LEPU MEDICAL

PC-1000A / AI-ECG Monitor
Central Monitoring System

Operator's Manual

I Preface

Copyright

Manual Purpose

The instructions for safe operation of the system in keeping with its function and intended use are contained in this manual. In order to operate the system properly, and protect patient and operator from injury, compliance with this manual is first priority. Please keep in touch with the manufacturer or your local distributor if you have any questions.

Intended Audience

This manual applies to clinical professionals with knowledge of medical procedures, practices and terminology as required for the monitoring of critically ill patients.

Only clinical professionals, anyone who are under their guidance or people who have been trained adequately can use this system. The unauthorized or the untrained are forbidden to operate the system.

About this Manual

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Contact Information

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II Manual Conventions

Illustrations

Setup or data displayed on your system may not be necessarily shown in all illustrations in this manual, because they are used as examples only.

All names mentioned in this manual and illustrations are fictitious. Any similarity is purely coincidental.

General Notes

- *Italic* text is used to indicate prompt information or quote the referenced chapters or sections.
- [XX] is used to indicate the word string in the software.
- → is used to indicate operational procedures.

Special Notes

The warnings, cautions and notes in this manual are used to remind readers of some specific information.

Warning

Indicates a potential hazard or unsafe practice that, if not avoided, could result in death or serious injury.

Caution

Indicates a potential hazard or unsafe practice that, if not avoided, could result in minor personal injury or product/property damage.

Note

Provides application tips or other useful information to ensure that you get the most from your product.

Table of Contents

Chapter 1 Safety Information

1.1 Warnings

⚠ Warning

This system is professional medical equipment. It can be operated and used by qualified professionals only.

⚠ Warning

The signal input/output part of this system can only be connected with the standard equipment for this system. Without the permission of our company, no other equipment may be connected to this system.

⚠ Warning

The computer where this system is installed must be well grounded. The network cable interface connected with the computer should not be shorted or placed on the ground at will.

⚠ Warning

Any Class I medical electrical equipment connected to this system must be connected with the protective grounding wire of this system. Non-medical electrical equipment needs additional protective grounding.

⚠ Warning

All kinds of accessories used for this system cannot be replaced at will. If you need to replace them, please contact our company; otherwise adverse consequences in terms of safety compatibility may occur.

⚠ Warning

Any device in this system that falls down accidentally or has other functional failures should be used temporarily. It is recommended to send the device back to our company for detailed testing of its safety performance and technical indicators, and it can be used only after the test results are qualified.

⚠ Warning

Data transmission between the CMS and the monitoring equipment depends on wired or wireless networks. Hospitals need to ensure the stability and security of the networks they use to prevent interruptions in data transmission or malicious damage that could affect patient monitoring.

⚠ Warning

Unnecessary treatment may even have side effects.

Warning

Delaying treatment or measurement may worsen the patient's condition.

1.2 Cautions

Caution

The monitoring equipment connected to this system must be our company's products or products with our company's data interface protocol. The operator must read carefully the Operator's Manual of this product before use.

Caution

The computer used in this system should not be used for other purposes, and no third-party software should be installed on this computer.

Caution

Don't move the computer while the system is running.

Caution

Report to the manufacturer and the competent authority of the Member State in which you're established for any serious incident that has occurred in relation to the device.

1.3 Notes

Note

The figures, illustrations and examples used in this manual are only for explanation, and they may differ from what is actually displayed on the system.

Note

The electronic Instructions for Use (IFU) for this product is available for free download at: https://www.creative-sz.com

To ensure accessibility, the website is compatible with major browsers and mobile devices.

Chapter 2 Product Introduction

2.1 Intended Use

PC-1000A and AI-ECG Monitor Central Monitoring System (hereinafter referred to as CMS) can work together with bedside patient monitors through cable LAN or WLAN to monitor simultaneously the physiological parameters such as ECG, RESP, TEMP, NIBP, SpO_2, PR, CO_2, adult IBP, EEG, BS%, Cerebral State Index (CSI), and EMG%, so as to perform central data monitoring, displaying, recording and printing. Up to 128 monitoring devices can be connected simultaneously.

It is applicable for use in hospitals. The operation should be performed by qualified professionals only.

> ☞ **Note**
>
> Your CMS may not cover all features, functions and accessories described below due to configuration differences.

> ☞ **Note**
>
> PC-1000A and AI-ECG Monitor only differ in model, this manual uses PC-1000A as an example for explanation.

2.2 Intended Patient Population

The CMS is qualified for use in the general population ranging from healthy subjects to which with cardiac and/or non-cardiac abnormalities.

2.3 Intended User

The CMS is intended for use by health care professionals whenever there is a need for monitoring the physiological parameters of patients.

2.4 Indications

The CMS connects to multiple bedside monitors, centrally display and manage patients' real-time vital signs, and handle alarms.

2.5 Product Components

The CMS consists of a system installation disk, softdog and watchdog.

2.6 Product Features

The CMS has the following features:

- Supports centralized monitoring of up to 128 monitoring devices.

- Supports single-screen and dual-screen display.
- Supports multiple real-monitoring views (all parameters, Oxy-CRG, etc.).
- Supports remote bidirectional control with bedside monitors.
- Supports functions for patient management, such as receiving patients, discharging patients, changing beds and changing equipment.
- Supports functions for alarm management such as alarm reset, alarm confirmation, alarm audio pause and shutdown.
- Supports the storage of up to 240 hours of patient monitoring data.
- Supports the review of monitoring data of discharged patients.

2.7 Symbols

2.7.1 Symbols on the Package

Symbol	Description
	Manufacturer
	Manufacturing date
	Serial number
	Warning --- refer to User Manual
	This device is fully in conformance with the Council Directive Concerning Medical Devices 93/42/EEC.
	Authorized representative in the European Community

2.7.2 Symbols on the Client

Symbol	Description
▲	To show or hide a working module area.
	To set up this system or module.
⋮	To expand a menu.
—	To minimize the current window.

Symbol	Description
	To exit the system or lock the window.
	To turn to the first page.
	To turn to the previous page.
	To turn to the next page.
	To turn to the final page.
	To expand the lower area of the screen and display the details of the current patient or case.
	To fold the lower area of the case list and hide the details of the current patient or case.
	Indicates that the current list is displayed in ascending order.
	Indicates that the current list is displayed in descending order.
	Indicates that the current list is in its default state.
	To refresh the list.
	Indicates that the alarm of a parameter is turned off.
	Indicates that alarm sounds are paused.
	Indicates that alarm sounds are turned off.

Symbol	Description
	Indicates that the alarm system has been reset. In this case, the audible alarm tones are turned off, but the visual alarm remains effective.
	Indicates that the alarm has been confirmed.
	Indicates that a pacemaker is worn.
	Indicates that no pacemaker is worn or specified.
	Indicates that the wired network is connected.
	Indicates that the wireless network is connected.
	Indicates that the monitor is being powered by AC power.
	Indicates that the monitor is being powered by batteries. The white part indicates the remaining charge of the battery.
	Indicates that the battery power of the telemetry device is low.
	Indicates the current charge of the telemetry device battery. The white part indicates the remaining charge of the battery.
	Indicates that the alarm audio can sound.
	Indicates that the alarm audio are muted.
	Indicates that the space of the disk where the client is located is not sufficient, and should be freed up in a timely manner.

Note

For more information about symbols on your computer, please refer to the computer's instruction manual or related equipment guidelines.

Chapter 3 Installation and Uninstallation

3.1 Installation Environment

The CMS should be installed in a separate, isolated LAN and protected using a firewall. And comprehensive compatibility test should be conducted to ensure that the CMS is operated normally in this environment. For more cybersecurity measures during installation, please refer to *D.2 Security Data* Type

The user passwords are encrypted using the MD5 irreversible encryption method, ensuring the security of user account passwords.

The data are categorized into the following types and security levels:

User information	High
Patient information	Medium-High
Patient monitoring data	Medium-Low
System configurations	Low

A.1 **Network Environment Settings**

- Install and run antivirus software to avoid virus attacks, and ensure the antivirus software is kept up-to-date.
- Enable the computer firewall to restrict or close unused network ports (e.g., ports 21, 23, 25, and 80), retaining only the ports required by the system, to prevent viruses from exploiting these ports for network attacks.
- Enable rate limiting and ICMP flood attack protection, and set Access Control Lists (ACLs) to block malicious IPs/ports, thereby defending against DDoS attacks.
- Enable MAC address filtering function on wireless networks, allowing only devices with pre-configured MAC addresses to connect via a whitelist mechanism.
- Implement VLAN isolation strategy on the switch by assigning the LAN ports of the monitor and CMS to a dedicated VLAN (e.g., VLAN 10). Configure port security policies to bind MAC addresses and limit the number of connections.
- Deploy Access Control Lists (ACLs) to allow HTTPS communication only through specific ports, prohibit cross-VLAN broadcast storms, and ensure network segmentation and isolation.

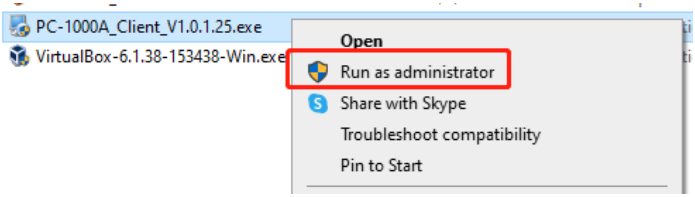
Network Security.

The computer where the system is installed should be placed in an environment reasonably free from noise, vibration, dust, corrosive, flammable and explosive substances. Sufficient space in front of and behind the computer should be left to ensure convenient operation, maintenance and repair, and to maintain good ventilation.

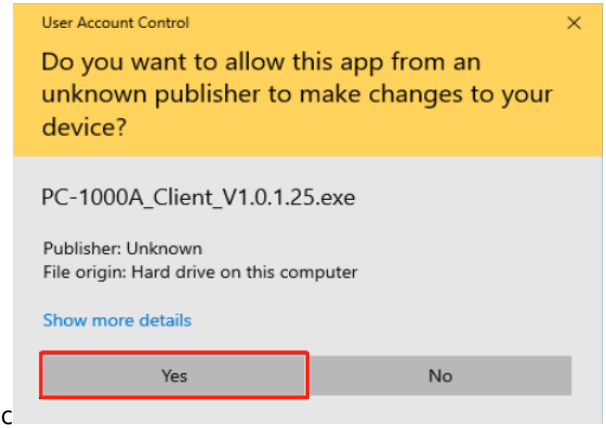
For normal operation of the CMS, the computer where the system is installed should be placed in a position where it can be easily viewed and operated.

3.2 Installation Procedures

1. Create a folder named PC-1000A_Client on local disk (D:).
2. Right-click the installer and select [Run as administrator].

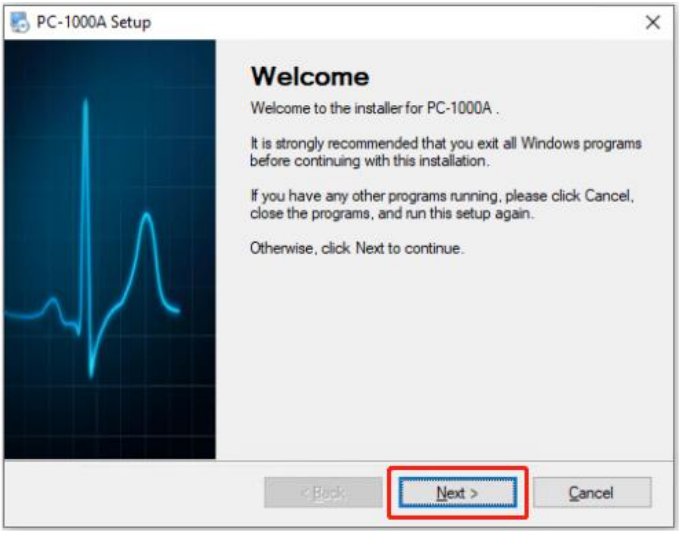


3. Click [Yes] to continue.

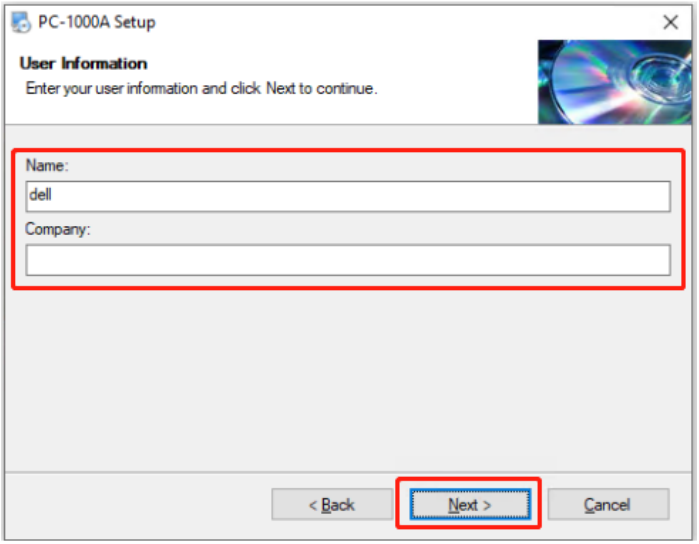


C

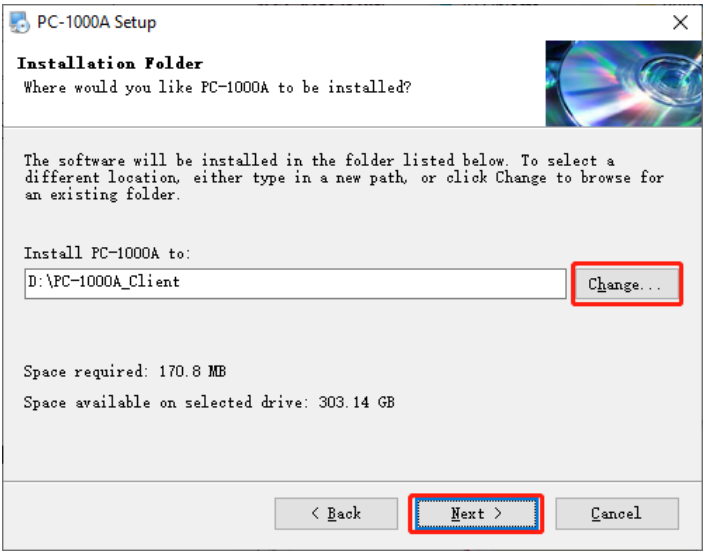
4. Click [Next] to continue.



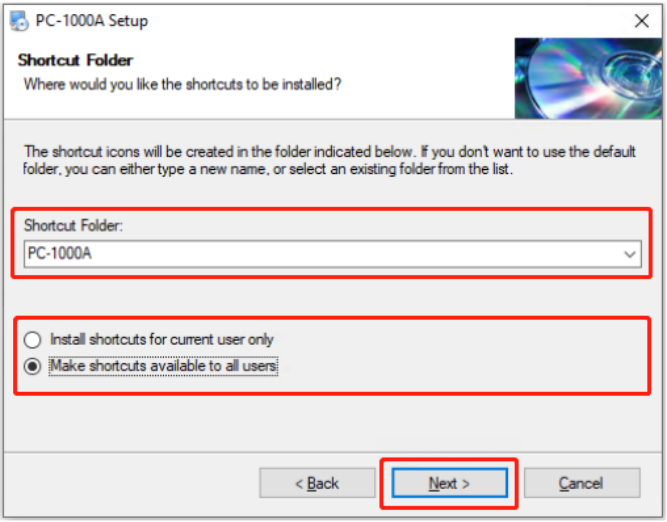
5. Enter the user name and company name (optional), and then click [Next] to continue.



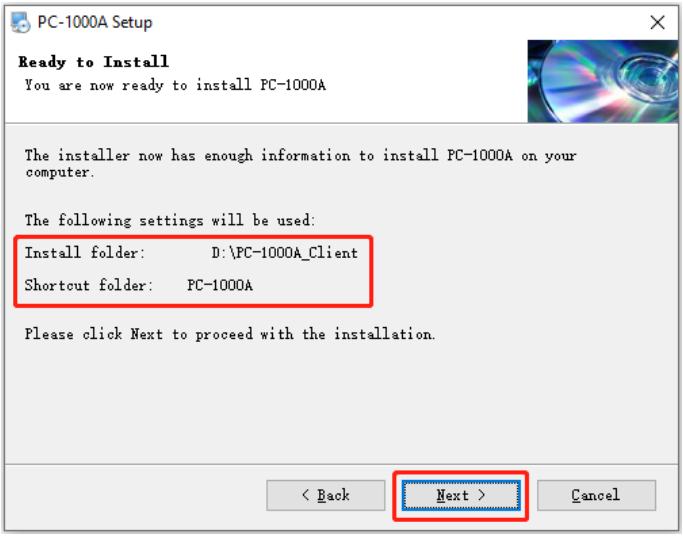
6. Click [Next] to install the client to the default path (recommended); or click the [Change…] button first to customize the target installation path, and then click [Next].



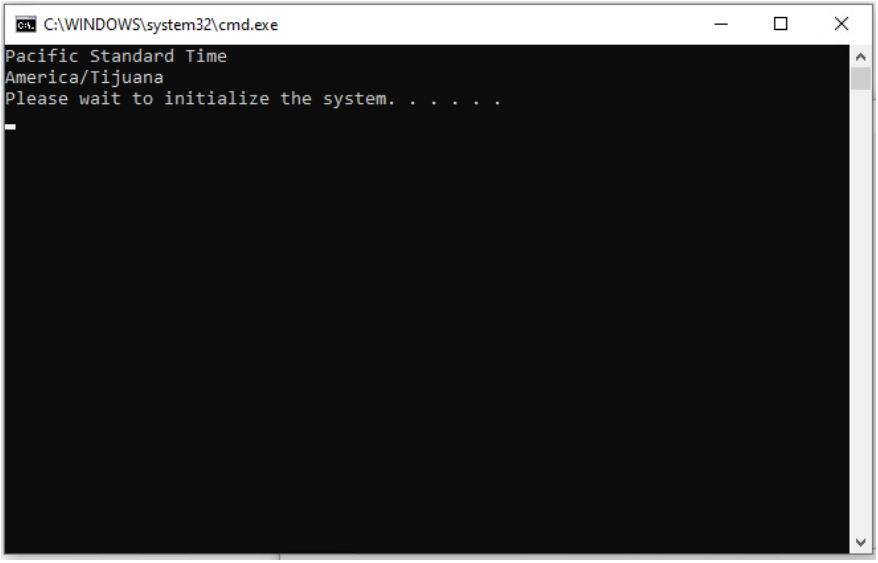
7. Select the folder you want the shortcut icons to be created in, choose whether to make the software available only to the user currently logged into Windows or to all users, and then click [Next] to continue.



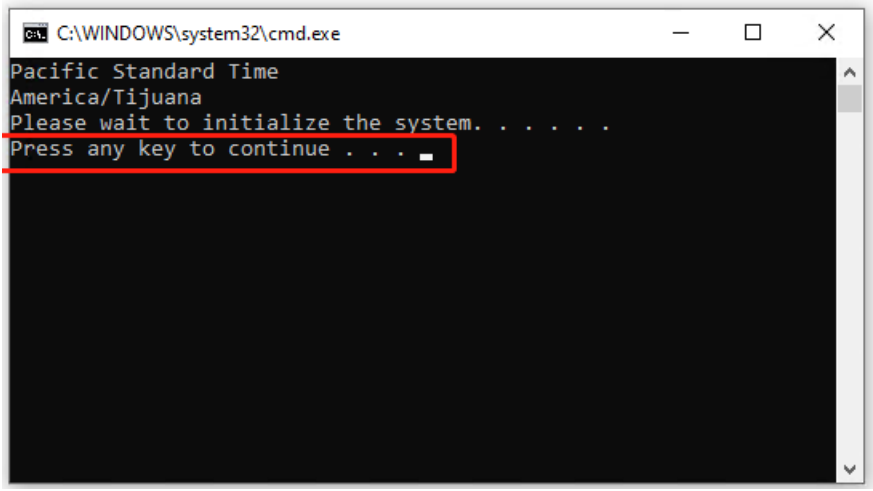
8. After confirming the installation settings, click [Next] to proceed with the installation. If you want to change your settings, click [Back] to return to the previous steps.



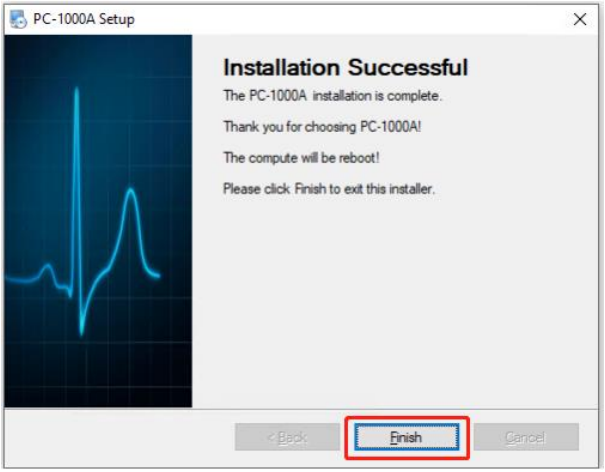
9. The installation process begins, with the system initialization window displayed.



10. Please wait until the following window is displayed, and then press any key to continue to exit the command window.



11. Now the installation is completed. Click [Finish] to exit the installer.



The shortcut icon 

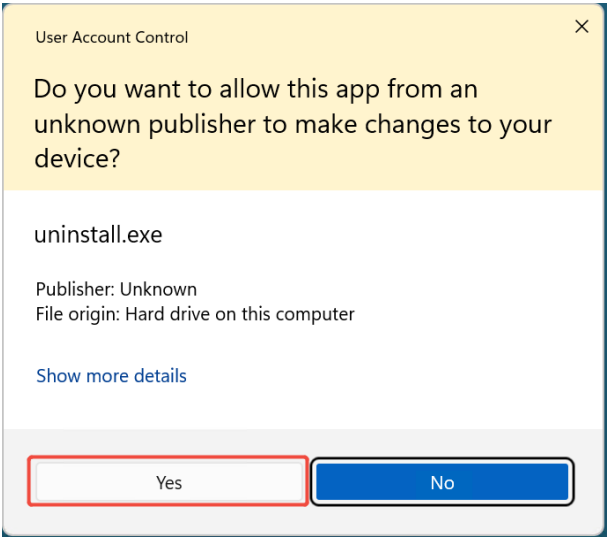
will be created on the desktop.

12. Restart your computer manually to make the installation take effect.

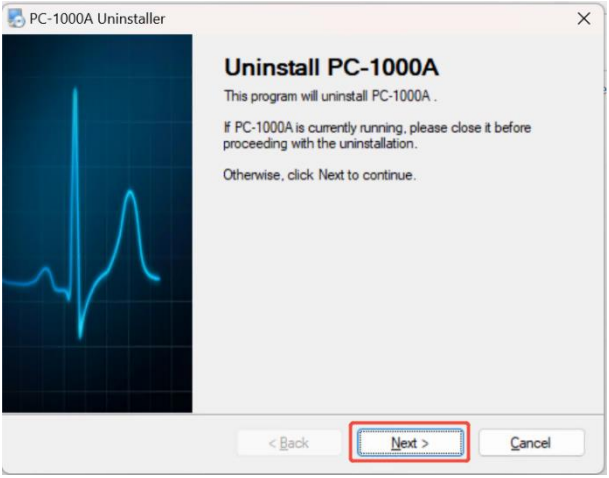
3.3 Uninstallation Procedures

1. Right click on the software shortcut icon, select Open file location, and enter the software installation directory.

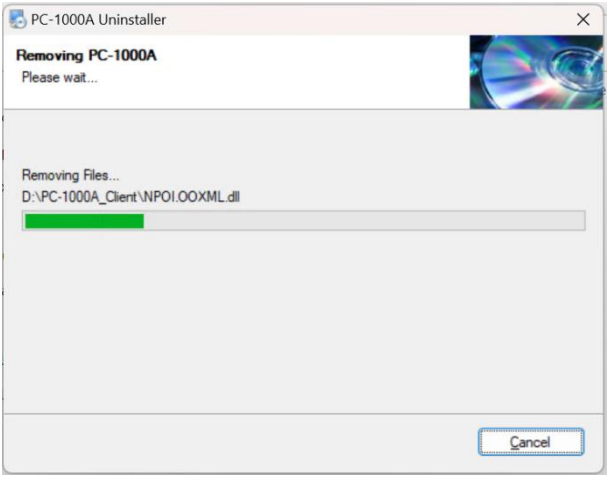
2. Find the file named Uninstall.exe and double-click to run it.
3. Click [Yes] to continue.



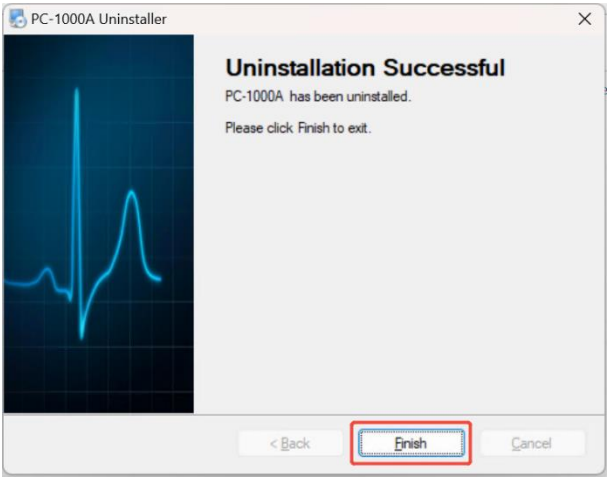
4. Click [Next] to continue.



5. The client uninstallation starts and the uninstallation process displays.



6. Click [Finish] to exit.



Chapter 4 Basic Operations

The CMS is mainly intended for physicians and nurses. Physicians and nurses can view physiological parameters on the client and perform corresponding operations according to the permission settings.

4.1 Pre-Use Inspection

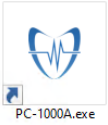
Before using the CMS, it is necessary to check whether the system works normally. The following checks are required:

- Check that all equipment are installed in accordance with the environment and requirements specified in this manual.
- Check that the computer case, accessories, cables and other parts are free from damage and in good condition.
- Check that the system functions normally (e.g. normal display of parameters, waveforms).
- Check that the alarm system works normally and the alarm settings are appropriate.
- Check that the information displayed on the screen is consistent with that on the monitoring devices.

4.2 Login

Take the following steps to log in to the CMS:

1 Insert the softdog to start the system.

2 Double-click the shortcut icon of the client 

, and the login screen is displayed.

3 Enter the correct user name and password. The default user name is "d1", and the default password is "111111".

4. Click [Login] to enter the main screen.

Caution

You are forced to change the login password in the first login, please remember the new password. As for password changing, refer to 4.3 Basic Settings.

Note

Each time when opening the client, you need to insert the softdog into the USB port of the computer case; otherwise, you will be prompted with "*Enter the license code, or insert the dongle.*" on the Register and Certify page.

Note

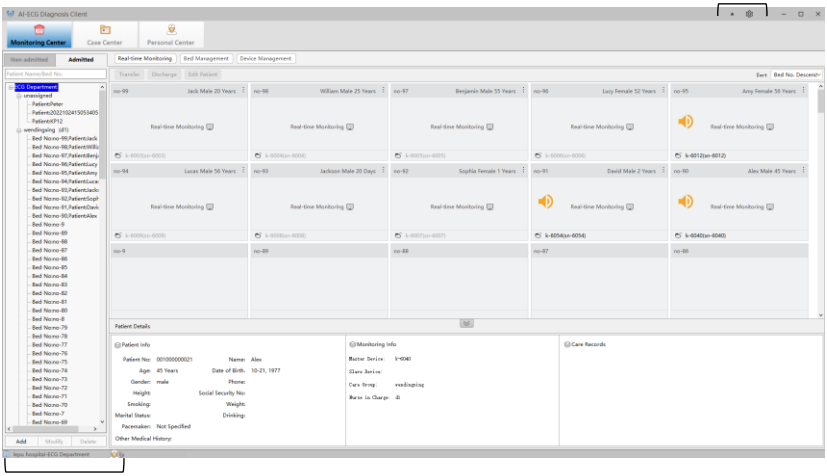
If you enter the wrong password six times in a row, the account will be locked for 10 minutes. If you forget your password, you need to contact the system administrator.

Note

It is recommended to insert the watchdog to the computer running the CMS. The watchdog will trigger audible and visual alerts in the event of unexpected program termination.

4.3 Basic Settings

After logging in to the system, the following main screen is displayed. Before using the system, you can make a preliminary setup and view the relevant information about the system.



Main Screen for Monitoring Center

Setting Multiple-Screen Monitoring

When the system is configured with more than one display screen for central monitoring, the multi-screen monitoring function needs to be enabled to display monitoring data on other display screens; otherwise, monitoring data can only be displayed on one screen.

Select the icon in the setup area of the main screen, and then select [Monitoring Center] → [Multi-screen Monitoring]. After clicking [save], the multi-screen monitoring function is enabled.

Changing the Password

Select the icon in the setup area of the main screen, and then select [Change Password] from the extended menu.

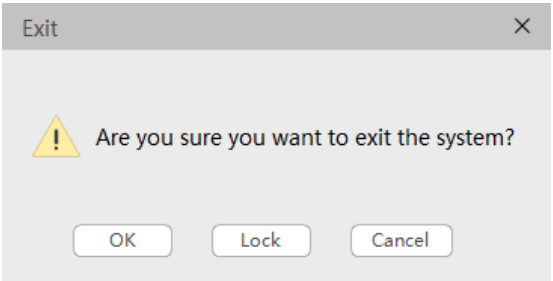
Viewing Information

- **Login information**: At the bottom of the main screen, you can view the login information of the user, that is, the organization and account name of the user.
- **Help file:** Select the icon in the setup area of the main screen, and then select [Help] from the extended menu.

- **System version:** Select the ⋮ icon in the setup area of the main screen, and then select [About] from the extended menu.

4.4 Exit/Lock Screen

Select ✕ in the top right corner of the client, and the following window pops up:



- [OK]: Close and exit the system.
- [Lock]: Exit and lock the current screen. When you log in again, the screen shown before locking is displayed.

4.5 Common Operations

In this system, some common operations can be performed through controls, buttons, mouse movements and other ways:

Window Icon	
▲	To show or hide a working module area.
⚙	To set up this system or module.
⋮	To expand a menu.
—	To minimize the current window.
✕	To exit the system or lock the window.
Page Turning Icon	
«	To turn to the first page.
‹	To turn to the previous page.
›	To turn to the next page.
»	To turn to the final page.

Area Display Icon	
	To expand the lower area of the screen and display the details of the current patient or case.
	To fold the lower area of the case list and hide the details of the current patient or case.
List Sorting Icon	For list headers with the  symbols (e.g. ), click to sort and display information in different orders.
	Indicates that the current list is displayed in ascending order.
	Indicates that the current list is displayed in descending order.
	Indicates that the current list is in its default state.
	To refresh the list.
[Set Column]	To set the items to be displayed in the list. Click this button to check the fields to be displayed. All list items are displayed by default.
[Search]	To make a query after selecting or entering certain criteria. The search results are usually displayed in the list in the right area.
[Reset]	To clear the current query criteria.

Adjusting the Order of List Items

You can adjust the order of the list items by selecting one of it and then dragging it to the location you wish.

Basic Computer Operations

This manual assumes that you have known how to perform the following operations which are related to the user screen of the system:

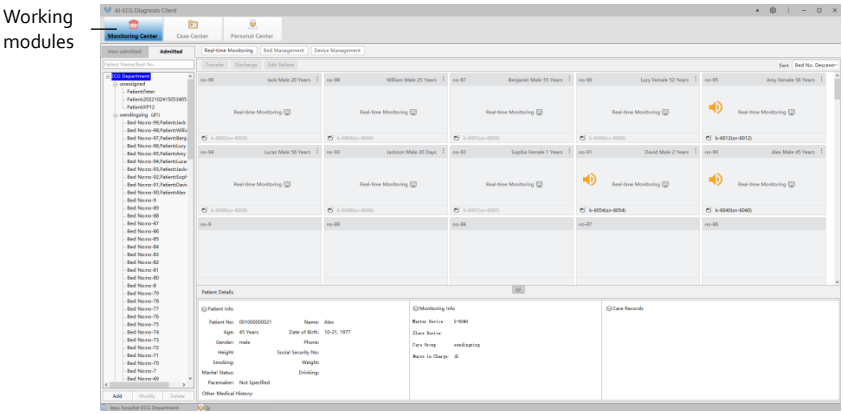
- Manipulate the mouse and trackball (e.g. clicking, double clicking, dragging, and selecting)
- Select from a menu
- Click a button
- Enter information in the text box
- Select options
- Select an entry from a pop-up list or drop-down list
- Use a scroll bar

- Close, maximize or minimize a window

Chapter 5 Working Modules

After logging in to the system, the main screen for monitoring center is displayed. At the top of the screen is the working module area. This system features modular design, with each module independently responsible for unique functions. This system consists of the following three modules:

- Monitoring Center
- Case Center
- Personal Center



Main Screen for Monitoring Center

5.1 Monitoring Center

Monitoring Center is an essential module of this system. It is designed for the real-time monitoring of multiple patients and the management of patients, devices and care groups.

There are two types of screen in Monitoring Center:

- **Main screen for Monitoring Center:** Mainly for the management of care groups, patients, devices and beds, and the monitoring of the alarm status of all patients under the given care group. For more information, please refer to *Chapter 6 Monitoring* Center.
- **Real-time monitoring screen:** Mainly for the real-time monitoring of patients' physiological parameters and alarm status. The multi-bed monitoring and key monitoring windows provide a more detailed view of current patient conditions. For more information, please refer to *Chapter 8 Multi-Bed Monitoring* and *Chapter 9 Key Monitoring Window*.

5.2 Case Center

In the working module area, select [Case Center] to enter the Case Center screen.

In Case Center, you can consult and print the monitoring data of discharged patients, including waveforms, graphics, values and reports.

5.2.1 Query

In Case Center, you can make a query in one of the following ways:

- Query by patient name or patient number
- Query by completion date
- Query by test type
- Query by patient source (outpatient, inpatient, etc.)

5.2.2 Viewing Raw Data

In Case Center, select the monitoring data of a past patient, and then click the [Raw Data] button to view the original data of the patient generated during monitoring.

5.2.3 Managing Reports

Reports generated by discharged patients during monitoring are included in the monitoring data.

After entering [Case Center], selecting a particular past patient, and clicking [Raw Data] → [Report Management], you can perform the following operations:

1. Set the start time and duration of monitoring, and check the parameters to be analyzed.
2. Click the [Analysis] button.
3. A telemetry monitoring report is generated. Then Select [Print], [Print To PDF] or [Save].
   - If you select [Print], the report will be printed by the printer without being saved in the system.
   - If you select [Print To PDF], the report will be saved in your computer in PDF format.
   - If you select [Save], the report will be stored under the [Monitoring Report] list in the current screen.

5.3 Personal Center

In the working module area, select [Personal Center] to enter the Personal Center screen. Personal Center supports setting and viewing the user's personal information. You can perform the following operations:

- Setting Personal Information
- Viewing Operation Logs

5.3.1 Setting Personal Information

You can set personal contact information and electronic signature.

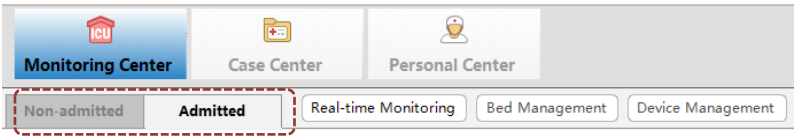
5.3.2 Viewing Operation Logs

You can view the operation logs of the user.

Chapter 6 Monitoring Center

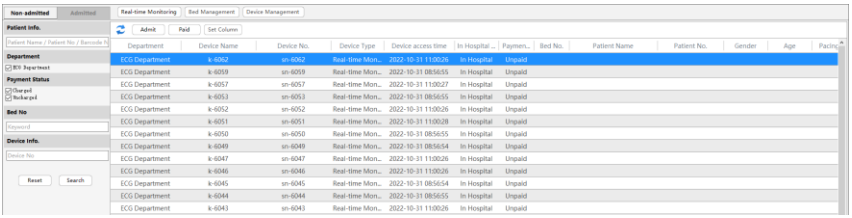
6.1 Main Screen for Monitoring Center

In the main screen for Monitoring Center, management or monitoring functions are displayed based on the admission status of patients. Patients are classified into [Non-admitted] and [Admitted], as displayed at the top left of the screen.



6.1.1 Main Screen-Non-admitted Patients

The [Non-admitted] screen mainly consists of a query bar and a device list. This screen provides a full view of the currently available monitoring devices.



Querying Information

You can make a quick query of a certain device in the query bar on the left side of the screen.

List Display

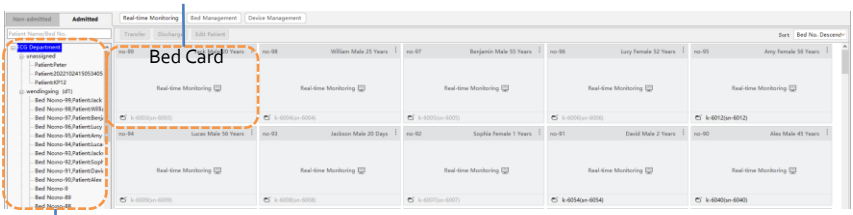
All devices, both in and out of hospital, are displayed by default.

Buttons

- [Admit]: To admit patients and connect them with the currently available devices. For more operations, please refer to *7.1 Patient Admission*.
- [Paid]: Out-of-hospital patients cannot be admitted until their payment has been confirmed.
- [Set Column]: To select list items. For more operations, please refer to *4.5 Common Operations*.

6.1.2 Main Screen-Admitted Patients

The [Admitted] screen mainly consists of a care group list and bed cards. This screen provides a full view of the admitted patients' information, such as their alarm status and the group responsible for their care.



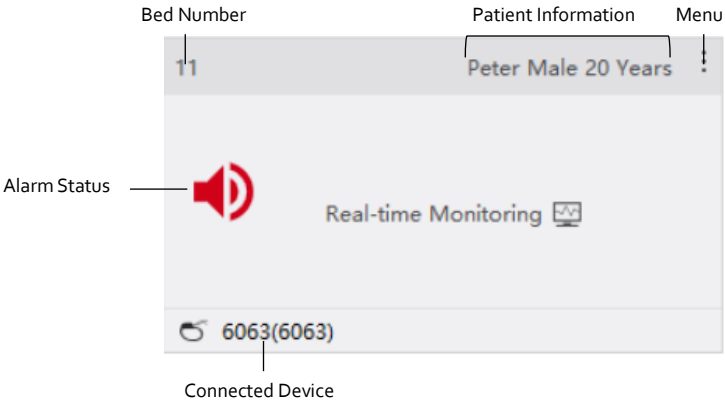
Care Group List

On the left side of the screen, departments, care groups and beds are displayed hierarchically.

Bed Card

Each admitted patient has a bed card. It displays the bed number, patient information, alarm status, monitoring status and connected device.

The bed card area displays the bed card(s) of the selected department, care group or patient. For example, if a department is selected, the bed card area will display the bed card(s) managed by this department.



6.2 Monitoring Center Management

Monitoring Center enables a full range of operations that manage patients, care groups, beds and devices.

For more information about patient management in Monitoring Center, please refer to *Chapter 7 Patient Management*.

6.2.1 Care Group Management

The care group list allows for the management of care groups and the beds they are responsible for.

- **Add a care group**: Select the [Add] button at the bottom of the list to create a new care group in the pop-up window.
- **Delete a care group**: Select a care group, click the [Delete] button at the bottom of the list, and then select [Yes] in the pop-up window.
- **Edit a care group:** Select a care group, click the [Modify] button at the bottom of the list, and then appoint the nurse in charge in the pop-up window.

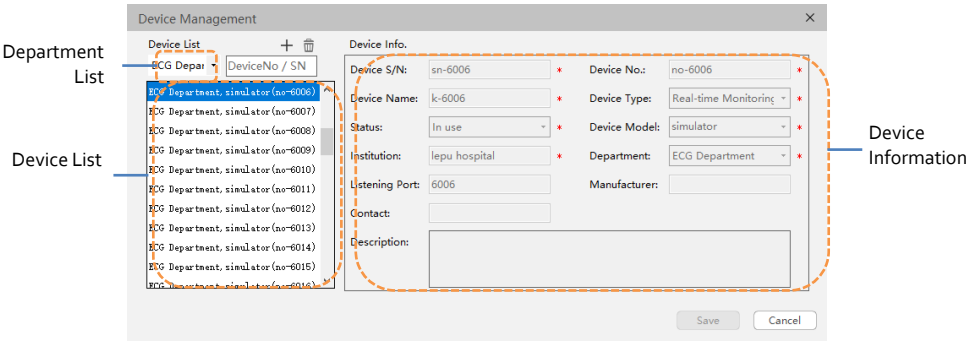
6.2.2 Bed Management

In Monitoring Center, you can Select [Bed Management] in the button area to enter the corresponding window, where the beds under a particular group can be reassigned or deleted.

> ☞ **Note**
>
> A bed that has been assigned to a patient cannot be deleted.

6.2.3 Device Management

You can view, register or delete the devices within a particular department on the device management window. Select [Device Management] in the button area to enter the corresponding window for operation.



- **Query devices:** Select the desired department in the department list, and all devices under this department will be displayed in the device list. You can also enter the device number or SN in the query field next to the department list to directly search for the desired device.
- **Register devices:** At the top of the device list area, select the + icon, and then enter the device name, number, responsible department and other relevant information in the device information area. Click [Save] to complete registration. Items marked with * must be filled in.

Note

Devices are registered only to record the monitoring devices related to the CMS within a particular department, but not to connect the devices to the CMS. If the registered device has not been connected to the CMS, relevant network settings should be performed on the device to establish a connection. Please refer to the Central Monitoring System Setup Manual or the operator's manual of the monitoring devices, or consult our technical support personnel.

- **Delete devices:** Select a device from the device list, and then select the icon above the device list area to remove the device from the list after confirmation.

Chapter 7 Patient Management

Patient management involves admitting, discharging and transferring patients, modifying patient information and changing devices. Patient management operations performed on the CMS can be synchronized to the corresponding bedside monitor.

Such operations can be performed on both Monitoring Center and the real-time monitoring screen.

7.1 Patient Admission

You need to enter patient information when admitting a patient. After the patient is admitted, the patient's information and monitoring data will establish connection for the unified management of patient data.

Caution

When admitting a patient, make sure that the patient information displayed on the CMS is consistent with the patient identity displayed on the bedside monitor.

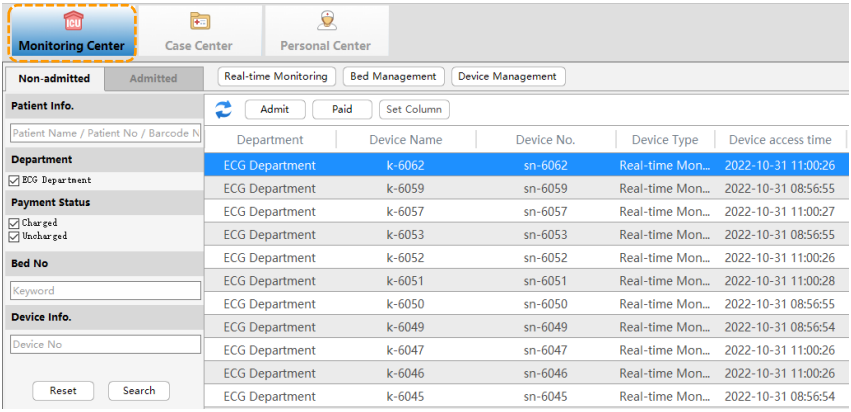
Note

When a patient starts to be monitored on the bedside monitor but not admitted on the CMS, the CMS will display the patient's physiological parameters and waveforms in real time, and will indicate an alarm when an alarm condition is reached. However, only the alarm events regarding the patient will be stored in the CMS; other monitoring data of the patient will not be stored.

Hospitalized patients can be admitted in:

- Main Screen for Monitoring Center
- Key Monitoring Window

Admitting Patients in Monitoring Center



1. In Monitoring Center, select the [Non-admitted] tab on the left side of the screen.
2. Select the desired device from the list.
3. Click the [Admit] button at the top of the list.
4. Enter the patient's name, gender, bed number and other information in the pop-up window. Items marked with * must be filled in.
5. Click the [Admit] button in the pop-up window. After the patient is admitted successfully, the device will be removed from the list, and the patient falls into the [Admitted] tab.

Admitting Patients in Key Monitoring Window

1. In Monitoring Center, click the [Real-time Monitoring] button to enter the multi-bed monitoring screen.
2. Double-click a blank window or the blank square of one of the bed thumbnails. For more information about the multi-bed monitoring screen, please refer to *8.2 Multi-Bed Monitoring Screen* and *8.4 Bed Thumbnails*.
3. Select the [Patient Management] tab in the pop-up key monitoring window.
4. Fill in patient and device information under this page. Items marked with * must be filled in.
5. Click [Admit] button in the pop-up window. After the patient is admitted successfully, the bed number of the patient displayed on the bed thumbnail of the multi-bed monitoring screen changes from [?] to the patient's bed number.

Patient Management Items

Patient Information

- Enter the correct information in [Barcode No], [Inpatient No], [Outpatient No], [Medical Record No], [Health Check No], [Prescription No], [Registration No], [Bed No], [Patient No], [Test No], [ID Card No] or [Social Insurance No.].
- **[Age]:** A required field. Patient age relates with the default alarm limits of the system.
- **[Gender]:** A required field
- **[Weight]:** Can be used for calculations. For example, in drug calculation, some drug doses are calculated based on the patient's weight.
- **[Pacemaker]:** It is necessary to recognize and distinguish the effect of a pacemaker on waveforms.
- **[Contact Information1/2]:** Enter the patient's telephone number.

Device Information

- **[Main Device]:** Connect the patient to the main monitoring device.
- **[MRN on device]**: The medical record number displayed on the device for the current patient.

Bed Information

- **[Bed No.]:** Select the existing bed or the + icon next to the bed number to add a new bed. The bed number is associated with the care group. After the bed number is selected, the corresponding care group is automatically assigned.

  ☞ **Note**

  If no bed number is selected when adding a patient, the patient will be classified into the [Unassigned] group.

7.2 Patient Information Modification

The information of admitted patients can be modified in:

- Main Screen for Monitoring Center
- Key Monitoring Window

Modifying Information in Monitoring Center

1. Click the [Admitted] button in the query bar on the left side of the screen.
2. Start editing in either of the following ways.
   - In the care group list, select a patient and right-click. Select [Edit] in the pop-up menu.
   - Select a patient bed card, and then select [Edit Patient Info.] above the bed card area.
   - In a patient bed card, select the menu icon ⋮, and then select [Edit Patient Info.].
3. Modify the patient-related items in the pop-up patient information window.
4. Select [Save].

Modifying Information in Key Monitoring Window

1. In Monitoring Center, click the [Real-time Monitoring] button to enter the multi-bed monitoring screen.
2. Double-click the window of a single patient. The key monitoring window of the patient pops up.
3. Click the [Patient Management] button to display the corresponding page.
4. Modifying Relevant Information.
5. Select [Save].

Note

If the CMS is connected to a hospital information management system (e.g. HIS), it will make queries in the HIS system based the unique ID of a patient. The patient information queried will be automatically entered and cannot be changed on this system.

7.3 Patient Transfer

When patients need to be transferred to other departments and beds, transfer operations should be performed on this system to ensure correct patient information and complete monitoring data.

Caution

Patients transferred to beds in another department will not be monitored any more in the current department. The department which the patients are to be transferred should be notified in time.

Admitted patients can be transferred in:

- Main Screen for Monitoring Center
- Multi-Bed Monitoring Screen
- Key Monitoring Window

Transferring Patients in Monitoring Center

1. In Monitoring Center, select the [Admitted] tab on the left side of the screen.
2. Enter the transfer screen in any of the following ways.
   - Select the bed card of a patient, and then click the [Transfer] button above the bed card area.
   - In the patient bed card, select the menu icon ⋮, and then select [Edit Patient Info.].
3. Select the department, bed and device to which the patient is to be transferred in the pop-up window.
4. Select [OK].

Transferring Patients in Multi-Bed Monitoring Screen

1. In Monitoring Center, click the [Real-time Monitoring] button to enter the multi-bed monitoring screen.
2. Select and right-click a single patient window. For more information about the single patient window, please refer to *8.3 Single Patient Window*.

3. Select [Transfer] in the pop-up menu.
4. Select the department, bed and device to which the patient is to be transferred in the pop-up window.
5. Select [OK].

Transferring Beds in Key Monitoring Window

1. In Monitoring Center, click the [Real-time Monitoring] button to enter the multi-bed monitoring screen.
2. Double-click a single patient window. The key monitoring window of the patient pops up.
3. Click the [Patient Management] tab to display the corresponding page.
4. Select the desired bed from the [Bed No.] drop-down list.
5. Select [Save].

7.4 Patient Discharge

Discharging a patient means that the system officially stops monitoring the patient. After discharging the patient, the system stops recording the patient's data and releases the monitoring device which the patient currently uses. However, the patient's historical monitoring data can be reviewed in Case Center. Please refer to *5.2 Case Center* for more information.

Admitted patients can be discharged in:

- Main Screen for Monitoring Center
- Multi-Bed Monitoring Screen
- Key Monitoring Window

Discharging Patients in Monitoring Center

1. In Monitoring Center, select the [Admitted] tab on the left side of the screen.
2. Perform discharge operations in the care group list or bed card screen.
   - Select the bed card of a patient, and then click the [Discharge] button above the bed card area.
   - Select the bed card of a patient, click the bed card icon ⋮, and then select [Discharge].

Discharging Patients in Multi-Bed Monitoring Screen

1. In Monitoring Center, click the [Real-time Monitoring] button to enter the multi-bed monitoring screen.
2. Select and right-click a single patient window. For more information about the single patient window, please refer to *8.3 Single Patient Window*.
3. Select [Discharge] in the pop-up menu.

Discharging Patients in Key Monitoring Window

1. In Monitoring Center, click the [Real-time Monitoring] button to enter the multi-bed monitoring screen.
2. Double-click a single patient window. The key monitoring window of the patient pops up.
3. Discharge the patient in the key monitoring window:
   - Click the drop-down list of [Function Menu] in the [Real-time Monitoring] page, and then select [Discharge]. For more information about Function Menu, refer to *9.2 Real-time Monitoring of Key Patients*.
   - Click the [Patient Management] tab to enter the corresponding page, and then select [Discharge].

7.5 Device Replacement

When the monitoring device used by a patient is changed, you should operate on the CMS to release the original device and add the patient to a new device.

Replace the device in the following steps:

1. Enter the [Edit Patient] window or the [Patient Management] page. Please refer to *7.2 Patient Information Modification* for specific operations.
2. Change the current device to the desired one from the [Main Device] list.

Chapter 8 Multi-Bed Monitoring

In Monitoring Center, click the [Real-time Monitoring] button to enter the multi-bed monitoring screen, where the real-time parameters and waveforms of multiple patients can be viewed simultaneously.

8.1 Safety Information

Warning

When the monitoring device is disconnected from the CMS, or the CMS is disconnected from the network, please pay close attention to the actual clinical condition of the patient, or learn the real-time physiological condition of the patient by other means.

8.2 Multi-Bed Monitoring Screen

The Multi-Bed Monitoring screen consists of three parts:

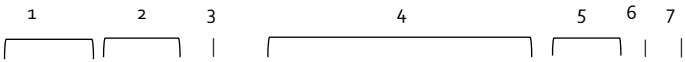
- Upper part: the information bar, which displays account name and time.
- Middle part: Windows of up to 32 patients can be displayed on a screen. For more information about the single patient window, please refer to *8.3 Single Patient Window*.
- Bottom part: bed thumbnails, functional area and mute icon.

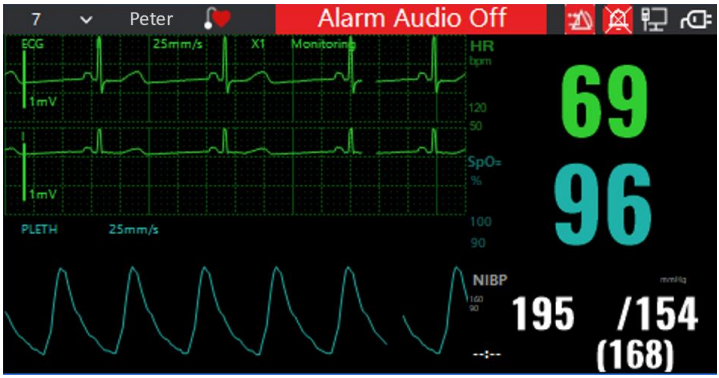
Single Patient Window

8.3 Single Patient Window

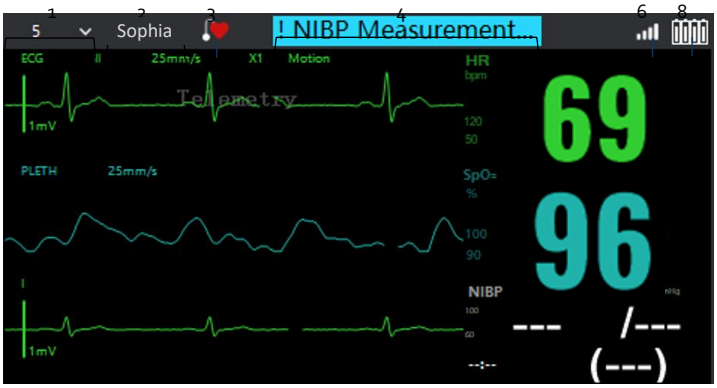
Single patient window is a rectangular or square window on the multi-bed monitoring screen. It displays the real-time monitoring information of a single patient. Due to space limitation, every single patient window cannot display all the monitoring parameters and waveforms, but only the parameters and waveforms set by the user. For more information about the setting method, please refer to *8.3.1 Single Patient Window Setup*.

What is displayed on the single patient window of a connected monitor is different from that of a telemetry device.





Single Patient Window--Monitor



Single Patient Window-Telemetry Device

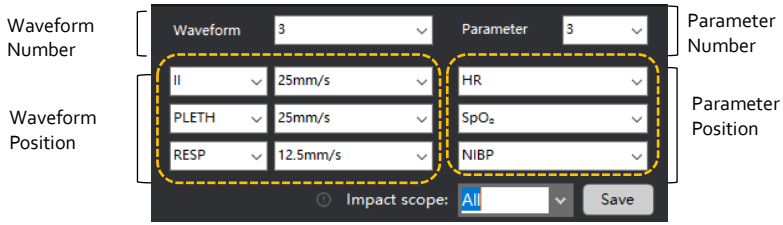
1	Bed Number	Click the drop-down list of bed numbers to display other beds on the single patient window.
2	Patient Name	The patient's name is displayed.
3	Pacemaker Icon	Indicates whether the patient has a pacemaker. •  indicates that a pacemaker is worn. •  indicates that no pacemaker is worn or specified.
4	Alarm Message Area	Physiological alarms and technical alarms are displayed alternately. Display priority: physiological alarms > technical

		alarms.
5	Alarm Status Area	The alarm icon on the left shows the alarm reset status: •  indicates that the alarm system has been reset. The alarm icon on the right shows the alarm sound status: •  indicates that the audible alarm tones are paused. •  indicates that audible alarm tones are turned off.
6	Network Connection	Displays the network connection status of the connected monitoring device. •  indicates that the wired network is connected. •  indicates that the wireless network is connected.
7	Power Indicator	Displays the power status of the connected monitor. •  indicates that the monitor is being powered by AC power. •  indicates that the monitor is being powered by batteries. The white part indicates the remaining charge of the battery.
8	Power Indicator	Displays the power status of the telemetry device. Each battery icon corresponds to a telemetry device. •  indicates that the battery power of the telemetry device is low. •  indicates the current charge of the telemetry device battery. The white part indicates the remaining charge of the battery.

8.3.1 Single Patient Window Setup

Right-click a single patient window, and select [Layout] in the pop-up menu to enter the parameter setting screen of the single patient window.

On the setting screen, you can set the number and position of waveforms and parameters displayed in the single patient window. The layout of each single patient window can be set separately.



The maximum number of waveforms and parameters that can be displayed in each single patient window is automatically calculated by the system. Normally, the more beds displayed on the multi-bed monitoring screen, the less waveforms and parameters can be displayed in the single patient window, and vice versa. For the layout settings of the multi-bed monitoring window, please refer to *8.5.3 System Setup*.

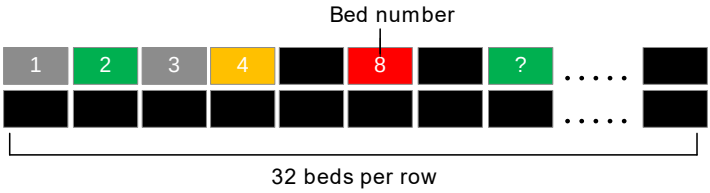
The waveforms or parameters selected in the layout window are the waveforms and parameters displayed in the single patient window. At the same time, their position in the parameter layout window is their actual corresponding position on the screen.

When set [Impact Scope], the selected layout is applicable to the following range:

- [Only Current]: applies to the current bed.
- [Default]: applies to all the beds with the monitoring devices of same type.
- [All]: Applies to all beds.

8.4 Bed Thumbnails

Bed thumbnails correspond to the beds to be viewed on the current screen, and 32 beds are displayed in each row. Double-click a bed to display the corresponding key monitoring window.



Bed thumbnails prompt the operator with background color and background flashing. The specific meaning of each color and flashing is as follows:

Background Color	
Red	There is a high priority alarm for the patient's physiological conditions.
Yellow	There are medium or low priority alarms for the patient's physiological conditions.
Green	There is no alarm for the patient's physiological conditions.
Grey	The monitoring device of the current bed is disconnected from to the CMS.
Background Flashing	
Flashing	The bed is not displayed on the multi-bed monitoring screen.
Non-flashing	The bed is displayed on the multi-bed monitoring screen.
Bed Number	
With number	Indicates that this bed has admitted a patient, and the number indicates the bed number.
Without number	Indicates that this bed is empty, that is, no monitoring device is assigned to the bed, and no patient is admitted.
?	Indicates that there is a monitoring device available to admit a patient, or that the device has admitted a patient, but has not been assigned with a bed.

8.5 Functional Area

In the functional area, you can adjust screen display and set the monitoring system.

8.5.1 Displaying Care Group Beds

All care groups are listed in the drop-down list of [Current Screen]. Select a care group or [All], and the screen will display the monitoring information of the beds under this group or all groups.

If multiple display screens are configured, what is displayed on the respective screens will be different if different care groups are set in [Current Screen]. Display rules are as follows, with two display screens, Care Group A, Care Group B, and [All] selected as examples:

Display Number	Display Settings	Display Mode
Display 1	Care Group	The multi-bed monitoring screen of Display 1 and 2

<table>
<tr><th>Display Number</th><th>Display Settings</th><th colspan="3">Display Mode</th></tr>
<tr><td></td><td>A</td><td colspan="3">are used to display the beds under Care Group A.</td></tr>
<tr><td>Display 2</td><td>Care Group A</td><td colspan="3">If there are still beds under Group A that are not displayed on both Display 1 and 2, they and beds under other groups will be shown in the bed thumbnails of Display 1, which keep flashing there.</td></tr>
<tr><td></td><td></td><td></td><td>Display 1</td><td>Display 2</td></tr>
<tr><td></td><td></td><td>Multi-Bed Monitoring Screen</td><td>Beds under Care Group A</td><td>Beds under Care Group A</td></tr>
<tr><td></td><td></td><td>Bed Thumbnails</td><td>Undisplayed beds under Care Group A;
Beds under other groups.</td><td></td></tr>
<tr><td>Display 1</td><td>Care Group A</td><td colspan="3">The beds under Care Group A are displayed on the multi-bed monitoring screen of Display 1.</td></tr>
<tr><td>Display 2</td><td>Care Group B</td><td colspan="3">The beds under Care Group B are displayed on the multi-bed monitoring screen of Display 2.
For beds not shown under Care Group A/Care Group B, their thumbnails flash on the corresponding screen.
If there are other groups, their beds will only be shown in the bed thumbnails of Display 1, which keep flashing there.</td></tr>
<tr><td></td><td></td><td></td><td>Display 1</td><td>Display 2</td></tr>
<tr><td></td><td></td><td>Multi-Bed Monitoring Screen</td><td>Beds under Care Group A</td><td>Beds under Care Group B</td></tr>
<tr><td></td><td></td><td>Bed Thumbnails</td><td>Undisplayed beds under Care Group A;
Beds under other groups.</td><td>Undisplayed beds under Care Group B</td></tr>
<tr><td>Display 1</td><td>Care Group A</td><td colspan="3">The beds under Care Group A are displayed on the multi-bed monitoring screen of Display 1.</td></tr>
<tr><td>Display 2</td><td>All</td><td colspan="3">The beds under other care groups than Care Group A are displayed on the multi-bed monitoring screen of Display 2.
For beds not shown under Care Group A, their</td></tr>
</table>

Display Number	Display Settings	Display Mode		
		thumbnails flash on Display 1. For beds not shown under other groups, their thumbnails flash on Display 2.		
			Display 1	Display 2
		Multi-Bed Monitoring Screen	Beds under Care Group A	Beds under other groups.
		Bed Thumbnails	Undisplayed beds under Care Group A;	Undisplayed beds under other groups.

Note

Any bed will be displayed on one screen only.

8.5.2 Shortcut Key

- Click the [Monitoring Center] button to enter the main screen for Monitoring Center.
- Click the [Key Monitoring] button to expand the key monitoring window of the selected bed.

8.5.3 System Setup

Click the [System] button in the functional area to set the screen layout, parameter color, unit, alarm volume, patient privacy protection, etc.

Setting the Screen Layout

Select [System] → [Layout] to set the number of single beds to be displayed on each screen and the display(s) used for the key monitoring window.

This system supports the connection of four display screens. Each display screen supports the simultaneous display of monitoring data of up to 32 beds. The number of beds displayed on each screen can be set separately. The more the beds displayed, the smaller single patient windows will become.

Different number of display screens will lead to different display modes of the key monitoring window:

- When there is only one display screen, the key monitoring window is displayed in the lower part of the screen.

- When there are more than one display screen, the key monitoring window can be displayed in either of the following ways:

  Full screen display: The key monitoring window is displayed in full screen on the display screen with [Show Real-time View] checked.

  Half screen display: If [Show Real-time View] is not checked on both display screens, the key monitoring window will be displayed in the lower half of Display 1.

For more information about the layout of the key monitoring window, please refer to *9.1 Key Monitoring Screen*.

> ☞ **Note**
>
> When multiple displays are configured and the multi-screen display function is activated, the real-time monitoring data can be displayed on these screens. Otherwise, the data are still displayed on one display screen. For more information about the multi-screen display function, please refer to *4.3 Basic Settings*.

Setting the Alarm Audio

You can adjust the volume of the alarm audio, and mute/unmute the system.

Select [System] → [General Settings] to set the alarm audio of different priority respectively. You can also double-click the mute icon on the screen to enter this setting page.

- Alarm Audio

  The system supports setting alarm volumes for high priority alarms, medium priority alarms, and low priority alarms separately. The alarm volume settings follow a step-down hierarchy, meaning that the volume for high priority alarms ≥ medium priority alarms ≥ low priority alarms.

  The alarm volume can be set to level 1-10.

- Mute

  [Mute]: All levels of alarms are audio off. Before clicking the [Mute] button, you need to enter the permission password.

  The bottom right of the screen shows whether the CMS is muted:

   : indicates that the alarm audio can sound.

   : indicates that the alarm audio is muted.

Warning

It can be risky for patients when the alarm volume is set to a low level or even muted during monitoring. In this case, patients should be kept under close observation.

Warning

When checking [Mute], no alarm audio will sound. Please think carefully whether you want to mute the CMS.

Setting the Monitoring Parameter Color

You can set the color of values and waveforms related to monitoring parameters.

Select [System] → [Color] to set the desired color for different monitoring parameters.

Setting Units

You can set the unit of height, weight, temperature, pressures and other parameters.

Select [System] → [Unit] to set the units as needed.

Setting Patient Privacy Protection

You can choose to display only the patient's surname on the multi-bed monitoring screen, and hide the patient's given name.

Select [System] → [General], and then check [Patient Name Privacy Protection].

Chapter 9 Key Monitoring Window

Under the key monitoring window, the tabs of each page can be switched to realize patient management, real-time monitoring, data review, calculation, alarm management and report management of the selected patient.

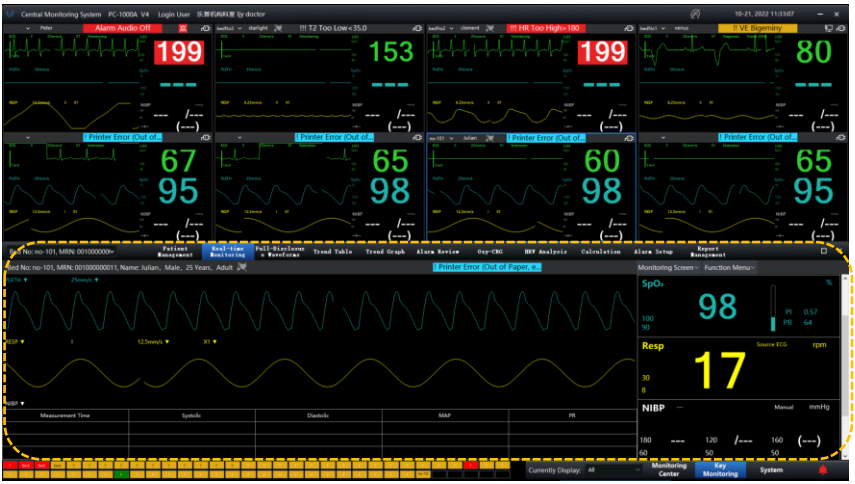
For information about the management of the patient under key monitoring, please refer to *Chapter 7 Patient Management*.

9.1 Key Monitoring Screen

Under the multi-bed monitoring screen, double-click the window of a single patient to open the key monitoring window of this patient. Different number of display screens will lead to different display modes of the key monitoring window.

Single Display Screen

When there is only one display screen for the CMS, the key monitoring window is displayed in the lower part of the screen.



Key Monitoring Screen-Single Display Screen

Multiple Display Screens

When there are more than one display screen for the CMS, the key monitoring window is displayed in the lower part of the screen or displayed independently on one display screen. For specific setting

methods, please refer to the layout setting as described in *8.5.3 System Setup*.

In the half-screen and full screen display modes, what is displayed on each display screen is as follows:

Display 1

Display 2/3/4

Half screen display

Display that enables [Show Real-time View]

Other displays

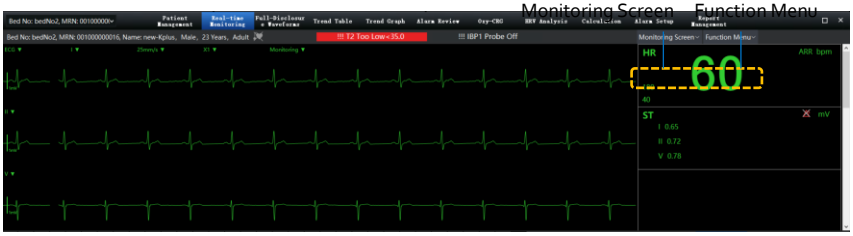
Full screen display

9.2 Real-time Monitoring of Key Patients

In the key monitoring window, you can view the real-time monitoring information of a key patient and remotely control the monitor.

The [Real-time Monitoring] page is displayed by default.

For more information about the layout of the real-time monitoring page, please refer to *8.3 Single Patient Window*.



Multiple Display Screens

You can view a variety of screens in real time to know more about the patient's current monitoring status:

- **Monitoring screen:** This is a conventional display screen, which consists of the waveform area and parameter area.
- **OxyCRG:** This screen displays the trend curves of HR, SpO_2, Resp, RR and $EtCO_2$.
- **Short Trend:** This screen displays the trend of each parameter value for the recent 8 hours at most.
- **ECG Full Screen:** This screen displays all ECG waveforms simultaneously.
- **All Parameters:** This screen only displays the parameter area, in which the monitoring values are displayed in large font.

You can select a certain display mode suitable for clinical use from the drop-down list of [Monitoring Screen] above the parameter area.

> ☞ **Note**
>
> When using 3-lead monitoring, ECG full screen display is not supported.

Monitoring Operations

Select the corresponding button from [Function Menu] to remotely control the monitoring device on the CMS.

- **Alarm Reset:** Select to reset the alarm system of the selected monitoring device. For more information about alarm reset, please refer to *10.5 Alarm Status Symbols.*
- **Alarm Audio Pause:** Select to mute the alarm system of the selected monitoring device. For more information about alarm audio pause, please refer to *10.8 Pausing Alarm Sound*.
- **Measure NIBP:** Select to start/stop/set NIBP measurements on the selected monitor.
- **Freeze:** Select to freeze/unfreeze the waveforms on the CMS.
- **Discharge:** Select to stop monitoring the patient and recording the patient's data, and release the monitoring device which the patient currently uses.

  Night Mode: Control the selected monitor to enter night mode. In night mode, the monitor turns down the sound and dims the screen

by default. The CMS continues to display patient information and monitoring data, with *"Night Mode"* displayed in the background. If you need to exit the night mode, select [Night Mode] in the [Function Menu] again.

- **Privacy Mode:** Control the selected monitor to enter privacy mode. In privacy mode, patient information and monitoring data are not displayed on the monitor. The CMS continues to display patient information and monitoring data, with *"Privacy Mode"* displayed in the background. If you need to exit the privacy mode, select [Privacy Mode] in the [Function Menu] again.

Parameter Setup

You can set parameters in either of the following ways:

- Select [Alarm Setup] → [Parameter Setup], and then select ECG, SpO_2, NIBP and other parameter tabs to set the corresponding parameter.
- Double-click a parameter window on the [Real-time Monitoring] page to enter the corresponding parameter tab on the [Parameter Setup] page under [Alarm Setup].

After the parameters are set successfully, they will be synchronized to the monitor.

☞ **Note**

The parameter setting may vary with different types of monitors and different parameter modules configured on the monitors.

☞ **Note**

For the setting method of each parameter, please refer to the relevant chapters of the Operator's Manual of the monitors.

9.3 Data Review

You can view the full-disclosure waveforms, tabular trend, graphic trend, alarm events and Oxy-CRG of the current patient in the key monitoring window. This system supports viewing the historical data of each patient for up to 240 hours. The review screen displays the latest, automatically updated data.

There are some general instruction and operation buttons on this screen:

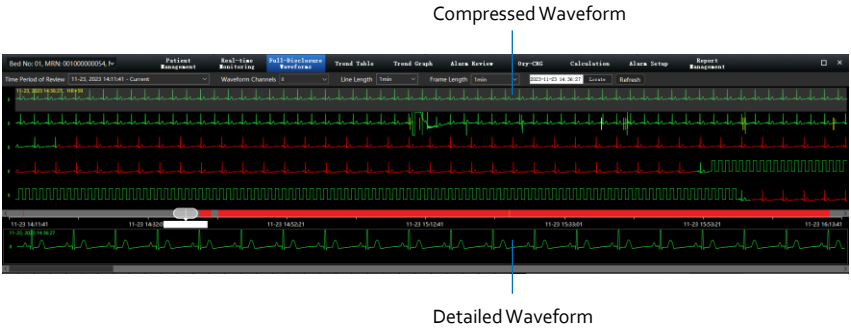
- Parameter with red background: indicates that the parameter involves a high priority physiological alarm.

- Parameter with yellow background: indicates that the parameter involves a medium or low priority physiological alarm.
-  : click to display the key monitoring window in full screen.
-  : click to close the key monitoring window.

9.3.1 Full Disclosure Review

On the Full Disclosure Review screen, you can view the patient's compressed ECG waveforms and detailed waveforms.

In the compressed waveform, the waveform will turn red when a high priority alarm occurs, yellow when a medium or low priority alarm occurs, and green when no alarm occurs. By dragging the slider, you can quickly locate the waveform corresponding to the alarm.



In the Full Disclosure screen, you can also perform the following operations:

- **Time Period of Review:** All review data are stored in this system and listed in the drop-down list of [Time Period of Review], including both the current and historical monitoring data. Each period of monitoring data has a start and end time. You can select a certain time period in [Time Period of Review] to view the corresponding ECG data.
- **Waveform Channels:** In full-disclosure waveform, up to 3 compressed waveforms can be selected in [Waveform Channels].
- **Line Length:** Set the length of time for each line of compressed waveform.
- **Frame Length:** The length of time that is selected for the compressed waveform.

- **Locate time:** For the currently selected time period of review, the waveform corresponding to the setting time can be accurately positioned. After selecting [Locate], selecting the desired time period in the pop-up window, and then the screen displays the compressed waveform and detailed waveform within this time period.
- **View the detailed waveform:** Details of the compressed waveform can be displayed with the mode of occupying the whole page. You can open this screen by right-clicking and selecting [View Details] from the pop-up menu.

9.3.2 Graphic Trends Review

The graphic trends review page displays data trends in a visual format.

In the trend graph, the blue cursor runs through all parameters from top to bottom. You can move the cursor to the desired viewing position.

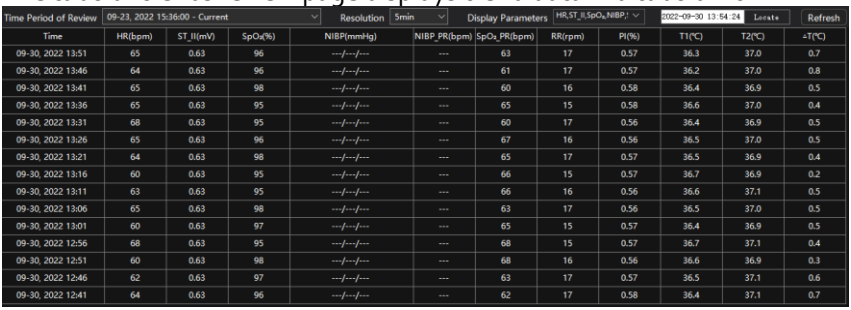
The corresponding time is displayed above the cursor. The parameter values at the corresponding time are displayed in the right area of the trend graph.

In the graphic trends page, you can perform the following operations:

- **Time Period of Review:** All review data are stored in this system and listed in the drop-down list of [Time Period of Review], including both the current and historical monitoring data. Each period of monitoring data has a start and end time. You can select a certain time period in [Time Period of Review] to view the corresponding data trend.
- **Zoom:** the maximum time length that can be displayed in a window on each screen. Select [Zoom] to set the length of time to be displayed on the current screen.
- **Parameter**: check one or more parameters from the drop-down list, and the window immediately displays the corresponding parameter trends.

9.3.3 Tabular Trends Review

The tabular trends review page displays trend data in a tabular form.



Time	HR(bpm)	ST_II(mV)	SpO₂(%)	NIBP(mmHg)	NIBP_PR(bpm)	SpO₂ PR(bpm)	RR(rpm)	PI(%)	T1(℃)	T2(℃)	ΔT(℃)
09-30, 2022 13:51	65	0.63	96	---/---/---	---	63	17	0.57	36.3	37.0	0.7
09-30, 2022 13:46	64	0.63	96	---/---/---	---	61	17	0.57	36.2	37.0	0.8
09-30, 2022 13:41	65	0.63	98	---/---/---	---	60	16	0.58	36.4	36.9	0.5
09-30, 2022 13:36	65	0.63	95	---/---/---	---	65	15	0.58	36.6	37.0	0.4
09-30, 2022 13:31	68	0.63	95	---/---/---	---	60	17	0.56	36.4	36.9	0.5
09-30, 2022 13:26	65	0.63	96	---/---/---	---	67	16	0.56	36.5	37.0	0.5
09-30, 2022 13:21	64	0.63	98	---/---/---	---	65	17	0.57	36.5	36.9	0.4
09-30, 2022 13:16	60	0.63	95	---/---/---	---	66	15	0.57	36.7	36.9	0.2
09-30, 2022 13:11	63	0.63	95	---/---/---	---	66	16	0.56	36.6	37.1	0.5
09-30, 2022 13:06	65	0.63	98	---/---/---	---	63	17	0.56	36.5	37.0	0.5
09-30, 2022 13:01	60	0.63	97	---/---/---	---	65	15	0.57	36.4	36.9	0.5
09-30, 2022 12:56	68	0.63	95	---/---/---	---	68	15	0.57	36.7	37.1	0.4
09-30, 2022 12:51	60	0.63	98	---/---/---	---	68	16	0.56	36.6	36.9	0.3
09-30, 2022 12:46	62	0.63	97	---/---/---	---	63	17	0.57	36.5	37.1	0.6
09-30, 2022 12:41	64	0.63	96	---/---/---	---	62	17	0.58	36.4	37.1	0.7

In the trend table, you can perform the following operations:

- **Time Period of Review:** All review data are stored in this system and listed in the drop-down list of [Time Period of Review], including both the current and historical monitoring data. Each period of monitoring data has a start and end time. You can select a certain time period in [Time Period of Review] to view the corresponding data trend.
- **Zoom:** the maximum time length that can be displayed in a window on each screen.
- **Resolution:** the time interval between each two sets of physiological data displayed in the trend table. Resolution is divided into three types: interval time, NIBP time and on-the-hour time:

  Interval time: You can select [1s], [5s], [30s], [1min], [5min], [10min], [15min], [30min], [1h], [2h] and [3h] as the resolution.

  NIBP time: When [NIBP] is selected as the resolution, the trend table displays the time of NIBP measurement as the time of the whole set of physiological data.

  On-the-hour time: You can select [30min On the Hour], [1h On the Hour], [2h On the Hour] and [3h on the Hour]. When the above options are selected as the resolution, the time interval of the trend table is synchronized with the clock. For example, when the resolution is [30min On the Hour], and the first time of the trend table is 12:03:06, then the subsequent times are 12:30:00, 13:00:00, 13:30:00....

- **Display Parameters**: check one or more parameters from the drop-down list, and the window immediately displays the corresponding parameter trends.

- **Locate time:** For the currently selected time, the values corresponding to the setting time can be accurately positioned. After selecting [Locate], and selecting the desired time period in the pop-up window, then the screen displays the trend table within this time period.

9.3.4 Reviewing Alarm Events

On the alarm event page, you can review physiological alarm events and technical alarm events of patients.

The alarm event page has the following features:

- The events list displays events in descending chronological order, with the most recent ones displayed at the top.
- On the left side of the event list, the alarm priority of the events is indicated by the corresponding color bar. For more information about alarm priorities, please refer to *10.3 Alarm Mode*.

In addition, events with different alarm priorities can be filtered:

1. Select the [Filter] button.
2. In the pop-up window, select the alarm priority as [High], [Med] or [Low].
3. Select [OK]. Filtered events are displayed on the event list.

9.3.5 OxyCRG Review

On the OxyCRG screen, up to 240 hours of the patient's HR and SpO_2, and Resp data can be viewed at most, as well as event lists and statistics.

In the OxyCRG graph, the blue cursor runs through all parameters from top to bottom. You can move the cursor to the desired viewing position. The corresponding time is displayed above the cursor.

On the right side of the OxyCRG graph, the event list and event statistics are displayed. Relevant events include Apnea, Low HR, Hypoxia, and Hypoxia + Low HR. The number of events in each category is displayed at the bottom. The time of occurrence, apnea time, HR and SpO_2 values of the corresponding events are displayed at the top, with abnormal HR or SpO_2 values in red font. When you click an event, the respiratory OxyCRG graph corresponding to the event will appear.

In the OxyCRG page, you can perform the following operations:

- **Time Period of Review:** All review data are stored in this system and listed in the drop-down list of [Time Period of Review], including both the current and historical monitoring data. Each period of monitoring data has a start and end time. You can select a certain time period in [Time Period of Review] to view the corresponding parameter trend.
- **Zoom:** the maximum time length that can be displayed in a window on each screen. Select [Zoom] to set the length of time displayed on the current screen.

9.4 Calculations

Select the [Calculation] tab in the key monitoring window to use the calculation function.

This system provides the following calculation tools to assist in obtaining calculation values:

- Drug Calculations
- Oxygenation Calculations
- Ventilation Calculations
- Renal Function Calculations
- Hemodynamic Calculations

Warning

Check that the entered values are correct and the calculated values are appropriate. We assume no responsibility for any consequences caused by wrong entries and improper operations.

Note

The calculation function provided by the system is independent of the patient monitoring function, which means that the calculation object may not be the current patient, and that the calculation operation will not affect the monitoring process of the current patient.

9.4.1 Drug Calculations

When preparing a drug solution, it is necessary to obtain drug concentration, infusion rate and other values on the basis of drug amount, drug dose and solution volume. The drug calculator can calculate these required values at one time.

The system supports dosage calculation for 30 types of drugs. These include Aminophylline, Dobutamine, Dopamine, Adrenaline, Heparin, Lidocaine, Nitroglycerin, Sodium Nitroprusside, Isoproterenol, Oxytocin, Diltiazem, Esmolol, Fentanyl, Amrinone, Insulin, Labetalol, Lorazepam, Midazolam, Milrinone, Nicardipine, Norepinephrine, Neosynephrine, Procainamide, Propofol, Vasopressin, Drug A, Drug B, Drug C, Drug D, Drug E.

Calculation Procedure

Under the Central Monitoring screen, select the key monitoring window of a patient, and then select [Calculation] → [Drug] to enter the drug calculation page.

To perform drug calculations, follow the steps below:

1. Select the desired drug under [Drug Name].
   Some drug names have been pre-defined in the drug calculator.
2. Select the patient type.
3. If the dose of drug is weight dependent, switch on [Weight Based] and input the patient's weight.
4. Enter the values of [Drug Amount], [Dose] and [Solution Volume], and select their appropriate units.
5. Click the [Calculate] button.
   After the calculation is completed, the calculated values of [Drug Concentration], [Infusion Duration] and [Infusion Rate] will be automatically displayed.

Checking the Titration Table

The titration table helps you understand the amount of drugs injected into the patient at different infusion rates. When the drug calculation is completed, the titration table is automatically generated.

To, check the titration table, follow the steps below:

1. Select the baseline in the titration table.
   [Dose]: the titration table calculates and displays the corresponding infusion rate based on the dose.

[Infusion Rate]: the titration table calculates and displays the corresponding dose based on the infusion rate.

2. Select [Dose Unit].
3. Select [step] to set the interval value of baseline sequence in the titration table.

Drug Calculation Formula

Description	Unit	Formula
Drug Amount	g series: mcg, mg, g Unit series: Unit, kU, MU mEq series: mEq	Drug Amount = Dose × Infusion Duration
Drug Amount (weight based)	g series: mcg, mg, g Unit series: Unit, kU, MU mEq series: mEq	Drug Amount (weight based) = Dose × Infusion Duration × Weight
Solution Volume	ml	Solution Volume = Infusion Rate × Infusion Duration
Dose	Dose/h, Dose/min	Dose = Infusion Rate × Concentration
Dose (weight based)	Dose/kg/h, Dose/kg/min	Dose (weight based) = Infusion Rate × Concentration / Weight
Concentration	mg/ml, mcg/ml, , g/ml, Unit/ml, KU/ml, MU/ml, mEq/ml	Concentration = Drug Amount / Solution Volume
Infusion Duration	h	Infusion Duration = Drug Amount / Dose
Infusion Duration (weight based)	h	Infusion Duration (weight based) = Drug Amount / (Dose × Weight)
Infusion Rate	ml/h	Infusion Rate = Dose / Concentration
Infusion Rate (weight based)	ml/h	Infusion Rate = Dose × Weight / Concentration

Titration Table Calculation Formula

Description	Unit	Formula
Infusion Rate	ml/h	Infusion Rate = Dose / Concentration
Infusion Rate	ml/h	Infusion Rate = Dose × Weight /

(weight based)		Concentration
Dose	Dose/h, Dose/min	Dose = Infusion Rate × Concentration
Dose (weight based)	Dose/kg/h, Dose/kg/min	Dose (weight based) = Infusion Rate × Concentration / Weight

9.4.2 Oxygenation Calculations

This system supports calculating the parameters related to Oxy-CRG function, and viewing the historical calculated values.

Calculation Procedure

To perform oxygenation calculations, follow the steps below:

1. In the input value field, enter the value of each parameter within the valid range. When the input value is beyond the valid range, it will be displayed with a red background.
2. Click [Calculate].
3. View the calculated value in the output value area.

   If the output value is above the normal range,  is displayed next to the value.

   If the output value is below the normal range,  is displayed next to the value.

   Select [Unit] or [Reference Range] to define the displayed output value as the parameter unit or the reference range of the parameter.

Input Parameters for Oxygenation Calculations

Input Parameter	English Full Name / Description	Unit	Adjustable Range
Height	Height	cm	20.0-300.0
Weight	Weight	kg	1.0-250.0
C.O.	Cardiac output	L/min	0.1-20.0
Hb	Hemoglobin	g/L	50-200
RQ	Respiratory quotient	/	0.1-1.5
FiO_2	Percentage fraction of inspired oxygen	%	18-100
CaO_2	Arterial oxygen content	ml/L	10-400
ATMP	Atmospheric Pressure	mmHg	300-1200

Input Parameter	English Full Name / Description	Unit	Adjustable Range
PaO_2	Partial pressure of oxygen in the arteries	mmHg	10-800
CvO_2	Venous oxygen content	ml/L	10-400
$PaCO_2$	Partial pressure of carbon dioxide in the arteries	mmHg	0-200
VO_2	Oxygen consumption	mL/min	50-1000

Output Parameters and Formulas for Oxygenation Calculations

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
BSA	Body surface area	m^2	$Wt^{0.425} \times Ht^{0.725} \times 0.007184$	/
VO_2 Calc	Oxygen consumption	mL/min	$(SaO2 - SvO_2) \times 13.4 \times Hb \times C.O.$	/
C (a-v) O_2	Arteriovenous oxygen content difference	ml/L	$CaO_2 - CvO_2$	42-59
O_2ER	Oxygen extraction ratio	%	$VO_2 / (CaO_2 \times C.O.) \times 100$	24-28
DO_2	Oxygen delivery	mL/min	$CaO_2 \times C.O.$	950-1150
PAO_2	Partial pressure of oxygen in the alveoli Partial pressure of oxygen in capillary blood	mmHg	$(FiO_2 \times 100) \times (ATMP - 47) - (PaCO_2 / RQ)$	/
$AaDO_2$	Alveolar-arterial oxygen difference	mmHg	$(FiO_2 \times 100) \times (ATMP - 47) – (PaCO_2 / RQ) - PaO_2$	10-15
CcO_2	Pulmonary capillary oxygen content	ml/L	$(Hb \times 1.34) + ((FiO_2 \times 100) \times (ATMP - 47) - (PaCO_2 / RQ)) \times 0.0031)$	/
Qs/Qt	Pulmonary	%	{[(Hb × 1. 34) +	3.0-5.0

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
	venous admixture		$((FiO_2 \times 100) \times (ATMP - 47) - (PaCO_2 / RQ)) \times 0.0031)] - CaO_2) / \{[(Hb \times 1.34) + ((FiO_2 \times 100) \times (ATMP - 47) - (PaCO_2 / RQ)) \times 0.0031)] - CvO_2\} \times 100$	
C.O. Calc	Calculated cardiac output	L/min	$VO_2 / (CaO_2 - CvO_2)$	0.1-20.0
PaO_2/FiO_2	Oxygenation index	mmHg	$PaO_2 / (FiO_2 \times 100)$	/
AaO_2/PaO_2	Ratio of alveolar-arterial oxygen partial pressure difference to oxygen partial pressure	/	$[(FiO2 \times 100) \times (ATMP - 47) – (PaCO_2 / RQ) - PaO_2] / PaO_2$	/
DO_2I	Oxygen delivery index	ml/min/m²	$(CaO_2 \times C.O.) / BSA$	/
VO_2I	Oxygen consumption index	ml/min/m²	$(CaO_2 – CvO_2) \times C.O. / BSA$	/

Viewing Historical Calculated Values

The occurrence time of historical oxygenation calculations is displayed on the left side of the [Oxy-CRG] screen. Double-click a time to display the corresponding values of the calculation in the input value and output value areas.

9.4.3 Ventilation Calculations

This system supports calculating the parameters related to the ventilation function, and viewing the historical calculated values.

Calculation Procedure

To perform ventilation calculations, follow the steps below:

1. In the input value field, enter the value of each parameter within the valid range. When the input value is beyond the valid range, it will be displayed with a red background.
2. Click [Calculate].
3. View the calculated value in the output value area.

   If the output value is above the normal range,  is displayed next to the value.

   If the output value is below the normal range,  is displayed next to the value.

   Select [Unit] or [Reference Range] to switch the displayed output value between the parameter unit and the reference range of the parameter.

Input Parameters for Ventilation Calculations

Input Parameter	English Full Name / Description	Unit	Adjustable Range
FiO_2	Percentage fraction of inspired oxygen	%	18-100
$PeCO_2$	End-tidal CO_2 pressure	mmHg	0-114
PaO_2	Partial pressure of oxygen in the arteries	mmHg	10-800
RQ	Respiratory quotient	/	0.1-1.5
ATMP	Atmospheric Pressure	mmHg	300-1200
RR	Respiratory rate	rpm	4-120
$PaCO_2$	Partial pressure of carbon dioxide in the arteries	mmHg	1-200
TV	Tidal volume	ml	15-2000

Output Parameters and Formulas for Ventilation Calculations

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
PAO_2	Partial pressure of oxygen in the alveoli	mmHg	$FiO_2 \times (ATMP - 47) - (PaCO_2 / RQ)$	/
$AaDO_2$	Alveolar-arterial	mmHg	$FiO_2 \times (ATMP - 47)$	/

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
	oxygen difference		$-(PaCO_2 / RQ) - PaO_2$	
PaO_2/FiO_2	Oxygenation index	mmHg	PaO_2 / FiO_2	/
Pa/AO_2	Arterial to alveolar oxygen ratio	%	$PaO_2 / (FiO_2 \times (ATMP - 47) - (PaCO_2 / RQ))$	/
$AaDO_2/PaO_2$	Respiratory index	/	$(FiO_2 \times (ATMP - 47) - (PaCO_2 / RQ) - PaO_2) / PaO_2$	/
MV	Minute volume	L/min	TV × RR / 1000	/
Vd	Volume of physiological dead space	ml	$((PaCO_2 - PeCO_2) / PACO_2) \times TV$	145-155
Vd/Vt	Physiologic dead space in percent of tidal volume	%	$((PaCO_2 - PeCO_2) / PaCO_2) \times 100\%$	25-40
VA	Alveolar volume	L/min	$(TV - ((PaCO_2 - PeCO_2) / PaCO_2) \times TV) \times RR$	/

Viewing Historical Calculated Values

The occurrence time of historical ventilation calculations is displayed on the left side of the [Ventilation] screen. Double-click a time to display the corresponding values of the calculation in the input value and output value areas.

9.4.4 Renal Function Calculations

This system supports calculating the parameters related to the renal function, and viewing the historical calculated values.

Calculation Procedure

To perform renal function calculations, follow the steps below:

1. In the input value field, enter the value of each parameter within the valid range. When the input value is beyond the valid range, it will be displayed with a red background.

2. Click [Calculate].
3. View the calculated value in the output value area.

   If the output value is above the normal range, ↑ is displayed next to the value.

   If the output value is below the normal range, ↓ is displayed next to the value.

   Select [Unit] or [Reference Range] to define the displayed output value as the parameter unit or the reference range of the parameter.

Input Parameters for Renal Function Calculations

Input Parameter	English Full Name / Description	Unit	Adjustable Range
Height	Height	cm	20-300
Weight	Weight	kg	1-250
URK	Urine potassium	mmol/L	1-9999
URNa	Urine sodium	mmol/L	0-9999
Urine	24 hours urine	ml/24h	0-5000
Posm	Plasma osmolality	mOsm/kgH_2O	100-500
Uosm	Urine osmolality	mOsm/kgH_2O	200-2000
SerNa	Serum sodium	mmol/L	50-300
SCr	Serum creatinine	umol/L	45-90
UCr	Urine creatinine	umol/L	100-5000
BUN	Blood urea nitrogen	mmol/L	0-10

Output Parameters and Formulas for Renal Function Calculations

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
URNaEx	Urine sodium excretion	mmol/ 24h	URNa × Urine / 1000ml	51-102
URKEx	Urine potassium excretion	mmol/ 24h	URK × Urine / 1000ml	/
Na/K	Excretion ratio of urine sodium and potassium	%	URNa / URK × 100%	/

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
CNa	Sodium clearance	ml/24h	(URNa × Urine) / SerNa	/
Clcr	Creatinine clearance rate	mL/min	(Urine × UCr) / (SCr × 1440)	/
FENa	Fractional excretion of sodium	%	(URNa × Scr) / (SerNa × UCr) × 100%	/
Cosm	Osmolar clearance	mL/min	(Uosm × Urine / 24 / 60) / Posm	/
CH2O	Free water clearance	ml/h	V × (1 – Uosm / Posm)	-120--25
U/Posm	Urine to plasma osmolality ratio	/	Uosm / Posm	3.0-4.5
BUN/Scr	Blood urea nitrogen-serum creatinine ratio	/	BUN / Scr	/
U/SCr	Urine-serum creatinine ratio	/	Ucr / Scr	/

Viewing Historical Calculated Values

The occurrence time of historical renal calculations is displayed on the left side of the [Renal] screen. Double-click a time to display the corresponding values of the calculation in the input value and output value areas.

9.4.5 Hemodynamic Calculations

Calculation Procedure

To perform hemodynamic calculations, follow the steps below:

1. In the input value field, enter the value of each parameter within the valid range. When the input value is beyond the valid range, it will be displayed with a red background.
2. Click [Calculate].
3. View the calculated value in the output value area.

   If the output value is above the normal range, ↑ is displayed next to the value.

If the output value is below the normal range, ↓ is displayed next to the value.

Select [Unit] or [Reference Range] to define the displayed output value as the parameter unit or the reference range of the parameter.

Input Parameters for Hemodynamic Calculations

Input Parameter	English Full Name / Description	Unit	Adjustable Range
Height	Patient height	cm	20.0-300.0
Weight	Patient weight	kg	0.1-499.0
HR	Heart rate	bpm	0-300
MAP	MAP	mmHg	0-300
CVP	Central venous pressure	mmHg	0-40
C.O.	Cardiac output	L/min	0.1-20.0
PAW	Pulmonary artery wedge pressure	mmHg	0-40
MPAP	Mean pulmonary artery pressure	mmHg	1-120
LVD	Axial diameter of left ventricle	mm	0-120

Output Parameters and Formulas for Hemodynamic Calculations

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
C.I.	Cardiac Index	liters/min/m^2	C.O. / BSA	2.5-4.0
SV	Stroke Volume	ml	C.O. / HR	60-100
SVI	Stroke Volume Index	ml/m^2	SV / BSA	33-47
SVR	Systemic Vascular Resistance	Dynes·sec/cm^{-5}	79.96 × (MAP - CVP) / C.O.	800-1200
SVRI	Systemic Vascular Resistance Index	dynes·sec/cm^{-5}/m^2	SVR × BSA	970-2390

Output Parameter	English Full Name / Description	Unit	Formula	Reference Range
PVR	Pulmonary Vascular Resistance	dynes·sec/cm^{-5}	79.96 × (paMAP - PAW) / C.O.	150-250
PVRI	Pulmonary Vascular Resistance Index	dynes·sec/cm^{-5}/m^2	PVR × BSA	255-285
LCW	Left Cardiac Work	kg-m	0.0136 × MAP × C.O.	5.4-10.0
LCWI	Left Cardiac Work Index	kg-m/m^2	LCW / BSA	3.0-5.5
LVSW	Left Ventricle Stroke Work	g · m	0.0136 × MAP × SV	8-10
LVSWI	Left Ventricle Stroke Work Index	g·m/m^2	LVSW / BSA	50-62
RCW	Right Cardiac Work	kg-m	0.0136 × paMAP × C.O.	/
RCWI	Right Cardiac Work Index	kg-m/m^2	RCW / BSA	0.54-0.66
RVSW	Right Ventricle Stroke Work	g · m	0.0136 × paMAP × SV	51-61
RVSWI	Right Ventricle Stroke Work Index	g·m/m^2	RVSW / BSA	5-10
EF	Ejection Fraction	m^2	(SV / t) × 100	40-60

Note:

- Body Surface Area (BSA) = $Wt^{0.425} \times Ht^{0.725} \times 0.007184$
  Wt: Weight, Ht: Height
- t = (7.0 / (2.4 + lv_d/10)) × lv_d × lv_d × lv_d / 1000
  lv_d: left ventricle diameter
- paMAP corresponds to MPAP

9.5 Generating Reports

The report management screen supports the generation of telemetry/monitoring reports of patients under monitoring.

After entering [Real-time Monitoring] → [Key Monitoring] →[Report Management], you can perform the following operations:

1. Set the start time and duration of monitoring, and check the parameters to be displayed in the report.
2. Click the [Generate Report] button.
3. A telemetry monitoring report is generated. Then Select [Print], [Print To PDF] or [Save].
   - If you select [Print], the report will be printed by the printer without being saved in the system.
   - If you select [Print To PDF], the report will be saved in your computer in PDF format.
   - If you select [Save], the report will be stored under the [Received Monitoring Report] list in the current screen.

Chapter 10 Alarm Management

Alarms are triggered by physiological parameters that appear abnormal or by technical problems of the monitoring device. When an alarm occurs, the system indicates it through visual and audible alarm indications.

Most of the alarms on the CMS arise from monitoring devices. The CMS supports remote setting of the alarm priority, alarm switch, alarm limit, alarm reset and alarm audio pause of monitors. At the same time, the alarm settings updated on monitors will be synchronized to the CMS.

Warning

Make sure that the alarm settings are appropriate for the current patient.

Warning

Do not set the alarm limits beyond the measurement ranges of the monitoring devices, which may render the alarm system ineffective. For more information, please refer to the Operator's Manual of the specific monitoring device.

Warning

Do not rely exclusively on the audible alarm system for monitoring. Adjustment of alarm volume to a low level may result in a hazard to the patient. Please pay close attention to the actual clinical condition of patients.

Warning

Every time the patient connected with a bedside monitor change, please re-check whether the system still works normally, whether the alarm function is normal and whether the alarm settings are appropriate.

Warning

For the operator to recognize alarm conditions clearly, the alarm signal sound should be set higher than ambient levels.

Warning

In order to ensure that the operator can accurately identify the alarms, it is recommended that the distance between the operator and the CMS should not exceed 4 meters. If the alarm event needs to be clearly distinguished, it is recommended that the distance between the operator and the CMS should not be more than 1 m (there should be no obstacle within the visual effective distance above).

10.1 Alarm Type

Alarms can be divided into two types: physiological alarms and technical alarms.

- **Physiological alarms:** also called patient status alarms, are triggered by parameter measurement exceeding the set alarm limits, or by an abnormal patient condition.
- **Technical alarms:** also called system status alarms, are triggered by a device malfunction or the monitoring result distortion due to improper operation or mechanical problems.

In addition to alarms, there is prompt information for monitoring devices, showing system status or patient status, such as *"Being calibrated"* and *"Over motion"*.

10.2 Alarm Priority

By severity, the alarms are classified into the following priority levels:

- **High priority alarms:** indicate life-threatening situations or severe device malfunctions. High priority alarms require an immediate medical response.
- **Medium priority alarms:** indicate abnormal vital signs or device malfunctions. Medium priority alarms require a swift medical response.
- **Low priority alarms:** indicate discomfort conditions, device malfunctions, or improper operations. Low priority alarms require a timely medical response.

10.3 Alarm Mode

The generated alarms will be prompted audibly and visually. The CMS will continuously send out alarm sound and display alarm information in the alarm information area.

Warning

This system can send out alarm sounds only when loudspeakers are configured.

Alarm Type	Sound	Alarm message	Parameter area
High Priority Alarm	beep-beep-beep-beep-beep-----beep-beep-beep-beep-beep	"!!!" before text Background: red Text: White Display mode:	Background: red

		background flashing Flashing frequency: 2Hz Duty cycle: 50% on	
Medium Priority Alarm	beep-beep-beep	"!!" before text Background: yellow Text: White Display mode: background flashing Flashing frequency: 0.5Hz Duty cycle: 50% on	Background: yellow
Low Priority Alarm	beep	"!" before text Background: yellow (physiological alarms) Cyan (technical alarms) Text: black Flashing frequency: Constant on Duty cycle: 100% on	Background: yellow

10.4 Alarm Indication Rules

Alarm Audio

When multiple beds send off alarms at the same time, the system will sort the current alarms into high, medium and low priorities, and send out respective alarm sounds in this order. The alarm sounds play circularly until all alarms disappear.

Alarm Message

When multiple alarms occur to a certain bed, these information will be scrolled and displayed on the alarm information area according to alarm priorities preset by the system.

The single patient window contains one alarm information area, which displays both physiological alarms and technical alarms.

- Alarm display priority: high-priority physiological alarm > medium-priority physiological alarm, high priority technical alarm > low-priority physiological alarm > medium-priority technical alarm > low-priority technical alarm > prompt information.

The key monitoring window has two alarm information areas for displaying physiological alarms and technical alarms separately:

- Priority for physiological alarm information area: high-priority physiological alarm > medium-priority physiological alarm > low-priority physiological alarm > prompt information
- Priority for technical alarm information area: high-priority technical alarm > medium-priority technical alarm > low-priority technical alarm > prompt information

10.5 Alarm Status Symbols

 : indicates that the alarm of a parameter is turned off.

 : indicates that alarm sounds are paused.

 : indicates that alarm sounds are turned off.

 : indicates that the alarm system has been reset. In this case, the audible alarm tones are turned off, but the visual alarm remains effective.

 : indicates that the alarm has been confirmed.

10.6 Viewing and Confirming Alarms

You can view the alarm information of the current key monitoring bed on the real-time monitoring page.

In the alarm information area, the alarms are displayed in rotation. You can also click the alarm message area to view all currently valid technical and physiological alarms in the pop-up alarm information list, with the most recent alerts at the top of the list.

You can confirm the alarms you have already recognized. After an alarm is confirmed:

- The alarm is silenced.
- The alarm information is retained, with a symbol  before it.
- Technical alarms are changed to prompt messages.

To confirm alarms, follow the steps below:

1. Select the technical or physiological alarm information area to enter the technical or physiological alarm information window.
2. Check the box next to one or more alarm messages.
3. Press [Confirm Alarm].

Click the "X" icon on the right side of the confirmed alarm to cancel the confirmation of the alarm. After canceling the alarm confirmation, the alarm sound is activated and the alarm confirmation symbol disappears.

10.7 Resetting Alarms

Alarm reset refers to the return of the alarm system back to the non-alarm state. Resetting alarms indicates that the current alarms have been confirmed.

Alarm reset operations can be performed on both the CMS and monitor. This means that alarm reset operations can be carried out at either end and synchronized with the other end.

For physiological alarms, when the alarm system is reset, the following will occur:

-  is displayed on the single patient window and the icon area of the key monitoring screen.
- The current physiological alarms are silenced.

For technical alarms, when the alarm system is reset, the following will occur:

-  is displayed on the single patient window and the icon area of the key monitoring screen.
- The current technical alarms are changed to prompt messages.

If a new alarm, either physiological alarm or technical alarm, is triggered after the alarm system is reset, the alarm reset icon will disappear and the alarm light and alarm tone will be reactivated.

> ☞ **Note**
>
> Alarm reset is not a toggle operation. Pressing the alarm reset key again or several times only resets the current alarm event, instead of exiting the alarm reset state.

10.8 Pausing Alarm Sound

Pausing alarm sound means that the alarm sound is temporarily turned off, but the display of alarm information will not be affected.

After the alarm sound is paused:

- The sound of all physiological alarms and technical alarms are switched off within the set alarm audio pause time.
- *"Alarm Audio Pause"* is prompted in the alarm area.
- The icon  and remaining alarm audio pause time are displayed in the icon area.

Entering Alarm Audio Pause

You can pause the alarm sound for the selected bed in either of the following ways:

- Select the single patient window screen and right-click, and then select [Alarm Audio Pause] in the pop-up menu.
- Select [Real-time Monitoring] → [Function Menu] → [Alarm Audio Pause] and enter the correct user password.

Exiting Alarm Audio Pause

After reaching the alarm audio pause time, the system will automatically exit the alarm audio pause status. You can also exit the alarm audio pause state by clicking [Alarm Audio Pause] again or selecting  .

Warning

Pausing or switching off alarm sound may result in a hazard to the patient. Please pay attention to the potential risks.

10.9 Switching Off Alarm Sound

If [Alarm Audio Pause] is set to [Permanent], the alarm sound is switched off.

After the alarm sound is switched off:

- The sound of all physiological alarms and technical alarms are switched off.
- *"Alarm Audio Off"* is prompted in the alarm area.
- The alarm audio off symbol  is displayed in the icon area.

For more information about entering and exiting alarm sound off, please refer to *10.8 Pausing Alarm Sound*.

10.10 Latching High Priority Alarms

This system supports to highlight certain high-priority physiological alarms that reach a critical level and require special attention. These alarms can be latched.

To enable the switch of specially-attended high priority alarms, go to [Alarm Setup] - [Alarm Latch].

For the non-latch alarms, their alarm indications disappear when the alarm condition ends. If you latch alarms, all visual and audible alarm indications remain until the alarms are reset.

The special high priority alarms involve visual and audio latch:

- Visual latch: Patient window background color and alarm message are latched.
- Audio latch: Alarm audio is latched.

Clearing Latched Alarms

You can clear the latched alarms through the following ways:

- Reset the alarms, then all the latched alarms are cleared.
- Confirm alarms: Click the alarm message area and Alarm List window appears. You can select specific latched alarms and confirm it, then the latched alarms are cleared.

Setting Latch Mode

You can set the visual and audio latch switch separately. To set the latch mode of special high-priority alarms, go to [System] – [General].

- [Latch for special high-priority alarm]: If selected, the patient window background color and alarm message are latched, but the alarm audio is not latched.

- [Customize audio for special high-priority alarm]: If selected, the alarm audio is latched. You can select special audio mode for this type of high-priority alarms.

10.11 Alarm Setup

When monitors connected to the CMS, the alarms can be set bi-directionally between the monitor and the CMS.

10.11.1 Setting Parameter Alarm Properties

You can set the parameters of the current monitoring devices on the CMS. Alarm setting can be carried out.

Select the [Alarm Setup] tab in the key monitoring window to enter the setting window.

> ☞ **Note**
>
> The parameters in the alarm setting are determined by the parameter modules configured by the monitoring device.

Setting Physiological Alarms

You can set the alarm limits, alarm switch and alarm priority for ECG, NIBP, SpO_2, PR, Resp, IBP, CO_2 and CMS.

10.11.2 Changing the Alarm Volume

The alarm volume of all monitoring beds is uniform on the CMS. For more information about alarm volume settings, please refer to *8.5 Functional Area*.

10.11.3 Setting the Alarm Audio Paused Time

You can set the pause time of the alarm sound. After the pause time is set, it is consistent for the bed every time its alarm audio is paused. To set the alarm audio paused time, follow the steps below:

1. Select [Alarm Setup] → [Alarm Configuration] → [Alarm Audio Paused Time].
2. Set the pause time to [1min], [2min], [3min] or [Permanent]. If [Permanent] is selected, the alarm sound will be switched off.

10.12 Reviewing Alarm Events

For more information, see *9.3.4 Reviewing Alarm Events*.

10.13 Alarm Records and Recovery

The remote alarm events of the CMS are triggered by bedside monitors. After a monitor's alarm events of any priority are triggered, the alarm events of the bedside monitor will be stored in the monitor and uploaded to the CMS in real time. After receiving the alarm event, the CMS provides alarm notifications for the corresponding event, and the alarm event will be stored and recorded as alarm log information by the CMS. Alarm events contain the key information of the events, such as alarm occurrence time, alarm priority, key parameters, and alarm information.

When the battery is low, the bedside monitor will trigger a high-priority alarm. At the same time, the alarm will be uploaded to the CMS for it to trigger, record and store an alarm. The bedside monitor can store alarm events before power failure. Specifically, the power management system of the bedside monitor will require the monitoring software to store files and exit the system before power failure, so as to ensure safe data storage.

The alarm logs are permanently stored on your computer's hard disk, whether there is an accidental or complete power outage, but the event of accidental power failure will not be stored in the log.

When the bedside monitor and the CMS network are disconnected and then reconnected, the bedside monitor will synchronize the alarms occurred during network interruption to the CMS, so as to ensure that the alarm event logs of the bedside monitor are consistent with those of the CMS.

The CMS can store up to 1,000 sets of alarm events for a single patient, which is consistent with bedside monitors. When this limit is exceeded, the earliest event is automatically deleted each time a new event is recorded. This means that the events displayed are the most recent 1,000 events for the current patient.

Chapter 11 Cleaning and Maintenance

11.1 Computer Case Cleaning

For more information about the cleaning of the computer case, please refer to the relevant information of your computer.

Warning

To prevent damage to the device, do not allow the cleaning liquid to flow into the socket of the computer.

Warning

When cleaning the computer, only wipe the outer periphery of the connector. Do not wipe the inner part.

Warning

Most detergents must be diluted before they can be used.

Warning

Do not use abrasive materials.

Warning

Do not allow any liquid to get inside the computer where the CMS is operated and used.

Warning

Do not soak any parts of this system in liquid.

11.2 Maintenance Inspection

The CMS is designed with a service life of 5 years. A comprehensive inspection of the CMS, including function, performance and safety, must be carried out annually or after each repair by trained and qualified personnel.

Warning

If the hospital using this system fails to implement a satisfactory maintenance plan, it may disable the system's functions and even endanger human health.

Caution

There are no parts inside the device that can be repaired by users themselves. Do not open the casing without permission; otherwise, unexpected failure may occur and the normal use of the CMS may be affected.

The CMS should not be used to monitor any patient if signs of damage are found. Please contact the seller or our company in time.

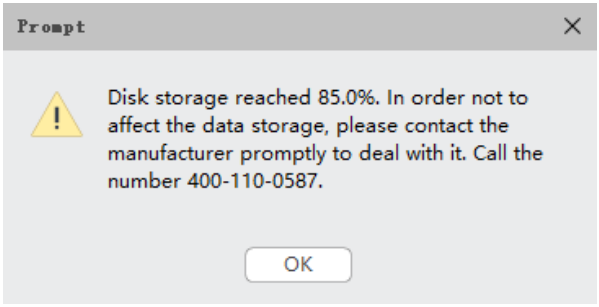
11.3 Switching On/Off

When switching on the computer where the system is operated, the external equipment should be powered up first, followed by the computer case. When switching off the computer, the computer case should be shut down first, followed by the external equipment. Do not move the equipment at will after connecting the power supply. All signal cables should be installed or unloaded during shutdown or power-off conditions.

> ☞ **Note**
>
> Long-term use of this system will easily lead to aging of hardware equipment and reduce the service life of the system. The heat dissipation of the computer case should be kept in good condition. It is recommended to switch off the computer at least once a week for care and maintenance.

11.4 Data Maintenance

The space of the disk where the CMS is located should be freed up in a timely manner. If the disk usage exceeds 80% of the total capacity, the icon  will displayed in the upper right corner of the page. When you click the icon, a prompt like the following will pop up:



In this case, you should clear the historical data or contact our company as soon as possible to avoid affecting the normal use of the system.

11.5 Software Update

Software upgrades and other maintenance operations can only be performed by qualified service professionals designated by the manufacturer.

Appendix B Technical Specifications

B.1 Hardware Requirements

For the CMS to function effectively, the following configuration is recommended:

Name	Configuration Requirements
Client	CPU: Intel® Core™ i3 RAM: 8GB Hard disk: 500GB Printer resolution: 600 dpi Port: RJ45, USB2.0/3.0 Sound card: PC97-compatible Loudspeakers: Sound pressure level of at least 45-85 db(A) within one meter from the computer.
Server	CPU: Intel® Core™ i5 RAM: 32GB Hard disk: 4TB

☞ **Note**

The CMS can be equipped with spare power supply to keep running after the mains power is cut off.

B.2 Software Environment Requirements

Name	Configuration Requirements
Client	Operating system: Windows 10/11 64-bit or compatible versions Web browser: IE11, Microsoft Edge 42, Google Chrome 77 or compatible versions. All browsers require PDF plug-ins.
Server	Ubuntu 20.04 + JDK 11.0.2 + NET Core SDK 2.1 + MySQL 8.0

B.3 Basic Parameter Specifications

- Number of connected monitoring device: 1-128
- Power supply: a.c. 220V, 50Hz
- Input power: ≤ 300VA
- Link type: Cable LAN or WLAN

- Storage capacity ≥ 10GB
- Bit error rate: ≤ 2×10^{-4}
- CMS startup time: ≤ 10s
- CMS response time ≤ 3s
- CMS data processing time ≤ 2s
- The alarm signal delay from the monitoring device to CMS is ≤ 1s.
- The maximum delay time for CMS to disconnect from the network and trigger an alarm is < 25s.
- Communication speed: Each channel 10kb/s
- CMS memory usage: ≤ 200MB
- CMS hard disk usage ≤ 1GB (excluding historical file data)
- Supported dynamic waveforms display: ECG, Resp, etc.
- Supported parameters display: Parameters are detected by cable or wireless transmission and display on the screen.
- The CMS controls the monitor through cable or wireless transmission for parameter setup, display mode, review and printing, etc. At the same time, the CMS can also be controlled on the monitor.
- Trend graph display: All parameters of the system can be displayed in trend graph format, and can be zoomed in or out.
- Alarm indication: The alarm limits of the system can be set by the user. When the measuring values exceed the alarm limits, audible or visual alarms will be provided to indicate the alarm beds.

B.4 Environmental Requirements

1. Working Environment

Surrounding: Keep the PC room tidy and clean.

Power Supply: Stable power supply with a UPS system.

Interference Prevention: Magnetic interference around the computer should be avoided. When the computer is working, the operation of switching on/off on power supply equipment nearby should also be avoided.

2. Operating Environment

Temperature: 5°C -40°C

Relative humidity: 30%-80%

Air pressure: 70.0 kPa-106.0kPa

Power supply: (100-240)VA

Frequency: 50Hz/60Hz

3. Transportation & Storage Environment

Temperature: - 20°C-60°C

Relative humidity: 10%-95%;

Air pressure: 50.0kPa-107.4kPa

B.5 Classifications

According to the intended purpose of the CMS and Rule 11 in Annex VIII of "Regulation (EU) 2017/745 (MDR)", software intended to monitor physiological processes is classified as class IIa, except if it is intended for monitoring of vital physiological parameters, where the nature of variations of those parameters is such that it could result in immediate danger to the patient, in which case it is classified as class IIb. The CMS is a class IIb medical device.

B.6 Standard Compliance

EN 60601-1-6:2010+ A1:2015 + A2:2020	Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance – Collateral standard: Usability
EN 60601-1-8:2020	Medical electrical equipment - Part 1-8: General requirements for basic safety and essential performance - Collateral Standard: General requirements, tests and guidance for alarm systems in medical electrical equipment and medical electrical systems
EN 62304:2006+A1:2015	Medical device software-Software life cycle processes
EN 62366-1:2015 +A1:2020	Medical devices - Part 1: Application of usability engineering to medical devices
ISO 15223-1:2021	Medical devices - Symbols to be used with medical device labels, labelling and information to be supplied - Part 1: General requirements
EN ISO 20417:2021	Medical devices - Information to be supplied by the manufacturer

EN 82304-1:2018	Health software – Part 1: General requirements for product safety

Appendix C Default Settings

C.1 Default System Settings

Item	Default Setting
Monitoring Center Screen	
Multi-screen Monitoring	Unchecked
Real-time Monitoring/System Setup	
Patient Name Privacy Protection	Off
Show Grid in Waveform Area	Off
Alarm Volume	6
Special high priority alarm volume	10
High priority alarm volume	8
Medium priority alarm volume	6
Low priority alarm volume	4
Mute	Unchecked
Number of Beds	16
Height unit	cm
Weight unit	Kg
NIBP unit	mmHg
CVP unit	mmHg
ICP unit	mmHg
IBP (excluding CVP&ICP) unit	mmHg
ST unit	mV
CO_2 unit	mmHg
Temp unit	℃
Real-time Monitoring-Key Monitoring Window	
Paced	Unspecified
Zoom for short trend	2h
Zoom for Oxy-CRG	2min
Alarm Audio Pause	Permanent

C.2 Default Alarm Limits

☞ **Note**

When the CMS is connected with the monitor, the alarm settings and their default values for the bed are consistent with those from the monitor. For more information about the default alarm limits of the monitors, please refer to their Operator's Manuals.

Appendix D Alarm Events and Troubleshooting

D.1 Alarm Events

Local Alarms

Alarm Event	Alarm Priority	Reasons/Solutions
Monitoring Device Offline	High Priority Alarm	The monitoring device is disconnected from the wired or wireless network of the CMS.

Remote Alarms

Remote alarms refer to the physiological alarms and technical alarms from the monitoring device. For more information, please refer to the Operator's Manual of the specific monitoring device.

D.2 Troubleshooting

Category	Common Problems	Reasons	Solutions
Black screen	The computer boots up normally, but there is no display on the screen.	The power cord of the display is not well connected; The signal line between the display and the computer case is not connected well; The display itself needs repairing.	Re-plug the power cord. If the power indicator on the display does not light up, please replace the power cord after confirming that it is in good condition; Re-plug the information line. If the screen remains black, the output port or the information line may be broken; If the fault remains unsolved, the display will need to be replaced.
	The computer doesn't boot up, and there is no display on the screen.	One long and two short beeps: graphics card issue; Long beeps: memory issue;	Take out the graphics card, wipe the golden finger clean with an eraser, and reinsert it into the computer. If there are still one long and two short beeps, please replace the graphics card;

Category	Common Problems	Reasons	Solutions
		No beep: CPU or motherboard issue.	Take out the memory bank, wipe the golden finger clean with an eraser, and reinsert it into the computer. If there are still beeps, please replace the memory bank; Please contact the seller.
	The screen turns black after the system runs for a period of time, but returns to normal after moving the mouse.	The screen saver is set to activate; Power management is improperly set.	Open the display properties window and set the screen saver to [None], that is, to close the screen saver; Set all options in the power management settings to [Never].
Indistinct display	Improper color, size, font, etc.	Color Setup; Resolution Setup; Font Setup.	Set the display color to 16 bits; Set the screen resolution to 1920 × 1080 pixels or above; Set the display appearance to Windows standard.
	There is a slight flicker on the display screen	The display refresh rate is too low; Hardware failure.	Adjust the display refresh rate to 60Hz. If the fault remains unsolved, the display will need to be replaced to address hardware failure.
	The CMS is displayed incompletely	Resolution Setup; Taskbar Setup.	Set the screen resolution to 1920 × 1080 pixels or above; Set the taskbar to automatically hide itself.
Startup time too long	It takes a long time to start the system	Effects of viruses; There is a bad track on the hard disk.	Use antivirus software to check/remove viruses from the system (it is usually because the user installs software other than the CMS on the computer); If there is indeed a bad track on

Category	Common Problems	Reasons	Solutions
			the hard disk, the disk will need replacing.
Login error	*"System Error"* is prompted on the login page.	The VM is not fully started when logging in to the client.	After the computer starts up, wait for at least one minute before logging in to the client.

Appendix E Cybersecurity Measures

E.1 Personal Information Safety

Protecting personal health information is a major component of security strategy. To protect personal health information while ensuring the proper system performance, the user should take necessary precautions in accordance with local laws and regulations and institution's policies. It is recommended that health care organizations or medical institutions implement a comprehensive and multifaceted strategy that may consist of:

- Physical safeguards - safety measures to ensure that unauthorized personnel do not have access to the system.
- Operational safeguards - safety measures during operation.
- Administrative safeguards - safety measures in management.
- Technical safeguards - safety measures in technical field.

The basic principles are as follows:

- The access to and operation of the system is restricted to authorized personnel. Only staff with a specific role can be assigned the right to use the system.
- The CMS system should be operated within authorized specifications, including approved software, software configuration and security configuration.
- Protect all passwords to prevent unauthorized changes.
- Remind the user to change the password periodically.

Warning

Users should destroy patients' sensitive information in idle or abandoned devices by employing technical measures such as physical destruction and logical erasure, ensuring that such information is completely irretrievable on the storage media.

E.2 Security Data Type

The user passwords are encrypted using the MD5 irreversible encryption method, ensuring the security of user account passwords.

The data are categorized into the following types and security levels:

User information	High
Patient information	Medium-High
Patient monitoring data	Medium-Low

System configurations	Low

E.3 **Network Environment Settings**

- Install and run antivirus software to avoid virus attacks, and ensure the antivirus software is kept up-to-date.
- Enable the computer firewall to restrict or close unused network ports (e.g., ports 21, 23, 25, and 80), retaining only the ports required by the system, to prevent viruses from exploiting these ports for network attacks.
- Enable rate limiting and ICMP flood attack protection, and set Access Control Lists (ACLs) to block malicious IPs/ports, thereby defending against DDoS attacks.
- Enable MAC address filtering function on wireless networks, allowing only devices with pre-configured MAC addresses to connect via a whitelist mechanism.
- Implement VLAN isolation strategy on the switch by assigning the LAN ports of the monitor and CMS to a dedicated VLAN (e.g., VLAN 10). Configure port security policies to bind MAC addresses and limit the number of connections.
- Deploy Access Control Lists (ACLs) to allow HTTPS communication only through specific ports, prohibit cross-VLAN broadcast storms, and ensure network segmentation and isolation.

E.4 Network Security

Data transmission between the CMS and the monitoring equipment depends on wired or wireless networks. Hospitals need to ensure the stability and security of the networks they use to prevent interruptions in data transmission or malicious damage that could affect patient monitoring.

To keep the CMS safe and virus-free, the following measures should be taken during installation:

- The CMS should be installed in a separate, isolated LAN and protected using a firewall.
- Comprehensive compatibility test should be conducted to ensure that the CMS is operated normally in this environment.

And the following measures should be taken during operation:

- In case of user interface error, application logic error, system or network resource availability error, unforeseen software problems

may occur during the operation of the CMS. To avoid operating system abnormality and application system failure, it is recommended not to install any other software on the computer where this system is operated.

- Force users to change their passwords upon first login. For more information about changing the password, please refer to *4.3 Basic Settings*. After modifying the password, please keep it safe and private.
- For safety considerations, change the password periodically and set a more complex password, a combination of numbers, uppercase letters, lowercase letters, and if possible, special characters is recommended.
- The CMS should be operated with firewalls and/or other security software in place. It is recommended to use the firewall provided by the manufacturer or Windows defender firewall that can defend against DoS and DDoS attacks, and keep it up to date.
- DoS and DDoS protection of the router or switch must be turned on to defend against attacks.
- Sudden power failure may lead to the loss of recent monitoring data. Please save, print or back up important data regularly.

To prevent possible cyber-attacks during software update, the CMS is not upgraded online, but performed by qualified service professionals designated by the manufacturer.

CE 0123

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