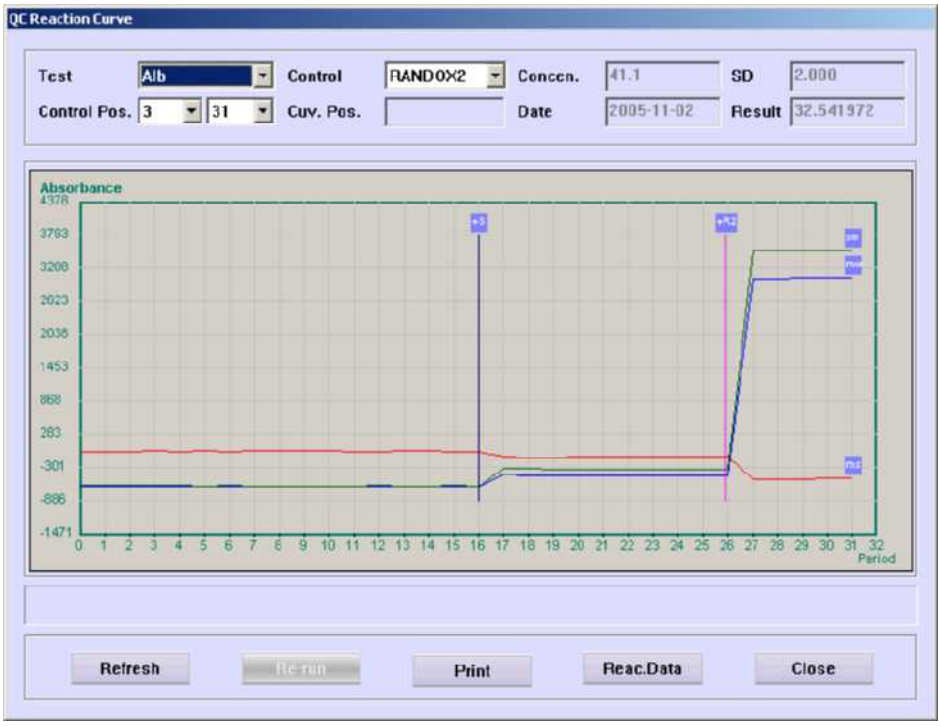
The following table introduces the buttons on the screen.

Button	Function
Refresh	After setting or changing searching conditions, the system will not refresh the searching results automatically. You need to click this button to refresh and display the latest results. Click this button to pop up the following dialog box.  Click ***OK*** to display the latest searching results; click ***Cancel*** to abort refreshing.
Print	Click this button to print the QC data or QC plot currently displayed.
Delete	After selecting one of the searched QC results, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected result; click ***Cancel*** to abort the deletion.
Reaction Curve	After selecting one of the searched QC results, click this button to pop up the ***QC Reaction Curve*** dialog box, which is used to display the reaction curve of the selected QC result. For more information about the ***QC Reaction Curve*** dialog box, refer to the following text **QC** Reaction Curve.

QC Reaction Curve

At the ***Day to Day QC*** screen, after selecting one of the searched QC results, click ***Reaction Curve*** to pop up the ***QC Reaction Curve*** dialog box, as shown in Figure 4-42, where you can view the reaction curve of the selected QC result.

Figure 4-42 QC Reaction Curve Dialog Box



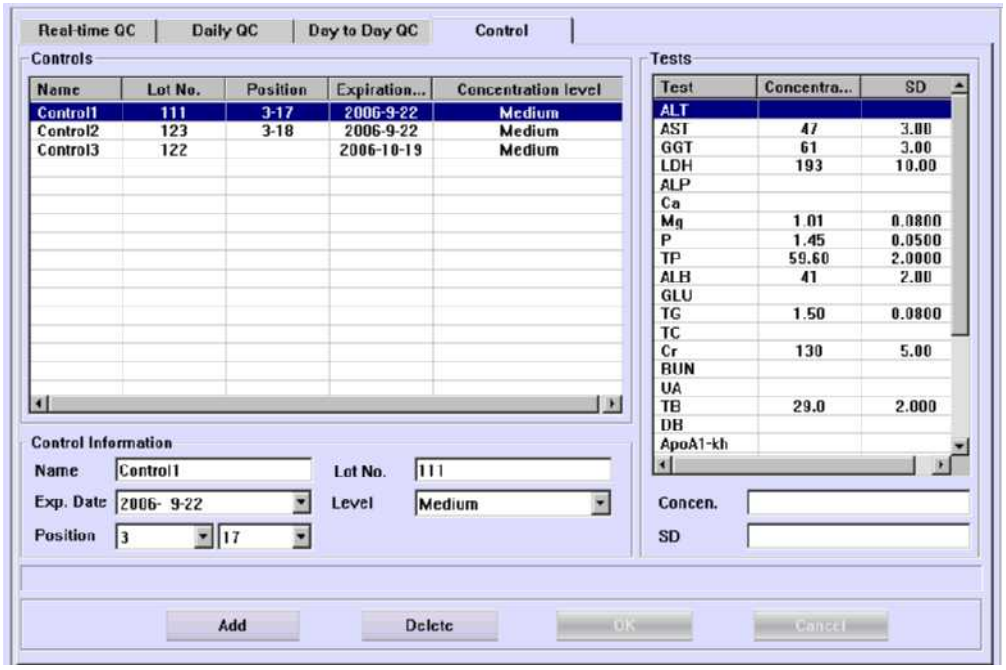
The following table introduces the buttons of the dialog box.

Button	Function
Refresh	Click this button to refresh the current reaction curve.
Re-run	Click this button to re-request the current QC run. It is only available for the QC runs of current day since powering on which have been finished or have no results.
Print	Click this button to print the current reaction curve.
Reac. Data	Click this button to pop up a dialog box to display the reaction data of the curve.
Close	Click this button to close the ***QC Reaction Curve*** dialog box.

4.13.4 Control

The ***Control*** screen, as shown in Figure 4-43, is where you can set the basic information, concentration and SD of a control.

Figure 4-43 Control Screen



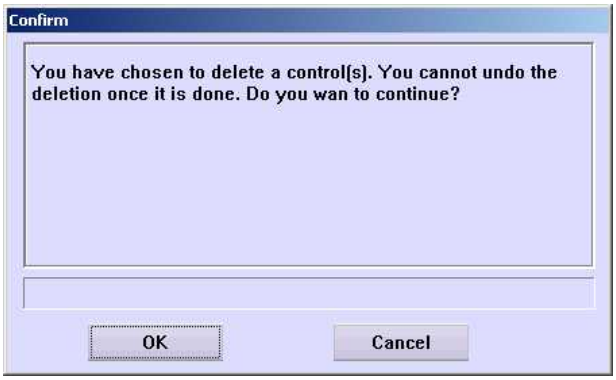
The following table explains the parameters on the screen.

Parameter	Description
Name	Name of the control.
Exp. Date	The control is effective before this date.
Lot No.	Lot No. of the control.
Level	Concentration level of the control. It includes High, Medium and Low.
Position	Position of the control on the sample disk. The first drop-down list box is the No. of virtual sample disk, and the second one is the position on the sample disk.
Concen.	It refers to concentration of the selected control for the selected test.
SD	It refers to SD of the selected control for the selected test.

NOTE:

Ensure the right expiration date is set so that the analyzer can correctly judge whether the control has expired.

The following table introduces the buttons on the screen.

Button	Function
Add	Click this button to add a new control to the ***Controls*** list.
Delete	After selecting a control in the ***Controls*** list, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected control; click ***Cancel*** to abort the deletion.
OK	Click this button to save modification to relevant control information. Refer to the following text **To Modify Control Information** for detailed operations.
Cancel	Click this button to cancel modification to relevant control information. Refer to the following text **To Modify Control Information** for detailed operations.

To Modify Control Information

1 Select a control in the ***Controls*** list.

2 If you don't need to modify the basic information of the selected control, proceed to the next step.

Otherwise, modify the basic information in the ***Control Information*** area.

3 If you don't need to modify the concentration and SD of the selected control, proceed to the next step.

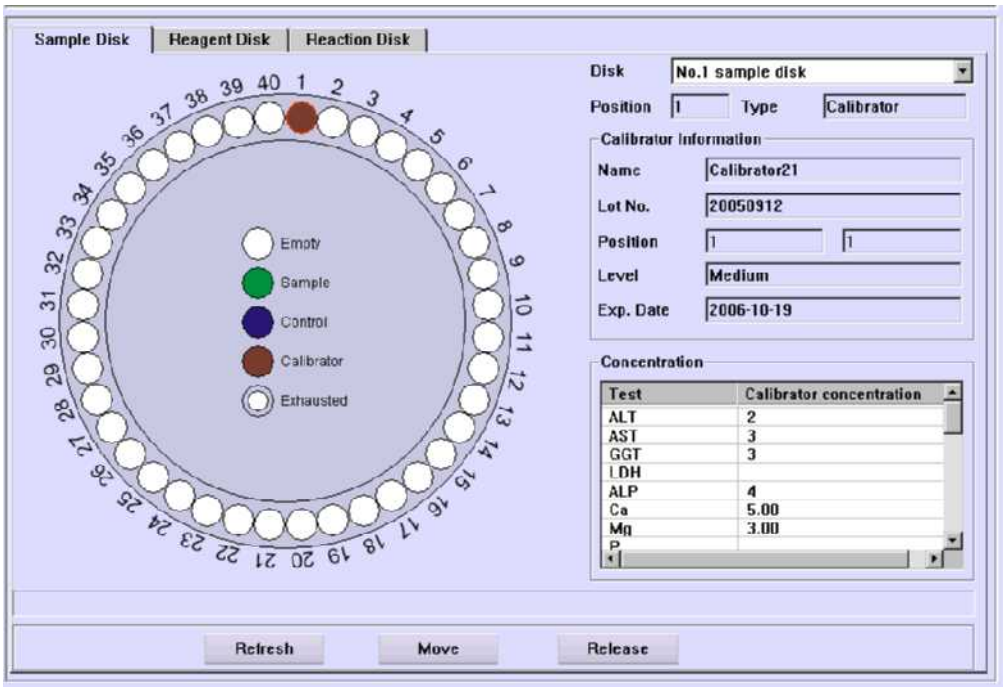
Otherwise, after selecting a test in the ***Tests*** list, enter concentration in the ***Concen.*** edit box and SD in the ***SD*** edit box. You can repeat this step.

4 If you want to save the modification, click ***OK***, otherwise click ***Cancel***.

4.14 Status

Click ***Status*** to enter the screen as shown in Figure 4-44, which is used to display the current status of the sample disk, reagent disk and reaction disk.

Figure 4-44 Status Screen

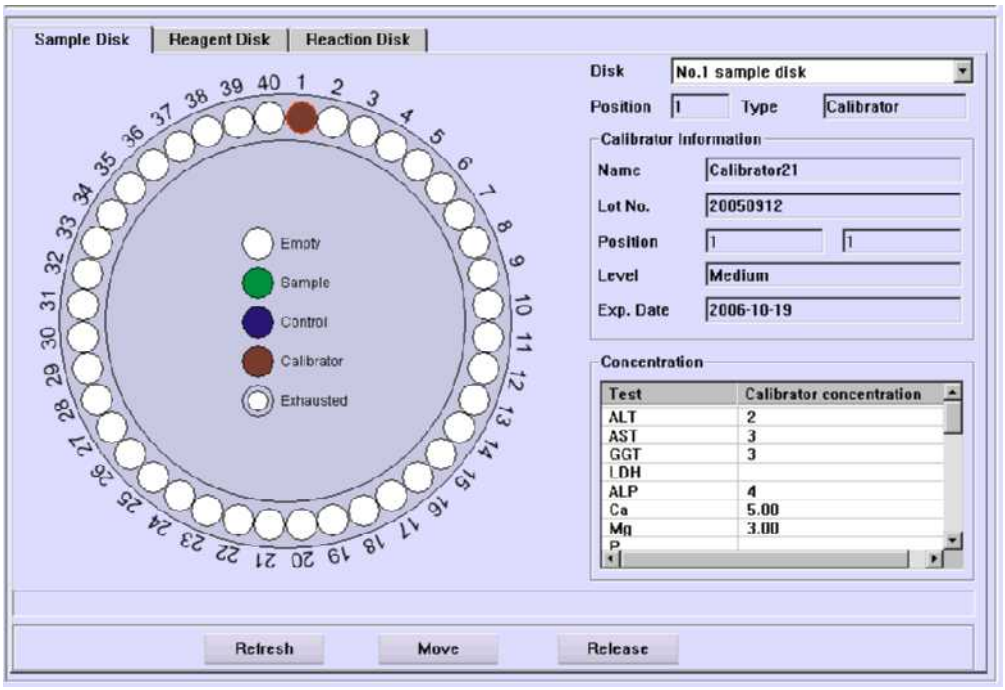


The following sections introduce the ***Status*** screen by tab.

4.14.1 Sample Disk

The ***Sample Disk*** screen, as shown in Figure 4-45, is used to display the current status of the sample disk.

Figure 4-45 Sample Disk Screen



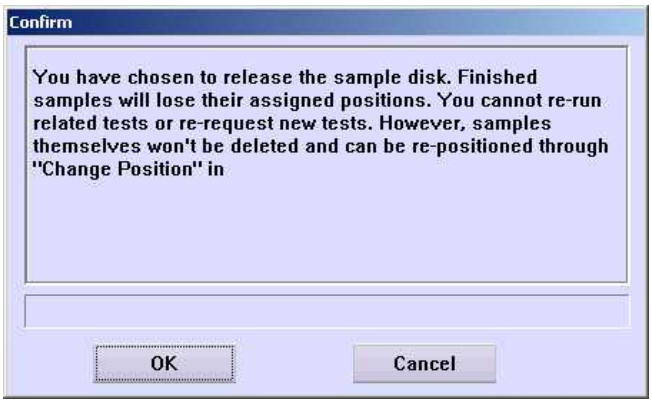
At this screen, the sample disk graph on the left displays current status of each sample position. Click a position to display its sample information (calibrators and controls) on the right.

The following table introduces the buttons on the screen.

NOTE:

If the remaining sample (calibrator or control) is not enough or exhausted, you must click the ***Refresh*** button after adding more.

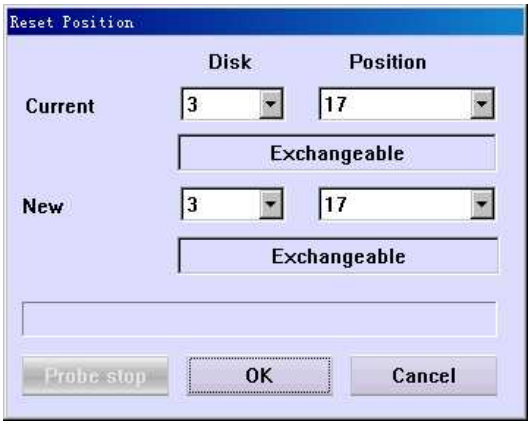
Button	Function
Refresh	When a sample (calibrator or control) is not enough or exhausted, after adding more to it, click the sample position on the sample disk graph, and then click ***Refresh*** to refresh its status.
Move	After selecting a virtual sample disk from the ***Disk*** drop-down list box and a sample position on the sample disk graph, click ***Move*** to pop up the ***Reset Position*** dialog box, where you can change position of the selected sample. For more information about the ***Reset Position*** dialog box, refer to the following text **To Reset Sample Position**.

Button	Function
Release	After selecting a virtual sample disk from the ***Disk*** drop-down list box, click this button to pop up the following dialog box.  Click ***OK*** to release positions of all samples (exclusive of calibrators and controls) which have been tested; click ***Cancel*** to abort the releasing.

To Reset Sample Position

At the ***Sample Disk*** screen, after selecting a virtual sample disk from the ***Disk*** drop-down list box and a sample position on the sample disk graph, click ***Move*** to pop up the ***Reset Position*** dialog box, as shown in Figure 4-46.

Figure 4-46 Reset Position Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Current	Current position of the selected sample (calibrator or control) on the sample disk.
New	New position of the selected sample (calibrator or control) on the sample disk.

Parameter	Description
Disk	No. of the virtual sample disk. Void means the selected sample (calibrator or control) is not on the sample disk.
Position	Position on the selected virtual sample disk. Void means the selected sample (calibrator or control) is not on the sample disk.

The following table introduces the buttons of the dialog box.

Button	Function
Probe stop	If the system is in testing status, and the sample (calibrator or control) position to be changed or the target position is on the sample disk currently running, you should first stop the probe, the mixing bar and the sample/reagent disk. Click this button to stop the probe, the mixing bar and the sample/reagent disk, and the button will change into ***Resume***. After exchanging the positions, click ***Resume*** to continue.
OK	Click this button to save the new sample position you have set.
Cancel	Click this button to cancel the new sample position you have set.

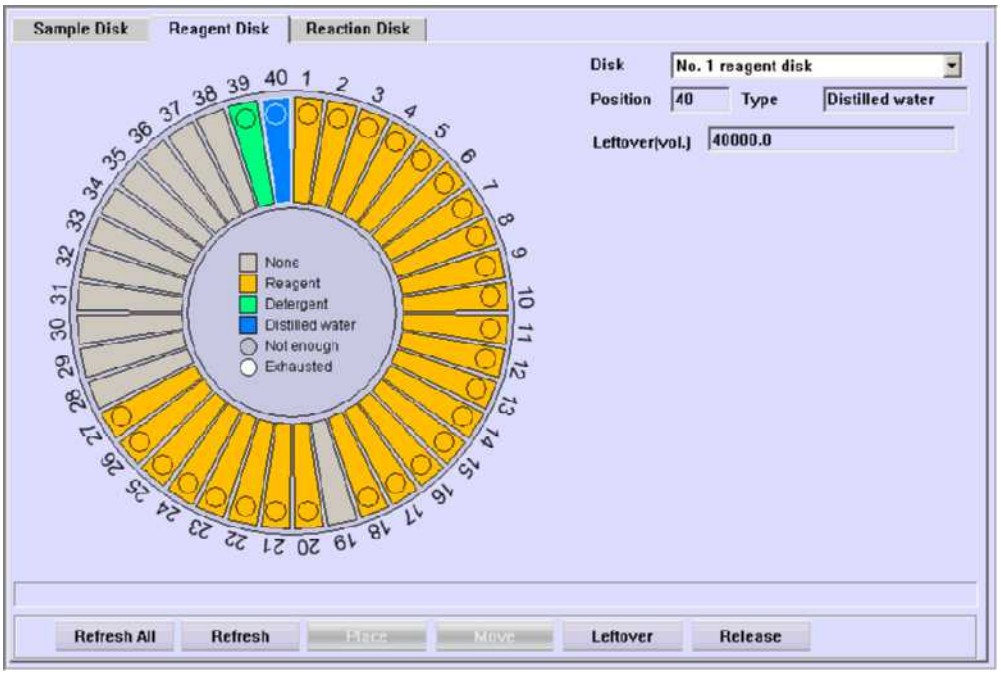
CAUTION:

Do not put the probe, the mixing bar and the sample/reagent disk on hold for a long time. Otherwise, certain analyses may be affected.

4.14.2 Reagent Disk

The ***Reagent Disk*** screen, as shown in Figure 4-47, is used to display the current status of the reagent disk.

Figure 4-47 Reagent Disk Screen



At this screen, the reagent disk graph on the left displays current status of each reagent position. Click a position to display its reagent information on the right.

NOTE:

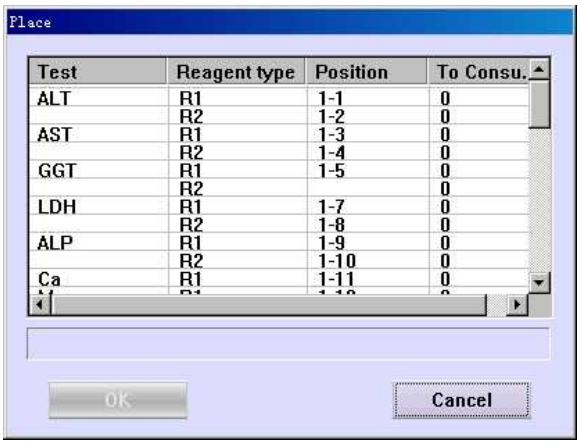
When you select one position of a double-reagent test, both of the two positions will be selected and their reagent information will be displayed on the right side.

If the remaining reagent (distilled water or detergent) is not enough or exhausted, you must click the ***Refresh*** button after adding more.

The following table introduces the buttons on the screen.

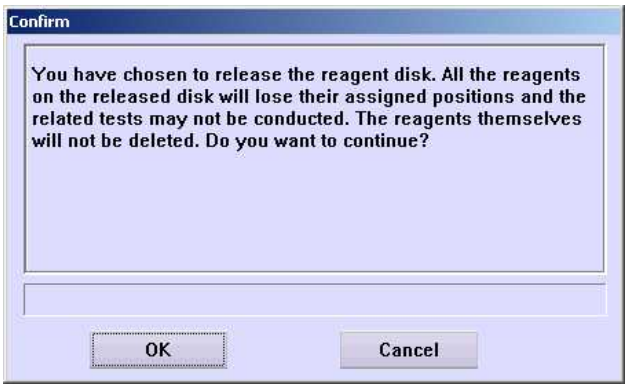
Button	Function
Refresh All	After adding more reagents (distilled water or detergent) to all the bottles on the reagent disk, select the corresponding virtual reagent disk from the ***Disk*** drop-down list box and then click this button to refresh leftover of all the positions with bottles on the graph to full.
Refresh	When reagent (distilled water or detergent) is not enough or exhausted, after adding more to it, select the corresponding virtual reagent disk from the ***Disk*** drop-down list box and the reagent position on the reagent disk graph, and then click this button to refresh leftover of the position on the graph to full.

Button	Function
Place	After selecting a virtual reagent disk from the ***Disk*** drop-down list box and an empty position on the reagent disk graph, click this button to pop up the following dialog box.



Click ***OK*** to put the selected reagent in the selected reagent position; click ***Cancel*** to abort the setting.

Move	After selecting a virtual reagent disk from the ***Disk*** drop-down list box and a reagent position on the reagent disk graph, click ***Move*** to pop up the ***Reset Position*** dialog box, where you can change position of the selected reagent. For more information about the ***Reset Position*** dialog box, refer to the following text **To Reset Reagent Position**.
Leftover	After selecting a virtual reagent disk from the ***Disk*** drop-down list box, click this button to check volume of all reagents on current disk.
Release	After selecting a virtual reagent disk from the ***Disk*** drop-down list box, click this button to pop up the following dialog box.

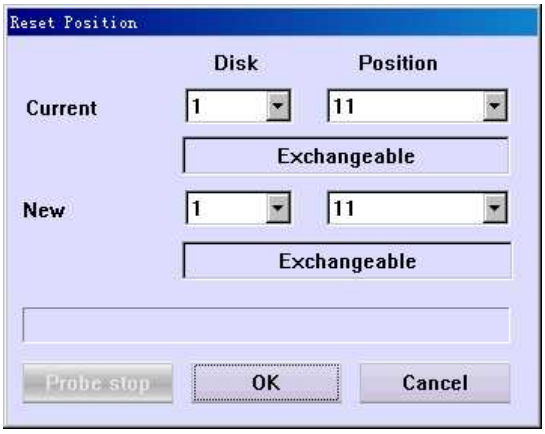


Click ***OK*** to release all reagent positions on the reagent disk (exclusive of No. 39 and No. 40); click ***Cancel*** to abort the releasing.

To Reset Reagent Position

At the ***Reagent Disk*** screen, after selecting a virtual reagent disk from the ***Disk*** drop-down list box and a reagent position on the reagent disk graph, click ***Move*** to pop up the ***Reset Position*** dialog box, as shown in Figure 4-48.

Figure 4-48 Reset Position Dialog Box



The following table explains parameters of the dialog box.

Parameter	Description
Current	Current position of the selected reagent on the reagent disk.
New	New position of the selected reagent on the reagent disk.
Disk	No. of the virtual reagent disk. Void means the selected reagent is not on the reagent disk.
Position	Position on the selected virtual reagent disk. Void means the selected reagent is not on the reagent disk.

The following table introduces buttons of the dialog box.

Button	Function
Probe stop	If the system is in testing status, and the reagent position to be changed or the target position is on the reagent disk currently running, you should first stop the probe, the mixing bar and the sample/reagent disk. Click this button to stop the probe, the mixing bar and the sample/reagent disk, and the button will change into ***Resume***. After exchanging the position, click ***Resume*** to continue.
OK	Click this button to save the new reagent position you have set.
Cancel	Click this button to cancel the new reagent position you have set.

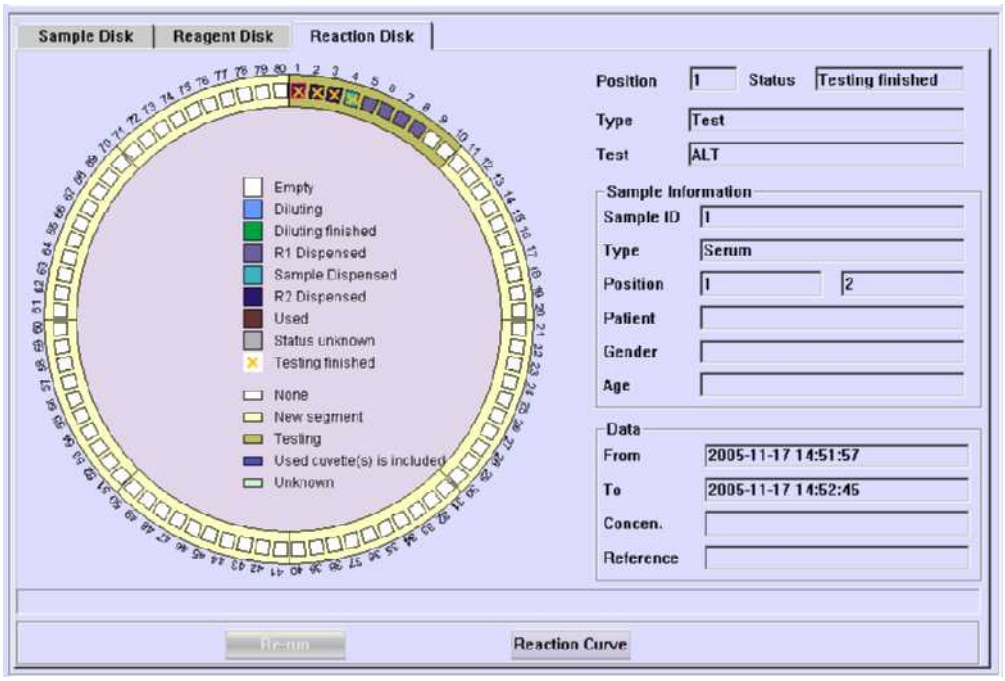
CAUTION:

Do not put the probe, the mixing bar and the sample/reagent disk on hold for a long time. Otherwise, certain analyses may be affected.

4.14.3 Reaction Disk

The ***Reaction Disk*** screen, as shown in Figure 4-49, is used to display the current status of the reaction disk.

Figure 4-49 Reaction Disk Screen



At this screen, the reaction disk graph on the left displays current status of each cuvette position. Click a position to display its sample and testing information on the right.

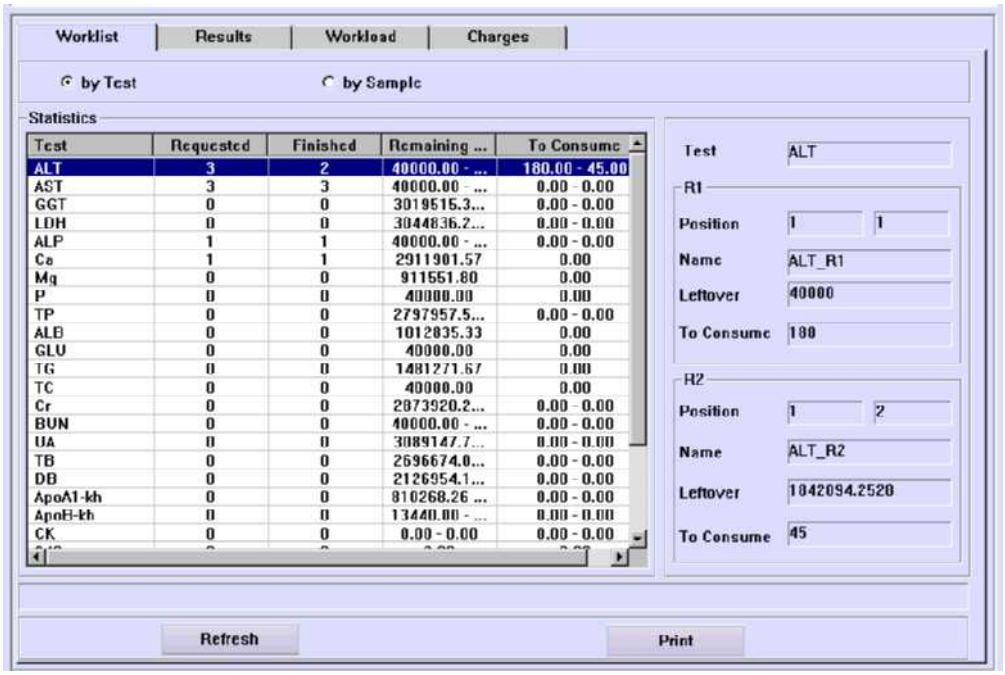
The following table introduces the buttons on the screen.

Button	Function
Re-run	After clicking a cuvette that has been tested on the reaction disk graph, click this button to re-request the run with the original result invalidated.
Reaction Curve	After selecting a cuvette that has been tested, click this button to pop up the ***Reaction Curve*** dialog box to view the reaction curve of the run.

4.15 Statistics

Click ***Statistics*** to enter the screen as shown in Figure 4-50, which is used to display several kinds of statistical information.

Figure 4-50 Statistics Screen

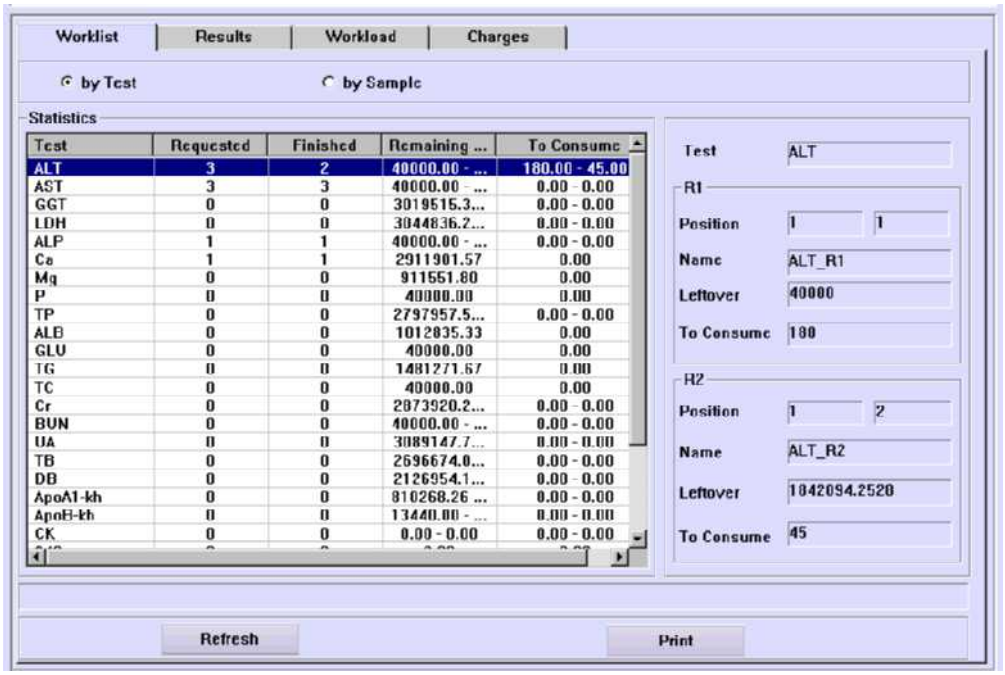


The following sections introduce the ***Statistics*** screen by tab.

4.15.1 Worklist

The ***Worklist*** screen, as shown in Figure 4-51, is used to display statistical information of the tests and samples since powering on within the current day.

Figure 4-51 Worklist Screen



Select ***by Test*** to display statistical information by test, and select ***by Sample*** to display by sample.

NOTE:

When ***by Test*** is selected, the calculation tests and the off-system tests are not included in the statistical information; When ***by Sample*** is selected, they are included in the statistical information.

Requested and ***Finished*** in the ***Statistics*** list refer to No. of runs.

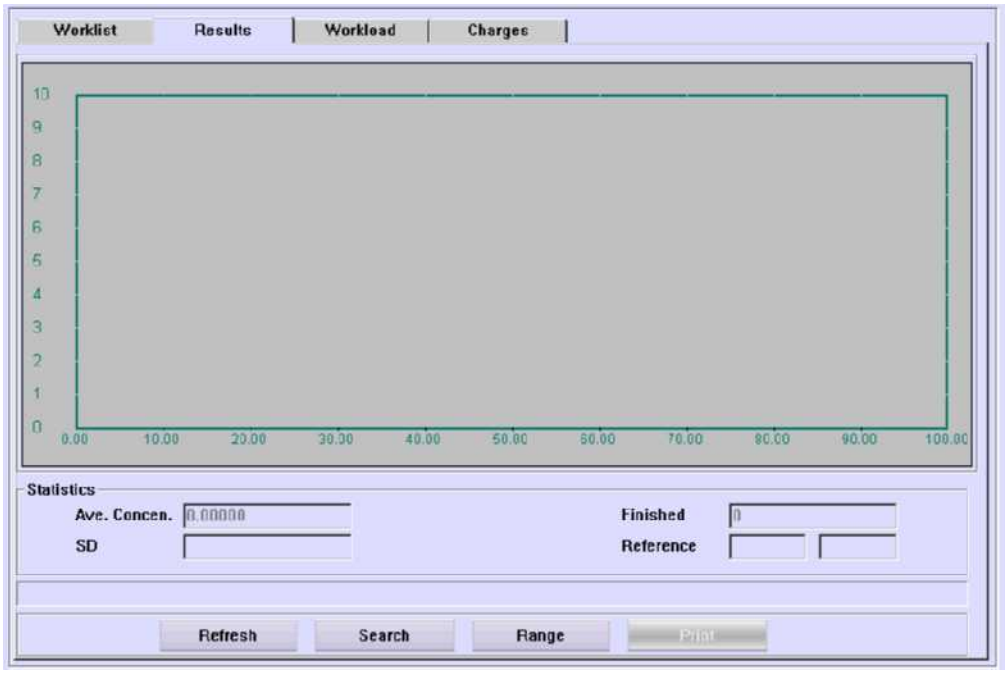
The following table introduces the buttons on the screen.

Button	Function
Refresh	The system will not refresh the statistical results automatically. You need to click this button to refresh.
Print	Click this button to print the statistical results.

4.15.2 Results

The ***Results*** screen, as shown in Figure 4-52, is used to display the statistical graph and data of sample results.

Figure 4-52 Results Screen

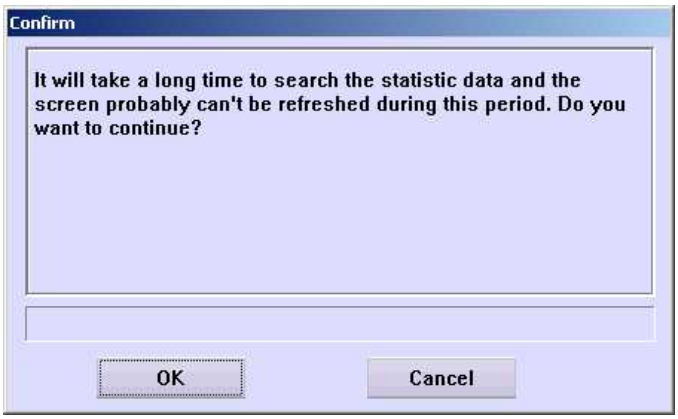
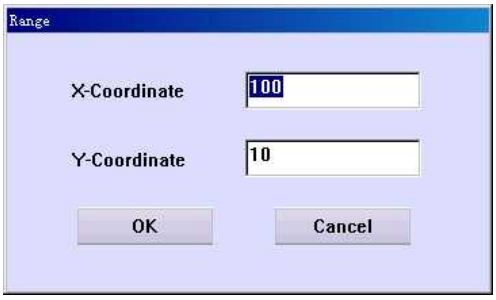


On the statistical graph, X-coordinate refers to sample concentration, and Y-coordinate refers to No. of runs.

The following table explains the parameters on the screen.

Parameter	Description
Ave. Concen.	Average concentration, which is obtained by dividing sum of all searched sample results with the No. of runs.
Finished	No. of sample runs that have been finished.
SD	SD of calibration. It displays only when there's one test result.
Reference	Reference range of test result. It displays only when there's one test result.

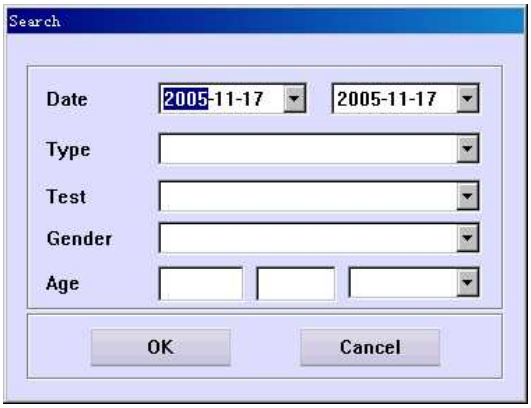
The following table introduces the buttons on the screen.

Button	Function
Search	Click this button to pop up the ***Search*** dialog box, where you can set the searching conditions and search the qualified results. For more information about the ***Search*** dialog box, refer to the following text **Search**.
Refresh	The system will not refresh the statistical results automatically. You need to click this button to refresh. Click this button to pop up the following dialog box  Click ***OK*** to refresh and display the latest statistical results; click ***Cancel*** to abort refreshing.
Range	Click this button to pop up the following dialog box, where you can set coordinate ranges of the statistical graph. 
Print	Click this button to print the statistical results.

Search

At the ***Results*** screen, click ***Search*** to pop up the ***Search*** dialog box, as shown in Figure 4-53, where you can search the sample results that meets the conditions.

Figure 4-53 Search Dialog Box



The following table explains the parameters of the dialog box.

NOTE:

Void means the parameter is exclusive.

Parameter	Description
Date	Date of sample runs that you want to search. The first drop-down list box is starting time, and the second one is ending time.
Type	Type of the samples that you want to search.
Test	Test you want to search.
Gender	Gender of the patients you want to search.
Age	Age of the patients you want to search.

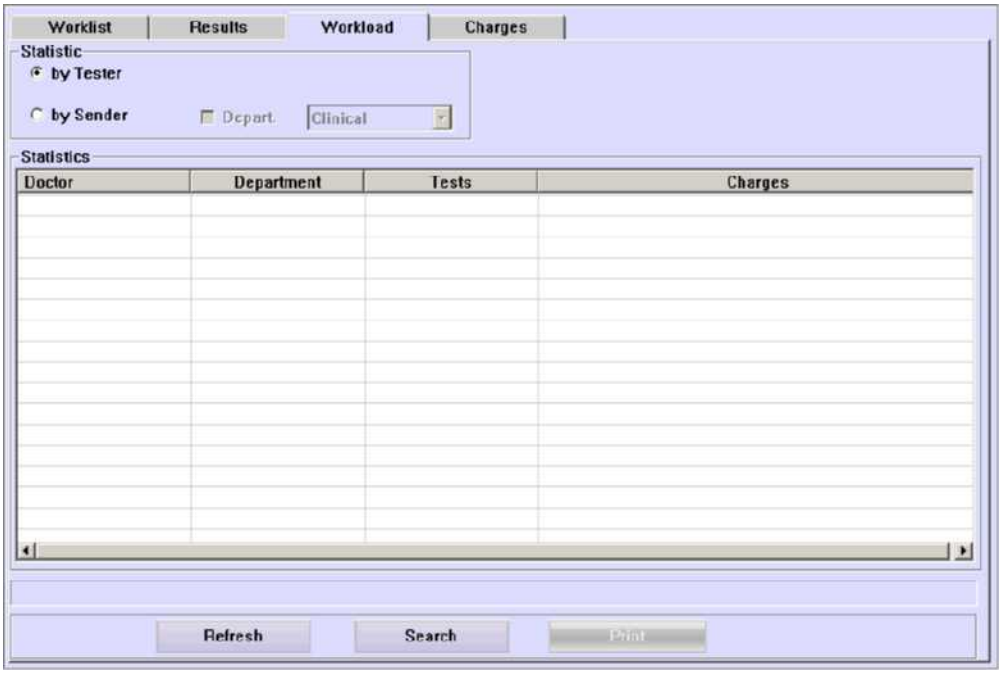
The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to search for sample runs that meet the conditions you have set.
Cancel	Click this button to cancel searching.

4.15.3 Workload

The ***Workload*** screen, as shown in Figure 4-54, is used to display workloads of all doctors.

Figure 4-54 Workload Screen

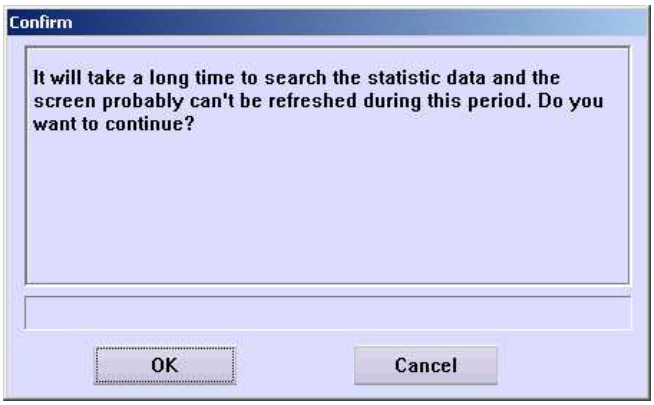


Select ***by Tester*** to display workloads in the ***Statistics*** list by tester.

Select ***by Sender*** to display workloads in the ***Statistics*** list by sender. Mark the ***Depart.*** check box to display workloads in the ***Statistics*** list by sender of the selected department.

The following table introduces the buttons on the screen.

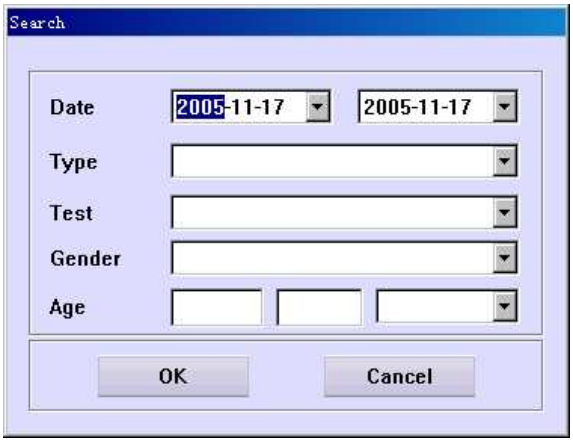
Button	Function
Search	Click this button to pop up the ***Search*** dialog box, where you can set the searching conditions and search the qualified results. For more information about the ***Search*** dialog box, refer to the following text **Search**.

Button	Function
Refresh	The system will not refresh the statistical results automatically. You need to click this button to refresh. Click this button to pop up the following dialog box  Click ***OK*** to refresh and display the latest statistical results; click ***Cancel*** to abort refreshing.
Print	Click this button to print the statistical results.

Search

At the ***Workload*** screen, click ***Search*** to pop up the ***Search*** dialog box, as shown in Figure 4-55, where you can search the workloads information that meets the conditions.

Figure 4-55 Search Dialog Box



The following table explains the parameters of the dialog box.

NOTE:

Void means the parameter is exclusive.

Parameter	Description
Date	Date of sample runs that you want to search. The first drop-down list box is starting time, and the second is ending time.
Type	Type of the samples that you want to search.
Test	Test you want to search.
Gender	Gender of the patients you want to search.
Age	Age of the patients you want to search.

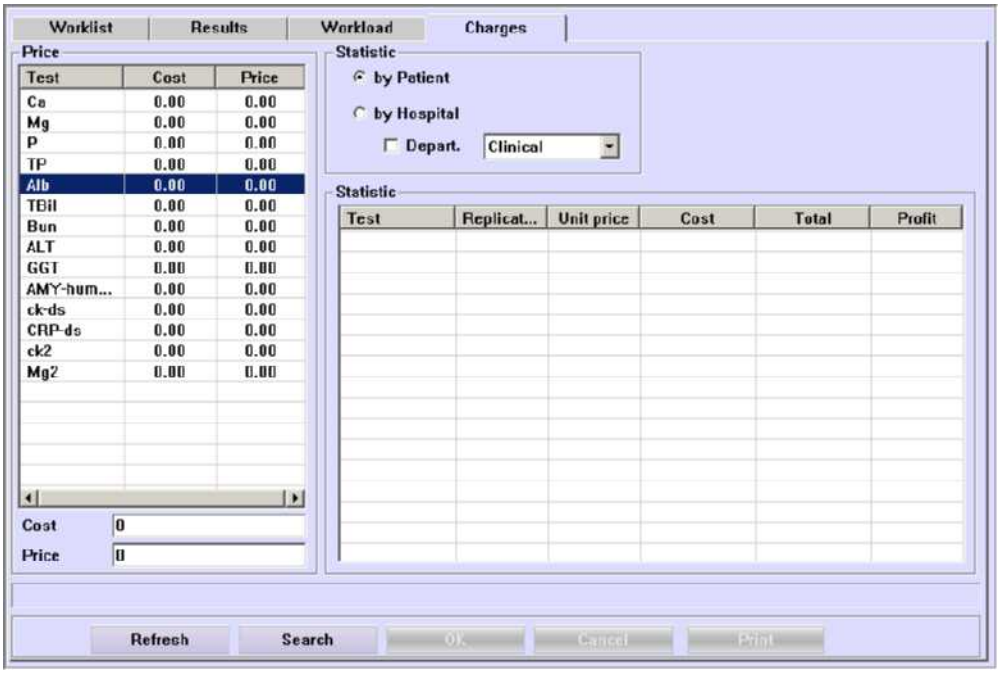
The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to search for workloads information that meets the conditions you have set.
Cancel	Click this button to cancel searching.

4.15.4 Charges

The ***Charges*** screen, as shown in Figure 4-56, is used to display the charges information.

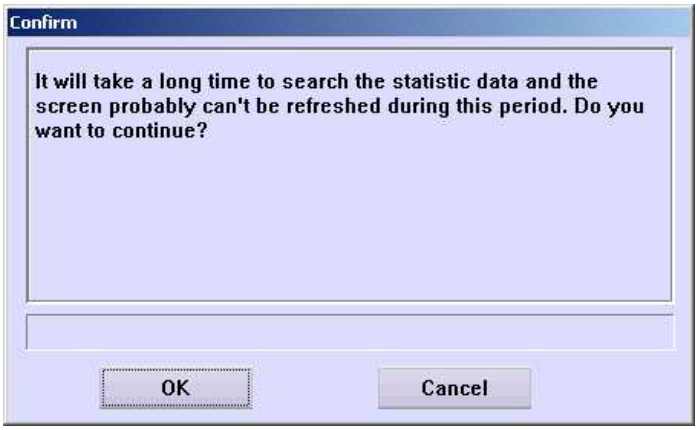
Figure 4-56 Charges Screen



Select ***by Patient*** to display charges information in the ***Statistic*** list by patient.

Select ***by Hospital*** to display charges information in the ***Statistic*** list by test. Mark the ***Depart.*** check box to display charges information of the selected department in the ***Statistic*** list by test.

The following table introduces the buttons on the screen.

Button	Function
Refresh	The system will not refresh the statistical results automatically. You need to click this button to refresh. Click this button to pop up the following dialog box  Click ***OK*** to refresh and display the latest statistical results; click ***Cancel*** to abort refreshing.
Search	Click this button to pop up the ***Conditions*** dialog box, where you can set the searching conditions and search the qualified results. For more information about the ***Conditions*** dialog box, refer to the following text **Conditions**.
OK	Click this button to save settings of test cost and price. Refer to the following text **To Set Cost and Price** for detailed operations.
Cancel	Click this button to cancel settings of test cost and price. Refer to the following text **To Set Cost and Price** for detailed operations.
Print	Click this button to print the statistical results.

Conditions

At the ***Charges*** screen, click ***Search*** to pop up the ***Conditions*** dialog box, as shown in Figure 4-57, where you can search the charges information that meets the conditions.

Figure 4-57 Conditions Dialog Box

The following table explains the parameters of the dialog box.

Parameter	Description
Date	Date of sample runs that you want to search. The first drop-down list box is starting time, and the second one is ending time.
Test	Test you want to search.

The following table introduces the buttons of the dialog box.

Button	Function
OK	Click this button to search for charges information that meets the conditions you have set.
Cancel	Click this button to cancel searching.

To Set Cost and Price

1 Select the test you need to set in the ***Price*** list.

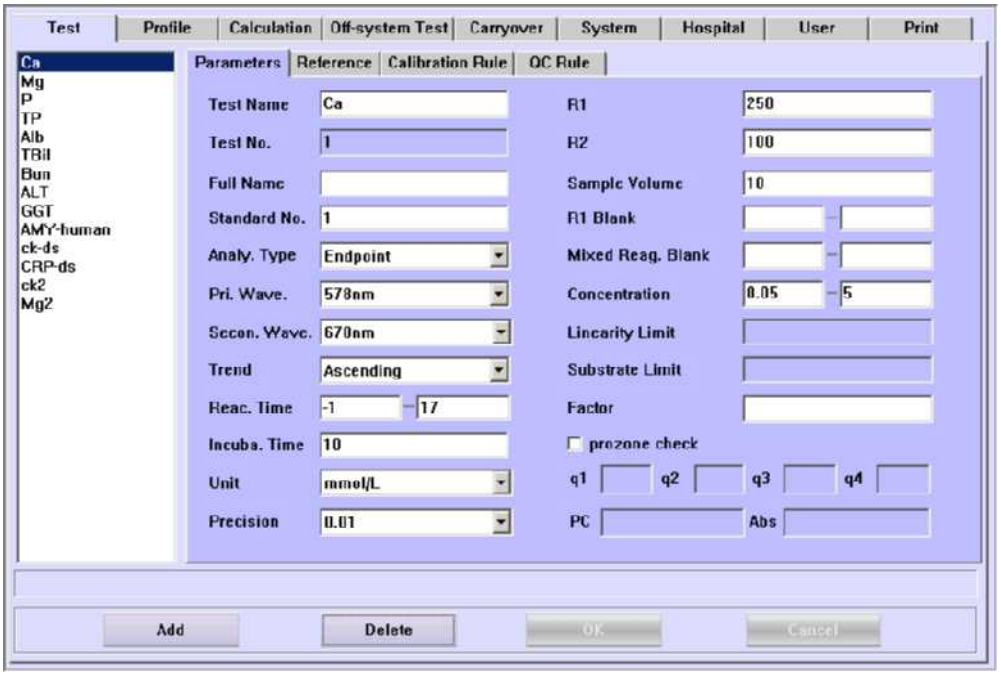
2 Enter numbers in the ***Cost*** and ***Price*** edit boxes.

3 If you want to save the setting, click ***OK***; otherwise click ***Cancel***.

4.16 Setup

Click ***Setup*** to enter the screen as shown in Figure 4-58, where you can set various parameters.

Figure 4-58 Setup Screen

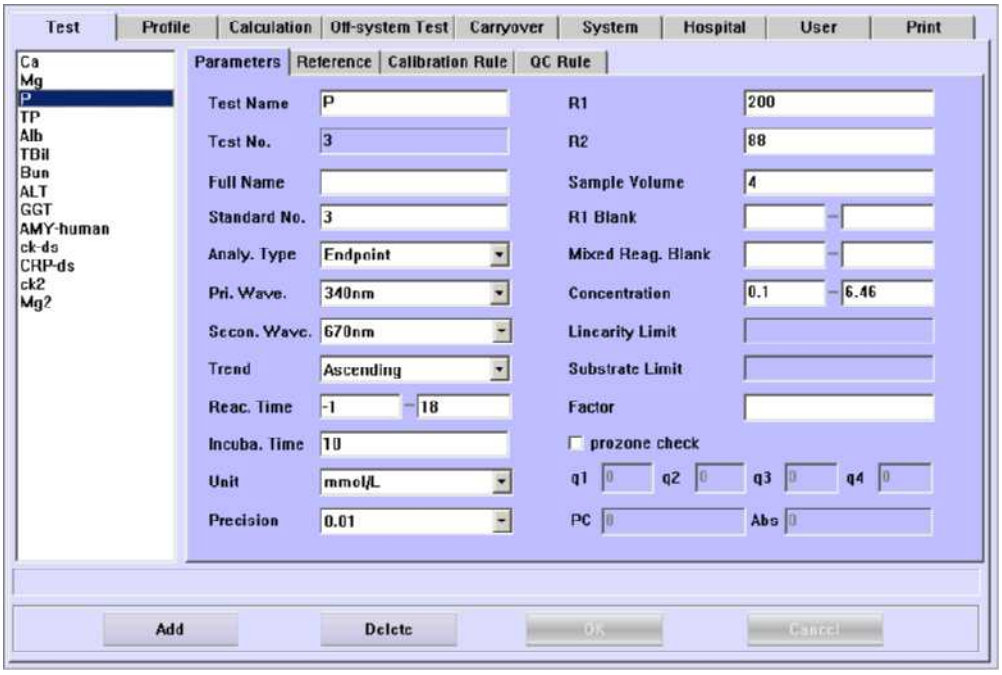


The following sections introduce the ***Setup*** screen by tab.

4.16.1 Test

The ***Test*** screen, as shown in Figure 4-59, is where you can set test parameters, reference ranges, calibration and QC rules of tests.

Figure 4-59 Test Screen

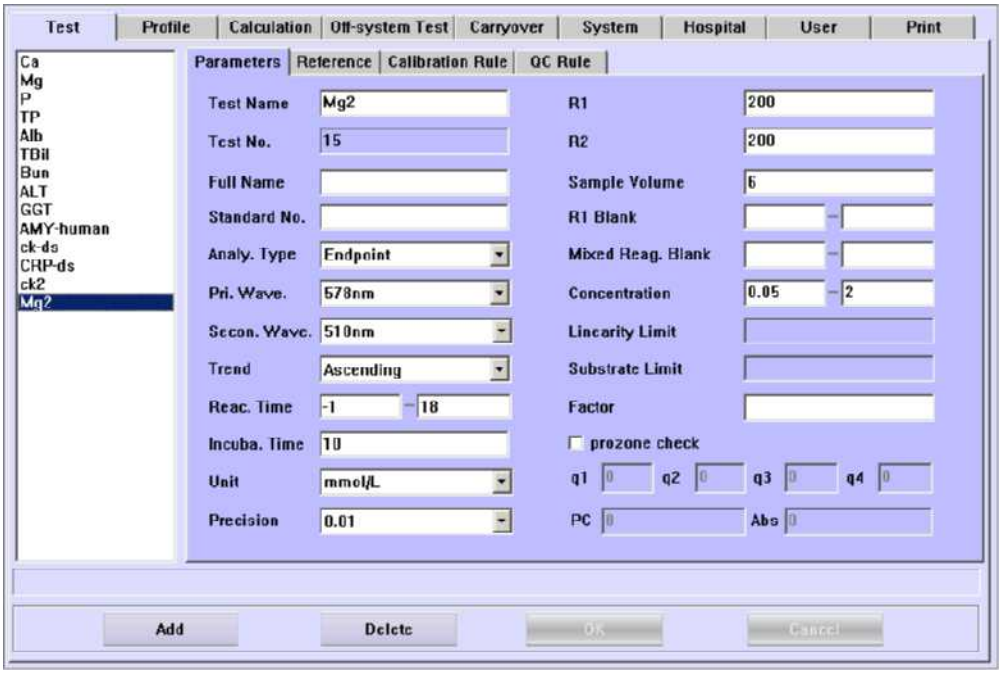


The ***Test*** screen includes four tabs:

- Parameters
- Reference
- Calibration Rule
- QC Rule

4.16.1.1 Parameters

Figure 4-60 Parameters Screen



The following table explains the parameters on the ***Parameters*** screen.

NOTE:

Please set parameters according to instructions of reagents. Improper settings may lead to unreliable test results.

Parameter	Description
Test Name	Name of the test.
Test No.	No. of the test. It cannot be edited.
Full Name	Full name of the test. It can be void.
Standard No.	Standard No. of the test. It can be void.
Analy. Type	Analyzing method, including Endpoint, Fixed-time and Kinetic.
Pri. Wave.	Primary wavelength to be used on the test.

Parameter	Description
Secon. Wave.	Secondary wavelength to be used on the test. It can be void.
Trend	It refers to the changing direction of the absorbance during the reaction process. If the absorbance increases, select ***Ascending***; otherwise, select ***Descending***.
Reac. Time	The unit is period, which equals to 16 seconds. The first edit box is starting time, and the second one is ending time. For the Endpoint method, the reaction time refers to the interval between the start of the reaction and the end of the reaction. For the Kinetic or Fixed-time method, the reaction time refers to the interval between the point when the reaction becomes stabilized and the point when the reaction is no longer monitored. If the reaction time is negative, it means that you should deduct the reagent blank or sample blank. The analyzer defines the time when the photoelectrical data is measured in the reaction beginning period as 0. For the single-reagent test, the starting time refers to the point when the photoelectrical data is measured in the sample-dispensing period; for the double-reagent test, the starting time refers to the point when the photoelectrical data is measured in the second reagent-dispensing period.
Incuba. Time	It applies only to double-reagent tests. The incubation time refers to the interval between the point when the sample is dispensed and the point when the second reagent is dispensed. The unit is period, which equals to 16 seconds.
Unit	Unit of the result.
Precision	Precision of the result.
R1	It refers to the volume (180-450μl) of the first reagent to be dispensed for the reaction. Precision is 1. **NOTE:** The sum of the entered ***R1***, ***Sample Volume*** and ***R2*** (as needed) must be 180μl -500μl.
R2	It refers to the volume (30-450μl) of the second reagent to be dispensed for the reaction. Precision is 1. If the reaction doesn't need the second reagent, enter 0. **NOTE:** The sum of the entered ***R1***, ***Sample Volume*** and ***R2*** (as needed) must be 180μl -500μl.

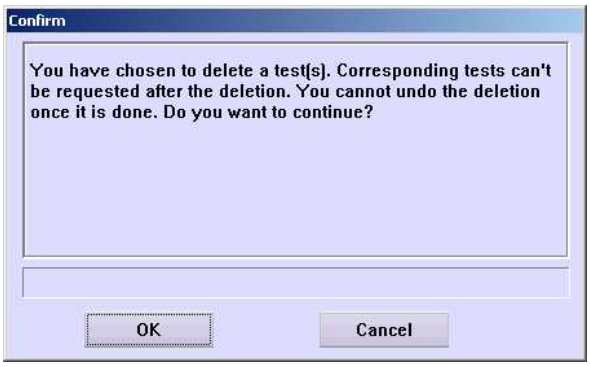
Parameter	Description
Sample Volume	It refers to the sample volume (3-45μl) to be dispensed for the reaction. Precision is 0.5.
	NOTE: The sum of the entered ***R1***, ***Sample Volume*** and ***R2*** (as needed) must be 180μl -500μl.
R1 Blank	It refers to the allowed absorbance range of the R1 blank. (R1 refers to the reagent of a single-reagent test or the first reagent of a double-reagent test)
	The first edit box is the lower limit, and the second one is the upper limit. Void means no check.
Mixed Reag. Blank	It refers to the allowed absorbance range of the mixture of the double-reagent test.
	The first edit box is the lower limit, and the second one is the upper limit. Void means no check.
Concentration	It refers to the range in which the test result is linear with the response.
	The first edit box is the lower limit, and the second one is the upper limit. Void means no check.
Linearity Limit	It applies to the Kinetic method only. It ranges from 0 to 1.
Substrate Limit	It refers to the minimum (descending curve) or maximum (ascending curve) absorbance within the given reaction time and there is still substrate left.
	It applies to the Kinetic and Fixed-time methods only. It ranges from 0 to 50,000.
Factor	For the test with a pre-set calculation factor, you can directly run it without running the calibration first.
	Void means the calculation factor is invalid.
prozone check	Select to check the prozone.
	The following parameters are available only when it is selected.
q1	Prozone test point q1.
	It is available when the ***prozone check*** is selected.
q2	Prozone test point q2.
	It is available when the ***prozone check*** is selected.
q3	Prozone test point q3.
	It is available when the ***prozone check*** is selected.
q4	Prozone test point q4.
	It is available when the ***prozone check*** is selected.

Parameter	Description
PC	Prozone limit PC. It is available when the ***prozone check*** is selected.
Abs	Lower limit of prozone absorbance. It is available when the ***prozone check*** is selected.

NOTE:

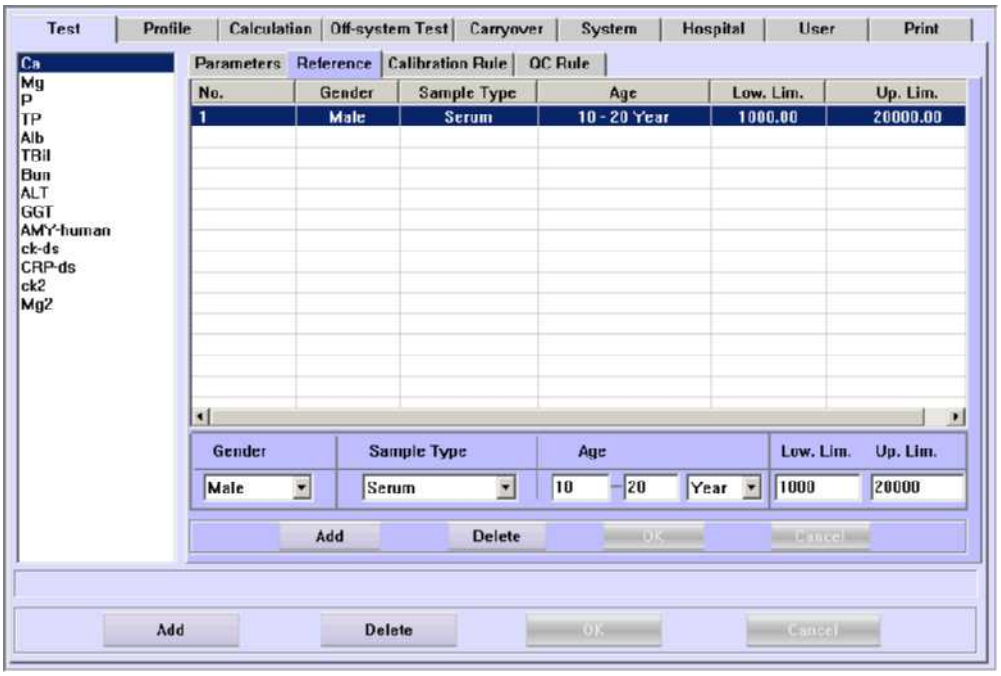
If the ***Factor*** is set, be sure not to set calibration rule at the ***Calibration Rules*** screen. Otherwise, the analyzer will run the calibration test to obtain calibration parameters rather than calculate them with the ***Factor***.

The following table introduces the buttons on the ***Parameters*** screen.

Button	Function
Add	Click this button to add a new test.
Delete	After selecting a test, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected test; click ***Cancel*** to abort the deletion.
OK	After selecting a test and setting parameters for it, click this button to save the setting.
Cancel	After selecting a test and setting parameters for it, click this button to cancel the setting.

4.16.1.2 Reference

Figure 4-61 Reference Screen



The following table explains the parameters on the ***Reference*** screen.

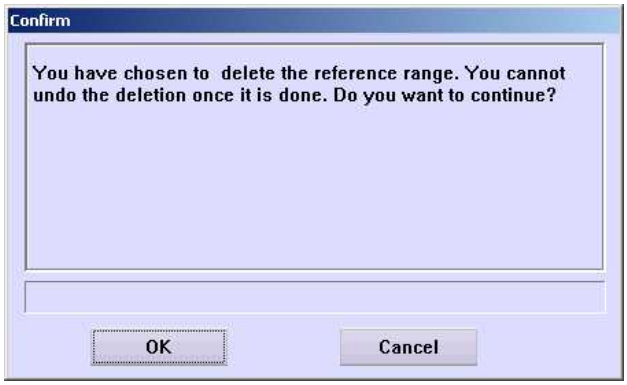
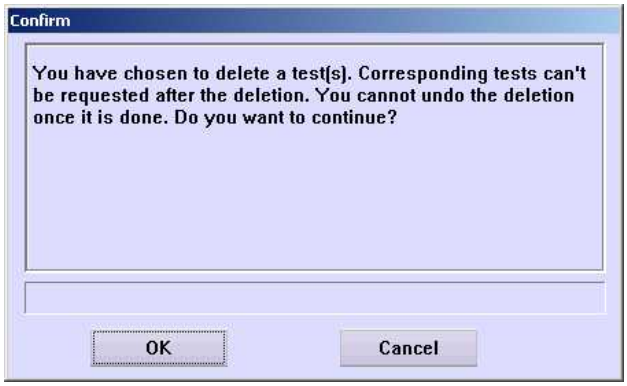
Parameter	Description
Gender	Gender of the patients.
Sample Type	Type of the samples.
Age	Age of the patients.
Low. Lim.	Lower limit of reference range for the sample results.
Up. Lim.	Upper limit of reference range for the sample results.

NOTE:

When the test, ***Gender*** and ***Sample Type*** of two reference ranges are the same, the ranges of ***Age*** should not contain or intersect with each other.

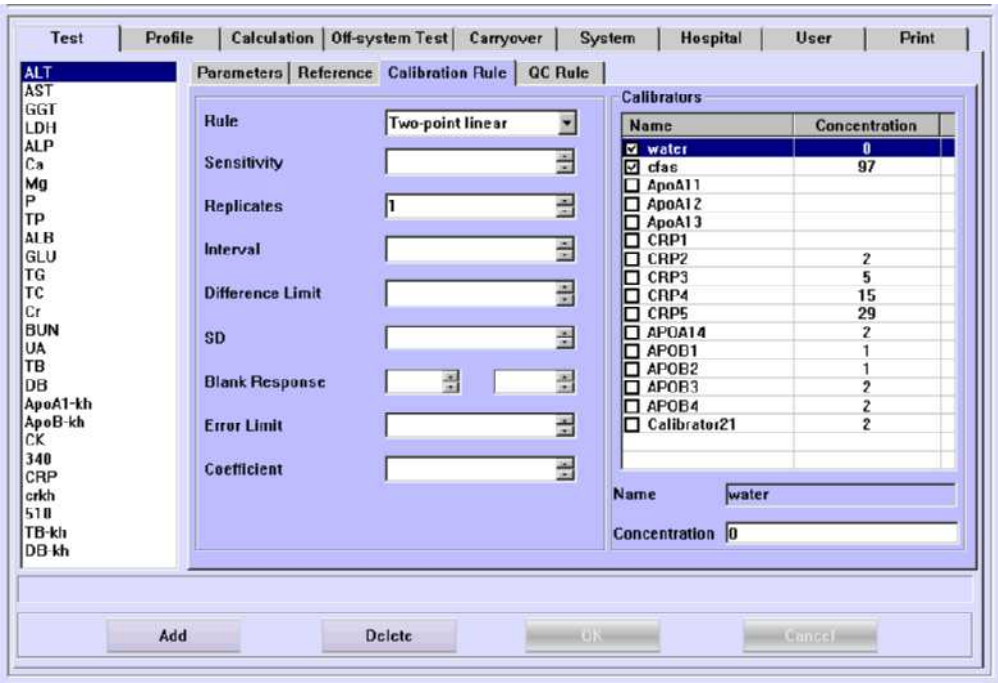
The following table introduces the buttons on the ***Reference*** screen.

Button	Function
Add (up)	Click this button to add a new reference range.

Button	Function
Delete (up)	After selecting a reference range, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected range; click ***Cancel*** to abort the deletion.
Add (down)	Click this button to add a new test.
Delete (down)	After selecting a test, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected test; click ***Cancel*** to abort the deletion.
OK	After selecting a reference range and modifying the relevant parameters of it, click this button to save the setting.
Cancel	After selecting a reference range and modifying the relevant parameters of it, click this button to cancel the setting.

4.16.1.3 Calibration Rule

Figure 4-62 Calibration Rule Screen



The following table explains the parameters on the ***Calibration Rule*** screen.

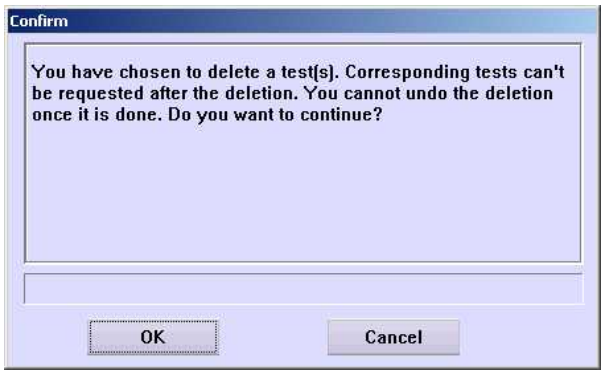
Parameter	Description
Rule	Calibration rule.
Sensitivity	It refers to the difference between the response of the largest-concentration calibrator and that of the smallest-concentration calibrator. The system will alert the user once the actual difference exceeds this limit. Void means no check.
Replicates	It refers to the times of each calibration test. It ranges from 1 to 5.
Interval	It refers to the interval (0-99 days) between two adjacent auto reminding of calibrations. The analyzer will remind you of the next calibration when the time is up. Void or 0 means the analyzer will not remind you the next calibration automatically.
Difference Limit	It refers to the difference between the calibration parameter k (slope of the calibration curve) of current and last calibrations. Void means no check.
SD	SD of calibration curve. It applies to non-linear calibrations only. The default is 0, which means no check.

Parameter	Description
Blank Response	It refers to the response limit for the 0-concentration calibrators. The first edit box is the lower limit, and the second one is the upper limit. Void means no check.
Error Limit	Error limit of repeated tests. It is within 0 and 50000. Void means no check.
Coefficient	Correlation coefficient of calibration curve. It applies to the multi-point linear and non-linear calibrations only. It ranges from 0 to 1. 0 means no check.
Concentration	Concentration of the calibrator for the selected test.

NOTE:

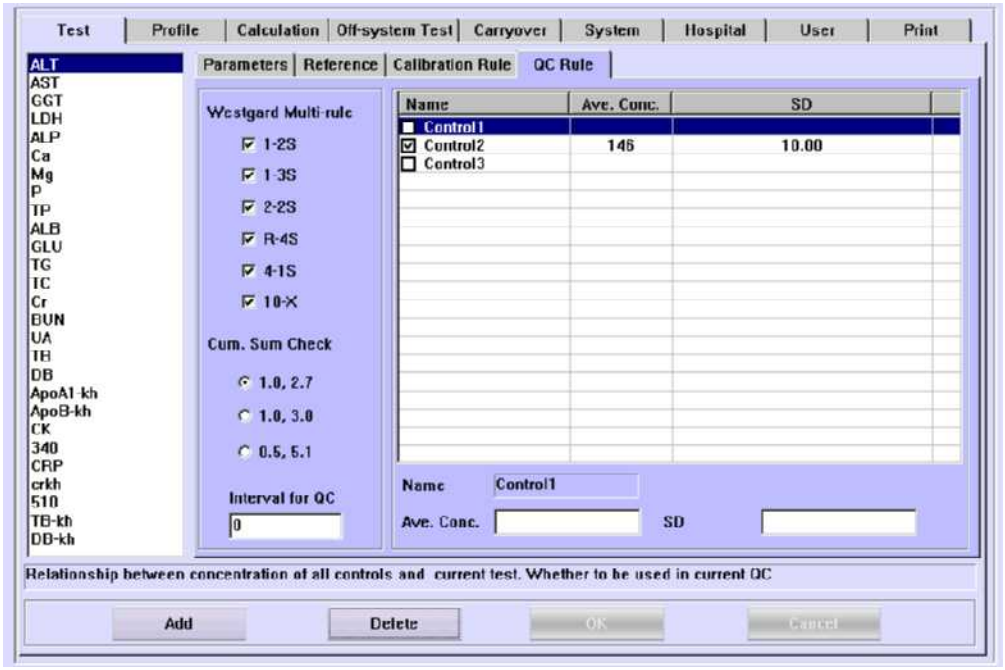
You must determine the number of the calibrators to be used according to the selected calibration rule.

The following table introduces the buttons on the ***Calibration Rule*** screen.

Button	Function
Add	Click this button to add a new test.
Delete	After selecting a test, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected test; click ***Cancel*** to abort the deletion.
OK	After selecting a test and setting the calibration rule for it, click this button to save the setting.
Cancel	After selecting a test and setting the calibration rule for it, click this button to cancel the setting.

4.16.1.4QC Rule

Figure 4-63 QC Rule Screen



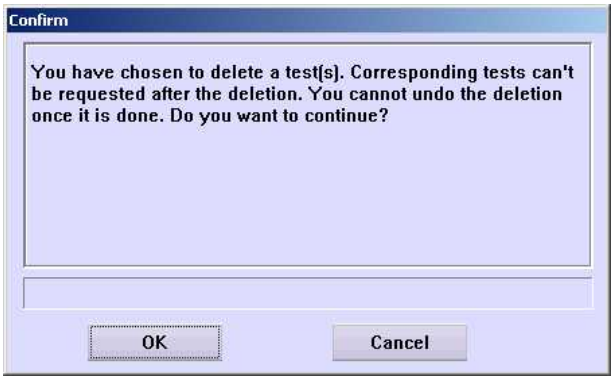
The following table explains the parameters on the ***QC Rule*** screen.

Parameter	Description
Westgard Multi-rule	QC rule. It is related to the test and has nothing to do with the control.
	Set the sub rule for the selected test.
Cum. Sum Check	QC rule. It is related to the test and has nothing to do with the control.
	Set the sub rule for the selected test.
Interval for QC	It refers to the number of sample runs between two adjacent auto QC tests.
	The default is 0, which means the analyzer will not perform QC automatically.
Name	Name of the control.
Ave. Conc.	It refers to the average concentration of the selected control for the selected test.
SD	It refers to the concentration SD of the selected control for the selected test.

NOTE:

If ***Auto QC*** on the ***System*** screen is selected and ***Interval for QC*** on the ***Test*** screen is not 0, the analyzer will automatically insert QC tests among sample tests.

The following table introduces the buttons on the ***QC Rule*** screen.

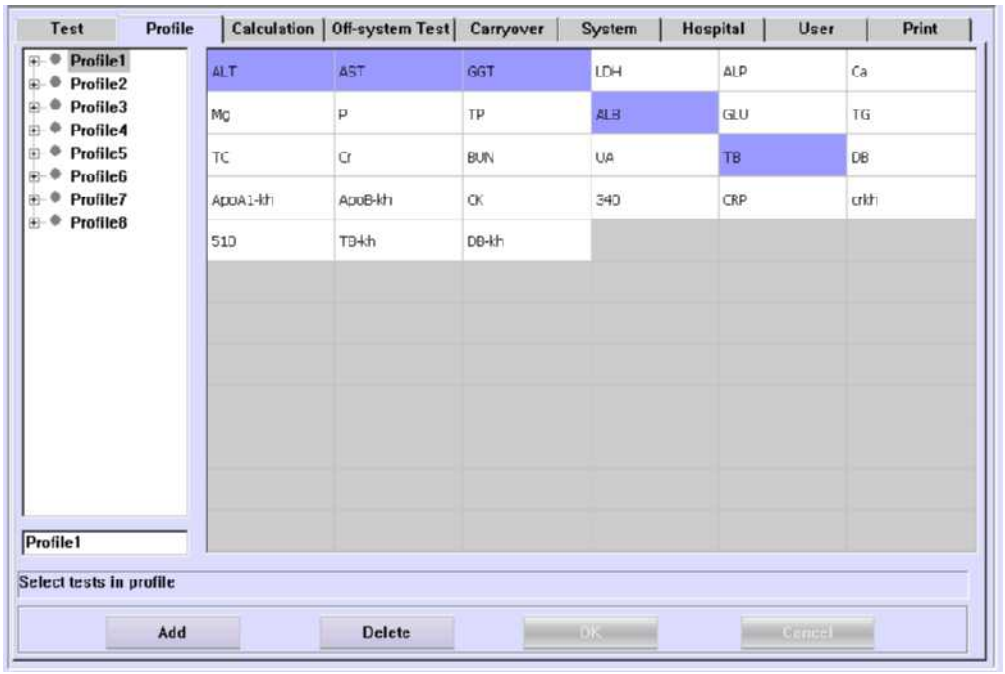
Button	Function
Add	Click this button to add a new test.
Delete	After selecting a test, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected test; click ***Cancel*** to abort the deletion.
OK	After selecting a test and setting QC rule for it, click this button to save the setting.
Cancel	After selecting a test and setting QC rule for it, click this button to cancel the setting.

4.16.2 Profile

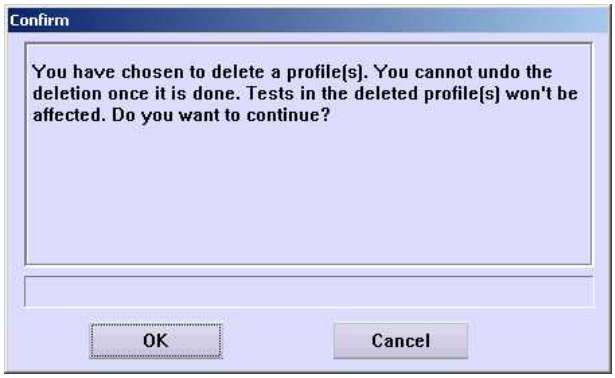
Tests grouped together for certain clinical purpose (for instance liver function) constitute a profile.

The ***Profile*** screen, as shown in Figure 4-64, is where you can set profiles.

Figure 4-64 Profile Screen



The following table introduces the buttons on the screen.

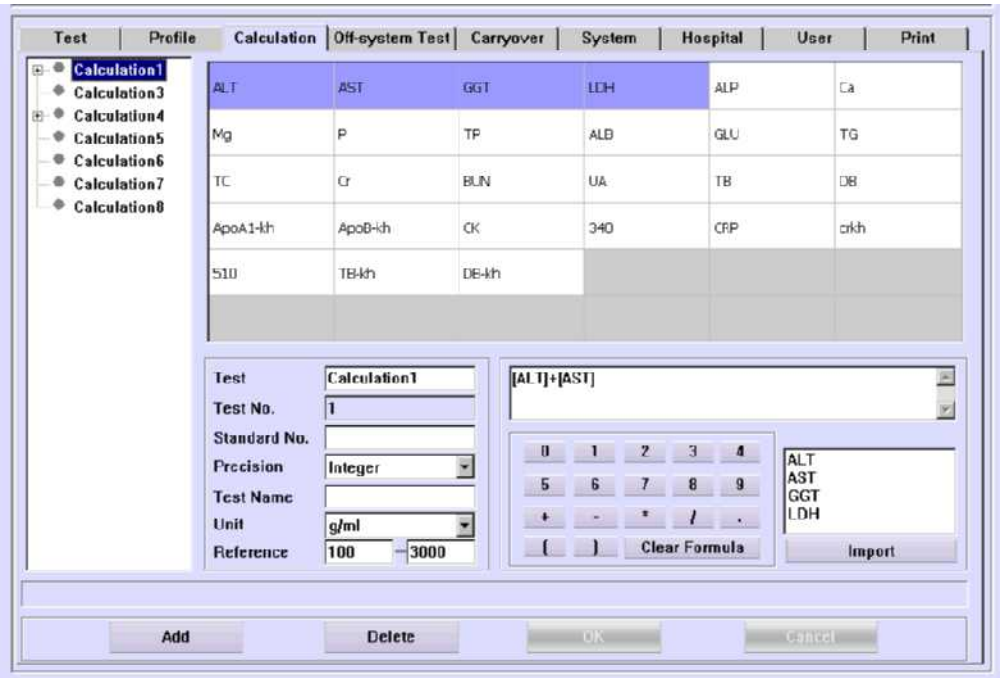
Button	Function
Add	Click this button to add a new profile.
Delete	After selecting a profile, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected profile; click ***Cancel*** to abort the deletion.
OK	After selecting a profile and editing its name or selecting tests for it, click this button to save the setting.
Cancel	After selecting a profile and editing its name or selecting tests for it, click this button to cancel the setting.

4.16.3 Calculation

Calculating certain tests can derive certain new tests of clinical purpose, such as A/G, TBil-DBil and so forth.

The ***Calculation*** screen, as shown in Figure 4-65, is where you can set parameters and formulas for calculation tests.

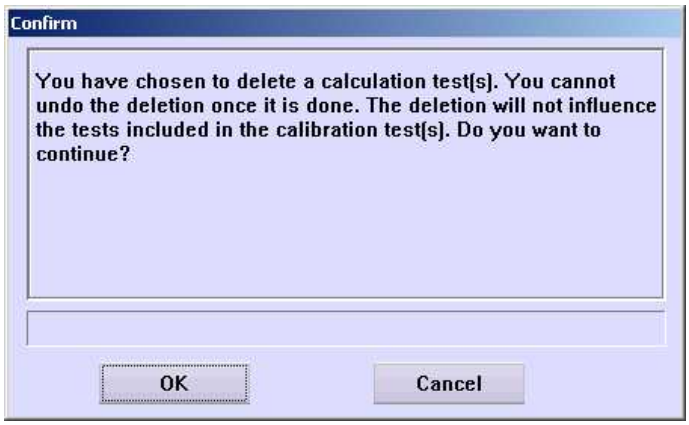
Figure 4-65 Calculation Screen



The following table explains the parameters on the screen.

Parameter	Description
Test	Name of the calculation test.
Test No.	No. of the calculation test. It cannot be edited.
Standard No.	Standard No. of the calculation test. It can be void.
Precision	It refers to number of decimal places the calculation test result should have.
Test Name	Full name of the calculation test. It can be void.
Unit	Unit of the calculation test result.
Reference	Reference range for the calculation test result. The first edit box is the lower limit, and the second one is the upper limit.

The following table introduces the buttons on the screen.

Button	Function
0-9	Click these buttons to enter numbers in the formula.
+ - * /	Click these buttons to enter +, -, * and / symbols in the formula.
. ( )	Click these buttons to enter the decimal point . and ( ) in the formula.
Clear Formula	Click this button to remove the current formula.
Import	After selecting a test in the above box, click this button to add the selected test to the formula.
Add	Click this button to add a new calculation test.
Delete	After selecting a test, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected test; click ***Cancel*** to abort the deletion.
OK	Click this button to save settings of the parameters and formula. Refer to the following text **To Set Calculation Test** for detailed operations.
Cancel	Click this button to ignore settings of the parameters and formula. Refer to the following text **To Set Calculation Test** for detailed operations.

To Set Calculation Test

1 Select a calculation test.

2 Set the parameters of the selected calculation test.

3 Select tests that are related to the selected calculation test from the list on the top screen.

4 Click the 0-9 buttons, operators and ***Import*** button to edit the formula. The 0-9 and operators can also be entered from the keyboard.

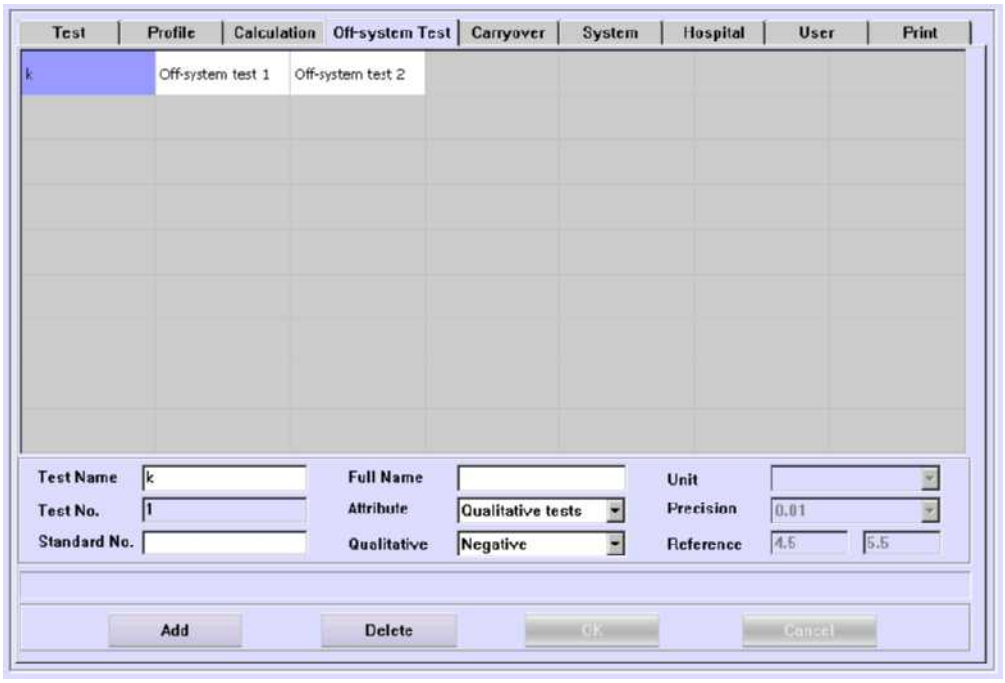
5 If you want to save the settings, click ***OK***; otherwise click ***Cancel***.

4.16.4 Off-system Test

All the tests that are not run by the analyzer are referred to as the off-system tests. You can manually enter the off-system test results into the system to print out them in the patient report.

The ***Off-system Test*** screen, as shown in Figure 4-66, is where you can manage the information of off-system tests.

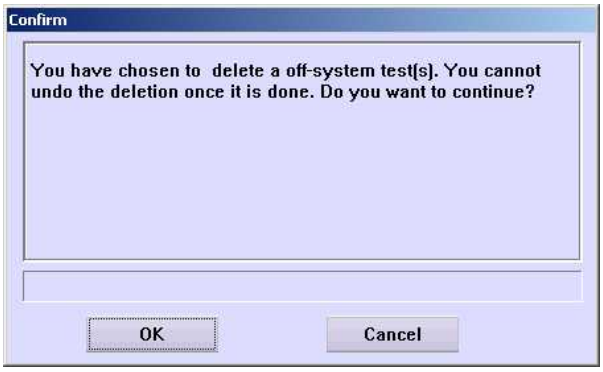
Figure 4-66 Off-system Test Screen



The following table explains the parameters on the screen.

Parameter	Description
Test	Name of the off-system test.
Test No.	No. of the off-system test. It cannot be edited.
Standard No.	Standard No. of the off-system test. It can be void.
Full Name	Full name of the off-system test.
Attribute	It includes ***Qualitative*** tests and ***Quantitative*** tests. When you select ***Qualitative*** tests, the ***Unit***, ***Precision*** and ***Reference*** are disabled; when you select ***Quantitative*** tests, the ***Qualitative*** is disabled.
Qualitative	Qualitative reference for the off-system test result.
Unit	Unit of the off-system test result.
Precision	Precision of the off-system test result.
Reference	Reference range of the off-system test result.

The following table introduces the buttons on the screen.

Button	Function
Add	Click this button to add a new off-system test.
Delete	After selecting a test in the test list, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected off-system test; click ***Cancel*** to abort the deletion.
OK	After selecting an off-system test and modifying the information of it, click this button to save the setting.
Cancel	After selecting an off-system test and modifying the information of it, click this button to cancel the setting.

4.16.5 Carryover

Carryover between adjacent reagents, though minimized by the washing process, is still a factor to be taken into account. This carryover may impose serious effect on certain reagents and consequently on the related test results.

This ***Carryover*** screen is designed so that you can minimize this effect by keeping the tests whose reagents may affect each other as far away from each other as possible, or, if this is not an option, ordering extra washing process before analyzing those tests.

The ***Carryover*** screen, as shown in Figure 4-67, is where you can set the carryover information of reagents among tests.

Figure 4-67 Carryover Screen

At the ***Carryover*** screen, current reagents are listed in the upper field and the reagents that may be affected by the current reagents are listed in the lower field.

The following table introduces the buttons on the screen.

Button	Function
OK	Click this button to save the settings of carryover information. Refer to the following text **To Set Carryover Parameters for a Reagent** for detailed operations.
Cancel	Click this button to ignore the settings of carryover information. Refer to the following text **To Set Carryover Parameters for a Reagent** for detailed operations.

To Set Carryover Parameters for a Reagent

1 Select the desired test from the list tree or the upper field.

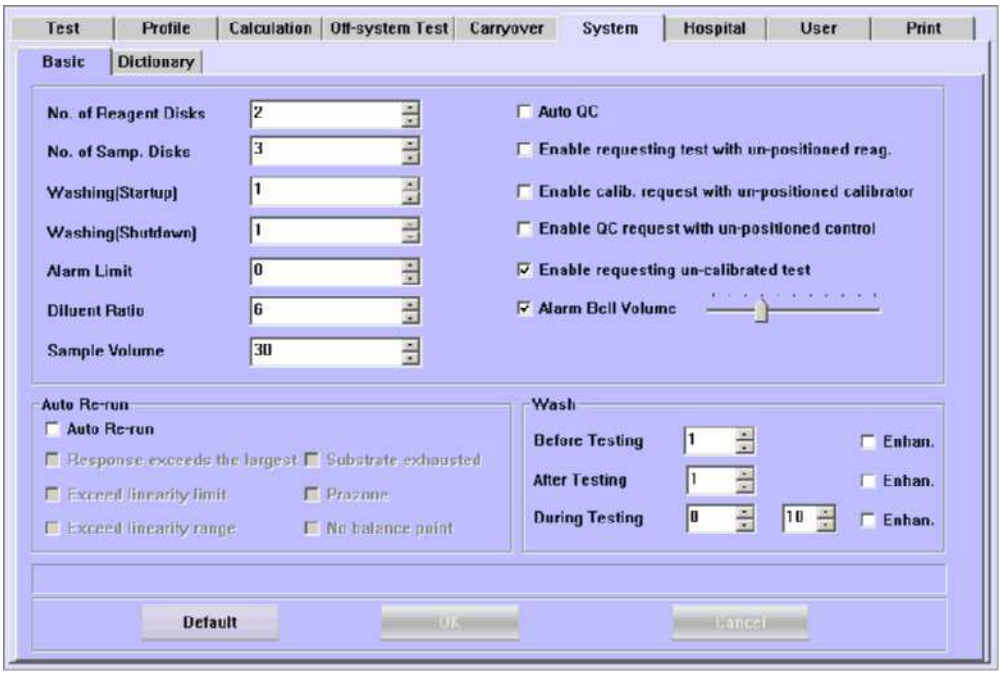
2 Select the reagents that may be affected by the current test from the lower field.

3 If you want to save the settings, click ***OK***; otherwise click ***Cancel***.

4.16.6 System

The ***System*** screen, as shown in Figure 4-68, is where you can set basic parameters and data dictionary for the analyzer.

Figure 4-68 System Screen



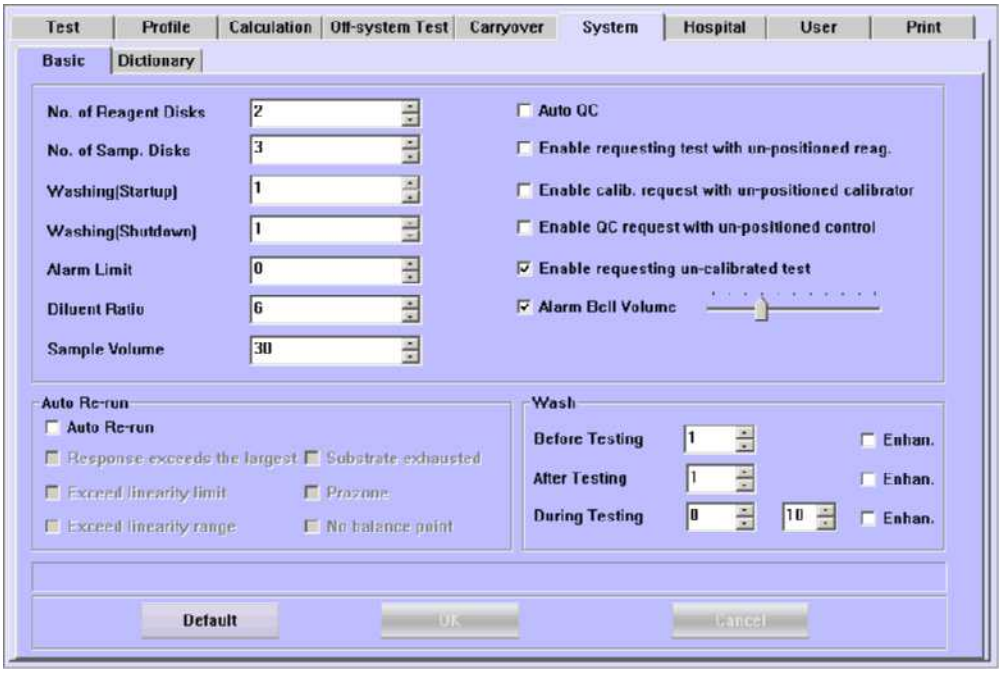
At the ***System*** screen, there are two tabs:

- ***Basic***
- ***Dictionary***

4.16.6.1 Basic

The ***Basic*** screen, as shown in Figure 4-69, is where you can set the basic parameters of the analyzer.

Figure 4-69 Basic Screen



The following table explains the parameters on the screen.

Parameter	Description
No. of Reagent Disks	Number of virtual reagent disks.
No. of Samp. Disks	Number of virtual sample disks.
Washing (Startup)	It refers to the times the analyzer should wash the probe and the mixing bar during every startup.
Washing (Shutdown)	It refers to the times the analyzer should wash the probe and the mixing bar during every shutdown.
Alarm Limit	It refers to the number of tests for insufficient reagent. When the available reagent is not enough for so many tests, the analyzer gives alarm.
Diluent Ratio	It refers to the dilution ratio to dilute the sample when auto re-running. It ranges from 4 to 150.
Sample Volume	It refers to the volume of the sample to be aspirated when auto re-running. It ranges from 3μl to 45μl.
Auto QC	When selected, it means the analyzer will automatically insert QC tests among sample tests.
Enable requesting test with un-positioned reag.	When selected, it means you can request tests with reagent positions not specified, but the analyzer will not run the tests unless the reagents are positioned.
Enable calib. request with un-positioned calibrator	When selected, it means you can request calibration tests with calibrator positions not specified, but the analyzer will not run the calibrations unless the calibrators are positioned.
Enable QC request with un-positioned control	When selected, it means you can request QC tests with control positions not specified, but the analyzer will not run the QCs unless the controls are positioned.

Parameter	Description
Enable requesting un-calibrated test	When selected, it means you can request samples, QCs for the un-calibrated tests that meet the calibration requirements, and the analyzer will request the calibrations automatically.
Auto Re-run	When selected, it means the analyzer will judge whether an auto re-run is necessary based on the conditions listed below. The following conditions are only available when this option is selected.
Response exceeds the largest	When selected, it means the analyzer will re-request the sample automatically if its response is beyond that of the largest-concentration calibrator.
Exceed linearity limit	When selected, it means the analyzer will re-request the sample automatically if its reaction curve is beyond the linearity limit.
Exceed linearity range	When selected, it means the analyzer will re-request the sample automatically if its result is beyond the upper limit of the linearity range.
Substrate exhausted	When selected, it means the analyzer will re-request the sample automatically if the substrate ran out during running. It applies to the Kinetic or Fixed-time method only.
Prozone	When selected, it means the analyzer will re-request the sample automatically if the prozone was found during running.
No balance point	When selected, it means the analyzer will re-request the sample automatically if no balance point was detected during running. It applies to the Endpoint method only.
Before Testing	It refers to the times of auto-washing performed before testing. Selecting ***Enhan.*** Means to wash with a detergent.
After Testing	It refers to the times of auto-washing performed after testing. Selecting ***Enhan.*** Means to wash with a detergent.
During Testing	It refers to the times of auto-washing performed during testing. The first edit box is washing times, and the second one is interval (number of tests). Selecting ***Enhan.*** Means to wash with a detergent.
Alarm Bell Volume	Select it and then drag the drag bar to set the volume of the alarm bell.

NOTE:

If ***Auto QC*** on the ***System*** screen is selected and ***Interval for QC*** on the ***Test*** screen is not 0, the analyzer will automatically insert QC tests among sample tests.

For the ***Diluent Ratio*** and ***Sample Volume*** fields, besides the restrictions mentioned above, you must also guarantee the diluted sample is no less than 180μl and no more than 450μl.

Please set a suitable value for ***Alarm Limit*** so that the analyzer can alert you about insufficient reagents in time.

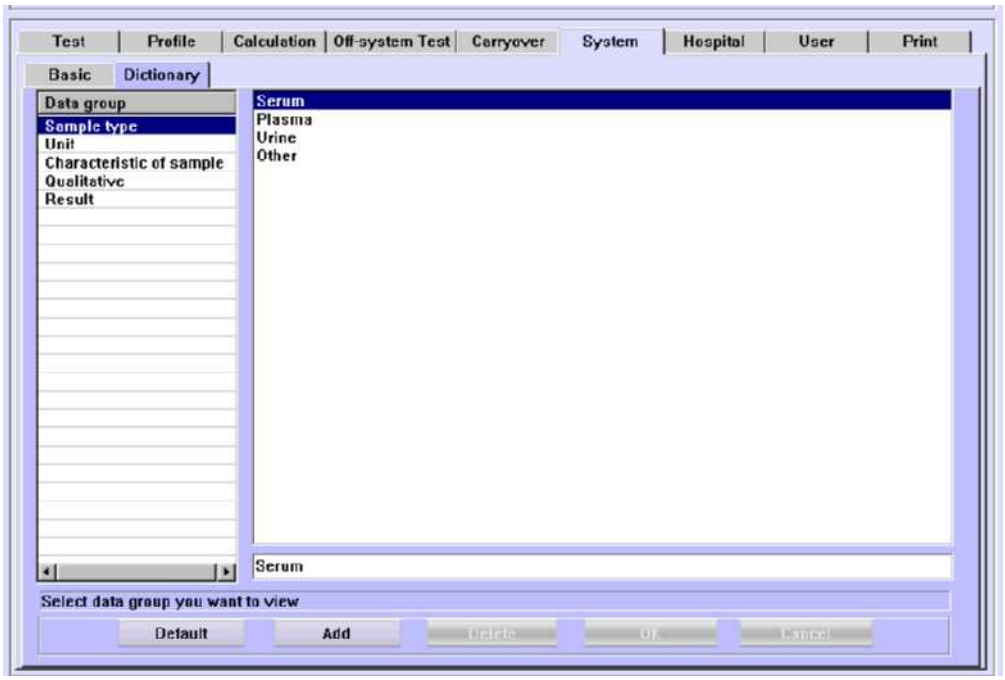
The following table introduces the buttons on the Basic screen.

Button	Function
Default	Click this button to set all parameters on the screen to default values.
OK	After clicking ***Default*** or setting parameters, click this button to save the settings.
Cancel	After clicking ***Default*** or setting parameters, click this button to ignore the settings.

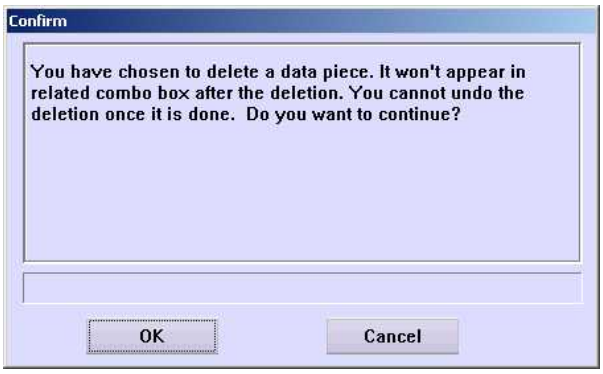
4.16.6.2 Dictionary

The ***Dictionary*** screen, as shown in Figure 4-70, is where you can set the data dictionary of the analyzer, such as sample type, result unit and so forth.

Figure 4-70 Dictionary Screen



The following table introduces the buttons on the screen.

Button	Function
Default	After selecting a data group from ***Data Group***, click this button to clear all the new data pieces and adopt the default ones for the selected data group.
Add	After selecting a data group from ***Data Group***, click this button to add a new data piece to the selected group.
Delete	After selecting a data group from ***Data Group*** and a data piece, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected data piece; click ***Cance***l to abort the deletion.
OK	After clicking the ***Default*** button, or modifying a data piece of a data group, click this button to save the settings.
Cancel	After clicking the ***Default*** button, or modify a data piece of a data group, click this button to ignore the settings.

NOTE:

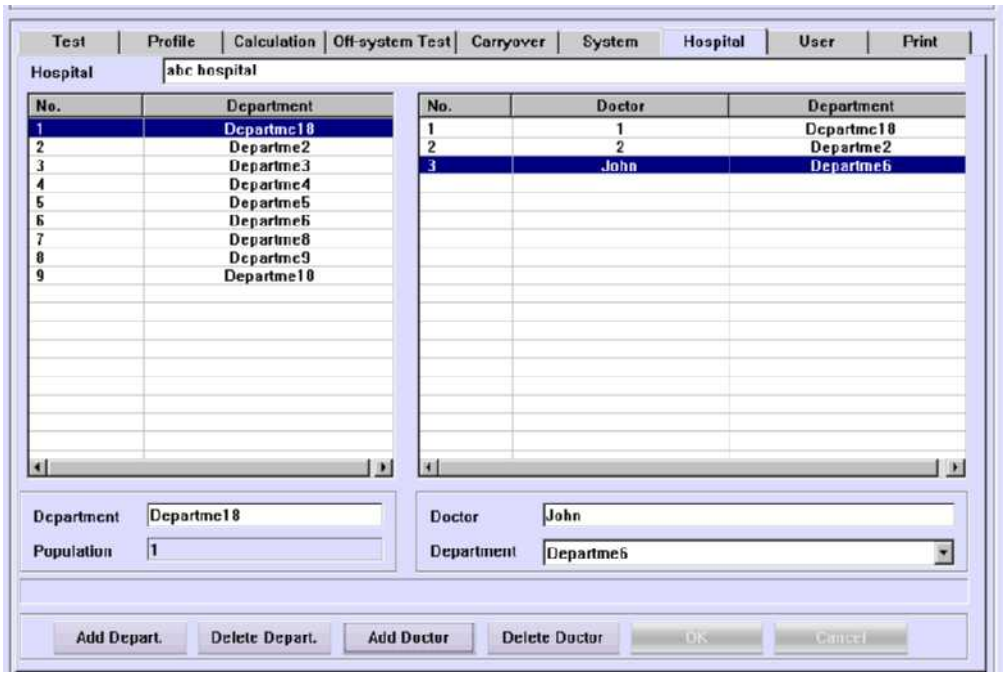
The data pieces given by the analyzer (those in the data group ***Result*** not included) cannot be modified or deleted.

You can modify the data pieces given by the analyzer in the data group ***Result***, which include ***Normal***, ↑, ↓. You can even change them to void but cannot delete them.

4.16.7 Hospital

The ***Hospital*** screen, as shown in Figure 4-71, is where you can set the hospital name, departments and doctor information.

Figure 4-71 Hospital Screen

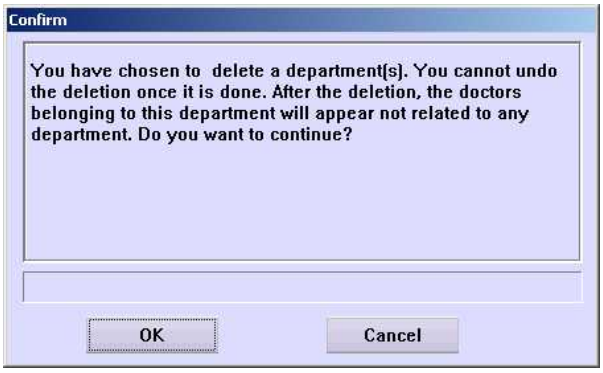
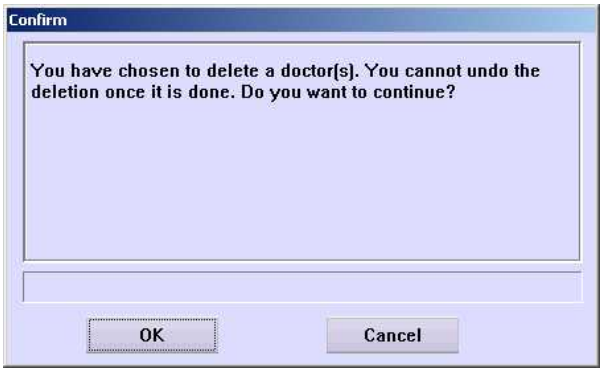


The following table explains the parameters on the screen.

Parameter	Description
Hospital	Name of the hospital.
Department	Name of the department.
Population	Number of doctors in the department. It cannot be edited but obtained by the system according to the doctors of the department.
Doctor	Name of doctor.
Department	Department to which the doctor belongs.

The following table introduces the buttons on the screen.

Button	Function
Add Depart.	Click this button to add a new department.

Button	Function
Delete Depart.	After selecting a department from the department list, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected department; click ***Cancel*** to abort the deletion.
Add Doctor	After selecting a department from the department list, click this button to add a new doctor to the selected department.
Delete Doctor	After selecting a doctor in the doctor list, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected doctor; click ***Cancel*** to abort the deletion.
OK	After modifying the hospital name, department name or doctor information, click this button to save the modification.
Cancel	After modifying the hospital name, department name or doctor information, click this button to ignore the modification.

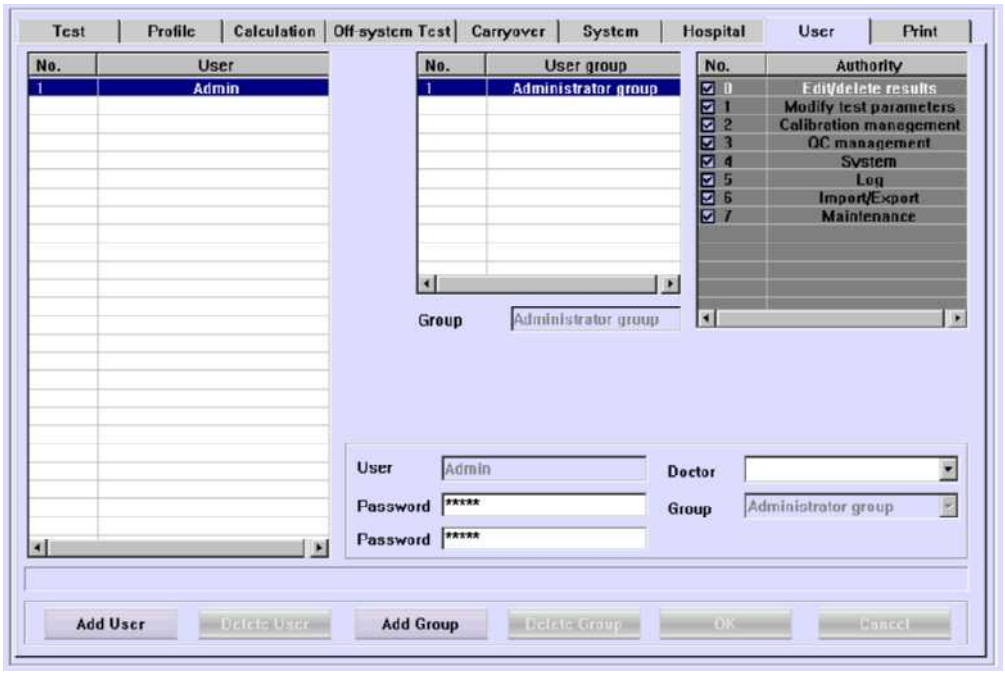
4.16.8 User

The ***User*** screen, as shown in Figure 4-72, is where you can set user authority.

NOTE:

Only users of the administrator group can operate the screen.

Figure 4-72 User Screen



The following table explains the parameters on the screen.

Parameter	Description
Authority	Authorities of a user to use the analyzer.
Group	Name of user group.
User	Name of user.
Password(up)	Password of user.
Password(down)	Confirming password of user. It must be same as the password above.
Doctor	Name of doctor.
Group	User group to which the doctor belongs. Void means the doctor does not belong to any group.

NOTE:

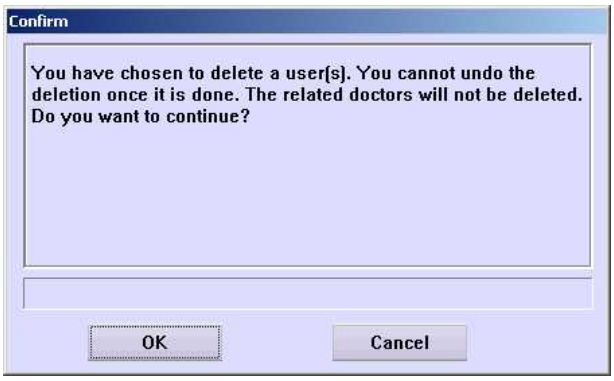
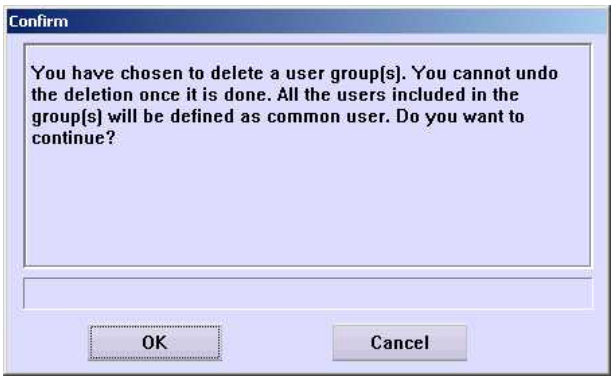
Users of the administrator group possess all authorities that cannot be changed.

"Admin" is the default user who belongs to the administrator group. Its name cannot be changed.

Mindray recommends all users to set their own passwords.

If a user group has none of the authorities as shown on the screen, the user group can perform basic operations except for the ones within the authorities as shown on the screen.

The following table introduces the buttons on the screen.

Button	Function
Add User	Click this button to add a new user. Mindray recommends you to set a password immediately for the user you have added. For detailed instructions of setting user information, refer to the following text **To Set User Information**.
Delete User	After selecting a user in the user list, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected user; click ***Cancel*** to abort the deletion.
Add Group	Click this button to add a new user group to the user group list. You should set authorities for the newly-added user group, which has only basic authorities and none of the ones as shown on the screen. For detailed instructions of setting authorities of user groups, refer to the following text **To Set User Group Information** .
Delete Group	After selecting a user group in the user group list, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected user group; click ***Cancel*** to abort the deletion.

Button	Function
OK	Click this button to save the modification to user group information or user information. For detailed instructions of setting user group information, refer to the following text **To Set User Group Information** . For detailed instructions of setting user information, refer to the following text **To Set User Information**.
Cancel	Click this button to ignore the modification to user group information or user information. For detailed instructions of setting user group information, refer to the following text **To Set User Group Information** . For detailed instructions of setting user information, refer to the following text **To Set User Information**.

To Set User Group Information

1 Select a user group in the user group list.

2 If you don't need to modify the user group name, proceed to the next step.

Otherwise, modify the user group name in the ***Group*** edit box.

3 If you don't need to modify the authorities of a user group, proceed to the next step.

Otherwise, select an authority in the authority list. You can select one or more pieces at one time.

4 If you want to save the settings, click ***OK***; otherwise click ***Cancel***.

To Set User Information

1 Click ***Add User*** to add a new user or select a user from the user list.

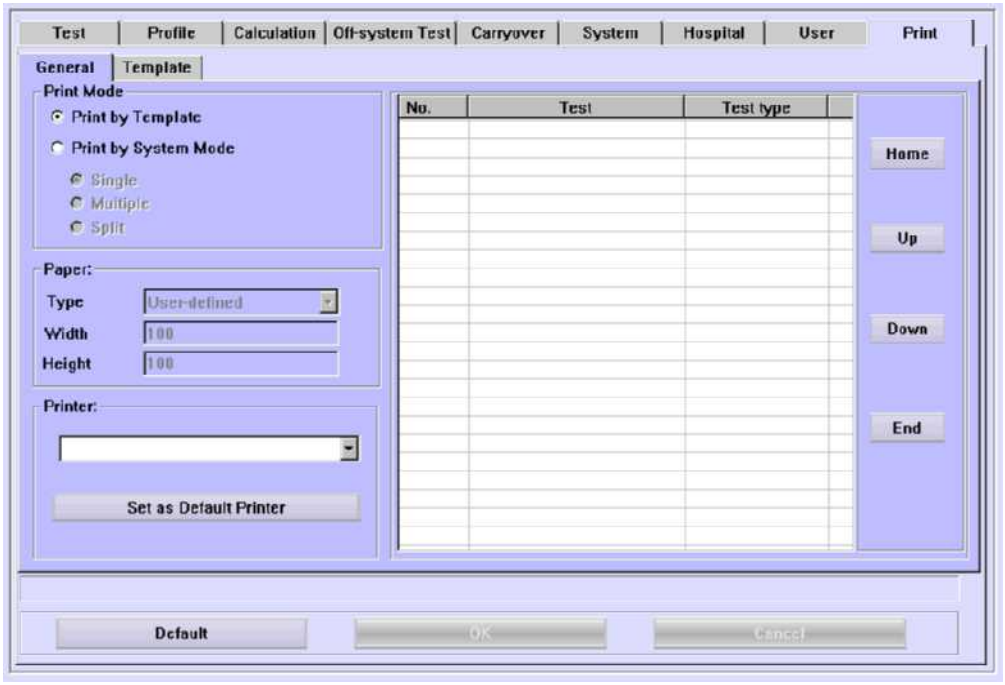
2 Set the parameters like ***User***, ***Password***, ***Doctor*** and ***Group*** as you need.

3 If you want to save the settings, click ***OK***; otherwise click ***Cancel***.

4.16.9 Print

The ***Print*** screen, as shown in Figure 4-73, is where you can set the parameters regarding printing reports.

Figure 4-73 Print Screen

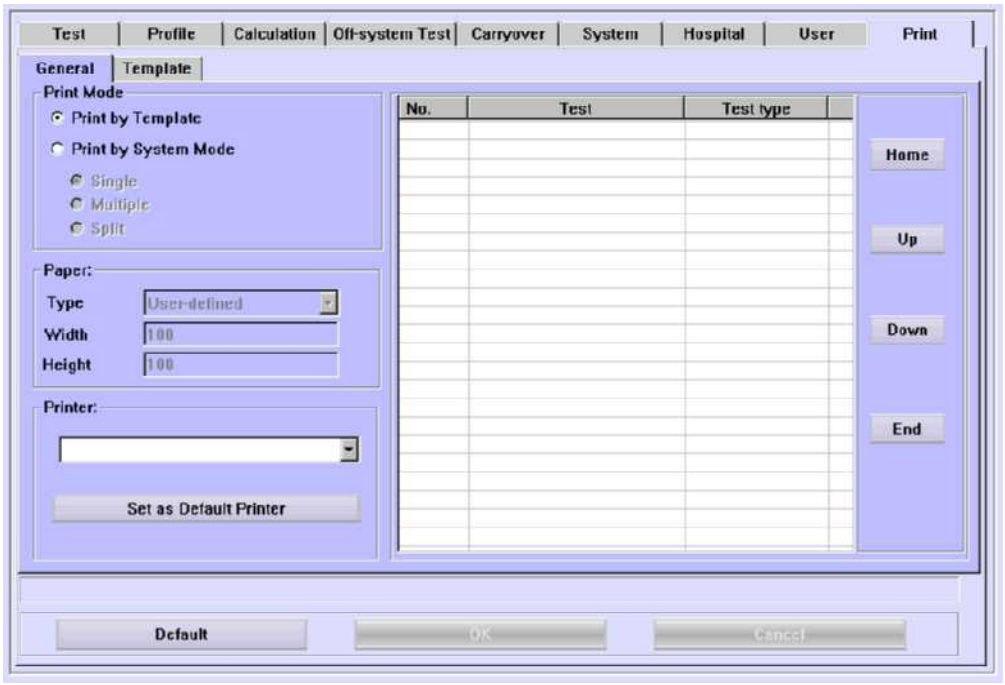


At the ***Print*** screen, there are two tabs:

- ***General***
- ***Template***

4.16.9.1 General

Figure 4-74 General Screen



The following table explains the parameters on the screen.

Parameter	Description
Print by Template	Print the patient report by the template.
Print by System Mode	User can select to print one or more reports on one page. ***Single*** means you can print only one report on each page; ***Multiple*** means you can continue printing reports on the page if the remaining space is enough for one or more reports; ***Split*** means you can continue printing other reports on the page no matter whether the remaining space is enough or not.
Type	It is only available when you select ***Print by System Mode***. Type of printing paper you wish to use.
Width	It is only available when you select ***Print by System Mode***. Width of printing paper. The unit is mm.
Height	It is only available when you select ***Print by System Mode***. Height of printing paper. The unit is mm.
Printer:	Select a printer.

The following table introduces the buttons on the screen.

Button	Function
Home	After selecting a test, click this button to set it as the first one appearing on the patient report.
Up	After selecting a test, click this button to move it to the previous position on the patient report.
Down	After selecting a test, click this button to move it to the next position on the patient report.
End	After selecting a test, click this button to set it as the last one appearing on the patient report.
Set as Default Printer	After selecting a printer, click this button to set it as the default one.
Default	Click this button to adopt the default printing parameters.
OK	After clicking the ***Default*** button or setting the printing parameters, click this button to save the settings.
Cancel	After clicking the ***Default*** button or setting the printing parameters, click ***Cancel*** to ignore the settings.

4.16.9.2 Template

The ***Template*** screen, as shown in Figure 4-75, is where you can set template for printing various reports and curve diagrams.

Figure 4-75 Template Screen

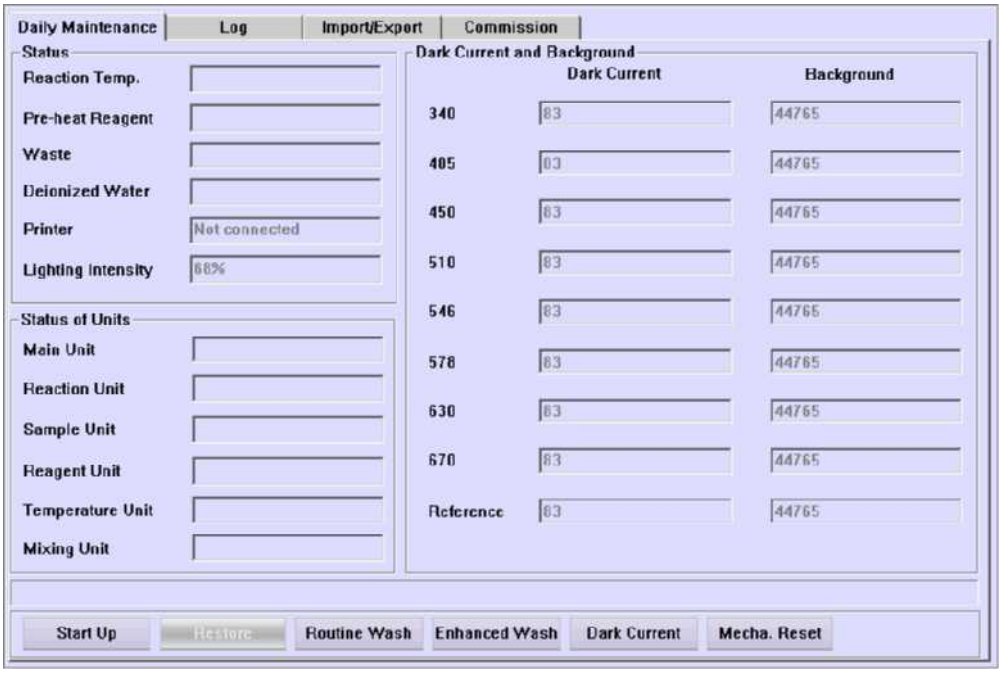
The following table introduces the buttons on the screen.

Button	Function
template buttons	Click these buttons to select .bcr files as the templates.
Def.	Click this button to adopt the default template.
Prev.	Click this button to preview the current template.
Default	Click to adopt the default templates for all reports, curve diagrams and charts, etc.
OK	After clicking the template button, Def. or Default button, click this button to save the settings.
Cancel	After clicking the template button, Def. or Default button, click this button to ignore the settings.

4.17 Maintenance

Click ***Maintenance*** to enter the screen as shown in Figure 4-76, where you can maintain the analyzer and data.

Figure 4-76 Maintenance Screen



The following sections introduce the ***Maintenance*** screen by tab.

4.17.1 Daily Maintenance

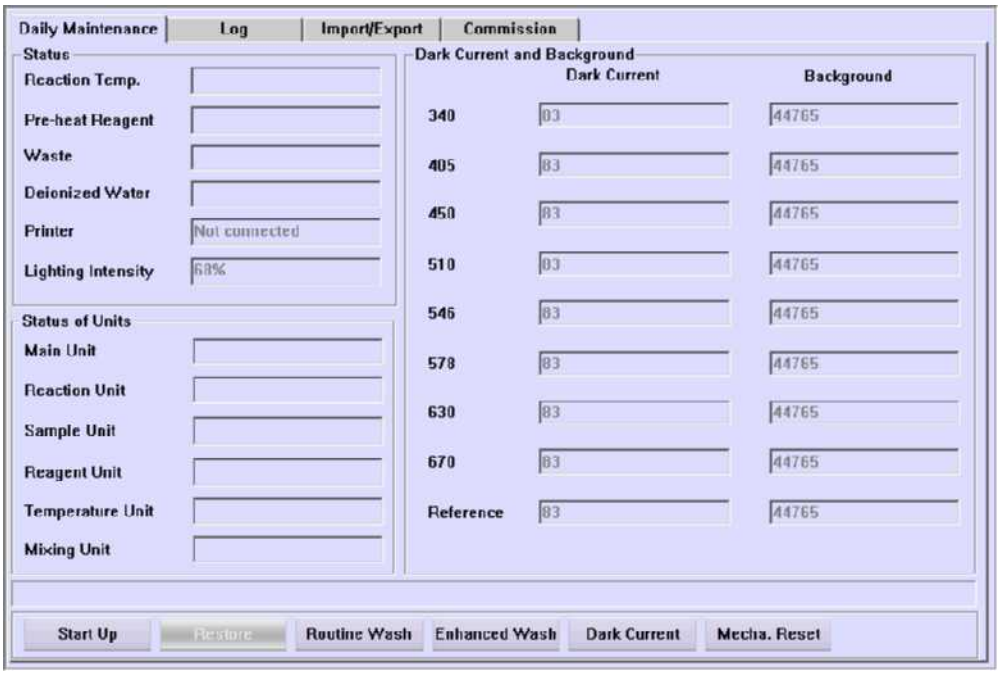
The ***Daily Maintenance*** screen, as shown in Figure 4-77, is where you can maintain the analyzer generally.

CAUTION:

Do not perform any maintenance actions unless you are certain the analyzer is not testing.

When commissioning, you can send a new instruction only after the current one has been completed. Otherwise, warning messages will be given probably. If you mis-send a new instruction, you can send it again after the current one has been completed and at least 30 seconds have been passed after the last sending.

Figure 4-77 Daily Maintenance Screen



The ***Daily Maintenance*** screen can display not only real-time status of each unit of the analyzer, but also the dark current and background of every wavelength.

Dark current refers to the AD output of the wavelength when the lamp of the photometer is switched off. Background refers to the AD output of the wavelength when there is no cuvette in the optical path.

The following table introduces the buttons on the screen.

Button	Function
Startup	Click this button to start startup check again after commissioning or the connection between the analyzing unit and the operation unit failed.
Restore	When failure occurs, click this button to try to restore the analyzer to normal state.
Routine Wash	Click this button to wash the probe and the mixing bar with deionized water.
Enhanced Wash	Click this button to wash the probe and the mixing bar with a detergent.

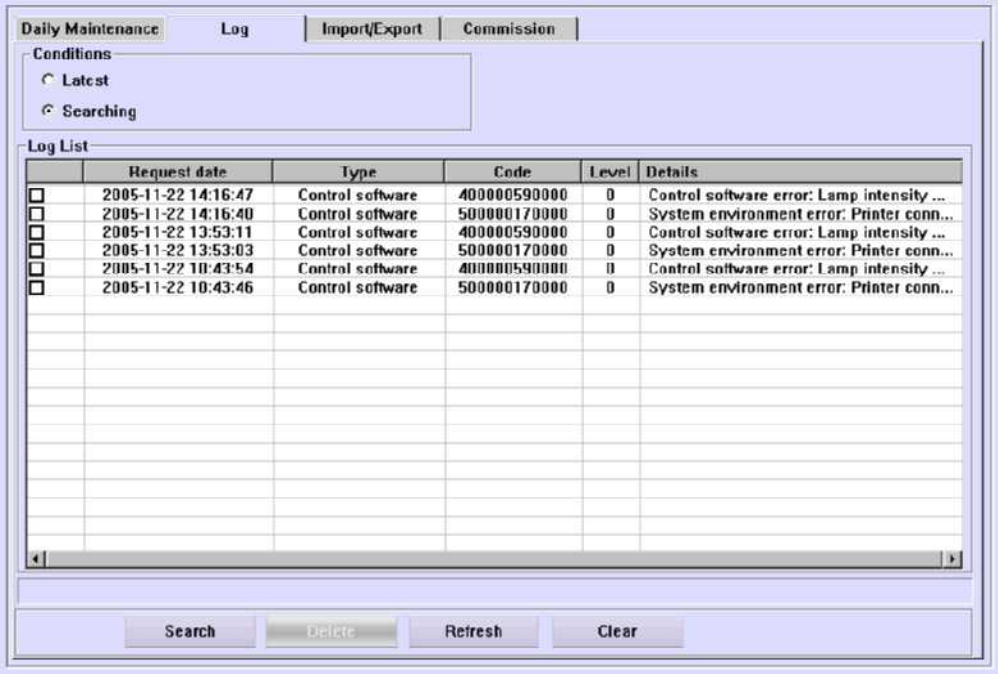
Button	Function
Dark Current	Click this button to test the dark current and display the results.
Mecha. Reset	Click this button to reset all mechanical parts of the analyzer.

4.17.2 Log

The ***Log*** screen, as shown in Figure 4-78, is where you can search and delete the alarm messages. You can take corresponding actions according to the alarm messages.

For detailed information about troubleshooting, refer to **6 Troubleshooting**.

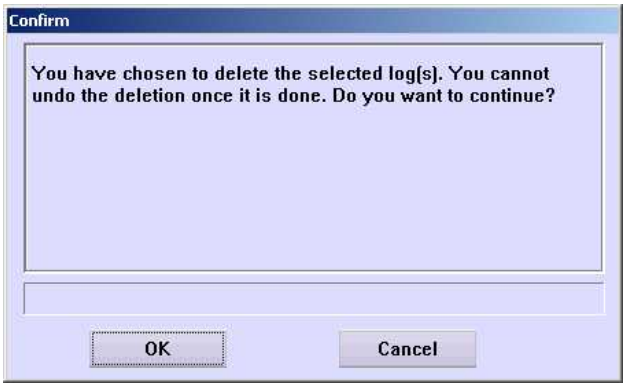
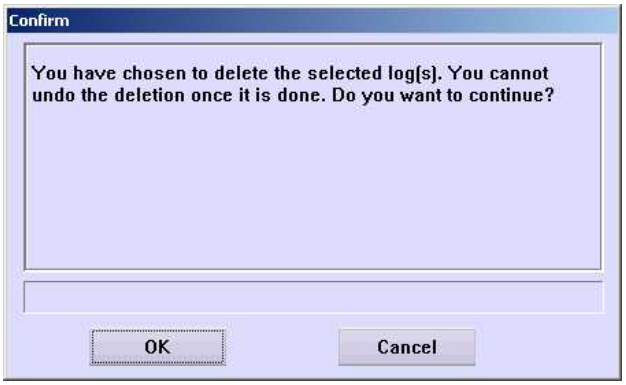
Figure 4-78 Log Screen



At the ***Log*** screen, when you select the ***Latest*** field, the ***Log List*** will display all logs of the current day; when you select ***Searching***, the ***Log Searching Conditions*** dialog box will pop up, where you can set the searching conditions as needed. For detailed operations, refer to the following text ***Log Searching Conditions***.

The following table introduces the buttons on the screen.

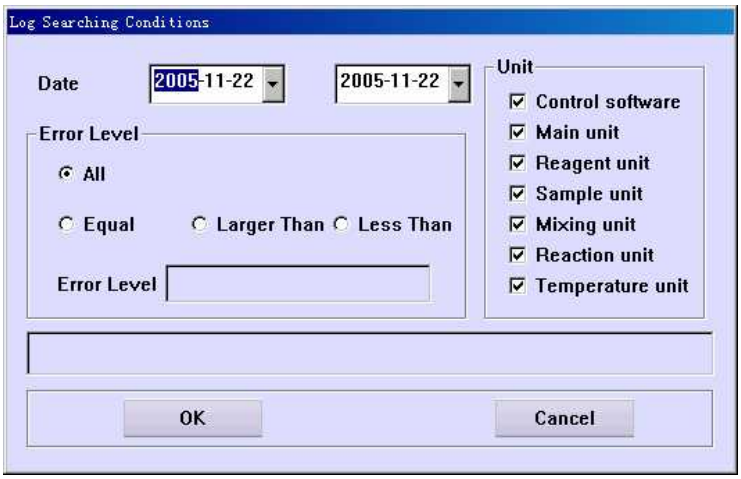
Button	Function
Search	Click this button to pop up the ***Log Searching Conditions*** dialog box, where you can set conditions and search for qualified logs. For more information about the ***Log Searching Conditions*** dialog box, refer to the following text **Log Searching Conditions**.

Button	Function
Delete	After selecting the check box on the left of a log(s) in the ***Log List***, click this button to pop up the following dialog box.  Click ***OK*** to delete the selected log(s); click ***Cancel*** to abort the deletion.
Refresh	Click this button to refresh the logs according to the searching conditions you have set.
Clear	Click this button to pop up the following dialog box.  Click ***OK*** to remove all logs currently displayed from the database and to clear the ***Log List***; click ***Cancel*** to abort the deletion.

Log Searching Conditions

The ***Log Searching Conditions*** dialog box, as shown in Figure 4-79, is where you can set the log searching conditions.

Figure 4-79 Log Searching Conditions Dialog Box



The following table explains the parameters of the dialog box.

Parameter	Description
Date	Date of log. The first edit box is starting time, and the second is ending time.
Error Level	Level of logs. ***All*** refers to logs of all levels; ***Equal***, ***Larger Than*** or ***Less Than*** refer to the logs with level equal to, larger than or less than the one set in the ***Error Level*** field.
Unit	Select a unit(s) to which the logs you want to search correspond.

The following table introduces the buttons of the dialog box.

Button	Function
OK	After setting the conditions, click this button to confirm and display the qualified logs at the ***Log*** screen.
Cancel	Click this button to abort the searching.

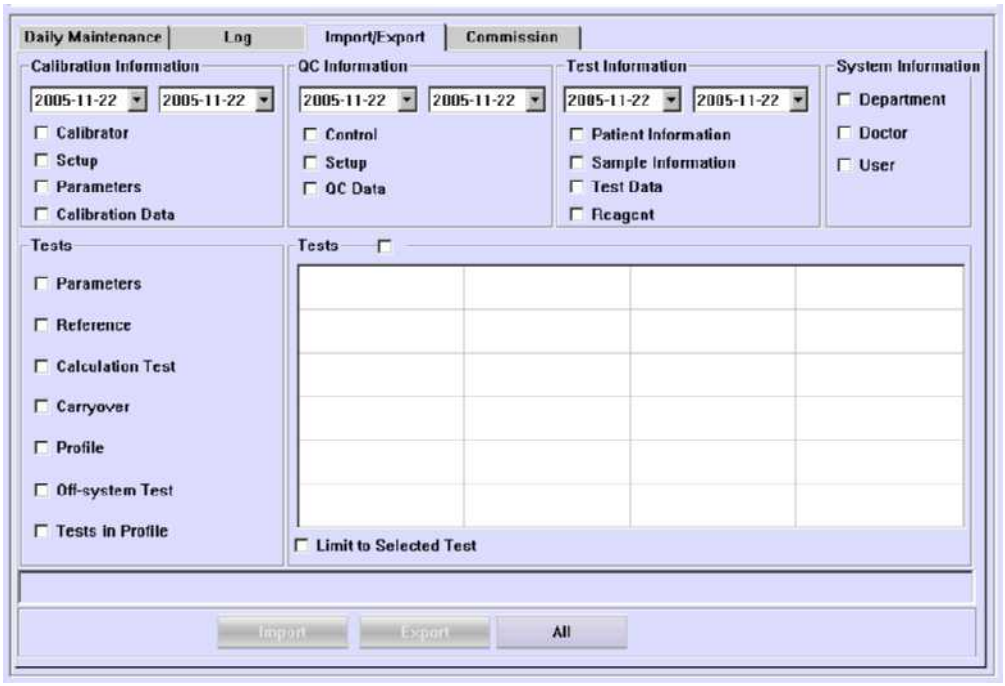
4.17.3 Import/Export

The ***Import/Export*** screen, as shown in Figure 4-80, is where you can import or export parameters and test results.

CAUTION:

You can import or export parameters and test results when the analyzer is not testing.

Figure 4-80 Import/Export Screen



NOTE:

This analyzer automatically backs up its parameters and test results. Exporting data refers to saving some data to a file temporarily for transmitting or updating purposes. It is not the same as backing up the database. Mindray recommends this exporting function not be used unless necessary.

The imported data will overwrite the corresponding data in the analyzer's database. Before importing data, ensure the corresponding data is exported to another file. Mindray recommends this importing function not be used unless necessary.

The file used for exporting or importing data should be a .SHD file.

The ***Import/Export*** screen displays the options you can import or export. The drop-down list boxes in the screen are used to set date ranges, including starting time and ending time.

When importing or exporting test-related information, selecting ***Limit to Selected Test*** means to importing or exporting that of selected test(s) in the ***Tests*** field only. Mark the check box on the right of ***Tests*** field to select or deselect all the tests.

The following table introduces the buttons on the screen.

Button	Function
Import	After selecting options, click this button to import them from the selected .SHD file.
Export	After selecting options, click this button to export them to the selected .SHD file.

Button	Function
All	Click this button to select all options on the screen and the button will change into ***None***; click ***None*** to deselect the selected options.

4.17.4 Commission

The ***Commission*** screen, as shown in Figure 4-81, is where you can maintain and commission the analyzer.

CAUTION:

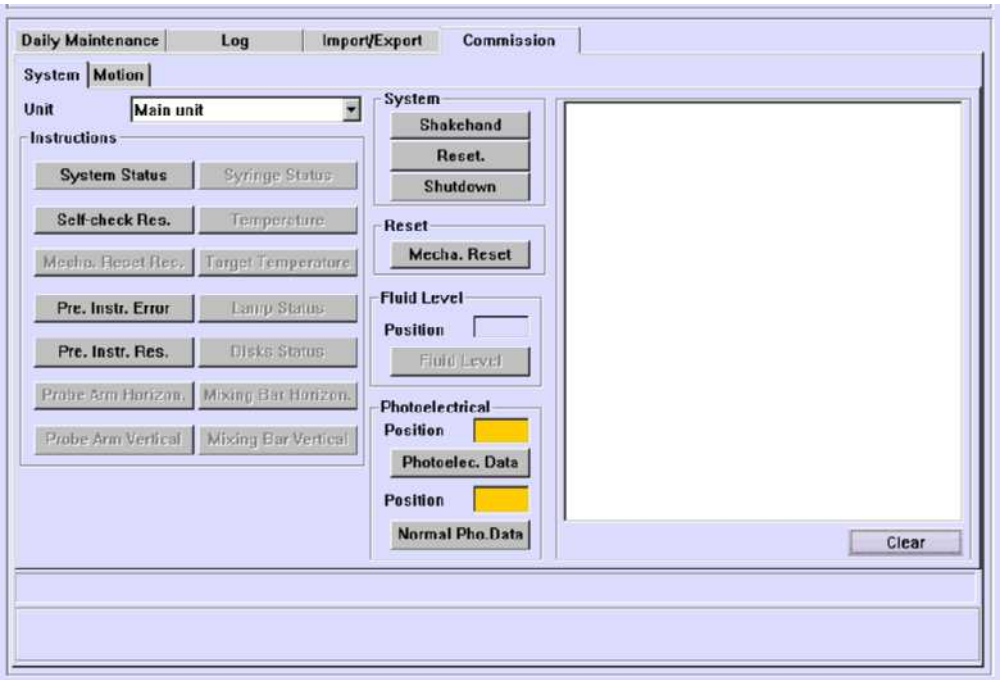
Do not perform any maintenance actions unless the analyzer is not testing.

When commissioning, you can send a new instruction only after the current one has been completed. Otherwise, warning messages will be given probably. If you mis-send a new instruction, you can send it again after the current one has been completed and at least 30 seconds have been passed after the last sending.

NOTE:

You are recommended to click the ***Startup*** button on the ***Daily Maintenance*** screen to start the startup check after commissioning. Refer to **4.17.1 Daily Maintenance** for details.

Figure 4-81 Commission Screen



There are two tabs on the ***Commission*** screen:

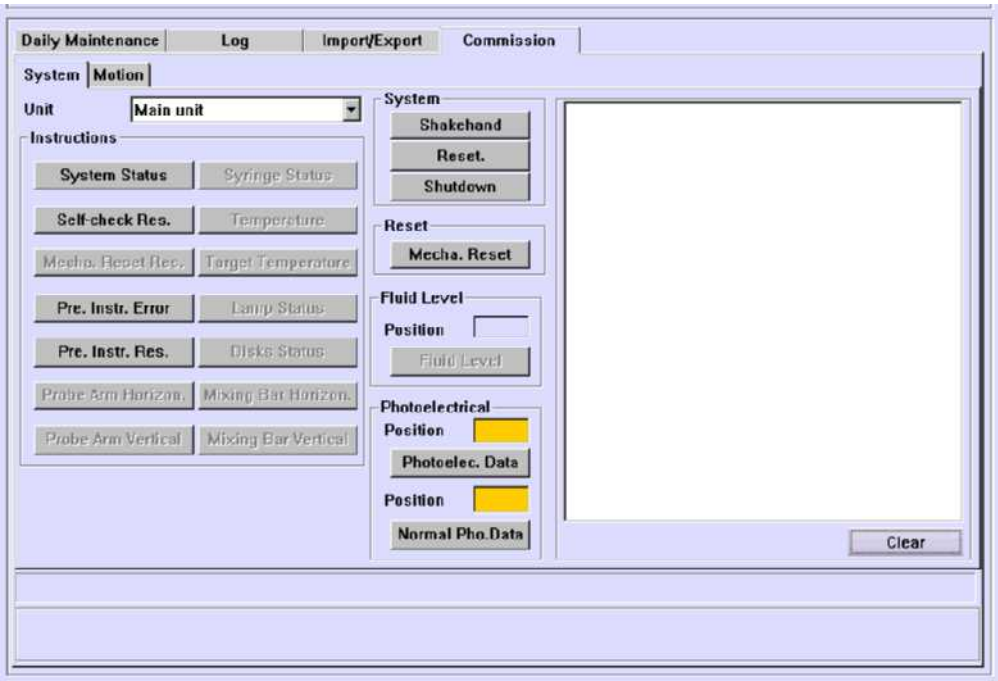
- ***System***
- ***Motion***

The following sections introduce the ***Commission*** screen by tab.

4.17.4.1 System

The ***System*** screen, as shown in Figure 4-82, is where you can maintain the analyzer.

Figure 4-82 System Screen



The following table explains the parameters on the screen.

Parameter	Description
Unit	Select a unit you want to maintain.
Position	Enter a position No. to search relevant parameters.

The following table introduces the buttons on the screen.

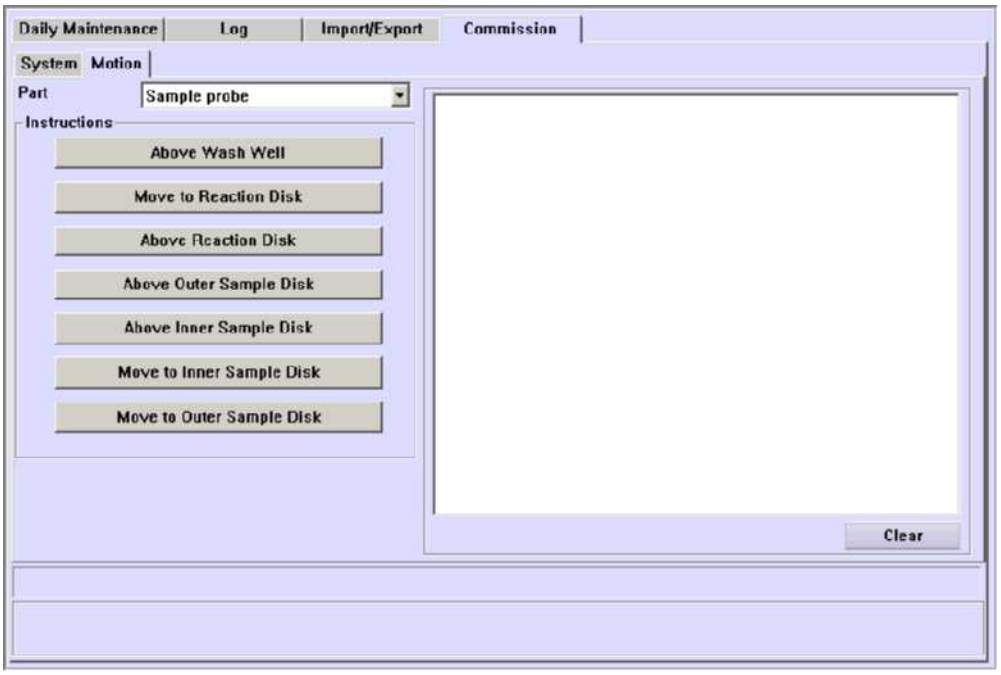
Button	Function
System Status	Click this button to send an instruction to check the status of the specified unit.
Self-check Res.	Click this button to send an instruction to check the self-check results of the specified unit.
Mecha. Reset Res.	Click this button to send an instruction to check the mechanical reset result of the specified unit.
Pre. Instr. Error	Click this button to send an instruction to check the previous instruction error.

Button	Function
Pre. Instr. Res.	Click this button to send an instruction to check the previous instruction result.
Probe Arm Horizon.	Click this button to send an instruction to check the horizontal status of the probe arm.
Probe Arm Vertical	Click this button to send an instruction to check the vertical status of the probe arm.
Syringe Status	Click this button to send an instruction to check the status of the syringe.
Temperature	Click this button to send an instruction to check the temperature of the reaction disk.
Target Temperature	Click this button to send an instruction to check the target temperature of the reaction disk.
Lamp Status	Click this button to send an instruction to check the status of the lamp.
Disks Status	Click this button to send an instruction to check the status of the specified disk.
Mixing Bar Horizon.	Click this button to send an instruction to check the horizontal status of the mixing bar.
Mixing Bar Vertical	Click this button to send an instruction to check the vertical status of the mixing bar.
Shakehand	Click this button to send an instruction to shake hand with the specified unit.
Reset	Click this button to send an instruction to reset the specified unit.
Shutdown	Click this button to send an instruction to inform the specified unit of shutdown.
Mecha. Reset	Click this button to send an instruction to reset the mechanical parts.
Fluid Level	After entering a number in the ***Position*** field, click this button to send an instruction to check the fluid level of specified position on the specified unit.
Photoelec. Data	After entering a number in the ***Position*** field, click this button to send an instruction to check the photoelectrical data of the specified position.
Normal Pho. Data	After entering a number in the ***Position*** field, click this button to send an instruction to check the normal photoelectrical data of the specified position.
Clear	Click this button to remove all instructions displayed in the above window.

4.17.4.2 Motion

The ***Motion*** screen, as shown in Figure 4-83, is where you can commission parts of the analyzing unit.

Figure 4-83 Motion Screen



The following table explains the parameter on the screen.

Parameter	Description
Part	Select a part you want to commission.

The following table introduces the buttons on the screen.

Part	Button	Function
Sample probe	Above Wash Well	Click this button to send an instruction to move the sample probe to a position above the wash well.
	Move to Reaction Disk	Click this button to send an instruction to move the sample probe to the dispensing position at the reaction disk.
	Above Reaction Disk	Click this button to send an instruction to move the sample probe to a position above the reaction disk.
	Above Outer Sample Disk	Click this button to send an instruction to move the sample probe to a position above the outer circle of the sample disk.
	Above Inner Sample Disk	Click this button to send an instruction to move the sample probe to a position above the inner circle of the sample disk.

Part	Button	Function
	Move to Inner Sample Disk	Click this button to send an instruction to move the sample probe to the aspirating position at the inner circle of the sample disk.
	Move to Outer Sample Disk	Click this button to send an instruction to move the sample probe to the aspirating position at the outer circle of the sample disk.
Reagent probe	Above Wash Well	Click this button to send an instruction to move the reagent probe to a position above the wash well.
	Move to Reaction Disk	Click this button to send an instruction to move the reagent probe to the dispensing position at the reaction disk.
	Above Reaction Disk	Click this button to send an instruction to move the reagent probe to a position above the reaction disk.
	Above Outer Reagent Disk	Click this button to send an instruction to move the reagent probe to a position above the outer circle of the reagent disk.
	Above Inner Reagent Disk	Click this button to send an instruction to move the reagent probe to a position above the inner circle of the reagent disk.
	Move to Outer Reagent Disk	Click this button to send an instruction to move the reagent probe to the aspirating position at the inner circle of the reagent disk.
	Move to Outer Reagent Disk	Click this button to send an instruction to move the reagent probe to the aspirating position at the outer circle of the reagent disk.
Mixing bar	Above Wash Well	Click this button to send an instruction to move the mixing bar to a position above the wash well.
	Move to Wash Well	Click this button to send an instruction to move the mixing bar to the washing position at the wash well.
	Above Reaction Disk	Click this button to send an instruction to move the mixing bar to a position above the reaction disk.
	Move to Reaction Disk	Click this button to send an instruction to move the mixing bar to the mixing position at the reaction disk.
	Mix for	Enter the desired mixing time into the edit box to the right of ***Time***, and then click this button to send an instruction to mix for the specified time.

Part	Button	Function
Reaction disk	Rotate Given Circles to Target Position	After entering the desired numbers into the edit boxes to the right of ***Circles*** and ***Target Position***, click this button to send an instruction to rotate the reaction disk for given circles and stop at the specified position.
	Rotate Given Positions	After entering the desired number into the edit box to the right of ***Positions***, click this button to send an instruction to rotate the reaction disk for given positions.
Reagent disk	Rotate Given Circles to Target Position	After entering the desired numbers into the edit boxes to the right of ***Circles*** and ***Target Position***, click this button to send an instruction to rotate the reagent disk for given circles and stop at the specified position.
	Rotate Given Positions	After entering the desired number into the edit box to the right of ***Positions***, click this button to send an instruction to rotate the reagent disk for given positions.
Sample disk	Rotate Given Circles to Target Position	After entering the desired numbers into the edit boxes to the right of ***Circles*** and ***Target Position***, click this button to send an instruction to rotate the sample disk for given circles and stop at the specified position.
	Rotate Given Positions	After entering the desired number into the edit box to the right of ***Positions***, click this button to send an instruction to rotate the sample disk for given positions.
Fluid	Wash Sample Probe	Select ***Interior***, ***Exterior*** or ***All*** from the drop-down list box to the left of this button and click it to send an instruction to wash the sample probe with deionized water.
	Wash Reagent Probe	Select ***Interior***, ***Exterior*** or ***All*** from the drop-down list box to the left of this button and click it to send an instruction to wash reagent probe with deionized water.
	Wash Mixing Bar	Click this button to send an instruction to wash the mixing bar with deionized water.
	Samp. Syr. Aspirates	After entering the desired number (μl) into the edit box to the right of ***Vol. (Sample Syringe)***, click this button to send an instruction to make the sample syringe aspirate the given volume.
	Samp. Syr. Dispenses	After entering the desired number (μl) into the edit box to the right of ***Vol. (Sample Syringe)***, click this button to send an instruction to make the sample syringe dispense the given volume.
	Sample Syr. Reset	Click this button to send an instruction to reset the sample syringe.

Part	Button	Function
	Reag. Syr. Aspirates	After entering the desired number (μl) into the edit box to the right of ***Vol. (Reagent Syringe)***, click this button to send an instruction to make the reagent syringe aspirate the given volume.
	Reag. Syr. Dispenses	After entering the desired number (μl) into the edit box to the right of ***Vol. (Reagent Syringe)***, click this button to send an instruction to make the reagent syringe dispense the given volume.
	Reagent Syr. Reset	Click this button to send an instruction to reset the reagent syringe.
Lamp	ON	Click this button to send an instruction to turn on the lamp of the photometer.
	OFF	Click this button to send an instruction to turn off the lamp of the photometer.
Other	Download Parameters	Click this button to send an instruction to download parameters.
	Reset Mechanical Parts	Click this button to send an instruction to reset all the mechanical parts of the analyzing unit.
Button		**Function**
Clear		Click this button to remove all instructions displayed in the above window.

CAUTION:

Ensure the sample disk is placed in the home position or stopped at certain position before clicking ***Move to Inner Sample Disk***, ***Move to Outer Sample Disk***, ***Move to Inner Reagent Disk*** or ***Move to Outer Reagent Disk*** button. Otherwise, it may lead to probe collision.

Ensure the reaction disk is placed in the home position or stopped at certain position before clicking ***Move to Reaction Disk*** or ***Move for*** button. Otherwise, it may lead to probe or mixing bar collision.

Before operating the reaction disk, ensure the probe and the mixing bar are away from it. Otherwise, the moving disk may bend the probe or the mixing bar.

Before operating the sample/reagent disk, ensure the probe is away from it. Otherwise, the moving disk may bend the probe.

NOTE:

If no test is to be run for a long time and you have no intention to exit the control software, you can turn off the lamp to maximize its service life.

5 Maintenance

To ensure reliability, good performance and service life of the system, regular maintenance is required. Be sure to follow the instructions given below to maintain the system. In case of problems beyond your ability or not covered in this chapter, be sure to contact Mindray Service Department or your local distributor in time.

WARNING:

Do not perform any maintenance procedures that are not described in this chapter.

Performing unauthorized maintenance procedures can damage your system, void any applicable warranty or service contract and even cause personal injury.

After performing any maintenance actions or procedures, ensure that the system runs normally.

Most maintenance actions or procedures should be performed after the Power is placed to OFF. For some maintenance actions or procedures, be sure to place the MAIN POWER to OFF first.

Do not spill water or reagent on the mechanical or electrical components of the system.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles during maintenance process.

Mindray recommends the copy of the maintenance log in **5.7 Maintenance Log** be used to keep the maintenance records.

5.1 Preparation

The following things may facilitate your maintenance.

Tools

- M1.5, M3 and/or M4 hex wrenches
- Cross-headed screwdrivers (large, medium and small)
- Tweezers
- Clean cup
- Clean gauze
- Clean cotton swabs
- Clean brush

Detergent

- Acid: 0.1mol/l hydrochloric acid
- Alkaline: 0.5% (V/V) javel water

NOTE:

Do not mix the acid detergent with the alkaline one.

Be sure to use the detergent recommended by Mindray. Otherwise, proper result may not be obtained.

Others

- Ethanol
- Disinfector

5.2 Daily Maintenance

5.2.1 Checking Remaining Deionized Water

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

CAUTION:

The water must meet requirements of the CAP Type II water.

1 Place the Power to OFF.

2 Check how much deionized water is left in the tank.

If not much, proceed to the next step.

3 **CAUTION:**

After removing the cap of the deionized water tank (together with the pickup tube and sensor), place it on a clean table.

Unscrew (counter-clockwise) the tank cap and remove the cap together with the pickup tube and the sensor.

4 Add deionized water to the tank.

5 Screw (clockwise) the cap together with the pickup tube and the sensor back onto the tank until secure.

CAUTION:

When placing the deionized water tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the deionized water pickup tube is not blocked, bent, or twisted.

5.2.2 Emptying Waste Tank

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of the wastewater in accordance with your local or national guidelines for biohazard waste disposal, and consult the manufacturer or distributor of the reagents for details.

1 Place the Power to OFF.

2

BIOHAZARD:

After removing the cap of the waste tank (together with the tube and sensor), place it on an appropriate place to avoid biohazard contamination.

Unscrew (counter-clockwise) the tank cap and remove it together with the waste tube and the sensor from the tank.

3 Empty the tank.

4 Screw (clockwise) the cap (together with the waste tube and the sensor) back onto the tank until secure.

CAUTION:

When placing the waste tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the waste tube is over the tank and not blocked, bent, or twisted. A blocked, bent or twisted waste tube may lead to wastewater overflow that may damage the analyzer.

5.2.3 Checking Connection of Deionized Water

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of the used gauze in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 Check the connections between the two connectors (green and red) marked DEIONIZED WATER on the analyzer and their counterparts.

If no leaks, skip to step 4.

If you see leaks, wipe off the water with clean gauze and proceed to the next step.

3 Check whether the connectors are loose.

If not, proceed to the next step.

If so, unscrew the connector counter-clockwise to remove it and then screw it back on.

4 Check the connections between the pickup tubes and their connectors.

If not, go directly to the next step.

If you see leaks, wipe off the water with clean gauze and tighten the connections and proceed to the next step.

5 Check the connection between the pickup tube and the tank cap.

If you see leaks, wipe off the water with clean gauze and tighten the connection.

CAUTION:

When placing the deionized water tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the deionized water pickup tube is not blocked, bent, or twisted.

NOTE:

If leaking remains, please contact Mindray Service Department or your local distributor.

5.2.4 Checking Connection of Wastewater

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of the used gauze in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 Check the connections between connector marked WASTE on the analyzing unit and its counterpart.

If no leaks, go directly to the next step.

If you see leaks, wipe off the water with clean gauze, then press the pin on the WASTE connector and grab its counterpart and pull it off the connector. Keep pressing the pin and re-insert the counterpart and proceed to the next step.

3 Check the connection between the waste tube and the connector.

If no leaks, go directly to the next step.

If you see leaks, wipe them off with clean gauze and tighten the waste tube and then proceed to the next step.

4 Check the connection between the waste tube and the tank cap.

If you see leaks, wipe them off with clean gauze and tighten the connection.

CAUTION:

When placing the waste tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the waste tube is over the tank and not blocked, bent, or twisted. A blocked, bent or twisted waste tube may lead to wastewater overflow that may damage the analyzer.

NOTE:

If leaking remains, please contact Mindray Service Department or your local distributor.

5.2.5 Checking Syringe

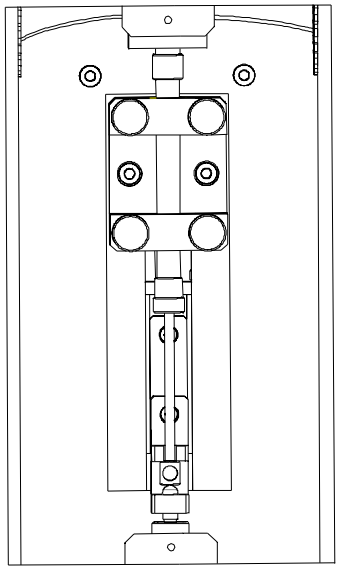
WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

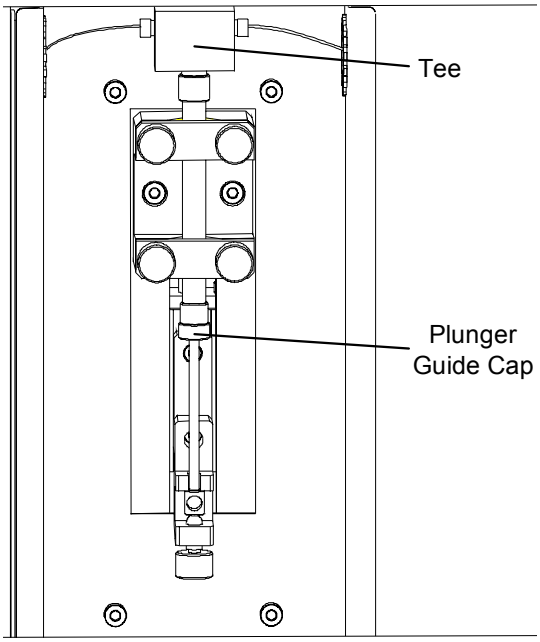
Wear gloves and lab coat and, if necessary, goggles.

Figure 5-1 Syringe



1 Place the Power to OFF.

2 Unscrew the screws on the cover of the syringe and you can see the syringe.



3 Check whether the Tee leaks.

If no leaks, proceed to the next step.

If you see leaks, please contact Mindray Service Department or your local distributor.

4 Check whether the plunger guide cap leaks.

If no leaks, proceed to the next step.

If you see leaks, replace the plunger assembly of syringe as instructed by **5.6.4 Replacing Plunger Assembly of Syringe**.

5 Place the cover of syringe back and tighten the screws.

5.2.6 Checking Probe

1 Check whether the probe is bent or dirty.

2 If not bent, go directly to the next step.

If so, replace the probe as instructed by **5.6.2 Replacing Probe**.

3 If not dirty, go directly to the next step.

If so, clean the probe as instructed by **5.3.1 Cleaning Probe**.

4 Check whether the probe tip has remaining liquid on it.

5 If not, go directly to the next step.

If so, please contact Mindray Service Department or your local distributor.

6 During washing process, check whether the flow from the interior of the probe is continuous and in the direction of the probe; check the exterior of the probe to see whether the flow is normal.

7 If the flow from the interior appears normal, go directly to the next step.

Otherwise, please contact Mindray Service Department or your local distributor.

8 If the flow to wash the exterior appears normal, the checking operation is over.

Otherwise, clean the probe as instructed by **5.6.1 Unclogging Probe**.

9 If the flow becomes normal after cleaning, the checking operation is over.

Otherwise, please contact Mindray Service Department or your local distributor.

5.2.7 Checking Mixing Bar

1 Check whether the mixing bar is bent or dirty.

2 If not bent, go directly to the next step.

If so, replace the mixing bar as instructed by **5.6.3 Replacing Mixing Bar**.

3 If not dirty, go directly to the next step.

If so, clean the mixing bar as instructed by **5.3.2 Cleaning Mixing Bar**.

4 During washing process, check whether the bar rotates normally and the flow appears normal.

5 If so, the checking operation is over.

If not, please contact Mindray Service Department or your local distributor.

5.3 Weekly Maintenance

5.3.1 Cleaning Probe

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

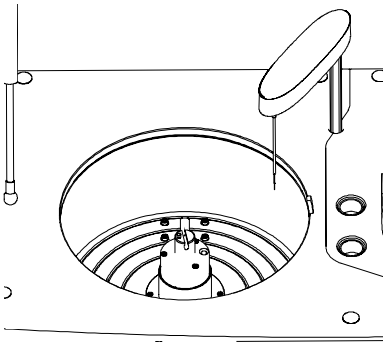
Dispose of the used gauze in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 Remove the cover from the sample/reagent disk.

3 Remove the sample/reagent disk.

4 Pull the probe arm to the highest point by hand. Rotate the probe arm to move the probe to a position above the sample/reagent compartment and convenient to operate.



5

CAUTION:

The tweezers may scratch the probe. Exercise caution when using it to clean the probe. Avoid direct contact between the tweezers and the probe. Do not use excessive force when cleaning the probe. Otherwise it may bend.

NOTE:

Mindray recommends the acid and alkaline detergents be used alternately for this purpose. For instance, if the acid detergent has been used for last maintenance, the alkaline detergent had better be used for this time.

Pinch acid or alkaline detergent-soaked gauze with tweezers and gently clean the exterior of the probe until it is clean and smooth.

6 Pinch deionized water-soaked gauze to clean the probe.

7 After cleaning, gently pull the probe arm to its highest point and rotate the probe arm to move the probe to a position above the wash well.

8 Load the sample/reagent disk.

9 Close the cover.

5.3.2 Cleaning Mixing Bar

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of the used gauze in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 Pull the mixing bar arm to the highest point by hand. Rotate the bar arm to move the bar to a position convenient to operate.

3

CAUTION:

The tweezers can scratch the bar. Exercise caution when using the tweezers to clean the bar. Avoid direct contact between the tweezers and the bar. Do not use excessive force when cleaning the bar. Otherwise it may bend.

NOTE:

Mindray recommends the acid and alkaline detergents be used alternately for this purpose. For instance, if the acid detergent has been used for last maintenance, the alkaline detergent had better be used for this time.

Pinch acid or alkaline detergent-soaked gauze with tweezers and gently clean the exterior of the mixing bar until it is clean and smooth.

4 Pinch deionized water-soaked gauze to clean the mixing bar.

5 After cleaning, gently pull the bar arm to its highest point and rotate the bar arm to move the bar to a position above the wash well.

5.3.3 Washing Deionized Water Tank

CAUTION:

The deionized water to be used on the analyzer must meet the CAP Type II water requirements.

1 Place the Power to OFF.

2

CAUTION:

After removing the cap of the deionized water tank (together with the pickup tube and sensor), place it on a clean table.

Unscrew (counter-clockwise) the cap (together with the deionized water pickup tube and the sensor).

3 Wash the tank interior with deionized water. Use a clean brush to clean the interior if necessary.

4 Wash the pickup tube and the sensor with deionized water. Use clean gauze to wash them if necessary.

5 Wipe water off the tank exterior, pickup tube and sensor cable with clean gauze.

6 Add deionized water into the tank.

7 Screw (clockwise) the cap (together with the pickup tube and sensor) back onto the tank until secure.

CAUTION:

When placing the deionized water tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the deionized water pickup tube is not blocked, bent, or twisted.

5.3.4 Washing Waste Tank

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Exercise caution and do not spill the waste onto other people or things.

Dispose of the waste in accordance with your local or national guidelines for biohazard waste disposal and consult the manufacturer or distributor of the reagents for details.

Dispose of used gauze in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 **BIOHAZARD:**

After removing the cap of the waste tank (together with the waste tube and sensor), place it on an appropriate place to avoid biohazard contamination.

Unscrew (counter-clockwise) the cap (together with the waste tube and the sensor).

3 Empty the waste tank.

4 Wash the tank interior with clean water. Soak the tank with disinfector if necessary.

5 Wash the waste tube and the sensor with clean water.

6 Wipe water off the tank exterior, waste tube and sensor cable with clean gauze.

7 Screw (clockwise) the cap (together with the waste tube and sensor) back onto the tank until secure.

CAUTION:

When placing the waste tank, ensure the top of the tank is lower than the bottom of the upper cabinet.

Ensure the waste tube is over the tank and not blocked, bent, or twisted. A blocked, bent or twisted waste tube may lead to wastewater overflow that may damage the analyzer.

5.3.5 Cleaning Sample/Reagent Compartment

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of the used gauze in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 Remove the cover from the sample/reagent disk.

3 Take out all calibrators, controls, samples, reagents, distilled water and detergent from the sample/reagent disk.

4 Remove the sample/reagent disk.

5 Wash the disk with clean water and wipe it dry with clean gauze.

6 Use clean gauze (water or disinfector-dipped gauze if necessary) to clean the inside of the compartment.

7 Load the sample/reagent disk.

8 Close the cover.

5.3.6 Cleaning Panel of Analyzing Unit

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

1 Place the Power to OFF.

2 Wipe the panel of the analyzing unit with clean gauze (water or disinfector-dipped gauze if necessary).

5.4 Monthly Maintenance

5.4.1 Cleaning Wash Well of Probe

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of used cotton swabs in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 Pull the probe arm to its highest point. Rotate the arm to move the probe away from the wash well.

3 Clean the inside of and the place around the wash well with cotton swabs.

4 Pull the probe arm to its highest point and rotate it to move the probe to a position above the wash well.

5.4.2 Cleaning Wash Well of Mixing Bar

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of used cotton swabs in accordance with your local or national guidelines for biohazard waste disposal.

1 Place the Power to OFF.

2 Pull the mixing bar arm to its highest point. Rotate the bar arm to move the bar away from the wash well.

3 Clean the inside of and the place around the wash well with cotton swabs.

4 Pull the mixing bar arm to its highest point and rotate it to move the bar to a position above the wash well.

5.5 Maintenance Every Six Months

Washing Dust Screens

1 Place the MAIN POWER to OFF.

2 Use a screwdriver to unscrew the screws on the left and right plates and remove the two plates.

3 Remove the dust screens from the plates.

4 Wash the screens with clean water and dry them by airing.

5 Install the screens back to the left and right plates.

6 Install the left and right plates with screws.

5.6 Irregular Maintenance

5.6.1 Unclogging Probe

When the probe is clogged, the fluid flow will become abnormal. Follow the steps given below to remove, unclog and install the probe.

5.6.1.1 Removing Probe

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

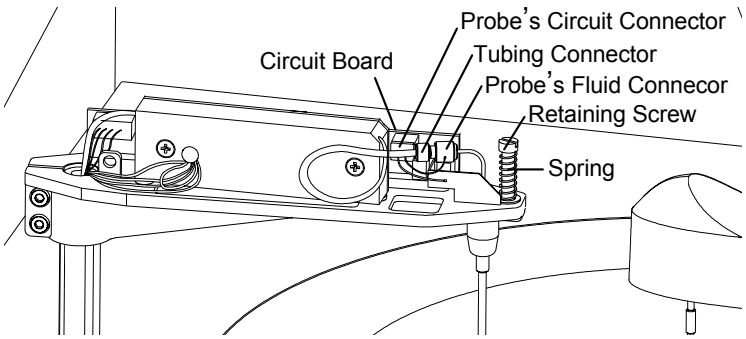
Wear gloves and lab coat and, if necessary, goggles.

1 Place the Power to OFF.

2 Remove the cover from the sample/reagent disk.

3 Pull the probe arm to its highest point. Rotate the probe arm to move the probe to a position above the sample/reagent compartment and convenient to operate.

4 Grab the lower part of the arm cover with two hands and pull them slightly outwards and remove the cover upward from the arm base. After you remove the cover, the inside structure of the probe arm is as shown in the figure below.



5 Hold the probe's fluid connector with one hand and the tubing connector with the other. Rotate the tubing connector counter-clockwise until it disconnects from the probe. Remove the tubing from the probe.

6 Press the circuit board with one hand and disconnect the probe's circuit connector from the board with the other hand.

CAUTION:

Exercise caution when disconnecting the connector. Excessive force may damage the connector and/or the circuit board.

7 Use a small screwdriver to remove the retaining screw on the probe and take out the spring.

8

WARNING:

Store the removed probe in a safe place where it will neither endanger people working around the area nor be damaged.

NOTE:

Exercise caution when pulling the probe away from the arm.

Slowly pull the probe away from the probe arm. Exercise caution so that the gasket inside the probe does not drop out and if it does, store it in a clean place for later installation.

NOTE:

A bent or damaged probe will lead to unreliable test results and should be replaced immediately.

5.6.1.2 Unclogging Probe

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of the used needle in accordance with your local or national guidelines for biohazard waste disposal.

1 Use a needle to unclog the probe from the tip.

CAUTION:

A bent or damaged probe will lead to unreliable test results and should be replaced immediately.

5.6.1.3 Installing Probe

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

1 Place the Power to OFF.

2 Insert the probe back into the hole on probe arm, and align the hole on probe plate to the rotor inside the arm.

3 Sleeve the spring on the rotor and screw the retaining screws to secure.

4 Pinch the probe by the part near the probe arm. Gently push the probe upward and then release the probe to see if the spring can move freely.

If so, proceed to the next step.

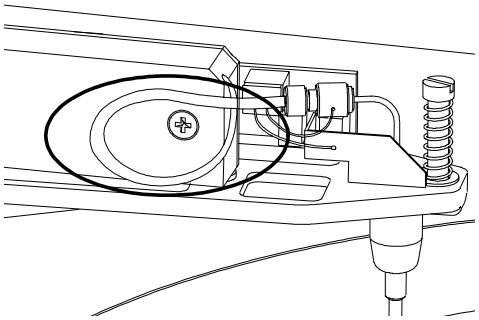
If not, check for errors and try again after removing the errors.

5 Connect the probe's circuit connector back to the circuit board.

6 Ensure the gasket is inside the probe.

7 **CAUTION:**

The fluid tube inside the probe arm should be bent into a circle when being installed.



Exercise caution when connecting the probe. Excessive force may bend the probe.

Screw (clockwise) the probe's fluid connector back to the tubing connector.

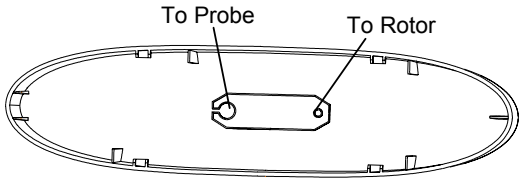
8 Add deionized water to a clean cup. Immerse the probe tip into the water by about 3mm and the LED on the circuit board will be lighted. Take the probe tip out of water, and the LED will be off. If the test succeeds, proceed to the next step.

If not, please contact Mindray Service Department or your local distributor.

9 Check the marks inside the probe arm cover to see the orientation of the cover. Install the cover back to the probe arm.

CAUTION:

The marks inside the probe arm cover are shown in the figure below.



10 Pull the probe arm to its highest point and rotate it to move the probe to a position above the wash well.

11 Install the sample/reagent disk.

CAUTION:

A bent or damaged probe will lead to unreliable test results and should be replaced immediately.

5.6.2 Replacing Probe

If the probe is bent or damaged, it must be replaced immediately. Follow the procedure given below to replace the damaged or bent probe.

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

CAUTION:

Please use Mindray-recommended consumables. Other consumables may decrease the system performance.

1 Remove the bent or damaged probe as instructed by **5.6.1.1 Removing Probe**.

BIOHAZARD:

Dispose of the bent or damaged probe in accordance with your local or national guidelines for biohazard waste disposal.

2 Install a new probe as instructed by **5.6.1.3 Installing Probe**.

5.6.3 Replacing Mixing Bar

If the mixing bar is damaged, it must be replaced immediately. Follow the procedure given below to replace the damaged mixing bar.

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

When replacing the bar, pinch the bar only by the knurled part and do not touch the other part of the bar. Protect the flat part of the bar from been scratched.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

Dispose of the damaged mixing bar in accordance with your local or national guidelines for biohazard waste disposal.

CAUTION:

Please use Mindray-recommended consumables. Other consumables may decrease the system performance.

1 Place the Power to OFF.

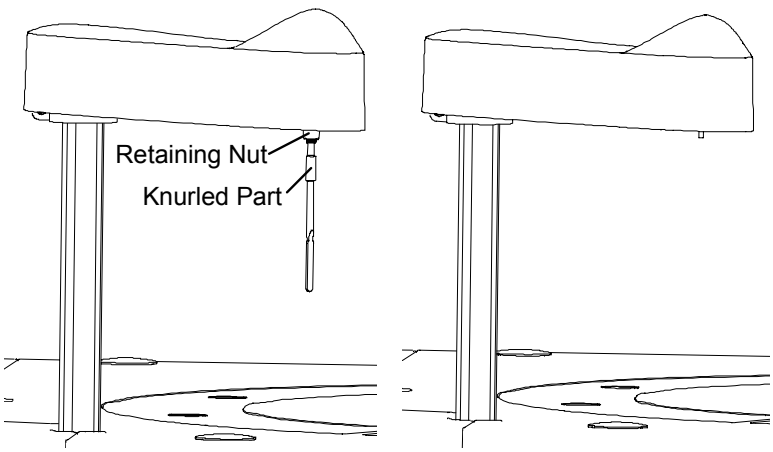
2 Gently pull the bar arm to its highest point and rotate it to move the bar to a position convenient to operate.

3

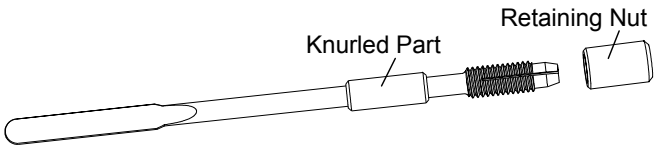
CAUTION:

When trying to pull out the bar, concentrate your force in the direction of the axis on the bar arm. Biased force may damage the bar and/or the axis.

Pinch the bar by the knurled part with one hand and unscrew (counter-clockwise) the retaining nut with the other hand until the mixing bar looses. Pull the bar downward to remove it and remove the nut.



4 Align the new mixing bar to the bigger hole end of the retaining nut and gently screw it into the nut until the end of the bar is in line with the smaller hole end of the nut.



5 Pinch the mixing bar by the knurled part and align the hole of the nut to the axis on the bar arm, then push the bar upward in the direction of the axis until it can't proceed. Tighten the nut by screwing clockwise with the other hand.

CAUTION:

When trying to push the bar, concentrate your force in the direction of the axis on the bar arm. Biased force may damage the bar and/or the axis.

Ensure the bar is all the way pushed to the end.

6 After replacing the bar, visually check whether the bar is vertical to the bar arm.

If not, remove the bar and re-install it.

If so, proceed to the next step.

7 Pull the bar arm to its highest point and rotate it to move the bar to a position above its wash well.

5.6.4 Replacing Plunger Assembly of Syringe

You should replace the old plunger assembly of syringe with a new one when

- The old one has served for three months; or
- The old one has been used for over 100,000 tests; or
- The old one is apparently damaged.

WARNING:

The probe tip is sharp and can cause puncture wounds. To prevent injury, exercise caution when working around the probe.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

CAUTION:

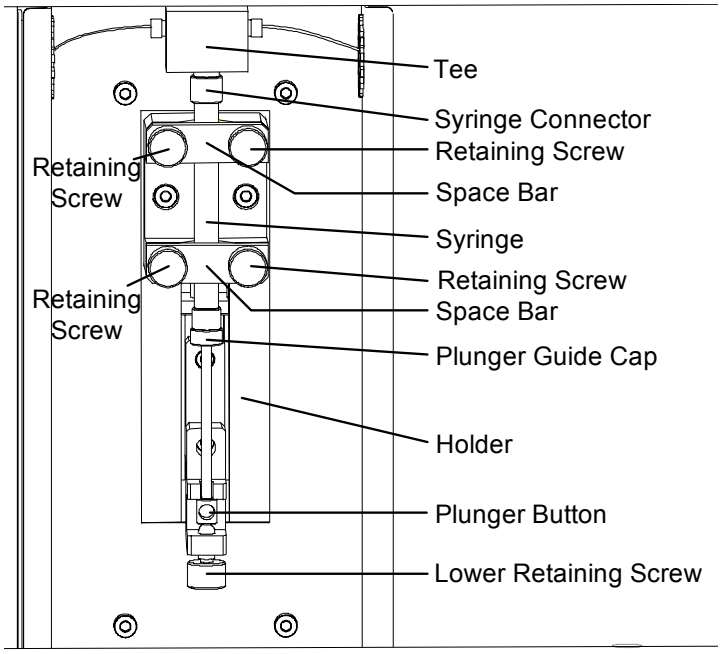
Please use Mindray-recommended consumables. Other consumables may decrease the system performance.

Exercise caution when installing the assembly. Excessive force may crack the syringe.

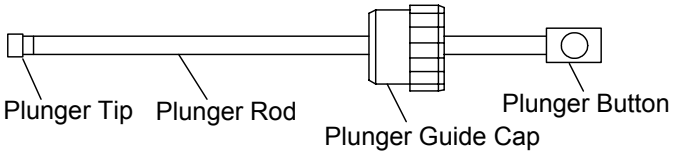
1 Place the Power to OFF.

2 Unscrew the screws on the syringe cover and remove the cover.

The structure of the syringe is as shown in the figure below.



3 Prepare a new plunger assembly (shown in the figure below) and soak the plunger tip in deionized water to eliminate bubbles.



4 Unscrew (counter-clockwise) the lower retaining screw.

5 Unscrew (counter-clockwise) the four retaining screws, remove the screws and space bars, and remove the syringe from the holder.

6

CAUTION:

There may be residual water in the syringe connector. Do not drop water onto the analyzing unit.

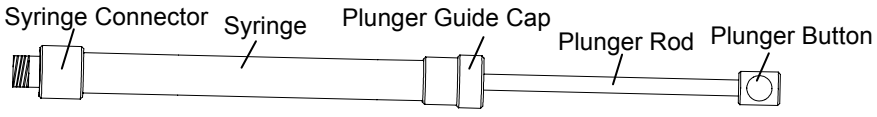
Grab the Tee with one hand and the syringe connector with the other hand and unscrew (counter-clockwise) the syringe.

7

CAUTION:

There may be residual water in the syringe. Do not drop water onto the analyzing unit.

Unscrew (counter-clockwise) the plunger guide cap and pinch the plunger button to gently pull the plunger assembly from the syringe.



8 Pinch the new plunger assembly by the plunger button and carefully insert the plunger tip into the syringe and push it all the way to the end. Screw (clockwise) the plunger guide cap until secure.

9 Immerse the syringe connector into deionized water. Pinch the plunger button, pull it to aspirate half syringe of deionized water and then push it to expel the deionized water and the air from the syringe.

10 Grab the Tee with one hand and the syringe connector with the other hand. Screw (clockwise) the syringe into the Tee until secure.

11 Place the syringe on the holder. Install space bars and fix retaining screws.

NOTE:

The upper edge of the upper space bar must reach the seventh line of the scale on the syringe.

When fixing retaining screws, be sure to tighten them alternately with equilibrium force.

12 Screw (clockwise) the lower retaining screw until secure.

13 Place the Power back to ON.

14 Enter the ***Commission*** screen of the control software and set the ***Vol.(Reagent Syringe)*** to 450. Click ***Reag. Syr. Aspirates***. After the syringe finishes the motion, click ***Reag. Syr. Dispenses***. You may repeat this action several times. Refer to **4.17.4 Commission** for details.

Pay attention to bubbles during the aspiration/dispensing process.

If there are bubbles observed during the process, they may be caused by the air leak between the syringe and the Tee. Uninstall the syringe and re-install it.

If the bubbles are found again, please contact Mindray Service Department or your local distributor.

5.6.5 Replacing Lamp

Replace the lamp with a new one when the system reminds you to do so, or the service time of the lamp has added up to 1,000 hours.

CAUTION:

Please use Mindray-recommended consumables. Other consumables may decrease the system performance.

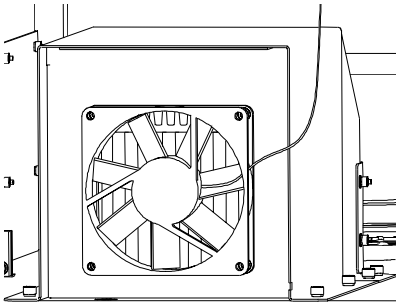
Do not touch either the light entrance of the lamp or the lens in front of the lamp. In case the entrance is dirty, clean it with ethanol-soaked defatted cotton.

1 Place the MAIN POWER to OFF. Wait at least 30 minutes for the lamp and its housing to cool down.

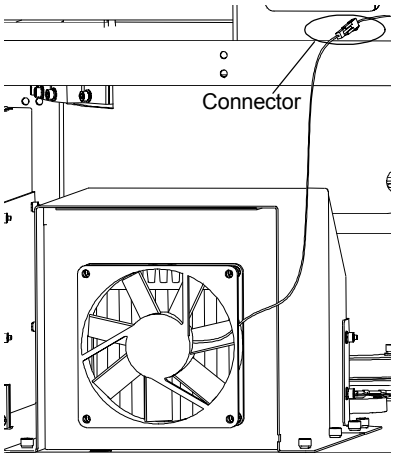
WARNING:

After working for a while, the lamp and its housing are usually hot enough to burn you. Do not proceed with this procedure until they have cooled down.

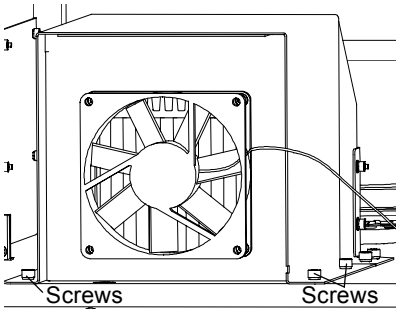
2 Unscrew the retaining screws on the back cover of the analyzing unit and remove the back cover. You can see the following box in the left lower part of the cabinet, where the lamp housing locates.



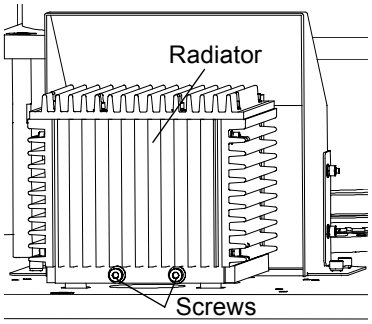
3 Unplug the connector of the wire.



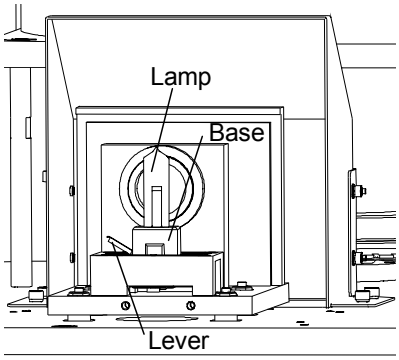
4 Unscrew the screws on the box with a hex wrench and remove the cover (together with the fan) backwardly.



5 Unscrew the screws on the back of the lamp housing with a hex wrench and remove the radiator from the housing backwardly.



6 Pinch the base of the lamp with one hand and press the lever on the left of the base and remove the lamp.



7 Pinch the new lamp by its base and insert the lamp pins into the mounting holes.

NOTE:

The larger pin is inserted into the larger hole and the smaller pin into the smaller hole.

8 Install the radiator back to the home position and tighten the screws.

9 Install the cover back to the box and tighten the screws.

10 Close the back cover of the analyzing unit and tighten the screws.

5.7 Maintenance Log

See the following table for the parts to be maintained and the maintenance schedules. Please copy it every month and place a check mark in each day column for the maintenance items in the list after performing maintenance.

Month ____ Year ____

Maintenance Record																																
Daily Maintenance		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Checking Syringe																															
2	Checking Probe																															
3	Checking Mixing Bar																															
4	Checking Connection of Deionized Water																															
5	Checking Connection of Wastewater																															
6	Checking Remaining Deionized Water																															
7	Emptying Waste Tank																															
Weekly Maintenance		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Cleaning Probe																															
2	Cleaning Mixing Bar																															
3	Washing Deionized Water Tank																															
4	Washing Waste Tank																															
5	Cleaning Sample/Reagent Compartment																															
6	Cleaning Panel of Analyzing Unit																															
Monthly Maintenance		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Cleaning Wash Well of Probe																															
2	Cleaning Wash Well of Mixing Bar																															
Maintenance Every Six Months		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Washing Dust Screens																															
Irregular Maintenance		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	Unclogging Probe																															
2	Replacing Probe																															
3	Replacing Mixing Bar																															
4	Replacing Plunger Assembly of Syringe																															
5	Replacing Lamp																															

6 Troubleshooting

This chapter presents all warning messages and recommended measures, which should be taken in time once any error occurs.

If the recommended measures fail to solve the problems, contact Mindray Service Department or your local distributor.

When an error or failure occurs, the system will display the error or warning message and take corresponding actions automatically.

The error or warning messages will be displayed in the warning messages area at the bottom of the control software screen and the warning messages will be recorded in the system log. The log will record the time, level, code and detailed message of each warning to help user record and search errors. Refer to **4.17.2 Log** for details about the log.

In case of a warning message, enter the log to check the error code. Based on the error code, check the table below for recommended corrective measures.

WARNING:

When troubleshooting the analyzer, first find out whether it is necessary to switch off the MAIN POWER or Power.

BIOHAZARD:

Wear gloves and lab coat and, if necessary, goggles.

NOTE:

The messages below are listed from smaller code to larger code.

Error Code	Error Message	Corrective Measure
100640010007	Main unit result error: Command error	Contact Mindray Service Department or your local distributor.
100640020007	Main unit result error: Self-check error	Contact Mindray Service Department or your local distributor.
100640030007	Main unit result error: Shaking hands with other units	Contact Mindray Service Department or your local distributor.
100640040007	Main unit result error: Shaking hands with other units error	Contact Mindray Service Department or your local distributor.
100640050007	Main unit result error: E2PROM read error	Contact Mindray Service Department or your local distributor.
100640060007	Main unit result error: E2PROM check sum error	Contact Mindray Service Department or your local distributor.
100640070007	Main unit result error: E2PROM write protection	Contact Mindray Service Department or your local distributor.
100640080007	Main unit result error: E2PROM write error	Contact Mindray Service Department or your local distributor.
100640090007	Main unit result error: Downloading parameter	Contact Mindray Service Department or your local distributor.
100640100007	Main unit result error: Parameter downloading failed	Contact Mindray Service Department or your local distributor.
100640110007	Main unit result error: Resetting other units	Contact Mindray Service Department or your local distributor.
100640120007	Main unit result error: Other units resetting error	Contact Mindray Service Department or your local distributor.
100640130007	Main unit result error: Shutting down other units	Contact Mindray Service Department or your local distributor.
100640140007	Main unit result error: Other units shutdown error	Contact Mindray Service Department or your local distributor.
100640150007	Main unit result error: Invalid status. Self-check	Contact Mindray Service Department or your local distributor.
100640150017	Main unit result error: Invalid status. Error	Contact Mindray Service Department or your local distributor.
100640150027	Main unit result error: Invalid status. Waiting for handshake	Contact Mindray Service Department or your local distributor.
100640150037	Main unit result error: Invalid status. Shutdown	Contact Mindray Service Department or your local distributor.
100640160007	Main unit result error: Unit busy. No response	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100640170007	Main unit result error: Analyzing error. Reaction disk affected	Contact Mindray Service Department or your local distributor.
100640180006	Main unit result error: Analyzing error. Reaction disk not affected	Contact Mindray Service Department or your local distributor.
100640190007	Main unit result error: Undefined system operation	Contact Mindray Service Department or your local distributor.
100640200007	Main unit result error: Wrong system operation parameter	Contact Mindray Service Department or your local distributor.
100640210007	Main unit result error: Undefined search	Contact Mindray Service Department or your local distributor.
100640220007	Main unit result error: Wrong searching parameter	Contact Mindray Service Department or your local distributor.
100640230007	Main unit result error: Undefined configuration	Contact Mindray Service Department or your local distributor.
100640240007	Main unit result error: Wrong configuration parameter	Contact Mindray Service Department or your local distributor.
100640250007	Main unit result error: Undefined process	Contact Mindray Service Department or your local distributor.
100640260007	Main unit result error: Wrong process parameter	Contact Mindray Service Department or your local distributor.
100640270007	Main unit result error: Restoring E2PROM	Contact Mindray Service Department or your local distributor.
100640280007	Main unit result error: Updating E2PROM	Contact Mindray Service Department or your local distributor.
100640290007	Main unit result error: Please re-download parameter	Contact Mindray Service Department or your local distributor.
100640300007	Main unit result error: Parameter write protection	Contact Mindray Service Department or your local distributor.
100640310007	Main unit result error: No result, or timeout	Contact Mindray Service Department or your local distributor.
100650010005	Reaction unit result error: Command error	Contact Mindray Service Department or your local distributor.
100650020005	Reaction unit result error: Self-check error	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100650030005	Reaction unit result error: Mechanical resetting error	Reset the mechanical parts as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100650040005	Reaction unit result error: Invalid status. Self-check	Contact Mindray Service Department or your local distributor.
100650040015	Reaction unit result error: Invalid status. Error	Contact Mindray Service Department or your local distributor.
100650040025	Reaction unit result error: Invalid status. Waiting for handshake	Contact Mindray Service Department or your local distributor.
100650040035	Reaction unit result error: Invalid status. Shutdown	Contact Mindray Service Department or your local distributor.
100650050005	Reaction unit result error: Unit busy. No response	Contact Mindray Service Department or your local distributor.
100650060005	Reaction unit result error: Undefined speed	Contact Mindray Service Department or your local distributor.
100650070005	Reaction unit result error: Wrong speed parameter	Contact Mindray Service Department or your local distributor.
100650080005	Reaction unit result error: Configure undefined parameter	Contact Mindray Service Department or your local distributor.
100650090005	Reaction unit result error: Wrong configuration parameter	Contact Mindray Service Department or your local distributor.
100650100005	Reaction unit result error: Undefined search	Contact Mindray Service Department or your local distributor.
100650110005	Reaction unit result error: Wrong searching parameter	Contact Mindray Service Department or your local distributor.
100650120005	Reaction unit result error: Undefined system operation	Contact Mindray Service Department or your local distributor.
100650130005	Reaction unit result error: Wrong system operation parameter	Contact Mindray Service Department or your local distributor.
100650140005	Reaction unit result error: Rotation error. Cannot reach the home position	Check the reaction disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100650140015	Reaction unit result error: Rotation error. Cannot move away from the home position	Check the reaction disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100650140025	Reaction unit result error: Rotation error. Step missing	Check the reaction disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100650140045	Reaction unit result error: Rotation error. Mixing	Contact Mindray Service Department or your local distributor.
100650140055	Reaction unit result error: Rotation error. Aspirating/dispensing sample	Contact Mindray Service Department or your local distributor.
100650140065	Reaction unit result error: Rotation error. Aspirating/dispensing reagent	Contact Mindray Service Department or your local distributor.
100650140075	Reaction unit result error: Rotation error. Aspirating/dispensing R2	Contact Mindray Service Department or your local distributor.
100650150005	Reaction unit result error: Photoelectric error. Lamp off	Check the lamp as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100650150015	Reaction unit result error: Photoelectric error. Lamp too dark	Check the lamp status as instructed by **4.17.1 Daily Maintenance**. Replace the lamp as needed. If the error remains, contact Mindray Service Department or your local distributor.
100650150025	Reaction unit result error: Photoelectric error. Signal collection busy	Contact Mindray Service Department or your local distributor.
100650150035	Reaction unit result error: Photoelectric error. Lamp On/Off actions are opposite	Check the lamp as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100650160005	Reaction unit result error: Undefined commission	Contact Mindray Service Department or your local distributor.
100650170005	Reaction unit result error: Wrong commissioning parameter	Contact Mindray Service Department or your local distributor.
100650180005	Reaction unit result error: Not commissioning	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100650190005	Reaction unit result error: Parameter modify protection	Contact Mindray Service Department or your local distributor.
100651250005	Reaction unit result error: Main unit sending error	Contact Mindray Service Department or your local distributor.
100651270005	Reaction unit result error: Main unit does not receive the reaction unit result	Contact Mindray Service Department or your local distributor.
100660010000	Temperature unit result error: Command error	Contact Mindray Service Department or your local distributor.
100660020000	Temperature unit result error: Self-check error	Contact Mindray Service Department or your local distributor.
100660030000	Temperature unit result error: Mechanical resetting error	Reset the mechanical parts as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100660040000	Temperature unit result error: Status error. Self-check	Contact Mindray Service Department or your local distributor.
100660040010	Temperature unit result error: Status error. Error	Contact Mindray Service Department or your local distributor.
100660040020	Temperature unit result error: Status error. Waiting for handshake	Contact Mindray Service Department or your local distributor.
100660040030	Temperature unit result error: Status error. Shutdown	Contact Mindray Service Department or your local distributor.
100660050000	Temperature unit result error: Unit busy. No response	Contact Mindray Service Department or your local distributor.
100660060000	Temperature unit result error: Undefined search	Contact Mindray Service Department or your local distributor.
100660070000	Temperature unit result error: Wrong searching parameter	Contact Mindray Service Department or your local distributor.
100660080000	Temperature unit result error: Undefined temperature parameter	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100660090000	Temperature unit result error: Wrong temperature parameter	Contact Mindray Service Department or your local distributor.
100660100000	Temperature unit result error: Undefined sensor parameter	Contact Mindray Service Department or your local distributor.
100660110000	Temperature unit result error: Wrong sensor parameter	Contact Mindray Service Department or your local distributor.
100660120000	Temperature unit result error: Undefined target temperature	Contact Mindray Service Department or your local distributor.
100660130000	Temperature unit result error: Wrong target temperature parameter	Contact Mindray Service Department or your local distributor.
100660140000	Temperature unit result error: Undefined system operation	Contact Mindray Service Department or your local distributor.
100660150000	Temperature unit result error: Wrong system operation parameter	Contact Mindray Service Department or your local distributor.
100660160000	Temperature unit result error: Parameter write protection	Contact Mindray Service Department or your local distributor.
100661250000	Temperature unit result error: Main unit sending error	Contact Mindray Service Department or your local distributor.
100661270000	Temperature unit result error: Main unit does not receive the Temperature unit result	Contact Mindray Service Department or your local distributor.
100670010005	Mixing unit result error: Command error	Contact Mindray Service Department or your local distributor.
100670020005	Mixing unit result error: Self-check error	Contact Mindray Service Department or your local distributor.
100670030005	Mixing unit result error: Mechanical resetting error	Reset the mechanical parts as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670040005	Mixing unit result error: Status error. Self-check	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100670040015	Mixing unit result error: Status error. Error	Contact Mindray Service Department or your local distributor.
100670040025	Mixing unit result error: Status error. Waiting for handshake	Contact Mindray Service Department or your local distributor.
100670040035	Mixing unit result error: Status error. Shutdown	Contact Mindray Service Department or your local distributor.
100670050005	Mixing unit result error: Unit busy. No response	Contact Mindray Service Department or your local distributor.
100670060005	Mixing unit result error: Undefined speed	Contact Mindray Service Department or your local distributor.
100670070005	Mixing unit result error: Wrong speed parameter	Contact Mindray Service Department or your local distributor.
100670080005	Mixing unit result error: Undefined configuration	Contact Mindray Service Department or your local distributor.
100670090005	Mixing unit result error: Wrong configuration parameter	Contact Mindray Service Department or your local distributor.
100670100005	Mixing unit result error: Undefined search	Contact Mindray Service Department or your local distributor.
100670110005	Mixing unit result error: Wrong searching parameter	Contact Mindray Service Department or your local distributor.
100670120005	Mixing unit result error: Undefined system operation	Contact Mindray Service Department or your local distributor.
100670130005	Mixing unit result error: Wrong system operation parameter	Contact Mindray Service Department or your local distributor.
100670140005	Mixing unit result error: Undefined commission	Contact Mindray Service Department or your local distributor.
100670150005	Mixing unit result error: Wrong commissioning parameter	Contact Mindray Service Department or your local distributor.
100670160005	Mixing unit result error: Not commissioning	Contact Mindray Service Department or your local distributor.
100670170005	Mixing unit result error: Mixing bar vertical movement error. Cannot reach the home position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100670170015	Mixing unit result error: Mixing bar vertical movement error. Cannot move away from the home position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670170025	Mixing unit result error: Mixing bar vertical movement error. Trying to move away from the home position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670170035	Mixing unit result error: Mixing bar vertical movement error. Trying to move away from the washing limit position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670170045	Mixing unit result error: Mixing bar vertical movement error. Trying to move away from the mixing limit position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670170055	Mixing unit result error: Mixing bar vertical movement error. Collision	Turn off the analyzing unit and check if the mixing bar is blocked horizontally. If yes, remove the barrier. If the error remains, contact Mindray Service Department or your local distributor.
100670170065	Mixing unit result error: Mixing bar vertical movement error. Step missing	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670170075	Mixing unit result error: Mixing bar vertical movement error. Wrong direction	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670170085	Mixing unit result error: Mixing bar vertical movement error. Horizontal position error	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670170095	Mixing unit result error: Mixing bar vertical movement error. Reaction disk is rotating	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670180005	Mixing unit result error: Mixing bar horizontal movement error. Cannot reach the home position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100670180015	Mixing unit result error: Mixing bar horizontal movement error. Cannot move away from the home position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670180025	Mixing unit result error: Mixing bar horizontal movement error. Trying to move away from the washing limit position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670180035	Mixing unit result error: Mixing bar horizontal movement error. Trying to move away from the mixing limit position	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670180045	Mixing unit result error: Mixing bar horizontal movement error. Vertical position error	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670180055	Mixing unit result error: Mixing bar horizontal movement error. Collision	Turn off the analyzing unit and check if the mixing bar is blocked horizontally. If yes, remove the barrier. If the error remains, contact Mindray Service Department or your local distributor.
100670180065	Mixing unit result error: Mixing bar horizontal movement error. Step missing	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670180075	Mixing unit result error: Mixing bar horizontal movement error. Wrong direction	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670180085	Mixing unit result error: Mixing bar horizontal movement error. Disabled	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100670190015	Mixing unit result error: Mixing bar motor error. Cannot start up	Contact Mindray Service Department or your local distributor.
100670190025	Mixing unit result error: Mixing bar motor error. Cannot shut down	Contact Mindray Service Department or your local distributor.
100670200005	Mixing unit result error: Write protection	Contact Mindray Service Department or your local distributor.
100670210005	Mixing unit result error: Mixing bar selection error	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100670220005	Mixing unit result error: Undefined simple operation	Contact Mindray Service Department or your local distributor.
100670230005	Mixing unit result error: Wrong simple operation parameter	Contact Mindray Service Department or your local distributor.
100671250005	Mixing unit result error: Main unit sending error	Contact Mindray Service Department or your local distributor.
100671270005	Mixing unit result error: Main unit does not receive the mixing unit result	Contact Mindray Service Department or your local distributor.
100680010005	Sample unit result error: Command error	Contact Mindray Service Department or your local distributor.
100680020005	Sample unit result error: Self-check error	Contact Mindray Service Department or your local distributor.
100680030005	Sample unit result error: Mechanical resetting error	Reset the mechanical parts as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680040005	Sample unit result error: Status error. Self-check	Contact Mindray Service Department or your local distributor.
100680040015	Sample unit result error: Status error. Error	Contact Mindray Service Department or your local distributor.
100680040025	Sample unit result error: Status error. Waiting for handshake	Contact Mindray Service Department or your local distributor.
100680040035	Sample unit result error: Status error. Shutdown	Contact Mindray Service Department or your local distributor.
100680050005	Sample unit result error: Unit busy. No response	Contact Mindray Service Department or your local distributor.
100680060005	Sample unit result error: Undefined speed	Contact Mindray Service Department or your local distributor.
100680070005	Sample unit result error: Wrong speed parameter	Contact Mindray Service Department or your local distributor.
100680080005	Sample unit result error: Undefined configuration	Contact Mindray Service Department or your local distributor.
100680090005	Sample unit result error: Wrong configuration parameter	Contact Mindray Service Department or your local distributor.
100680100005	Sample unit result error: Undefined search	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100680110005	Sample unit result error: Wrong searching parameter	Contact Mindray Service Department or your local distributor.
100680120005	Sample unit result error: Undefined system operation	Contact Mindray Service Department or your local distributor.
100680130005	Sample unit result error: Wrong system operation parameter	Contact Mindray Service Department or your local distributor.
100680140005	Sample unit result error: Undefined commission	Contact Mindray Service Department or your local distributor.
100680150005	Sample unit result error: Wrong commissioning parameter	Contact Mindray Service Department or your local distributor.
100680160005	Sample unit result error: Not commissioning	Contact Mindray Service Department or your local distributor.
100680170005	Sample unit result error: Fluid controlling error	Turn off the analyzing unit. Check the syringe for leakage and check the sample probe to see if there are drops hanging on the probe tip. Then commission the fluid as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680180005	Sample unit result error: Sample disk rotation error. Cannot reach the home position	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680180015	Sample unit result error: Sample disk rotation error. Cannot move away from the home position	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680180025	Sample unit result error: Sample disk rotation error. Step missing	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680180035	Sample unit result error: Sample disk rotation error. Probe in disk	Move the sample probe outside the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680180045	Sample unit result error: Sample disk rotation error. Disabled	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100680190005	Sample unit result error: Disk and probe selection error	Contact Mindray Service Department or your local distributor.
100680200005	Sample unit result error: Syringe error. Full aspiration failed	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680200015	Sample unit result error: Syringe error. Full dispensing failed	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680200025	Sample unit result error: Syringe error. Cannot reach the home position	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680200035	Sample unit result error: Syringe error. Cannot move away from the home position	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680200045	Sample unit result error: Syringe error. Inadequate aspiration	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680200055	Sample unit result error: Syringe error. Inadequate dispensing	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680200065	Sample unit result error: Syringe error. Step missing	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680200075	Sample unit result error: Syringe error. Aspirating/dispensing not allowed now	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680210005	Sample unit result error: Reagent probe horizontal movement error. Cannot reach the home position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680210015	Sample unit result error: Sample probe horizontal movement error. Cannot move away from the home position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680210025	Sample unit result error: Sample probe horizontal movement error. Trying to move away from the sample disk limit position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100680210035	Sample unit result error: Sample probe horizontal movement error. Trying to move away from the reaction disk limit position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680210045	Sample unit result error: Sample probe horizontal movement error. Collision	Turn off the analyzing unit and check if the sample probe is blocked horizontally. If yes, remove the barrier. If the error remains, contact Mindray Service Department or your local distributor.
100680210055	Sample unit result error: Sample probe horizontal movement error. Step missing	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680210065	Sample unit result error: Sample probe horizontal movement error. Disabled	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220005	Sample unit result error: Sample probe vertical movement error. Cannot reach the home position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220015	Sample unit result error: Sample probe vertical movement error. Cannot move away from the home position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220025	Sample unit result error: Sample probe vertical movement error. Trying to move away from the initial limit position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220035	Sample unit result error: Sample probe vertical movement error. Trying to move away from the sample disk limit position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220045	Sample unit result error: Sample probe vertical movement error. Trying to move away from the washing limit position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220055	Sample unit result error: Sample probe vertical movement error. Trying to move away from the reaction disk limit position	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100680220065	Sample unit result error: Sample probe vertical movement error. No liquid surface detected	Pause dispensing and check if there is a sample at the specified position. If no, add one. If the error remains, contact Mindray Service Department or your local distributor.
100680220075	Sample unit result error: Sample probe vertical movement error. Collision	Turn off the analyzing unit and check if the sample probe is blocked horizontally. If yes, remove the barrier. If the error remains, contact Mindray Service Department or your local distributor.
100680220085	Sample unit result error: Sample probe vertical movement error. Step missing	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220095	Sample unit result error: Sample probe vertical movement error. Sample disk or reaction disk is rotating	If this error occurs frequently, contact Mindray Service Department or your local distributor.
100680220105	Sample unit result error: Sample probe vertical movement error. Disabled	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680220115	Sample unit result error: Sample probe vertical movement error. Keep collision	Check the sample probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100680230005	Sample unit result error: Undefined simple operation of this unit	Contact Mindray Service Department or your local distributor.
100680240005	Sample unit result error: Wrong simple operation parameter	Contact Mindray Service Department or your local distributor.
100680250005	Sample unit result error: Tube position error	Contact Mindray Service Department or your local distributor.
100680260005	Sample unit result error: Parameter write protection of this unit	Contact Mindray Service Department or your local distributor.
100681250005	Sample unit result error: Main unit sending error	Contact Mindray Service Department or your local distributor.
100681270005	Sample unit result error: Main unit does not receive the sample unit result	Contact Mindray Service Department or your local distributor.
100690010005	Reagent unit result error: Command error	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100690020005	Reagent unit result error: Self-check error	Contact Mindray Service Department or your local distributor.
100690030005	Reagent unit result error: Mechanical resetting error	Reset the mechanical parts as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690040005	Reagent unit result error: Status error. Self-check	Contact Mindray Service Department or your local distributor.
100690040015	Reagent unit result error: Status error. Error	Contact Mindray Service Department or your local distributor.
100690040025	Reagent unit result error: Status error. Waiting for handshake	Contact Mindray Service Department or your local distributor.
100690040035	Reagent unit result error: Status error. Shutdown	Contact Mindray Service Department or your local distributor.
100690050005	Reagent unit result error: Unit busy. No response	Contact Mindray Service Department or your local distributor.
100690060005	Reagent unit result error: Undefined speed	Contact Mindray Service Department or your local distributor.
100690070005	Reagent unit result error: Wrong speed parameter	Contact Mindray Service Department or your local distributor.
100690080005	Reagent unit result error: Undefined parameter configuration	Contact Mindray Service Department or your local distributor.
100690090005	Reagent unit result error: Wrong configuration parameter	Contact Mindray Service Department or your local distributor.
100690100005	Reagent unit result error: Undefined search	Contact Mindray Service Department or your local distributor.
100690110005	Reagent unit result error: Wrong searching parameter	Contact Mindray Service Department or your local distributor.
100690120005	Reagent unit result error: Undefined system operation	Contact Mindray Service Department or your local distributor.
100690130005	Reagent unit result error: Wrong system operation parameter	Contact Mindray Service Department or your local distributor.
100690140005	Reagent unit result error: Undefined commission	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100690150005	Reagent unit result error: Wrong commissioning parameter	Contact Mindray Service Department or your local distributor.
100690160005	Reagent unit result error: Not commissioning	Contact Mindray Service Department or your local distributor.
100690170005	Reagent unit result error: Fluid controlling error	Turn off the analyzing unit. Check the syringe for leakage and check the sample probe to see if there are drops hanging on the probe tip. Then commission the fluid as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690180005	Reagent unit result error: Disk rotation error. Cannot reach the home position	Check the reagent disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690180015	Reagent unit result error: Disk rotation error. Cannot move away from the home position	Move the reagent probe outside the reagent disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690180025	Reagent unit result error: Disk rotation error. Step missing	Check the reagent disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690180035	Reagent unit result error: Disk rotation error. Probe in disk	Move the reagent probe outside the reagent disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690180045	Reagent unit result error: Disk rotation error. Disabled	Check the reagent disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690190005	Reagent unit result error: Disk and probe selection error	Contact Mindray Service Department or your local distributor.
100690200005	Reagent unit result error: Syringe error. Full aspiration failed	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690200015	Reagent unit result error: Syringe error. Full dispensing failed	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690200025	Reagent unit result error: Syringe error. Cannot reach the home position	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100690200035	Reagent unit result error: Syringe error. Cannot move away from the home position	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690200045	Reagent unit result error: Syringe error. Inadequate aspiration	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690200055	Reagent unit result error: Syringe error. Inadequate dispensing	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690200065	Reagent unit result error: Syringe error. Step missing	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690200075	Reagent unit result error: Syringe error. Aspirating/dispensing not allowed now	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690210005	Reagent unit result error: Reagent probe horizontal movement error. Cannot reach the home position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690210015	Reagent unit result error: Reagent probe horizontal movement error. Cannot move away from the home position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690210025	Reagent unit result error: Reagent probe horizontal movement error. Trying to move away from the reagent disk limit position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690210035	Reagent unit result error: Reagent probe horizontal movement error. Trying to move away from the reaction disk limit position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690210045	Reagent unit result error: Reagent probe horizontal movement error. Collision	Turn off the analyzing unit and check if the reagent probe is blocked horizontally. If yes, remove the barrier. If the error remains, contact Mindray Service Department or your local distributor.
100690210055	Reagent unit result error: Reagent probe horizontal movement error. Step missing	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100690210065	Reagent unit result error: Reagent probe horizontal movement error. Disabled	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220005	Reagent unit result error: Reagent probe vertical movement error. Cannot reach the home position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220015	Reagent unit result error: Reagent probe vertical movement error. Cannot move away from the home position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220025	Reagent unit result error: Reagent probe vertical movement error. Trying to move away from the initial limit position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220035	Reagent unit result error: Reagent probe vertical movement error. Trying to move away from the reagent disk limit position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220045	Reagent unit result error: Reagent probe vertical movement error. Trying to move away from the washing limit position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220055	Reagent unit result error: Reagent probe vertical movement error. Trying to move away from the reaction disk limit position	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220065	Reagent unit result error: Reagent probe vertical movement error. No liquid surface detected	Pause dispensing and check if there is a reagent at the specified position. If no, add one. If the error remains, contact Mindray Service Department or your local distributor.
100690220075	Reagent unit result error: Reagent probe vertical movement error. Collision	Turn off the analyzing unit and check if the reagent probe is blocked vertically. If yes, remove the barrier. If the error remains, contact Mindray Service Department or your local distributor.
100690220085	Reagent unit result error: Reagent probe vertical movement error. Step missing	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
100690220095	Reagent unit result error: Reagent probe vertical movement error. Reagent disk or reaction disk is rotating	Contact Mindray Service Department or your local distributor.
100690220105	Reagent unit result error: Reagent probe vertical movement error. Disabled	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690220115	Reagent unit result error: Reagent probe vertical movement error. Keep Collision	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
100690230005	Reagent unit result error: Undefined simple operation	Contact Mindray Service Department or your local distributor.
100690240005	Reagent unit result error: Wrong simple operation parameter	Contact Mindray Service Department or your local distributor.
100690250005	Reagent unit result error: Bottle position error	Contact Mindray Service Department or your local distributor.
100690260005	Reagent unit result error: Parameter write protection	Contact Mindray Service Department or your local distributor.
100691250005	Reagent unit result error: Main unit sending error	Contact Mindray Service Department or your local distributor.
100691270005	Reagent unit result error: Main unit does not receive the reagent unit result	Contact Mindray Service Department or your local distributor.
200650010000	Reaction unit warning: Step missing	Contact Mindray Service Department or your local distributor.
200650020000	Reaction unit warning: Lamp too dark	Check the lamp status as instructed by **4.17.1 Daily Maintenance**. Replace the lamp as needed. If the error remains, contact Mindray Service Department or your local distributor.
200650030000	Reaction unit warning: Partial data missing	Contact Mindray Service Department or your local distributor.
200660010000	Temperature unit warning: Reaction temperature abnormal	Contact Mindray Service Department or your local distributor.
200660020000	Temperature unit warning: Reagent pre-heating temperature abnormal	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
200660030000	Temperature unit warning: Reagent refrigeration temperature abnormal	Contact Mindray Service Department or your local distributor.
200670010002	Mixing unit warning: Invalid mixing	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200670020002	Mixing unit warning: Invalid washing	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200670030000	Mixing unit warning: Mixing cancelled	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200670040000	Mixing unit warning: Washing cancelled	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200670050000	Mixing unit warning: Mixing bar exceeds the home position horizontally	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200670060000	Mixing unit warning: Mixing bar exceeds the limit position horizontally	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200670070000	Mixing unit warning: Mixing bar exceeds the home position vertically	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200670080000	Mixing unit warning: Mixing bar exceeds the limit position vertically	Check the mixing bar as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200680010000	Sample unit warning: Sample probe exceeds the home position horizontally	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200680020000	Sample unit warning: Sample probe exceeds the limit position horizontally	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200680030000	Sample unit warning: Sample probe exceeds the home position vertically	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200680040000	Sample unit warning: Sample probe exceeds the limit position vertically	Check the sample disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
200680050000	Sample unit warning: Sample syringe full	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200680060000	Sample unit warning: Sample syringe empty	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200680070003	Sample unit warning: No liquid surface detected when sample probe aspirating. … exhausted	Pause dispensing and check if there is enough sample (calibrator or control) at the specified position. If no, add more. If the error remains, contact Mindray Service Department or your local distributor.
200680080003	Sample unit warning: Liquid surface below probe tip when sample probe aspirating. … exhausted	Pause dispensing and check if there is enough sample (calibrator or control) at the specified position. If no, add more. If the error remains, contact Mindray Service Department or your local distributor.
200680090002	Sample unit warning: No liquid surface detected when sample probe dispensing	Pause dispensing and check if there is a sample at the specified position. If no, add one. If the error remains, contact Mindray Service Department or your local distributor.
200680100002	Sample unit warning: Inadequate dispensing of sample probe	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200680110006	Sample unit warning: No liquid surface detected when washing sample probe	Turn off the analyzing unit. Check the syringe for leakage and check the sample probe to see if there are drops hanging on the probe tip. Then commission the fluid as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200690010000	Reagent unit warning: Reagent probe exceeds the home position horizontally	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200690020000	Reagent unit warning: Reagent probe exceeds the limit position horizontally	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200690030000	Reagent unit warning: Reagent probe exceeds the home position vertically	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200690040000	Reagent unit warning: Reagent probe exceeds the limit position vertically	Check the reagent probe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
200690050000	Reagent unit warning: Syringe full	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200690060000	Reagent unit warning: Syringe empty	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200690070003	Reagent unit warning: No liquid surface detected when reagent probe aspirating. … exhausted	Pause dispensing and check if there is a reagent (distilled water or detergent) at the specified position. If no, add one. If the error remains, contact Mindray Service Department or your local distributor.
200690080003	Reagent unit warning: Liquid surface below probe tip when reagent probe aspirating. … exhausted	Pause dispensing and check if there is enough reagent (distilled water or detergent) at the specified position. If no, add more. If the error remains, contact Mindray Service Department or your local distributor.
200690090002	Reagent unit warning: No liquid surface detected when reagent probe dispensing	Pause dispensing and check if there is a reagent at the specified position. If no, add one. If the error remains, contact Mindray Service Department or your local distributor.
200690100002	Reagent unit warning: Inadequate dispensing of reagent probe	Check the syringe as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
200690110006	Reagent unit warning: No liquid surface detected when washing reagent probe	Pause dispensing and check if there is a reagent at the specified position. If no, add one. If the error remains, contact Mindray Service Department or your local distributor.
300640010007	Main unit response error: Odd/even check error	Contact Mindray Service Department or your local distributor.
300640020007	Main unit response error: Instruction too long	Contact Mindray Service Department or your local distributor.
300640030007	Main unit response error: Instruction too short	Contact Mindray Service Department or your local distributor.
300640040007	Main unit response error: Incomplete instruction	Contact Mindray Service Department or your local distributor.
300640050007	Main unit response error: Check sum error	Contact Mindray Service Department or your local distributor.
300640060007	Main unit response error: A value within 00-0x7F is larger than 0x7F	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
300640070007	Main unit response error: Unmatched machine type	Contact Mindray Service Department or your local distributor.
300641260007	Main unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300651260005	Reaction unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300651260005	Reaction unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300651260015	Reaction unit response error: Odd/even check error	Contact Mindray Service Department or your local distributor.
300651260025	Reaction unit response error: Instruction too long	Contact Mindray Service Department or your local distributor.
300651260035	Reagent unit response error: Instruction too short	Contact Mindray Service Department or your local distributor.
300651260045	Reaction unit response error: Incomplete instruction	Contact Mindray Service Department or your local distributor.
300651260055	Reaction unit response error: Check sum error	Contact Mindray Service Department or your local distributor.
300651260065	Reaction unit response error: A value within 00-0x7F is larger than 0x7F	Contact Mindray Service Department or your local distributor.
300651260075	Reaction unit response error: Unmatched machine type	Contact Mindray Service Department or your local distributor.
300651261265	Reaction unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300660030000	Temperature unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300660030010	Temperature unit response error: Odd/even check error	Contact Mindray Service Department or your local distributor.
300660030020	Temperature unit response error: Instruction too long	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
300660030030	Temperature unit response error: Instruction too short	Contact Mindray Service Department or your local distributor.
300660030040	Temperature unit response error: Incomplete instruction	Contact Mindray Service Department or your local distributor.
300660030050	Temperature unit response error: Check sum error	Contact Mindray Service Department or your local distributor.
300660030060	Temperature unit response error: A value within 00-0x7F is larger than 0x7F	Contact Mindray Service Department or your local distributor.
300660030070	Temperature unit response error: Unmatched machine type	Contact Mindray Service Department or your local distributor.
300660031260	Temperature unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300671260005	Mixing unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300671260015	Mixing unit response error: Odd/even check error	Contact Mindray Service Department or your local distributor.
300671260025	Mixing unit response error: Instruction too long	Contact Mindray Service Department or your local distributor.
300671260035	Mixing unit response error: Instruction too short	Contact Mindray Service Department or your local distributor.
300671260045	Mixing unit response error: Incomplete instruction	Contact Mindray Service Department or your local distributor.
300671260055	Mixing unit response error: Check sum error	Contact Mindray Service Department or your local distributor.
300671260065	Mixing unit response error: A value within 00-0x7F is larger than 0x7F	Contact Mindray Service Department or your local distributor.
300671260075	Mixing unit response error: Unmatched machine type	Contact Mindray Service Department or your local distributor.
300671261265	Mixing unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300681260005	Sample unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
300681260015	Sample unit response error: Odd/even check error	Contact Mindray Service Department or your local distributor.
300681260025	Sample unit response error: Instruction too long	Contact Mindray Service Department or your local distributor.
300681260035	Sample unit response error: Instruction too short	Contact Mindray Service Department or your local distributor.
300681260045	Sample unit response error: Incomplete instruction	Contact Mindray Service Department or your local distributor.
300681260055	Sample unit response error: Check sum error	Contact Mindray Service Department or your local distributor.
300681260065	Sample unit response error: A value within 00-0x7F is larger than 0x7F	Contact Mindray Service Department or your local distributor.
300681260075	Sample unit response error: Unmatched machine type	Contact Mindray Service Department or your local distributor.
300681261265	Sample unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300691260005	Reagent unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.
300691260015	Reagent unit response error: Odd/even check error	Contact Mindray Service Department or your local distributor.
300691260025	Reagent unit response error: Instruction too long	Contact Mindray Service Department or your local distributor.
300691260045	Reagent unit response error: Incomplete instruction	Contact Mindray Service Department or your local distributor.
300691260055	Reagent unit response error: Check sum error	Contact Mindray Service Department or your local distributor.
300691260065	Reagent unit response error: A value within 00-0x7F is larger than 0x7F	Contact Mindray Service Department or your local distributor.
300691260075	Reagent unit response error: Unmatched machine type	Contact Mindray Service Department or your local distributor.
300691261265	Reagent unit response error: No response, or timeout	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000010009	System environment error: Operating system error	Contact Mindray Service Department or your local distributor.
400000020009	System environment error: System language library does not exist	Contact Mindray Service Department or your local distributor.
400000030009	System environment error: Text resource library does not exist	Contact Mindray Service Department or your local distributor.
400000040009	System environment error: Resolution error	Reset the resolution (1024x768) of the display. If the error remains, contact Mindray Service Department or your local distributor.
400000050000	System environment error: Wrong color	Reset the color (at least 8 bits) of the display. If the error remains, contact Mindray Service Department or your local distributor.
400000060000	System environment error: Screen saver shutdown error	Close the screen saver. If the error remains, contact Mindray Service Department or your local distributor.
400000070000	System environment error: Sleeping shutdown error	Shutdown the sleeping function. If the error remains, contact Mindray Service Department or your local distributor.
400000080009	Control software error: Memory error	Contact Mindray Service Department or your local distributor.
400000110007	Control software error: No empty command buffer	Contact Mindray Service Department or your local distributor.
400000120009	Control software error: Void cursor	Contact Mindray Service Department or your local distributor.
400000130008	Control software error: Data processing thread error	Contact Mindray Service Department or your local distributor.
400000140008	Control software error: Test thread error	Contact Mindray Service Department or your local distributor.
400000150009	Control software error: Multi-media timer error	Contact Mindray Service Department or your local distributor.
400000160000	System environment error: Mouse error	If this error occurs once more, exit the control software, then connect the mouse again and re-start the operation unit.
400000180009	Control software error: Database does not exist	Contact Mindray Service Department or your local distributor.
400000190009	Control software error: Database initialization error	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000200009	Control software error: Database version error	Contact Mindray Service Department or your local distributor.
400000210009	Control software error: Database error	Contact Mindray Service Department or your local distributor.
400000220009	Control software error: Database connection error	Contact Mindray Service Department or your local distributor.
400000230009	Control software error: Database is read only!	Contact Mindray Service Department or your local distributor.
400000250000	Control software error: Database searching error	Contact Mindray Service Department or your local distributor.
400000260008	Control software error: Database updating error	Contact Mindray Service Department or your local distributor.
400000270000	Control software error: Database connection missing	Contact Mindray Service Department or your local distributor.
400000280000	Control software error: Database backing up error	Contact Mindray Service Department or your local distributor.
400000290000	Control software error: Database importing error	Contact Mindray Service Department or your local distributor.
400000300000	Control software error: Database exporting error	Contact Mindray Service Department or your local distributor.
400000310008	Control software error: Serial port startup error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000320008	Control software error: Serial port initialization error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000330008	Control software error: Serial port sending thread error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000340008	Control software error: Serial port receiving thread error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000350008	Control software error: Serial port sending error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000360008	Control software error: Serial port receiving error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000370009	Control software error: Configuration file does not exist	Contact Mindray Service Department or your local distributor.
400000380009	Control software error: Configuration file error	Contact Mindray Service Department or your local distributor.
400000390009	Control software error: Configuration file read error	Contact Mindray Service Department or your local distributor.
400000400000	Control software error: Configuration file write error	Contact Mindray Service Department or your local distributor.
400000410000	Control software error: Help file does not exist	Contact Mindray Service Department or your local distributor.
400000420000	Control software error: Help file opening error	Contact Mindray Service Department or your local distributor.
400000430000	Control software error: Log read error	Contact Mindray Service Department or your local distributor.
400000440000	Control software error: Log write error	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000450000	Control software error: Log error	Contact Mindray Service Department or your local distributor.
400000460008	Control software error: Cannot connect to the analyzing unit	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000470008	Control software error: Handshake failed	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again to initialize the serial port as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000480008	Control software error: Version No. checking error	Contact Mindray Service Department or your local distributor.
400000490000	Control software error: Response does not corresponds to the command	Contact Mindray Service Department or your local distributor.
400000500000	Control software error: Received frame does not corresponds to the command	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000510009	System environment error: Self-check error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, perform self-checking again as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000520008	Control software error: Parameter downloading error	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, download parameters again as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000530008	Control software error: Mechanical resetting error	Reset the mechanical parts as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000540008	Control software error: Cuvette segment replacing error	Check the reaction disk as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000550008	Control software error: Background measurement error	Contact Mindray Service Department or your local distributor.
400000560008	Control software error: Cuvette blank measurement error	Contact Mindray Service Department or your local distributor.
400000570008	Control software error: Washing error	Contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000580008	Control software error: Startup check is not finished normally	Check if the analyzing unit is connected to the operation unit properly, otherwise place the MAIN POWER to OFF and shut down the operation unit, then reconnect and restart them. After restarting the analyzing unit and operation unit, if the error remains, start the startup check again as instructed by **4.17.1 Daily Maintenance**. If the error remains, contact Mindray Service Department or your local distributor.
400000590000	Control software error: Lamp intensity on the low side	Check the lamp as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000600008	Control software error: Lamp intensity too low. Can't test	Check the lamp as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000610008	Control software error: Dark current checking failed	Contact Mindray Service Department or your local distributor.
400000620008	Control software error: Dark current too large	Contact Mindray Service Department or your local distributor.
400000630008	Control software error: Both AD values are too similar	Contact Mindray Service Department or your local distributor.
400000640008	Control software error: Off AD is larger than the On AD	Contact Mindray Service Department or your local distributor.
400000650008	Control software error: Lamp turning on failed	Check the lamp as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000660008	Control software error: Lamp turning off failed	Check the lamp as instructed by **4.17.4 Commission**. If the error remains, contact Mindray Service Department or your local distributor.
400000670008	Control software error: Ambient temperature too high	Check if the ambient temperature is within acceptable range. If the error remains, contact Mindray Service Department or your local distributor.
400000680008	Control software error: Ambient temperature too low	Check if the ambient temperature is within acceptable range. If the error remains, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000690008	Control software error: Reaction temperature too high	Contact Mindray Service Department or your local distributor.
400000700008	Control software error: Reaction temperature too low	Contact Mindray Service Department or your local distributor.
400000710000	Control software error: Temperature fluctuation	Contact Mindray Service Department or your local distributor.
400000720000	Control software error: Sending buffer overflows	Contact Mindray Service Department or your local distributor.
400000730000	Control software error: Receiving buffer overflows	Contact Mindray Service Department or your local distributor.
400000810001	Test result error: No balance point found in …	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000820001	Test result error: No linear range found in …	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000830001	Test result error: Linearity of reaction curve of … too weak	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000840001	Test result error: Response of … calculation error	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000850001	Test result error: Response of … exceeds the one of weakest calibrator	Check the calibrator and calibration rule and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000860001	Test result error: Response of … exceeds the one of strongest calibrator	Check the calibrator and calibration rule and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000870001	Test result error: Concentration of … exceeds the lower limit of linear range	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000880001	Test result error: Concentration of … exceeds the upper limit of linear range	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000910001	Test result error: Absorbance of … too low	Re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400000920001	Test result error: Reagent blank of … too high	Re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000930001	Test result error: R2 blank of … too low	Re-run the reagent blank. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000940001	Test result error: R2 blank of … too high	Re-run the reagent blank. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000950001	Test result error: Sample blank of … too low	Re-run the reagent blank of this test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000960001	Test result error: R2 blank of … too high	Re-run the reagent blank of this test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000970001	Test result error: Sample blank of … too low	Re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000980001	Test result error: Sample blank of … too high	Re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400000990001	Test result error: Substrate of … exhausted	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001000001	Test result error: Abnormal prozone check of …	Re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001010001	Test result error: Calibration parameter of … calculation failed	Check the calibrator and calibration rule and re-run the calibration. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001020001	Test result error: Calibration SD of … too large	Check the calibrator and calibration rule and re-run the calibration. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001030001	Test result error: Difference between calibration coefficients of … too large	Check the calibrator and calibration rule and re-run the calibration. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001040001	Test result error: Calibration related coefficients of … too low	Check the calibrator and calibration rule and re-run the calibration. If this error occurs frequently, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400001050001	Test result error: Incomplete repeated calibration data of …	Check the calibrator and calibration rule and re-run the calibration. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001060001	Test result error: Calibration curve of … not monotonic	Check the calibrator and calibration rule and re-run the calibration. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001070001	Test result error: Concentration of … calculation failed	Check the test parameters and re-run the test. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001080001	Test result error: Incomplete test result of …	If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001090001	Test result error: Error of repeated … too large	Check the calibrator and calibration rule and re-run the calibration. If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001100000	Test result error: QC out of control	If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001110001	Test result error: … dispensing delayed	If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001120001	Test result error: R2 of … delayed	If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001130001	Test result error: Photoelectric collection of … delayed	If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001140006	Control software error: Detergent exhausted, or invalid sensor	Check the deionized water tank. If the water is not enough, add more. If the error remains, contact Mindray Service Department or your local distributor.
400001150006	Control software error: Waste full	Check and clear the waste tank. If the error remains, contact Mindray Service Department or your local distributor.
400001230001	Test result error: Incomplete repeated QC data of …	If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001350000	Test result error: Blank response of … too low	If this error occurs frequently, contact Mindray Service Department or your local distributor.

Error Code	Error Message	Corrective Measure
400001360000	Test result error: Blank response of … too high	If this error occurs frequently, contact Mindray Service Department or your local distributor.
400001370000	Test result error: Calibration sensitivity of … too low	If this error occurs frequently, contact Mindray Service Department or your local distributor.
500000170000	System environment error: Printer connection error	Check the connection between the operation unit and the printer and ensure the printer is on. If the error remains, contact Mindray Service Department or your local distributor.
500001160000	Control software error: … is out of date. Please replace in time	Replace.
500001170000	Control software error: … is out of date. Please replace in time	Replace.
500001180000	Control software error: Calibration interval of … is out. Please re-calibrate in time	Re-run the calibration.

7 Calculation Methods

7.1 Analytical Methods

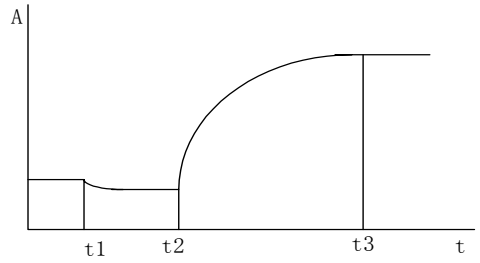
The analyzer can provide three analytical methods:

- Endpoint
- Fixed-time
- Kinetic

7.1.1 Endpoint

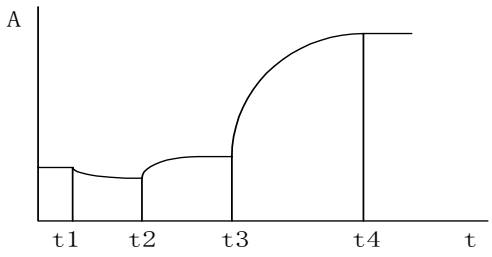
The endpoint or, more correctly, equilibrium method, is the most ideal. The reaction reaches equilibrium after a period of time. Because the equilibrium constant is very large, it can be considered that all substrates (analytes) have changed into products, and the absorbance of the reactant does not change any more. The absorbance change is directly proportional to the analytes concentration.

Figure 7-1 Single-reagent Endpoint reaction



As shown in Figure 7-1, t_1 is the time when the reagent is added, and t_2 is the time when the sample is added. The reaction starts when they are mixed. At t_3 the reaction reaches equilibrium and the absorbance reading is taken. The reaction period is t_2 to t_3.

Figure 7-2 Double-reagent Endpoint reaction



As shown in Figure 7-2, t_1 is the time when the first reagent is added, and t_2 is the time when the sample is added, incubation starts when they are mixed. t_3 is the time when the second reagent is added, then the reaction starts when they are mixed. At t_4 the reaction reaches equilibrium and the absorbance reading is taken. t_2 to t_3 is the incubation period and t_3 to t_4 is the reaction period.

The endpoint reaction is largely insensitive to minor changes in such condition changes as amount of enzyme, pH and temperature, provided the changes are not significant enough to affect the reaction time.

7.1.2 Fixed-Time

For the fixed-time reaction method (namely, first-order kinetic method or initial rate method), the reaction velocity (v), within a specific period, is directly proportional to the substrate concentration [S], namely, v=k[S]. As the substrate is consumed continuously, the reaction velocity becomes smaller and smaller, and so does the change rate of the absorbance. It takes much time for such a reaction to reach equilibrium. Theoretically, the absorbance reading can be taken at any time. The reaction can, however, become steady only after a delay because it is complicated at the beginning and there are miscellaneous reactions due to the complex serum compositions. For any first order reaction, the substrate concentration [S] at a given time after the start of the reaction is given by the following:

$$[S] = [S_0] \times e^{-kt}$$

Where,

$[S_0]$ - initial substrate concentration

e - base of the natural log

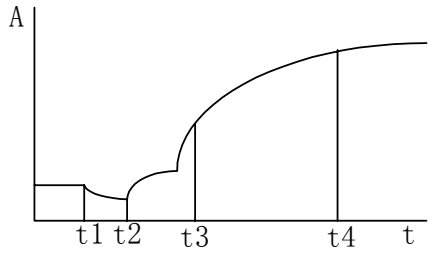
k - rate constant

The change in substrate concentration Δ[S] over a fixed-time interval, t_1 to t_2, is related to $[S_0]$ by the following equation:

$$[S_0] = \frac{-\Delta[S]}{e^{-kt_1} - e^{-kt_2}}$$

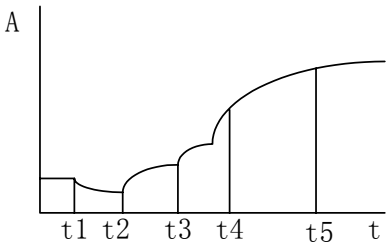
That is, within a fixed time interval, the change in substrate concentration is directly proportional to its initial concentration. This is the general property of first order reactions. Within this interval, absorbance change is directly proportional to the analytes concentration.

Figure 7-3 Single-reagent Fixed-time reaction



As shown in Figure 7-3, t_1 is the time when the reagent is added and t_2 is the time when the sample is added. The reaction starts when they are mixed. From t_3 the reaction becomes steady and t_4 is the time to stop monitoring the reaction. t_2 to t_3 is the delay period, and the absorbance readings are respectively taken at t_3 and t_4.

Figure 7-4 Double-reagent Fixed-time reaction



As shown in Figure 7-4, t_1 is the time when the first reagent is added, and t_2 is the time when the sample is added, and then the mixture absorbance reading is taken after they are mixed. t_3 is the time when the second reagent is added, then the reaction starts when they are mixed. At t_4 the reaction reaches equilibrium, and t_5 is the time to stop monitoring the reaction. t_2 to t_3 is the incubation period, and t_3 to t_4 is the delay period. The absorbance readings are respectively taken at t_4 and t_5.

The fixed-time reaction is more demanding technically than the equilibrium method. Because reaction rate is measured at two different points, all the factors that affect reaction rate, such pH, temperature, and amount of enzyme, must be kept constant from one assay to the next, as must the timing of the two measurements. A reference solution of the substrate must be used for calibration.

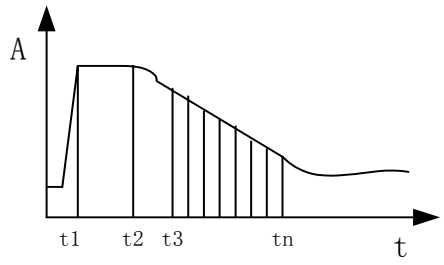
7.1.3 Kinetic

For the kinetic method (namely, zero-order kinetic or continuous-monitoring method), the reaction velocity is not related to the substrate concentration and remains constant in the reaction process. As a result, for a given wavelength, the absorbance of the analytes changes evenly, and the change rate (ΔA/min) is directly proportional

to the activity or concentration of the substrate. The kinetic method is usually used to measure enzyme activity.

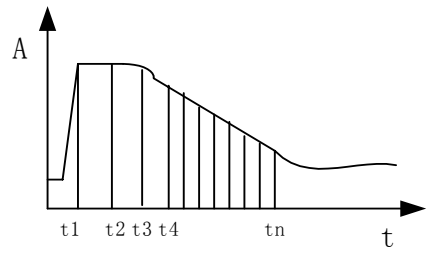
In fact, it is impossible for the substrate concentration to be high enough, and the reaction will be no longer a zero-order reaction when the substrate is consumed to a certain degree. Therefore, the theory only stands within certain period. In addition, the reaction can become steady only after a certain period of time, because the reaction is complicated at the beginning and there are miscellaneous reactions due to the complex serum compositions.

Figure 7-5 Single-reagent Kinetic reaction



As shown in Figure 7-5, t_1 is the time when the reagent is added, t_2 is the time when the sample is added and the reaction starts when they are mixed. From t_3 the reaction becomes steady. t_n is the time to stop monitoring the reaction. t_2 to t_3 is the delay period, and t_3 to t_n is the monitoring period, during which the absorbance readings are taken.

Figure 7-6 Double-reagent Kinetic reaction

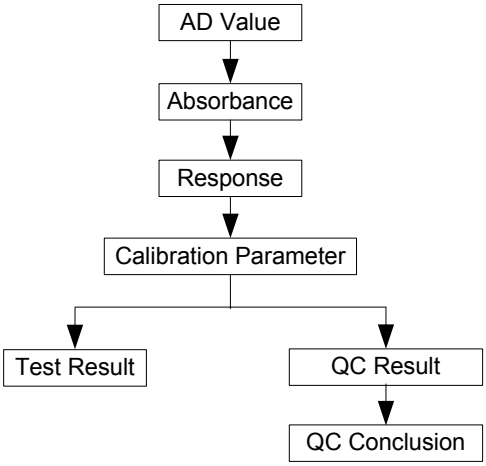


As shown in Figure 7-6, t_1 is the time when the first reagent is added, and t_2 is the time when the sample is added, and then they are mixed. t_3 is the time when the second reagent is added, then the reaction starts when they are mixed. At t_4 the reaction reaches equilibrium, and t_n is the time to stop monitoring the reaction. t_3 to t_4 is the delay period, and t_4 to t_n is the monitoring period, during which the absorbance readings are taken.

7.2 Calculation Process

The analyzer adopts such a measurement and calculation flow as shown in Figure 7-7.

Figure 7-7 Calculation process



7.2.1 Absorbance

The analyzer measures the light intensity through photoelectric conversion, linear amplification and AD conversion. For the light intensity signal I_i of Channel i, the AD output D_i is:

$$D_i = K_{pe} \cdot K_a \cdot K_{ad} \cdot I_i$$

Where,

K_{pe} - photoelectric conversion factor

K_a - linear amplification factor

K_{ad} - AD conversion factor

D_i - data of Channel i

I_i - light intensity of Channel i

So,

$$A_i = \lg \frac{I_{i0}}{I_i} = \lg \frac{D_{i0}}{D_i}$$

Where,

A_i - absorbance of Channel i

D_{i0} - background AD output

D_i - AD output after the substrate is added

In theory, when the lights are off, the AD output of each channel will be zero. In practice, because of the existence of dark current, there is still a background output $D_{ibackground}$, which should be deducted. Then, the complete absorbance formula should be:

$$A_i = \lg \frac{D_{i0} - D_{ibackground}}{D_i - D_{ibackground}}$$

7.2.2 Response

For the analyzer, the response (R) is defined as the absorbance change before and after the reaction, or the absorbance change rate during the reaction process.

The formula for calculating the response (R) is closely related to the analytical method (kinetic, fixed-time and endpoint), the number of reagents (single or double), and the number of wavelengths (single or double). They are respectively detailed in the following sections.

7.2.2.1 Calculating the response of the endpoint method

Single-reagent and single-wavelength

$R = R_s - R_{SB}$

R_s and R_{SB} are calculated through $R = A_{t_3} - A_{t_2-1} \times \frac{V}{V+S}$.

Where,

R_s - original response

R_{SB} - response of sample blank. If no sample blank is required, $R_{SB} = 0$.

A_{t_3} - absorbance at t_3

A_{t_2-1} - absorbance at previous point of t_2

$\frac{V}{V+S}$ - single-reagent volume calibration factor

Double-reagent and single-wavelength

$R = R_s - R_b$

R_s and R_b are calculated through $R = A_{t_4} - A_{t_3-n} \times \frac{V_1 + S}{V_1 + S + V_2}$.

Where,

R_s - original response

R_b - response of reagent blank. R_b is the response of the latest reagent blank.

A_{t_4} - absorbance at t_4

A_{t_3-n} - absorbance at $t_3 - n$, $-n$ is the starting value of the reaction time

$\frac{V_1 + S}{V_1 + S + V_2}$ - double-reagent volume calibration factor

Double-wavelength (for both single-reagent and double-reagent)

The calculation method is similar to that for single-wavelength reaction, except for every measurement period, the absorbance is the difference between primary wavelength absorbance and secondary wavelength absorbance.

7.2.2.2 Calculating the response of the fixed-time reaction

Single-wavelength (for both single-reagent and double-reagent)

$R = R_s - R_b$

R_s and R_b are calculated through $R = \frac{A_{t_m} - A_{t_k}}{t_m - t_k}$.

Where,

R_s - original response

R_b - response of reagent blank. R_b will be the response of the latest reagent blank. If no reagent blank has been required, $R_b = 0$

t_k - starting time for absorbance reading

t_m - ending time for absorbance reading

Double-wavelength (for both single-reagent and double-reagent)

The calculation method is similar to that for single-wavelength reaction, except for every measurement period, the absorbance is the difference between primary wavelength absorbance and secondary wavelength absorbance.

7.2.2.3 Calculating the response of the kinetic reaction

Single-wavelength (for both single-reagent and double-reagent)

$$R = R_s - R_b$$

R_s and R_b are calculated through the method of least squares.

Where,

R_s - original response

R_b - response of reagent blank. R_b will be the response of the latest reagent blank. If no reagent blank has been required, $R_b = 0$.

Formula with the method of least squares:

$$R = \frac{\sum_{i=I}^{M} (T_i - \overline{T}) \cdot (A_i - \overline{A})}{\sum_{i=I}^{M} (T_i - \overline{T})^2}$$

Where,

I - upper limit of linear range

M - lower limit of linear range

A_i - absorbance at i

$\overline{A}$ - average absorbance between I and M

Ti - time at i

$\overline{T}$ - average time between I and M

Double-wavelength (for both single-reagent and double-reagent)

The calculation method is similar to that for single-wavelength reaction, except for every measurement period, the absorbance is the difference between primary wavelength absorbance and secondary wavelength absorbance.

7.2.3 Calibration Parameters

The analyzer provides two calibration methods: linear calibration and nonlinear calibration.

The linear calibration includes one-point linear calibration, two-point linear calibration and multi-point linear calibration. They are mainly used for tests determined by colorimetry.

The nonlinear calibration includes Logistic-Log 4P, Logistic-Log 5P, Exponential 5P, Polynomial 5P, Parabola and Spline. They are mainly used for tests determined by turbidimetry.

In this section,

- R - calibrator response
- C - calibrator concentration (activity)
- K, R_0, a, b, c - calibration parameters

7.2.3.1 Calculating linear calibration parameters

One-point linear calibration

Calibration formula: $R = aC$

This calibration method adopts only one calibration parameter a, $a = \frac{R}{C}$.

This calibration method requires only one calibrator.

Two-point linear calibration

Calibration formula: $R = aC + b$

This calibration method adopts two calibration parameters: a and b, where, $a = \frac{R_2 - R_1}{C_2 - C_1}$, $b = R_1 - (\frac{R_2 - R_1}{C_2 - C_1})\ C_1$.

This calibration method requires two calibrators. C_1 and C_2 are respectively the concentrations of calibrator 1 and calibrator 2. R_1 and R_2 are respectively the responses of calibrator 1 and calibrator 2.

Multi-point linear calibration

Calibration formula: $R = aC + b$

This calibration method adopts two calibration parameters: a and b.

This calibration method requires n (n≥3) calibrators. C_i is the concentration of calibrator i. R_i is the response of calibrator i. a and b can be obtained through the method of least squares.

$$a = \frac{\sum_{i=1}^{n} C_i R_i - (\sum_{i=1}^{n} C_i)(\sum_{i=1}^{n} R_i)/n}{\sum_{i=1}^{n} C_i^{\,2} - (\sum_{i=1}^{n} C_i)^2/n}$$

$$b = (\sum_{i=1}^{n} R_i)/n - [\frac{\sum_{i=1}^{n} C_i R_i - (\sum_{i=1}^{n} C_i)(\sum_{i=1}^{n} R_i)/n}{\sum_{i=1}^{n} C_i^{\,2} - (\sum_{i=1}^{n} C_i)^2/n}](\sum_{i=1}^{n} C_i)/n$$

7.2.3.2 Calculating nonlinear calibration parameters

Logistic-Log 4P

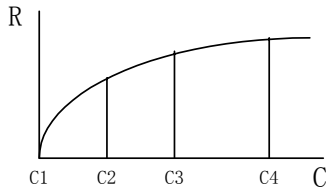
Calibration formula: $R = R_0 + K\dfrac{1}{1+\exp[-(a+b\ln C)]}$

This calibration method adopts four parameters: R_0, K, a and b.

This calibration method requires at least four calibrators. The concentration (or activity) of calibrator 1 is 0, and the corresponding R is equal to R_0.

This calibration method is applied to the calibration curve that the response becomes smaller and smaller with the concentration increase. See Figure 7-8.

Figure 7-8 Logistic-Log 4P calibration curve



Logistic-Log 5P

Calibration formula: $R = R_0 + K\dfrac{1}{1+\exp[-(a+b\ln C+cC)]}$

This calibration method adopts five parameters: R_0, K, a, b and c.

This calibration method requires at least five calibrators. The concentration (or activity) of calibrator 1 is 0, and the corresponding R is equal to R_0.

The applications of the calibration method are the same with that of Logistic-Log 4P, but this method has a higher fitting.

Exponential 5P

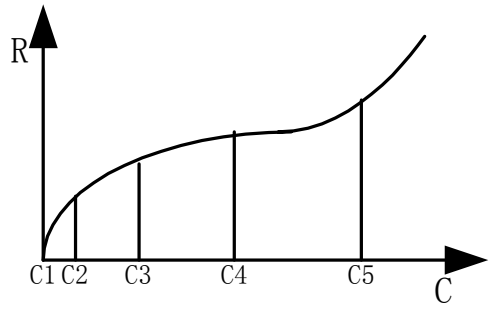
Calibration formula: $R = R_0 + K\exp[a\ln C + b(\ln C)^2 + c(\ln C)^3]$

This calibration method adopts five parameters: R_0, K, a, b and c.

This calibration method requires at least five calibrators. The concentration (or activity) of calibrator 1 is 0, and the corresponding R is equal to R_0.

This calibration method is applied to the calibration curve that the response increases sharply when the concentration reaches a specific value. See Figure 7-9.

Figure 7-9 Exponential 5p calibration curve



Polynomial 5P

Calibration formula: $\ln C = a + b(\dfrac{R-R_0}{100}) + c(\dfrac{R-R_0}{100})^2 + d(\dfrac{R-R_0}{100})^3$

This calibration method adopts five parameters: R_0, a, b, c and d.

This calibration method requires at least five calibrators. The concentration (or activity) of calibrator 1 is 0, and the corresponding R is equal to R_0.

Parabola

Calibration formula: $R = aC^2 + bC + c$

This calibration method adopts three parameters: a, b and c.

This calibration method requires at least three calibrators. The calibration parameters can be calculated through the method of polynomial least squares.

Spline

Calibration formula: $R = R_{0i} + a_i(C - C_i) + b_i(C - C_i)^2 + c_i(C - C_i)^3$

This calibration method requires 2 to 6 calibrators. The number of calibrators is set to be n, so the calibration method has 4(n-1) parameters in total: R_{0i}, a_i, b_i and c_i.

7.2.4 Concentration

7.2.4.1 Calculating concentration of linearly calibrated sample/control

One-point linear calibration

$$C = \frac{R}{a}$$

Where,

a - calibration parameter

Two-point linear calibration

$$C = \frac{R - b}{a}$$

Where,

a, b - calibration parameters

Multi-point linear calibration

$$C = \frac{R - b}{a}$$

Where,

a, b - calibration parameters

7.2.4.2 Calculating concentration of nonlinearly calibrated sample/control

Logistic-Log 4P

$$C = EXP(\frac{-a - \ln(\frac{K}{R - R_0} - 1)}{b})$$

Where,

R_0, K, a, b - calibration parameters

Logistic-Log 5P

Obtain the positive real root with the dichotomy method.

Exponential5P

Obtain the positive real root with the dichotomy method.

Polynomial5P

$$C = \exp(a + b(\frac{R - R_0}{100}) + c(\frac{R - R_0}{100})^2 + d(\frac{R - R_0}{100})^3)$$

Where,

R_0, a, b, c, d - calibration parameters

Parabola

Obtain the positive real root of the following linear quadratic equation:

$$aC^2 + bC + c - R = 0$$

Spline

Spline defines several calculation sections based on the responses of calibration concentrations. Each section differs in specific parameters. Therefore, the section to which the current response belongs should be confirmed before Spline calculation.

The parameters of relevant section shall be used to obtain a positive real root with the dichotomy method.

7.2.5 QC rules

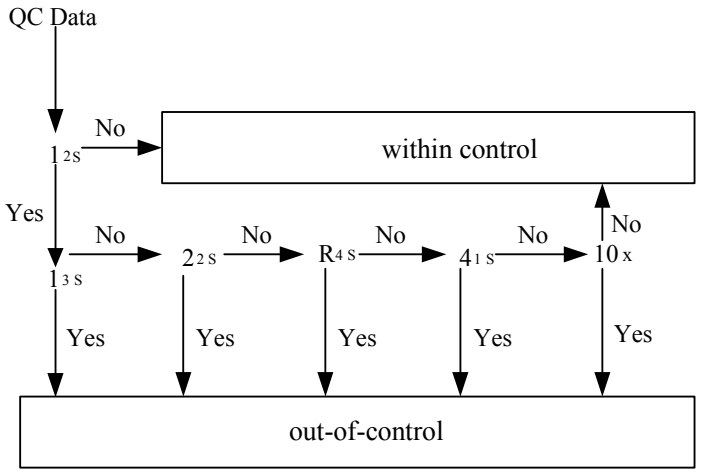
7.2.5.1 Westgard Multi-rule

Westgard multi-rule is shown below.

Symbol	Explanation	QC Conclusion
1_{2S}	One control value exceeds ±2 standard deviations.	Warning
1_{3S}	One control value exceeds ±3 standard deviations.	Out-of-control (random error, systematic error)
2_{2S}	Two consecutive control values for one level exceed ±2 standard deviations.	Out-of-control (systematic error)
R_{4S}	The difference between two consecutive control values exceeds 4 standard deviations.	Out-of-control (random error)
4_{1S}	Four consecutive control values for one level exceed ±1 standard deviation.	Out-of-control (systematic error)
10_X	Ten consecutive control values for one level lie on one side of the mean.	Out-of-control (systematic error)

Westgard multi-rule QC conclusion flow for single control is shown in Figure 7-10.

Figure 7-10 Westgard multi-rule QC conclusion flow



For several controls, the conclusion logic is similar to the above condition, except for multiple continuous QC data, which should be combined simultaneously.

7.2.5.2 Cumulative Sum Check

Regarding different requirements to the QC result, cumulative sum check usually adopts three controlling methods, which are mainly used to monitor the systematic error of the testing methods.

Where,

$\bar{x}$ - average value

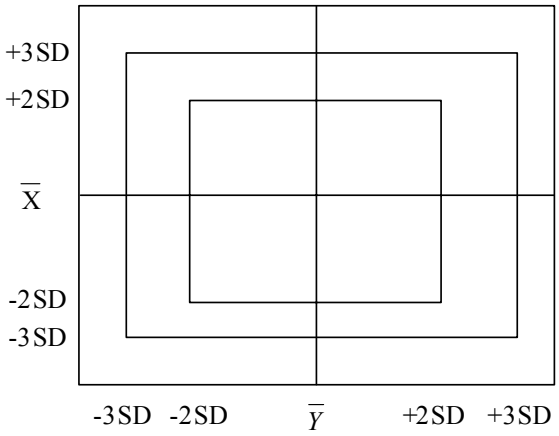
SD - standard deviation

Controlling Methods	Threshold (k)	Control Limit (h)
CS-(1.0SD: 2.7SD)	$\bar{x}$ ±1.0SD	±2.7SD
CS-(1.0SD: 3.0SD)	$\bar{x}$ ±1.0SD	±3.0SD
CS-(0.5SD: 5.1SD)	$\bar{x}$ ±0.5SD	±5.1SD

7.2.5.3 Twin-plot

In the analyzer, Twin-plot, which has no detailed rules, is present only as a whole chart to help you make a QC conclusion.

Figure 7-11 Twin-plot



The chart can sensitively indicate the systematic errors and random errors.

Appendix A Specifications

A.1 Technical Specifications

- Throughput: 200 tests/h maximum
- Tests analyzed simultaneously: 19 (double-reagent)/38 (single-reagent)
- Reaction types: Endpoint, Fixed-time and Kinetic. All supporting double reagent and double wavelength

- Sample/Reagent disk: 40 sample tube positions on the outer circle and 40 reagent bottle positions on the inner circle; a refrigerator to keep the temperature at 4-15°C
- Sample volume: 3μl-45μl; precision: 0.5μl
- Reagent volume: 30μl -450μl; precision 1μl
- STAT samples: can be inserted immediately for analysis with higher priority
- Probe: with a built-in level detector; equipped with auto safeguard; capable of tracking level
- Mixing bar: for single-reagent tests, it functions immediately (within the same period) after sample dispensing; for double-reagent tests, it functions immediately (within the same period) after dispensing of the second reagent.
- Washing: automatically washing the probe and the mixing bar; carryover less than 0.1%
- Auto re-run

- Reaction disk: 80 reaction cuvettes
- Reaction temperature: 37±0.3°C with fluctuation no greater than ±0.1°C
- Compatible cuvettes: 5mm×6mm×25mm; 5mm optical path; disposable; 900μl
- Reaction volume: 180-500μl

- Photometric system: static fiber optics; interference filters of various wavelengths; reversed optics
- Light source: tungsten-halogen lamp; 12V, 50VA
- Wavelength: 340nm, 405nm, 450nm, 510nm, 546nm, 578nm, 630nm, 670nm, 700nm (optional)
- Measurement period: 16 seconds

- Repeatability: CV, no greater than 1%
- Stability: Absorbance change no greater than 0.01 in 1h

A.2 Power Requirements

- Power supply: AC 110-130V/200-240V±10%, 50/60Hz, three-wire power cord and properly grounded
- Input power: 1000VA

A.3 Environmental Requirements

A.3.1 Storage Requirements

- Temperature: 0°C - 40°C
- Humidity: 30%RH-80%RH, no condensation
- Atmospheric pressure: 500 hPa - 1,060 hPa
- Above-sea-level height: -1,300feet - 18,000 feet
  -400m - 5,500 m

A.3.2 Operation Requirements

- Temperature: 15°C - 30°C
- Humidity: 35%RH-80%RH, no condensation
- Atmospheric pressure: 860 hPa - 1,060 hPa
- Above-sea-level height: -1,300feet - 6,500 feet
  -400m - 2,000 m

A.4 Dimension and Weight

- Dimension: 860mm×680mm×625mm (W×D×H, optional lower cabinet excluded)
  860mm×680mm×1160mm (W×D×H, optional lower cabinet included)
- Weight: 113kg (optional lower cabinet excluded; the optional lower cabinet weighs 51Kg)

A.5 Other Specifications

- Sound data: 73dB
- Fuse: 250VAC T1.6A; 250VAC T2A; 250VAC T6.3A; 250VAC T10A

A.6 Input/Output Devices

- PC Keyboard
- PC Mouse
- Printer
- Display

A.7 Interface

- Interface between Analyzing Unit and Operation Unit: RS-232C

Appendix B Supplies

To ensure personal safety and system performance, use supplies manufactured or recommended by Mindray only. Contact Mindray Service Department or your local distributor for details.

Description	Part Number	Location	Remarks
Light source lamp (50W tungsten–halogen lamp L9389 'Gilway')	BA30-10-06365	Lamp box	Replacing part Replace it when 1) It serves for over 1000h; or 2) The system prompts.
Plunger assembly of syringe (PLUNGER ASSEMBLY 24400 500µL PG 'KLOEHN')	0040-10-32317	Syringe	Replacing part Replace it when 1) It serves for 3 months; 2) It runs for 100,000 times; or 3) It is seriously damaged.
Syringe gasket	0040-10-32303	Connection part between the syringe and the Tee	Replacing part Replace it when the syringe is disassembled for 2 - 3 times.
Probe assembly	BA31-30-56790	Probe arm	Replacing part Replace it when 1) It serves for 1 year; or 2) It is damaged or bent.
Probe gasket	0040-10-32307	Probe	Replacing part Replace it when 1) The probe is disassembled for 2 - 3 times; or 2) The probe is replaced with a new one.
Mixing bar	BA30-20-06775	Mixing bar arm	Replacing part Replace it when it is damaged.

Description	Part Number	Location	Remarks
Reaction cuvette	BA31-20-41352	Reaction disk	Consumable
20ml reagent bottle	BA31-20-41376	Reagent disk	Consumable
40ml reagent bottle	BA31-20-41377	Reagent disk	Consumable
Cap of reagent bottle	BA31-20-41536	Reagent disk	Consumable
A4 copy paper	0150-10-00381	Printer	Consumable

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