MFM-CMS

Central Monitoring System
Version 2.2

User Manual

CE 0123

EDAN

About this Manual

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Statement

This manual will help you understand the operation and maintenance of the product better. It is reminded that the product shall be used strictly complying with this manual. User's operation failing to comply with this manual may result in malfunction or accident for which EDAN INSTRUMENTS, INC. (hereinafter called EDAN) can not be held liable.

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EDAN holds the rights to modify, update, and ultimately explain this manual.

Responsibility of the Manufacturer

EDAN only considers itself responsible for any effect on safety, reliability and performance of the equipment if:

Assembly operations, extensions, re-adjustments, modifications or repairs are carried out by persons authorized by EDAN, and

The electrical installation of the relevant room complies with national standards, and

The instrument is used in accordance with the instructions for use.

Terms Used in this Manual

This guide is designed to give key concepts on safety precautions.

WARNING

A **WARNING** label advises against certain actions or situations that could result in personal injury or death.

CAUTION

A **CAUTION** label advises against actions or situations that could damage equipment, produce inaccurate data, or invalidate a procedure.

NOTE

A **NOTE** provides useful information regarding a function or a procedure.

Table of Contents

1 Intended Use and Safety Guidance

1.1 Intended Use/Indications for Use

MFM-CMS provides centralized monitoring and critical care management for patients monitored by EDAN bedside monitors. From MFM-CMS, clinicians can gain access to patient information for patients on the Network. MFM-CMS displays waveforms, parameters and alarm status of EDAN bedside monitors for up to 32 patients on a single screen or up to 64 patients using two screens.

1.2 Safety Guidance

Federal (U.S.) Law restricts this device to sale by or on the order of a physician.

WARNING

1 The system should be installed by a qualified service engineer. Do not switch on power until all cables have been properly connected and verified.

2 The user of this system should get professional training and read this manual thoroughly before using it.

3 Do not use it in the presence of flammable anesthetic due to explosion risk.

4 To avoid the risk of electric shock, do not remove the unit covers.

5 Do not move the main unit and computer monitor while powering on the system.

6 Only the accessories supplied or recommended by the manufacturer can be connected to the system.

7 Please refer to *MFM-CMS Central Monitoring System Installation Guide* for detailed information of installation and uninstallation.

8 Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of the standard IEC/EN 60601-1. Therefore anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC/EN60601-1. If in doubt, consult our technical service department or your local distributor.

9 Ensure that the environment in which the system is operated is not subject to any sources of strong electromagnetic interference, such as radio transmitters, mobile telephones, etc. Keep them far away.

10 This equipment must be used by or under the guide of physician. This equipment is not intended for home use.

WARNING

11 MFM-CMS system can only collect, supervise, record, store and display the information from Multi-parameter patient monitor but cannot replace the monitoring function of the Multi-parameter patient monitor.

12 The wireless monitors and MFM-CMS form a wireless local area network (WLAN), and two-way transmission of data between them is by radio. Its RF emissions may cause interference in nearby electronic equipment. So the RF device must comply with the local standards and certification requirements.

13 The wireless monitors and MFM-CMS form a WLAN and two-way transmission of data between them is by radio. A loss of transmission data between a wireless monitor and MFM-CMS can occur due to interference caused by other RF signals.

14 The telemetry device and MFM-CMS form a WLAN via Wi-Fi, and two-way transmission of data between them is by radio. A loss of transmission data between a telemetry device and MFM-CMS can occur due to interference caused by other RF signals.

15 Ensure that the system can meet the requirements of standard IEC/EN 60601-1 before other devices are connected to the system. Other equipments connected to the interfaces of PC station must comply with the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore, all configurations should comply with the valid version of the system standard IEC/EN 60601-1. Everybody who connects additional equipment to the signal input connector or signal output connector configures a medical system, and is therefore responsible for the system complying with the requirements of the valid version of the system standard IEC/EN 60601-1. If in doubt, consult our technical service department or your local distributor.

16 The MFM-CMS can only be installed on the device recommended by EDAN.

17 Only use operating systems that are approved by EDAN, such as Windows 7. Using operating systems that are not approved by EDAN may compromise the system performance and cause a potential hazard.

18 Do not rely on the information displayed on MFM-CMS to make therapeutic and diagnostic decisions. Please follow hospital guidelines and best clinical practices.

19 Clinical decision making based on the output of the device is left to the discretion of the provider.

20 Prior to intervening based on data displayed on the Central Monitoring System, providers must verify this data with the corresponding bedside monitor.

21 Portable multi-socket outlet or extension cord can’t be connected to the system.

22 The appliance coupler or mains plug is used as isolation means from supply mains. Position the MFM-CMS in a location where the operator can easily access the disconnection device.

WARNING

23 No modification of this equipment is allowed without authorization of the manufacturer. If this equipment is modified, appropriate inspection and testing must be conducted to ensure continued safe operation.

24 The system settings must be configured by the authorized hospital personnel.

25 Restart MFM-CMS host once the prompt '**System running time is too long, please restart**' appears. According to the practical situation, restart cycle is 3 to 6 months.

CAUTION

1 The system should be used within temperature from +5 ℃ to +40 ℃(41 ℉~104 ℉).

2 Keep the environment clean. Avoid vibration. Keep it far from corrosive reagents, dust areas, high-temperature and humid environment.

3 The user must check that the equipment, cables and transducers do not have visible evidence of damage that may affect patient safety or monitoring capability before use. The recommended inspection interval is one week or less. If damage is evident, replacement is recommended before using it.

4 Turn off the system power before connecting or disconnecting any accessory to the system.

5 Please do not operate the system if it is not operating normally or requires service.

6 Turn off the system power and remove the power cable before maintaining the system.

7 Preventive maintenance of the system including periodic cleaning and appearance checking can be finished by the user because this maintenance does not touch the interior.

8 Avoid using attrite material to clean. Removing all dust from the exterior surface of the equipment with a soft brush or cloth or with a soft cloth, slightly dampened with a mild detergent solution or cool disinfector. Especially the tie-in and panel edge should be noticed.

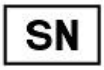
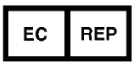
9 Avoid pouring liquids on the equipment while cleaning, and do not immerse any parts of the equipment into any liquids.

10 The system data will be delayed for no more than 5 seconds.

NOTE:

The illustrations in this manual are for reference only.

1.3 Explanation of Symbols

1		Operating instructions
2		SERIAL NUMBER
3		CE marking
4		AUTHORISED REPRESENTATIVE IN THE EUROPEAN COMMUNITY
5		Date of manufacture
6		MANUFACTURER
7	P/N	Part Number
8		Disposal method
9	Rx Only	Caution: Federal (U.S.) Law restricts this device to sale by or on the order of a physician.
10		Refer to User Manual (Background: Blue; Symbol: White)

NOTE:
The user manual is printed in black and white.

2 Introduction

2.1 General

MFM-CMS Central Monitoring System is a medical information device widely applied in clinical monitoring field. A monitoring network system is constructed by connecting multiple monitors. Being the center of the monitoring network, the system realizes central monitoring by collecting, processing, and analyzing the physiological information from multiple bedside monitors. The central system frees the doctors and nurses from multifarious clinical monitoring work and greatly improves monitoring quality.

This MFM-CMS is capable of connecting up to 64 bedside monitors/ telemetry devices that comply with the manufacturer network protocol.

This MFM-CMS connects bedside monitors via network and displays physiological information of the patients being monitored by bedside monitors/ telemetry devices. This system can simultaneously display the information from up to 64 bedside monitors/ telemetry devices.

Physiological waveforms of each bedside monitor that can be displayed on the MFM-CMS include:

- 2 ECG waveforms (up to 7 ECG waveforms for telemetry device and up to 12 ECG waveforms for non-telemetry device in multi-lead interface of **Single Bed View** sub-window)
- 1 RESP waveform
- 1 PLETH waveform
- 8 IBP waveforms (only IBP supported by the monitor will be displayed)
- 1 CO_2 waveform
- 4 AG waveforms for CO_2, O_2, N_2O and AA
- 3 RM waveforms
- 1 CO_2 (RM) waveforms
- 1 ICG waveform
- 1 BIS waveform

Physiological parameters of each bedside monitor that can be displayed on the MFM-CMS include:

- ECG: HR, ST value, PVCs
- RESP: RR
- NIBP: SYS, DIA, MAP
- SpO_2: SpO_2, PR, PI, SpO_2 bar graph
- IBP: ART, PA, CVP, RAP, ICP (CPP), LAP, P1, P2
- CO_2: $EtCO_2$, $FiCO_2$, AwRR

- TEMP: T1, T2, TD
- Quick TEMP
- AG: $EtCO_2$, $FiCO_2$, AwRR; EtO_2, FiO_2; EtN_2O, FiN_2O; HAL/ISO/ENF/SEV/DES: Et, Fi, MAC
- C.O.: C.O., TB
- RM: PEEP, PIP, Pplat, Pmean, AwRR, PIF, PEF, MVe, MVi, TVe, TVi

  （Only those parameters used in Respiratory Loop cannot be stored. ）
- CO_2 (RM): $EtCO_2$, $FiCO_2$
- ICG: CI, CO, SVR, DO2I, SV, SVRI, HR, SI, TFC, QI
- BIS: BIS, EMG, SQI, SR, SEF, TP, BC
- PAWP

This MFM-CMS can also make notification in both audio and visual ways for the alarm occurring at the bedside monitor in order to attract the doctor's attention; as thus the alarm event can be dealt with accurately in time.

The MFM-CMS supports various kinds of peripheral devices such as printer that can output monitoring report.

2.2 Network Structure

The typical central monitoring system network is shown in Figure 2-1.

- The MFM-CMS is connected to the switch via the network cable, and the switch is also connected with the monitors which have not been configured with Wi-Fi module.
- The MFM-CMS is connected to the wireless AP via the network cable, and the wireless AP is connected via Wi-Fi with the monitors or telemetry devices that are configured with Wi-Fi module.
- Monitoring data collected by the MFM-CMS are available to the CMS-WEB Observer via the hospital local area network.

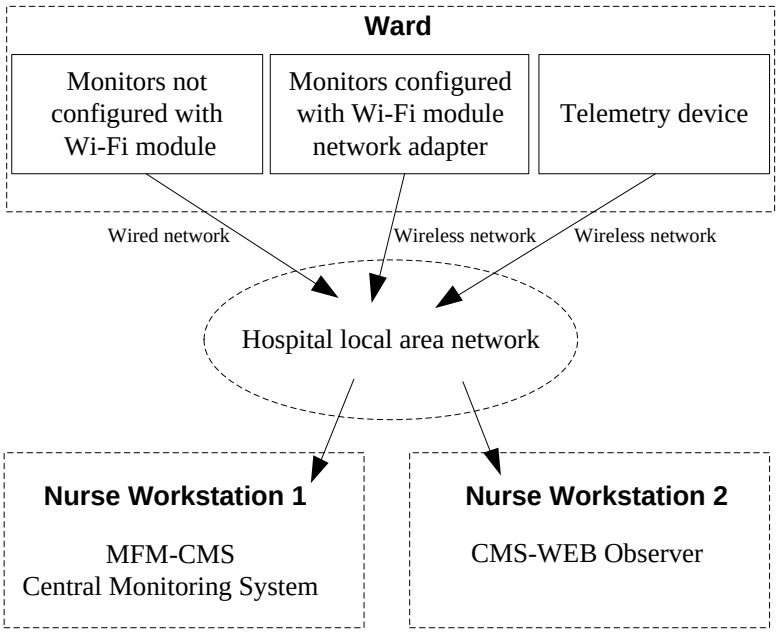


Figure 2-1 A Typical Central Monitoring System Network

2.3 System Functions

The MFM-CMS can realize the following system functions:

- Connecting of up to 64 bedside monitors simultaneously
- Alarm management of parameter alarms from bedside monitors
- Up to 240-hour of trend data storage and review for each bedside monitor
- Up to 240-hour physiological waveforms
- Storage and review 240-hour alarm events (up to 20000 pieces) for each bedside monitor
- Up to 12-hour short trend review for each bedside monitor
- Review 240-hour NIBP measurements (up to 20000 pieces)
- Review 240-hour 12-lead analysis results (up to 20000 pieces)
- Review 240-hour C.O. measurements (up to 20000 pieces)
- Review 240-hour Quick TEMP measurements (up to 20000 pieces)
- Review 240-hour PAWP measurements (up to 20000 pieces)
- Displaying multi-lead ECG
- Monitoring reports of review and alarm records can be output in a certain format
- Displaying single bed information for one bedside monitor
- Search, browse and maintaining management of patients' monitoring data
- Comprehensive system help function
- Power-off storage function available for all kinds of review information
- Calculation of drug doses and titration tables

- Hemodynamic Calculation
- Oxygenation Calculation
- Renal Function Calculation
- Ventilation Calculation
- Various alarm indicating methods
- Supporting wired connected and wireless connected monitor
- Web observation in the hospital local area network
- Perform information interaction with HIS system or EMR system
- Set patient information as well as alarm configuration and perform the NIBP measuring function via the MFM-CMS
- HL7
- For the telemetry devices: storing 100 groups of nurse call records and 100 groups of patient call records
- For the telemetry devices: set the physiological parameter configuration of telemetry device via the MFM-CMS

2.4 Mouse Operation

Usually, we use the following terms to describe mouse operation:

Left-key:

1. Click: move mouse to the target, then quickly press left-key once and release it.
2. Double-click: move mouse to the target, then quickly press left-key twice and release it.
3. Drag: move mouse to the target, press left-key and move to the destination and then release it.

Right-key:

1. Click: move mouse to the target, then quickly press right-key once and release it.
2. Double-click: move mouse to the target, then quickly press right-key twice and release it.

3 Display Screens of the MFM-CMS

3.1 Overview

The MFM-CMS can display the monitoring data using a single display or using dual displays. The main screen and the auxiliary screen are the main operation screens. The main screen and auxiliary screen on a single display are different from those on dual displays.

The patient sectors can be displayed in two modes: the general display mode with waveforms and physiological parameter values displaying on the screen and the large font display mode with only parameter values displaying on the screen. The number of patient sectors which you can simultaneously view on the main screen and the size of the patient sectors are depended on the layout of the patient sectors.

3.2 Main Screen

If a single display is used, the MFM-CMS system will enter the main screen for the single display (shown as Figure 3-1) after the system starts up. If dual displays are used, it will enter the main screen for dual displays (shown as Figure 3-2).

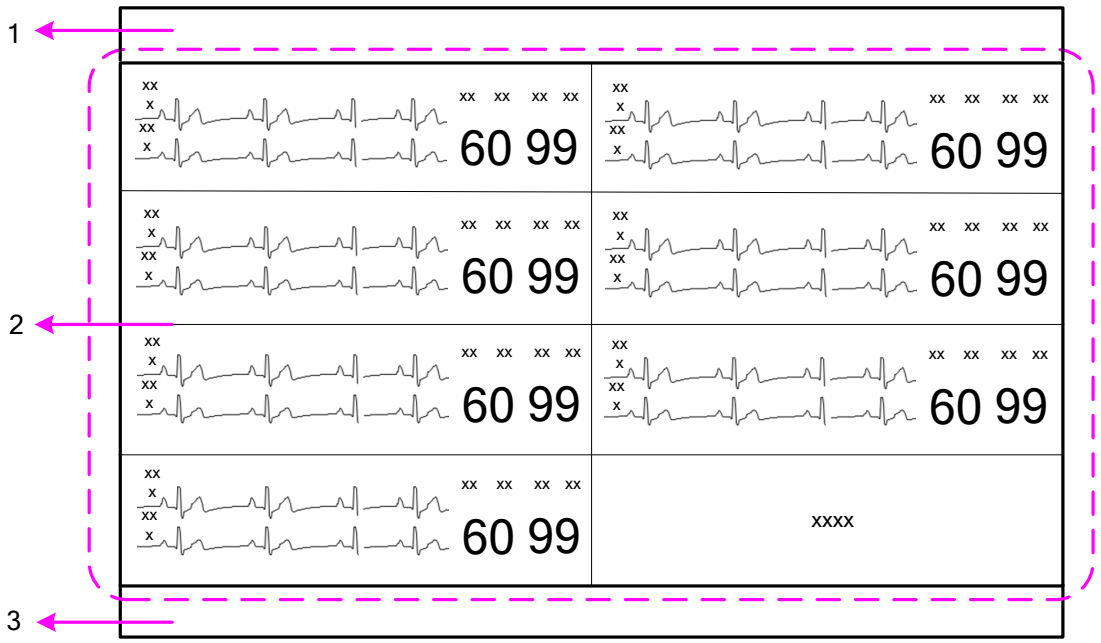


Figure 3-1 Main Screen on a Single Display

1: System information area 2: Patient sectors 3: Quick control area

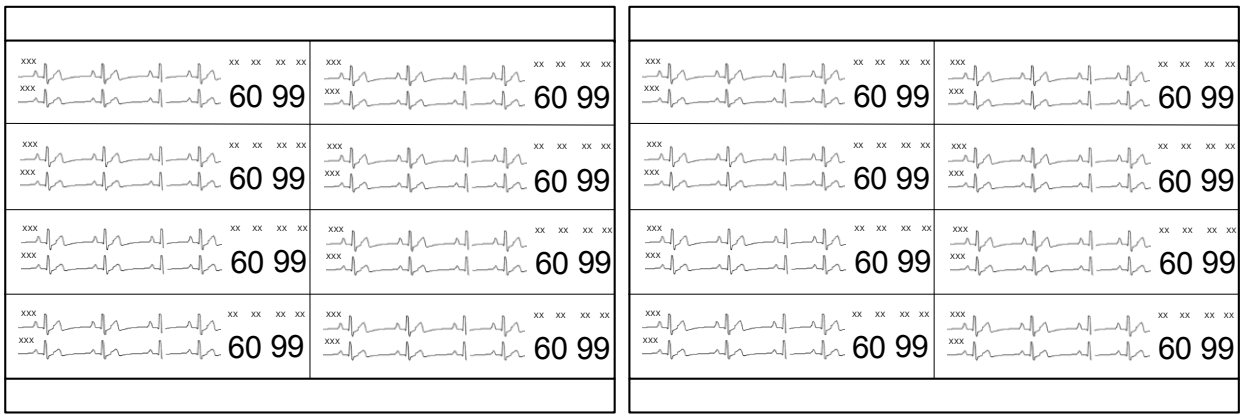


Figure 3-2 Main Screen on Dual Displays

3.2.1 System Information Area

The following information will be displayed in this area:

- The hospital and department information.
- Alarm sound pause indicator and alarm mute indicator .
- When connecting with the telemetry devices: nurse call indicator and patient call indicator .
- Alarm information and prompts of the MFM-CMS. If more than one piece of message occurs, they will be displayed circularly. Refer to Appendix II for all system alarms and prompts.
- The system time.
- EMR indicator. Please refer to section *Synchronizing Patient Information*.

3.2.2 Patient Sectors

A patient is monitored by a monitor. This monitor will occupy a patient sector when it is connected to the MFM-CMS; meanwhile, the monitoring data will be displayed in this patient sector. The MFM-CMS supports 64 monitors connected to the system; therefore, a total of 64 patient sectors are available in the MFM-CMS. The layout of patient sectors may cause some patient sectors temporarily invisible (refer to section *Layout of Patient Sectors*).

The patient sector has four types of state:

- Network Disconnected: The black background with the white font **Disconnected** in a patient sector indicates no device is assigned to this patient sector or this patient sector has been set to idle status (refer to section *Setting Idle Bed).*
- Patient discharged: The black background with bed No. at top left corner in patient sector indicates patient has been discharged.

- Improper Offline: If the system is connected with non-telemetry device, patient information and the message **Monitor is offline** with yellow background are displayed in the patient sector and accompany with low level alarm sound. If the system is connected with telemetry device, patient information, the name of telemetry device, and the message **Telemetry No Signal** with yellow background are displayed in the patient sector and accompany with medium level alarm sound. Improper Offline indicates the patient in this sector has been admitted but is offline. The alarm sound for improper offline will be given out only once.
- Networked Monitoring: Display of patient information, waveforms, trend data and alarm information indicates the patient in this sector has been admitted and is properly networked and under observation.

Refer to Chapter 6 *Patient Sector* for more information about the patient sectors in networked monitoring state.

3.2.3 Quick Control Area

Function Buttons

The quick control area contains the following function buttons:

Button	Button Label	Function
	Main Screen	Click on it to return to the main screen.
	Audio Pause	Click on this symbol to make the alarm pause and the symbol  appears in place of the symbol  . And click on the symbol  to disable the pause function and the symbol  appears in place of the symbol  . When the alarm sound pauses, the symbol  as well as the related prompt will be displayed in the system information area.
	Review	Click on it to enter the review interface, including patient information review, waveform review, alarm review, trend review, NIBP review, 12-lead diagnosis review, C.O. measurement review and Quick TMEP review.
	System Setup	Click on it to enter the system setup menu.
	Shut Down	Click on it to shut down the MFM-CMS and the operating system.
	Admission	Click on it to open the patient admission window.

	System Volume Adjustor	Click on it, and the volume adjustor icon  appears. Select the **Mute** check box, and then enter the password **ABC** in the text box on the pop-up window; the entire system become mute, and the symbol  appears. To disable the silence function, tick the **Mute** check box again and the symbol  appears. Additionally, the user can drag the volume adjustor to your desired volume. **NOTE:** MFM-CMS will keep mute as soon as mute check box is ticked. If a new alarm occurs, the system won't break mute status and will keep mute until mute check box is ticked again. Please use it with caution.
	Events Review	Review physiological alarms, nurse call events and patient events for all patients online. ◆ **Events Review** interface includes **Bed No.**, **Events** name, events level (that is at the same level with alarms), **Time** (the events is triggered), **Length** (30 min, 60min, 120 min and 240 min are optional. Default value is 30 min.) and **Refresh** (Click refresh for data refreshing. Review time starts from the click action. Review period is the length you have chosen. Events order remains unchanged). ◆ Events get new order by clicking areas where **Bed No.**, **Events**, or **Time** is. Time order is the default. ◆ To exit events review, you can click the exit button in the top right corner, or double-click any events to enter into alarm review interface for single patient. **NOTE:** 1. **Length** means review time starting from clicking events review symbol, or starting from the action of changing Length. 2. Events review interface will display nothing if there are no patients online.

Networked State

The networked state window has 64 panes (shown as Figure 3-3) representing the 64 monitors that can be supported and connected to the MFM-CMS. The pane only displays the bed number. You can access the single bed interface by clicking on the pane.

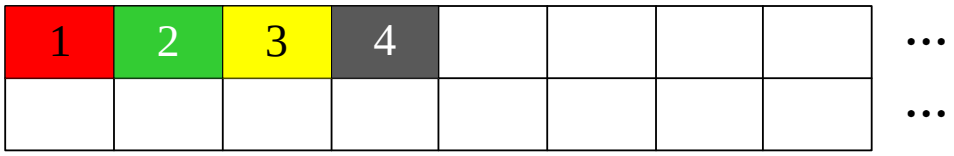


Figure 3-3 Networked State

The pane has the several types of state:

- Blank: Network disconnected.
- With grey background and white bed number: Improper offline or patient discharged.
- With green background: Networked monitoring; without physiological alarm.
- With yellow background: Networked monitoring; with medium or low level physiological alarm.
- With red background: Networked monitoring; with high level physiological alarm.

3.3 Auxiliary Screen

If the patient sector is in the state either of improper offline or networked monitoring, you can access the auxiliary screen by clicking the waveform area or parameter area (except for NIBP parameter area) on the patient sector. The auxiliary screen on a single display is shown as Figure 3-4, and the one on dual displays is shown as Figure 3-5.

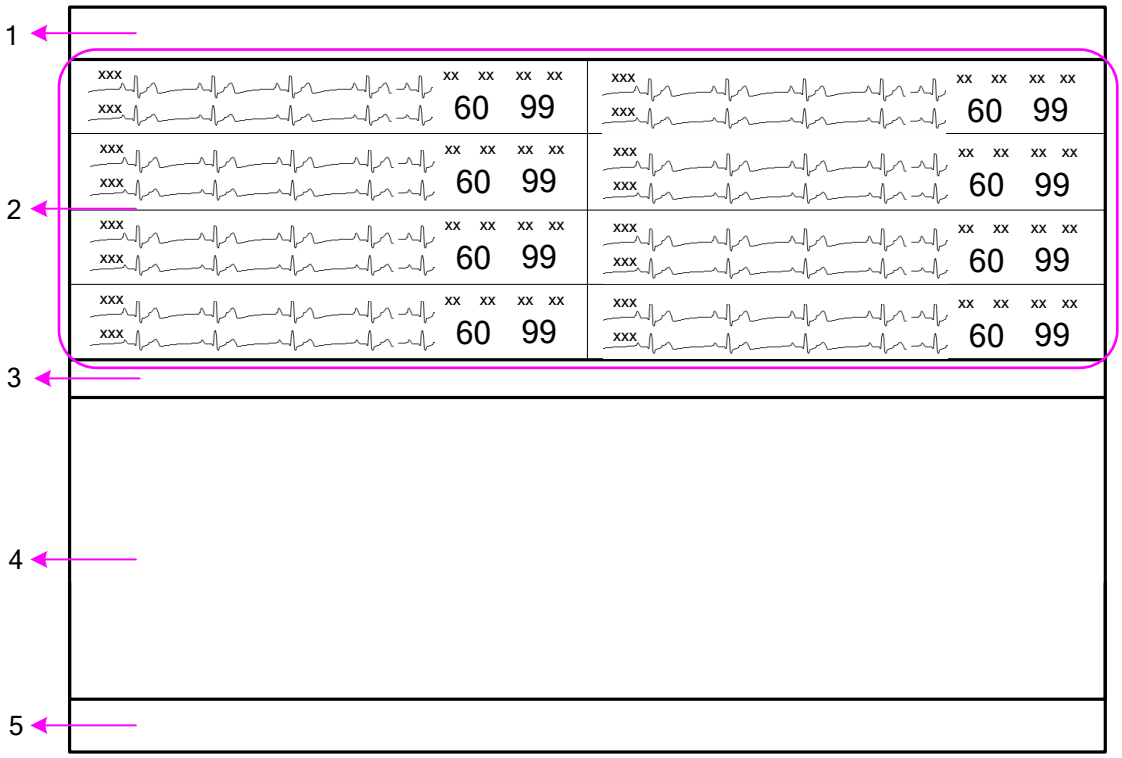


Figure 3-4 Auxiliary Screen on a Single Display

1: System information area 2: Patient sectors 3: Switch and setup area for sub-window
4: Sub-window of auxiliary screen 5: Quick control area

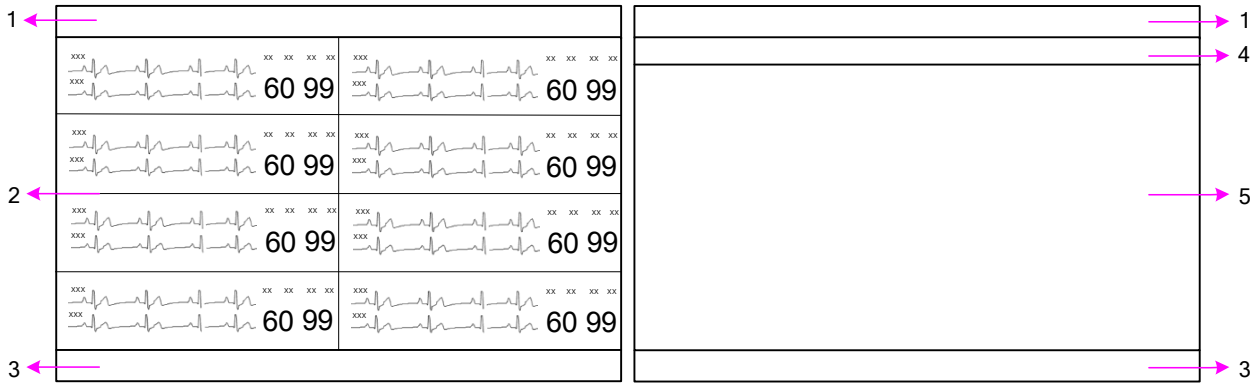


Figure 3-5 Auxiliary Screen on Dual Displays

1: System information area 2: Patient sectors 3: Quick control area
4: Switch and setup area for sub-window 5: Sub-window of auxiliary screen

The auxiliary screen contains a group of sub-windows including **Single Bed View**, **Patient Mgmt**, **Wave Review**, **Alarm Review**, **Trend Review**, **NIBP Review**, **Parameter/Waveform Setup**, **12-L Review**, **C.O. measure review**, **Quick TEMP Review**, **PAWP Review** and **Calculation**. The sub-window of **Single Bed View** will be displayed by default when you access the auxiliary screen.

In the switch and setup area for the sub-window, you can:

- Click a tag to switch the current sub-window to another sub-window.

- Click to scroll leftward and click to scroll rightward in the tag bar.
- Click to open the drop-down list in which you can set the tags to show/hide.
- Click to exit the auxiliary screen and enter the main screen.
- Drag a tag to adjust its location.
- Click or to switch between full screen display mode and half screen display mode for the auxiliary screen when using a single display.

3.4 Large Font Display

Choose **Display the window in large font** from the menu in the patient sector (refer to Section *Menu in the Patient Sector*), and this sector will be displayed in the large font display mode shown as Figure 3-6. Choose **Display the window in large font** again, and the sector will be displayed in the general display mode. In the large font display mode, parameter values are displayed in the patient sector, but no waveform is shown.

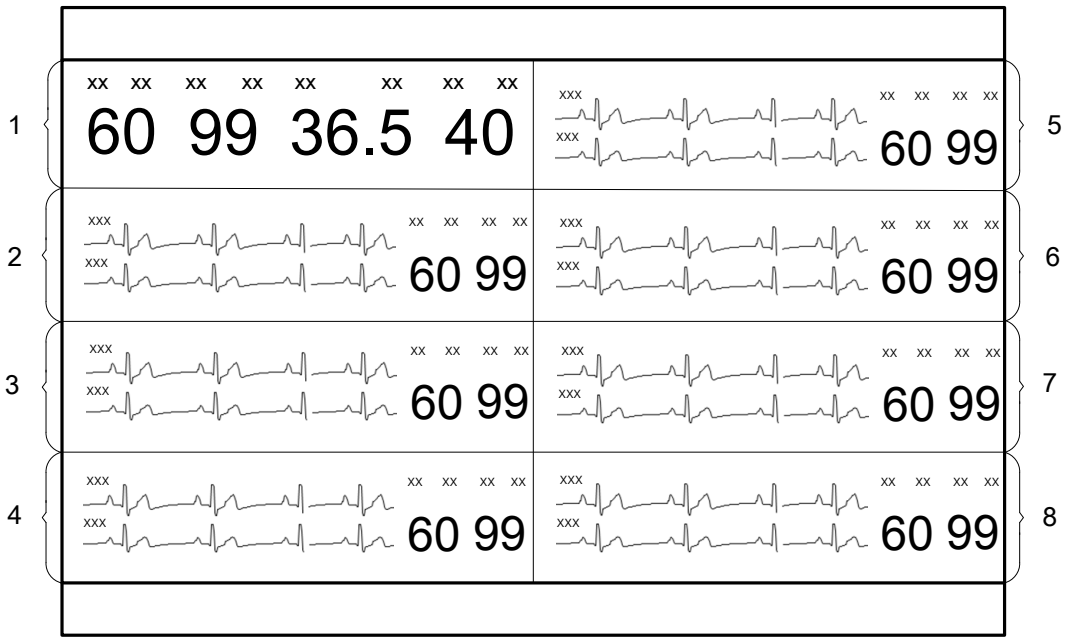


Figure 3-6 Viewing One Patient Sector in Large Font Display Mode

1: Large Font Display Mode 2-8: General Display Mode

Choose **Display all windows in large font** from the menu in the patient sector, and all sectors will be displayed in the large font display mode shown as Figure 3-7. Choose **Display all windows in large font** again, and all sectors will be displayed in the general display mode.

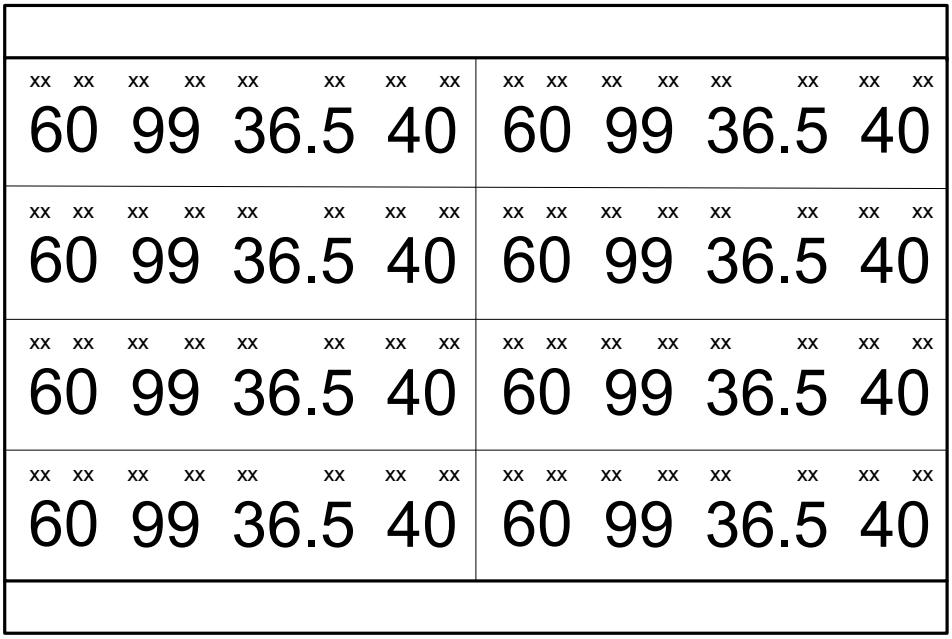


Figure 3-7 Viewing All Patient Sectors in Large Font Display Mode

3.5 Layout of Patient Sectors

The number of patients you can view on the screen and the size of each patient sector depend on the layout of the patient sectors. If 64 monitors are connected to the MFM-CMS and the number of patient sectors displayed on the main screen is set to 32, the screen will only display 32 patient sectors and the other 32 sectors are invisible. You may:

- Switch between the visible and invisible patient sectors (refer to Section *Switching Patient sector*).
- Click bed number to view the 64 patient sectors in the networked state window (refer to the *Networked State* in Section *Quick Control Area*).

Refer to Section *Display Setup* for more information about setting the layout of the patient sectors.

4 Switching on/off the MFM-CMS

4.1 Starting Monitoring

NOTE:

1. Before starting the system, please verify that the dongle has been installed. Otherwise, you may fail to access the system.
2. If system gets blocked, dongle will give out alarm sound till the system resumes normal status.

When all of its components are correctly connected, press the power button on the front panel of the device. The power indicator on the front panel lights up and the device performs hardware self-test. If the device works normally, the main screen appears. If the device detects abnormity during self-test, it beeps to show alarm and displays error information on the screen. In this case, you should record the error information, shut down the device and contact technical representative of EDAN. After the system self-test is completed, you will access the MFM-CMS system interface and the system will also finish the environment self-test automatically. Meanwhile, the system will sound Do-Do-Do, a test sound. The user should set the volume system and confirm that the volume of the system can be heard clearly.

CAUTION

1 Ensure that the sound equipment is always in a state of activation.

2 The audio adapter and network adapter should be correctly installed, or you may not access the MFM-CMS.

NOTE:

Ensure that the MFM-CMS system can give the test sound after startup.

4.2 Shutting down the System

It is important to shut down the system properly. Follow this simple procedure to properly shut down your system. This prevents inadvertent errors from occurring during system shut down.

The MFM-CMS can work continuously for a long time. You do not need to shut it down in order to achieve a longer working life.

You should follow the procedure to shut down the MFM-CMS.

Method 1:

Select **Shut Down** on the main menu and enter the password of user maintain (the password of user maintain refers to *User Maintain*). Confirm the password by clicking **OK**, and the MFM-CMS as well as the operating system will be shut down.

Method 2:

Select **System Setup** > **User Maintain,** and enter the password of user maintain (the password of user maintain refers to *User Maintain*); select **Other Setup**.

- Select **Shut Down**: the MFM-CMS as well as the operating system will be shut down.
- Select **Return to Windows**: you will exit from MFM-CMS, but the operating system will not be shut down.

WARNING

1 Shut down the system by strictly observing the shutdown procedure to avoid serious result.

2 Although UPS is an optional configuration of this system, if you really force to turn off the UPS, it results in system failure and hence affects the operation of next time.

3 If power cut-off occurs, turn off the system before the UPS exhausts its electricity.

CAUTION

Hospitals without a stable power source should use a UPS to provide power to the MFM-CMS. The UPS must not be turned off. When there is a power failure, the system should be shut down by following the specified shutdown procedure before the UPS is exhausted. If the system has a sudden power failure, system failure may occur and consequently the system may not work correctly next time or even has a serious result.

NOTE:

If you forget the password, please contact the technical representative of EDAN.

5 Patient Management

5.1 Admitting a Patient

Once MFM-CMS starts up and the monitor is properly connected with MFM-CMS, the system will prompt the user to admit patients by displaying the number of pending patients at the information area.

Click **Admission** in the quick control area to display a window of **Pending patient list**. Select the patients you want to admit from the left list in the window, and enter the patient information in the right area of the window. Click the **Admission** button at the bottom of the window to complete patient admission.

After being admitted, a patient will occupy a patient sector. The MFM-CMS displays the real-time monitoring data which will also be stored in the database.

For the monitor that has been offline due to network problems and is networked with MFM-CMS later, you need not readmit the patient of this monitor. This monitor will be automatically online in the patient sector which it has occupied.

WARNING

1. For those bedside monitors that have been networked with MFM-CMS for the first time, you have to complete patient admission by using the methods mentioned above, which enables the monitors to be online and observed by MFM-CMS. Otherwise, the monitors will not be online on MFM-CMS, and the monitoring data will not be saved by MFM-CMS.
2. Before accepting a new patient, no matter the former one on patient sector is in networked monitoring status or improper offline status, the operation of discharging the former one is needed.

5.2 Obtaining Patient Information

If configured, patient information from a Hospital Information System (HIS) or Electronic Medical Record (EMR) system can be obtained through Mirth Connect (MC) and will display on MFM-CMS.

There are two routes to obtain patient information:

Route 1:

1. Click Admission in the quick control area > **EMR Patient List** or select **Single Bed View** > **Patient Mgmt** > **EMR Patient List**, and the EMR patient list is displayed.

2. Input a query condition for **ALL**, **MRN**, **Last Name** or **First Name**, and then click **Query** button. The required patient information is displayed. The user also can select **Display all patients** or **Display pending patients** to show the required patient information.

3. Select a patient from the patient information list. Click **Confirm** and then **Admission**, or click **Confirm** and then **Update Monitor**. The corresponding patient information in MFM-CMS and the monitor will be updated.

Route 2:

Select **User Maintain** > **HL7** and tick **Auto Admitting via MRN**. When the monitor is networked with MFM-CMS and new patient is admitted (including the patient who is admitted for the first time and the patient who had been discharged and is admitted again), MFM-CMS will automatically search for the patient's MRN in EMR patient list. If the patient is found, the patient information will automatically be updated to MFM-CMS and the monitor.

NOTE:

1 **EMR Patient List** button is available only when Mirth Connect function is enabled. For Mirth Connect settings, please contact service personnel.

2 If patient's MRN is modified during monitoring, MFM-CMS will not perform automatical query.

3 Mirth Connect (MC) function is not applicable to North America.

5.3 Synchronizing Patient Information*

*Only applicable to patients admitted from EMR patient list.

When MFM-CMS is associated with a HIS/EMR system, MFM-CMS will be informed to synchronize and update the patient information with the HIS/EMR system. For instance, whenever the patient is updated/discharged/transferred in HIS/EMR system, 

will be displayed in MFM-CMS to prompt the user. Click 

, and a list of EMR handling messages (**Bed ** Updated**/**Bed **Discharged**/**Bed ** Transferred**) is displayed in **EMR Message List**. In this case, the user needs to confirm whether to synchronize the patient information with HIS/EMR system or ignore the message.

Likewise, if patient information is modified in MFM-CMS, prompt information will also be sent to inform HIS/EMR system of the update. Meanwhile, the patient's physiological data will also be sent to HIS/EMR system.

5.4 Changing Patient Information

You can change the patient information on MFM-CMS when you find the information incorrect. To modify the patient information, choose **Single Bed View** > **Patient Mgmt**, enter the correct information in the appropriate fields and click **Update Monitor**.

There are two ways to modify the patient information:

- Modify the patient information via the monitor. For more information, refer to the user manual of the monitor.
- Modify patient information via the MFM-CMS.

In the patient management window, the user can modify the patient information, such as **Serial No.**, **Patient Name**, **Type**, **Gender**, **Bed No.**, **Date of Birth** and so on. After editing the information, click on the **Update Monitor** button to update the changes on the monitor. The patient information can be printed when the user click on **Print**.

NOTE:

If you have changed the patient type via the MFM-CMS, the patient type on the monitor will be changed accordingly.

5.5 Switching Patient Sector

- For a disconnected patient sector (refer to Section *Patient Sectors*), click anywhere in it and choose a patient to be assigned to this sector from the patient list.
- For a patient sector which is patient discharged or improper offline or networked monitoring (refer to Section *Patient Sectors*), select **Show** from the list on the patient sector (refer to Section *Menu in the Patient Sector*), and choose another bedside monitor from the patient list; the chosen bedside monitor will be displayed in this patient sector.

5.6 Discharging a Patient

When the monitoring on a patient is completed, you need to discharge this patient by any of the following methods:

- Choose **Discharge Patient** from the menu in the patient sector (refer to Section *Menu in the Patient Sector*).
- Choose **Patient Mgmt** > **Discharge Patient** on the auxiliary screen.
- Discharge the patient via the **Review** window. Refer to Section *Patient Review*.

The operation of discharging a patient will cause the patient offline from the MFM-CMS, and there will be no patient admitted in the related patient sector. The discharged patient will be shown in the history patient list (refer to Section *History Patient Review*).

After discharging patient, open patient sector menu by clicking on patient information area. You can set this patient sector to idle status by clicking **Set Idle Bed** and switch patient sector by clicking **Show**.

5.7 Setting Idle Bed

A patient sector displays monitoring information for one monitoring device only. Setting idle bed will discharge monitoring device from the patient sector.

You can set idle bed by following methods:

Method 1: After discharging patient, click **Set Idle Bed** in patient sector menu;

Method 2: Select **System Setup** > **Common Setup** > **Display Setup**, and click the area which displays bed No., and then click **Set Idle Bed**. Or you can drag the area to change monitoring device’s position on patient sector.

NOTE:

1. Because the number of beds to be viewed on the screen is optional (refer to *10.1.3*), the monitoring device's position on patient sector is in a relatively fixed order, that is, from top to bottom and then left to right.
2. Switching patient sector isn't equal to setting idle bed. They are mutual independent and will not influence each other.

5.8 Transferring a Patient

Select **Patient Mgmt** >**Transfer** on the auxiliary screen, and you will see a list of online patients. From this list, select a patient whose bed will be considered as the destination bed and click **OK**, and then the current patient will be transferred to the destination bed.

NOTE:

1. Transferring a patient to the destination bed will at the same time discharge the selected patient on the destination bed.
2. Bed No. is mandatory for telemetry device.

5.9 Monitoring Statistics

The monitoring statistics of the selected patients will be shown in the patient management window. The monitoring statistics covers the total monitoring time for waveforms and trends, the number of alarm events, the number of NIBP measuring, the number of C.O. measuring, the number of 12-lead analysis, the number of Quick TEMP measuring and the number of PAWP measuring.

Click **Analysis**, the system will:

- Analyze the number of high and low limit alarms for each physiological parameter and analyze the percentage of the limit alarms of the parameter in all limit alarms.
- Analyze the number of arrhythmia events for each type of arrhythmia and analyze the percentage of a certain type of arrhythmia.
- Analyze the average value, maximum/minimum value, and measure time of the maximum/minimum value for the trend values.

5.10 Nurse Call / Patient Call

For the telemetry devices connected to network, you can use the functions of nurse call and patient call.

The MFM-CMS will response to the nurse call once the patient presses the nurse call button on the telemetry device.

- The nurse call indicator  will be displayed in the system information area on the main screen. You can cancel nurse call by clicking the indicator.

- The nurse call symbol  will appear in the patient sector and cover the waveforms. You can cancel nurse call by clicking the symbol.
- The nurse call indicator  will be displayed in the indicator area in the single bed window.
- The nurse call tune will sound.

The patient call tune will sound from the telemetry device when patient call is triggered. Patient Call Symbol  will also appear in the system information area on the main screen. You can perform or cancel the patient call via the MFM-CMS as follows:

- Choose **Call Patients** from the menu in the patient sector (refer to Section *Menu in the Patient Sector*) to trigger, and choose **Cancel Patient Calling** to cancel.
- Select the tag **Patient Mgmt** of auxiliary screen and access the **Patient Mgmt** window. Click **Call Patients** in this window to trigger and click **Cancel Patient Calling** to cancel.

After calling patients, you can also click Patient Call Symbol  in the system information area on the main screen to cancel.

6 Patient Sector

6.1 Overview

Refer to Section *Patient Sectors* for information about the three types of state of the patient sector. Refer to Section *Large Font Display* for information about the large font display mode in the patient sector. Refer to Section *Main Screen* for information about the layout of patient sectors.

When the patient sector is in the improper offline state or in the networked monitoring state, you can open a menu by clicking on the patient information area. Refer to Section *Menu in the Patient Sector* for more information about the menu.

When the patient sector is in the improper offline state or in the networked monitoring state, you can access the auxiliary screen by clicking on the waveform area or parameter area (expect for NIBP parameter area) in the patient sector.

When the patient sector is in the networked monitoring state, you can start a NIBP measurement by clicking on the NIBP parameter area.

When the patient sector is in the disconnected state, you can switch between patient sectors by clicking on the patient sector. Refer to Section *Switching Patient sector* for more information.

When the patient sector is in the patient discharged state, you can click patient information area, and choose **Set Idle Bed** to discharge monitoring device or choose **Show** to switch patient sector.

6.2 Networked Monitoring Display

The display of patient sector which is networked is shown as Figure 6-1.

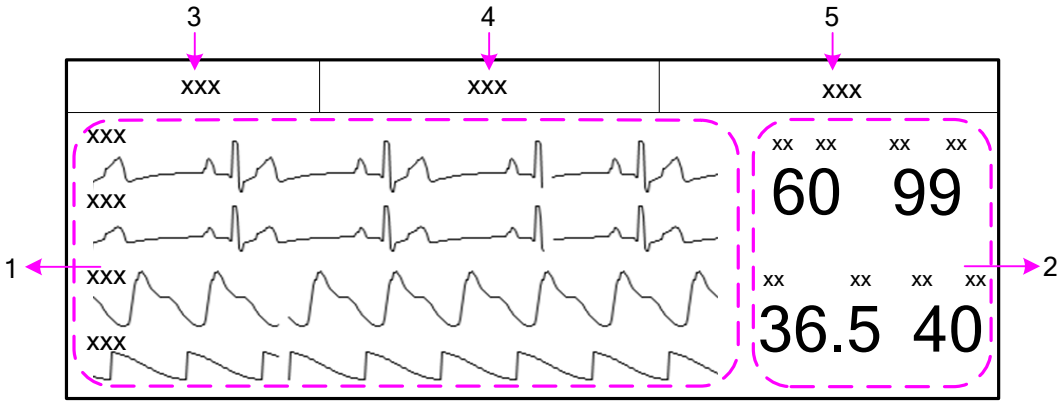


Figure 6-1 Display of the Networked Patient Sector

1: Waveform area 2: Parameter area 3: Patient information area
4: Technical alarm/ Prompts/ indicator area 5: Physiological alarm area

- Waveform area and parameter area: It displays some of real-time monitoring waveforms and parameter values. Refer to Section *Parameter/ Waveform Setup*.
- Patient information area: It displays the bed number and patient name. For telemetry device, it displays the bed number, device name and patient name.
- Technical alarm/ Prompts/ Indicator area: It displays the technical alarm messages when a

technical alarm occurs (refer to Section *Technical Alarm*). Click on the technical alarm message, and the list for the current technical alarms will be displayed. When no technical alarms and no prompts occur, it displays the indicators (shown as Table 6-1) indicating the state of the monitors.

Indicator	Description
	Pace on
	Pace off
	Alarm mute of the monitor
	Alarm pause of the monitor
	Battery power of the telemeter device: Level 4
	Battery power of the telemeter device: Level 3
	Battery power of the telemeter device: Level 2
	Battery power of the telemeter device: Level 1
	Battery power of the telemeter device: Level 0
	Wi-Fi signal intensity of the telemeter device: Level 4
	Wi-Fi signal intensity of the telemeter device: Level 3
	Wi-Fi signal intensity of the telemeter device: Level 2
	Wi-Fi signal intensity of the telemeter device: Level 1

Table 6-1 Monitors / Telemetry Devices State Indicators

- Physiological alarm area: It displays the physiological alarm messages (refer to Section *Physiological Information Alarm*). Click on the physiological alarm message, and the list for the current physiological alarms will be displayed.

NOTE:

1 Due to the delay of network transmission, data viewed at the MFM-CMS has a delay of 5 seconds compared with data generated at the corresponding bedside monitor.

2 Due to the operating system schedule, the waveform scan of the MFM-CMS might be suspended for about 20 milliseconds in very few occasions. After the suspension, waveform scan will go back to normal status. The quality of patient monitoring during the suspension will not be affected.

6.3 Menu in the Patient Sector

When the patient sector is in the improper offline state or in the networked monitoring state, you can open a menu by clicking on the patient information area. The available items in this menu are:

- **Display the window in large font**: Switch between the large font display mode and the general display mode for the current patient sector. Refer to Section *Large Font Display*.
- **Display all windows in large font**: Switch between the large font display mode and the general display mode for all patient sectors. Refer to Section *Large Font Display*.
- **Parameter/Waveform Setup**: Switch to the **Parameter/Waveform Setup** window on the auxiliary screen. Refer to Section *Parameter/ Waveform Setup*.
- **Monitor Parameter Setup**: Switch to **Monitor Parameter Setup** window on the auxiliary screen. Refer to Section *Setting Parameters*.
- **NIBP MEASURE**: Start a NIBP measurement.
- **Discharge Patient**: Discharge the patient in the current patient sector. Refer to Section *Discharging a Patient*.
- **Freeze**: Freeze/ unfreeze the waveform in the current patient sector. Refer to Section *Freeze*.
- **Print**: Print the monitoring data in the current patient sector. Refer to Section *Real-Time Printing*.
- **Call Patients**: For telemetry devices only. Refer to Section *Nurse Call / Patient Call*.
- **Show**: Switch between patient sectors. Refer to Section *Switching Patient sector*.
- **Alarm Reset**: Activate alarm reset function. Refer to Section *Alarm Reset*.

6.4 Parameter/ Waveform Setup

Due to the limited display space of the patient sector, the numbers of waveforms and parameters to be displayed depends on the numbers of monitors displayed on patient sector which can be set by users (refer to *Display Setup*). Six waveforms and four parameters to be displayed on patient sector are the maximum. You can set the displayed waveforms and parameters by setting configuration in the **Parameter/Waveform Setup** window. You may access this window by either of the two methods below:

- Choose **Parameter/ Waveform Setup** from the menu on the patient sector.
- Click the tag **Parameter/ Waveform Setup** on the auxiliary screen.

6.4.1 Setting Waveforms

Select or deselect the check box before a Wave Name to display or not display the waveform. Click **Update Wave Setup** to confirm the configuration. The patient sector will only display the selected waveforms.

Choose **Speed** and set the desired sweep speed for the waveform. Click **Update Wave Setup** to confirm the configuration. The waveform will be displayed according to the speed you have set.

6.4.2 Setting Parameters

- Adding a parameter to be displayed

To add a new parameter to be displayed, select the desired parameter name in **Available Params** and click on **Add** to add it into **Current Params**, and then click on **Refresh ParamGroup** to update the parameters displayed on the patient sector.

- Removing a parameter displayed

To remove a parameter displayed, select the parameter in the **Current Params** box, and click on **Remove** and **Refresh ParamGroup.**

- Setting Parameter Order for Display

To adjust the display position of the parameter, select the parameter name in the **Current Params** box, and click on **Move UP** or **Move Down**. To make the change valid, click on **Refresh ParamGroup.**

NOTE:

Due to the limited display space, the displayed waveforms and parameters of each patient sector will decrease as the displayed patient sectors increase. If you want more waveforms and parameters to be displayed in one patient sector, modify the display layout by reducing the patient sectors displayed on the main screen.

6.5 Freeze

Choose **Freeze** from the menu in the patient sector, you can freeze the waveform displayed in this patient sector. And the item name **Freeze** is changed into **Unfreeze**. You can unfreeze the waveform by choosing **Unfreeze**. And then the item name will resume **Freeze**.

The wave stops scanning during freeze. The freeze time and a timeline will also be displayed in the window. You can use the arrow buttons  and  beside the timeline or drag the pointer on the freeze wave to review more details.

You can review a frozen waveform of 3-minute period in length.

6.6 Real-Time Printing

To print real-time data from MFM-CMS, click **Print** from the menu in the patient sector or click the **Print** button in the single bed window.

After you select **Print**, MFM-CMS starts to collect data for printing and the system will indicate **Collecting Data…** at the top of the main screen. After the system completes 11-second data collecting, a dialog box for printing setup will appear. The printout includes the 11-second waveform data starting from the time chosen as the beginning time for printing, data of all physiological parameters at the time you select **Print** and the latest NIBP measurement which is the nearest from the time finishing collecting.

6.7 Alarm Reset

Choose **Alarm Reset** from the menu in the patient sector to activate the alarm reset function. During the alarm reset status, MFM-CMS will do the followings:

- The audio alarm is turned off, and no alarms are sounding.
- The visual alarm indications are still displayed.
- Clear all the latched alarms.
- Alarm reset on MFM-CMS will not influence alarm status on bedside monitors.

NOTE:

If a new alarm occurs during the alarm reset period, the new alarm on MFM-CMS will recover normal. That is, the new alarm will be sounded and displayed.

7 Viewing Single Bed

7.1 Display of Single Bed

The **Single Bed View** sub-window (shown as Figure 7-1) will be displayed by default when you access the auxiliary screen.

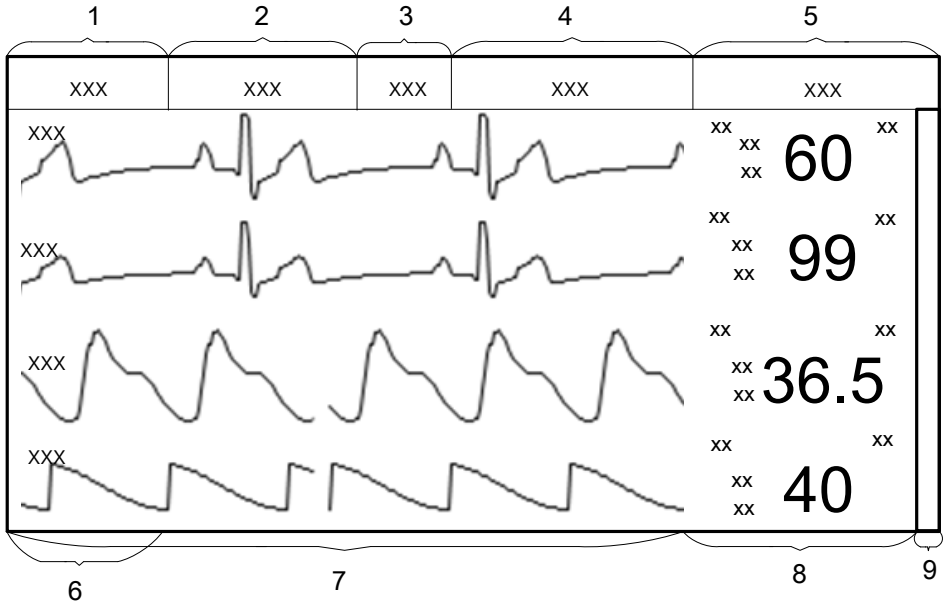


Figure 7-1 Single Bed View Sub-Window

1: Patient information area 2: Toolbar 3: Indicator area

4: Technical alarm area/ Prompts area 5: Physiological alarm area 6: Short trend area

7: Waveform area 8: Parameter area 9: Scroll bar

- Patient information area: It displays the bed No., patient name, gender and patient type. For telemetry device, it also displays the device name.
- You can perform the following functions via the toolbar:
  - Freezing or unfreezing the waveforms displayed in the **Single Bed View** sub-window.
  - Real-time printing (refer to Section *Real-Time Printing*).
  - Display setup: choosing the multi-lead waveform of ECG to be hidden or shown (refer to Section *Hiding/Showing Multi-Lead Waveform*); setting the short trend display to on or off; choosing the OxyCRG window to be opened or closed.
- Indicator area: It displays indicators indicating the state of the monitors (refer to Table 6-1). Nurse Call indicator will also be displayed here once the patient presses the nurse call button on the telemetry device.
- Technical alarm area/ Prompts area: It displays technical alarm messages consistent with the messages displayed in the patient sector. The mouse operation here of technical alarm is the same as the one in patient sector (refer to Section *Networked Monitoring Display*).

- Physiological alarm area: It displays physiological alarm messages consistent with the messages displayed in the patient sector. The mouse operation here of physiological alarm is the same as the one in patient sector (refer to Section *Networked Monitoring Display*).
- Short trend area: When the short trend display is on, the short trend will be displayed in this area. When the short trend display is off, waveforms will be displayed in this area.
- Waveform area: It displays all waveforms from the networked monitor.
- Parameter area: It displays all parameters from the networked monitor.
- Scroll bar: You can drag the scroll bar to view more waveforms and parameters in this window.

7.2 Hiding/Showing Multi-Lead Waveform

Choose **View Selection > Multi-lead** on the toolbar in the **Single Bed View** sub-window. The waveform area can display multi-lead waveforms for ECG (shown as Figure 7-2). Choose **View Selection > Multi-lead** again, and the multi-lead waveform display for ECG will become unavailable. When 3-lead is used, multi-lead waveform display is unavailable.

Figure 7-2 Multi-Lead Waveforms for ECG

7.3 Short Trend Review

After entering the single bed view interface, choose **View Selection > Trend Screen** on the toolbar and the short trend will be displayed on the left of the interface. Click short trend area and a dialog box of short trend settings will pop up. You can set the display mode of the short trend

with the optional items in **Param Select** and **Interval**. You may select the desired parameters needed to be displayed from the drop-down list of **Param Select**. Also, you can set the interval of the short trend by choosing from **1h**, **2h**, **4h**, **8h** and **12h** in the drop-down list of **Interval**.

7.4 OxyCRG

In the **Single Bed View** window, choose **View Selection** > **OxyCRG** on the toolbar, and the OxyCRG window will be open. You can switch the display between respiratory rate and respiratory waveform by clicking **RR** and **RESP**. You can also set the interval of the OxyCRG to 1 minute, 2 minutes or 4 minutes.

7.5 Freeze

You can freeze the waveform displayed in this window by choosing **Freeze** on the toolbar and unfreeze the waveform by choosing **Unfreeze**.

The display of freezing waveform in the **Single Bed View** sub-window is consistent with the one in the patient sector. Refer to Section *6.5* for more information.

8 Setting Monitors via the MFM-CMS

8.1 Changing Patient Information

Refer to Section *Changing Patient Information* for more information.

8.2 Viewing Bedside Monitor’s Work Status

When the bedside monitor is connected to MFM-CMS, its real-time work status will be transmitted to MFM-CMS.

8.2.1 Standby Mode

When the monitor is in standby mode:

1. MFM-CMS won’t update monitoring data, and will display monitor's standby mode. If network is disconnected, monitor will make request for connection.
2. MFM-CMS will neither store data transmitted from the monitor, nor display waveforms/parameters/alarms.
3. MFM-CMS cannot transfer or discharge the patient. Printing and freezing functions are disabled. The patient information cannot be modified.
4. MFM-CMS can normally review the history data.

The monitor exits standby mode in any of the conditions:

1. Click patient information area in patient sector, and click **Exit Standby Mode** in the patient sector menu.
2. MFM-CMS admits a new patient.

8.2.2 Privacy Mode

When the monitor is in privacy mode, MFM-CMS normally updates and displays monitoring data, and displays monitor's privacy mode in technical alarm area of patient sector.

8.3 Setting Parameters

You can open the parameter setup window by two methods:

Method 1: Choose **Monitor Parameter Setup** in the patient sector.

Method 2: Select the parameter area in the single bed interface, and click on the chosen parameter area.

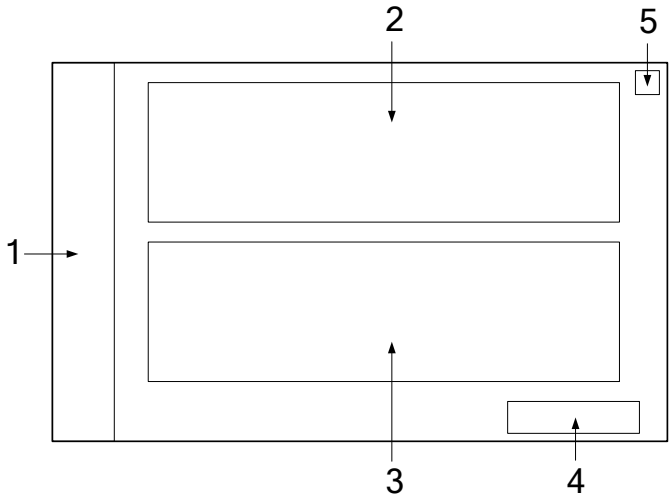


Figure 8-1 The Layout of the Parameter Setup Window

1: Physiological parameter list; 2: Alarm display and configuration list;
3: Physiological parameter attribute and configuration; 4: Update Monitor button;
5: Button for closing the window

The layout of the parameter setup window is shown as Figure 8-1.

The physiological parameter list shows all the available physiological parameter module of the networked monitor. Choose a parameter, the relevant alarm settings and parameter attribute will be respectively displayed in Area 2 and Area 3. You can configure the alarm settings (including alarm level, alarm switch, alarm upper and lower limits) and modify parameter attributes, after which you click **Update Monitor** to update the relevant settings of the monitor.

Clicking button 5 can close parameter setup window.

8.3.1 Configuring NIBP Measurement Settings

Choose NIBP in the parameter list on the parameter setup window, and you can configure the NIBP measurement settings on the physiological parameter attribute and configuration area. You can modify the measurement mode and measurement interval of NIBP. The operation steps are shown as follows:

1. Choose a measurement mode.
2. If you have chosen the automatic measurement mode, you also need to set the measurement interval.
3. Click **Update Monitor** to bring the configuration into effect.
4. If you want a continual measurement, click **Continual**.

8.3.2 Parameters Alarm Setting

You can configure the alarm setting via the alarm display and configuration list on the parameter setup window. You can configure the alarm switch, alarm level, alarm upper and lower limits. The operation steps are shown as follows:

1. Choose a parameter from the physiological parameter list.
2. Configure the alarm settings in the alarm display and configuration list.
3. Click **Update Monitor** to bring the configuration into effect.

WARNING

1 Prior to monitoring, make sure that the alarm limit settings are appropriate for your patient.

2 When the alarm is set to **OFF**, MFM-CMS won't give an alarm even if an alarm occurs. In order to avoid endangering the patient's life, the user should use this function cautiously.

3 Setting alarm limits to extreme values may cause alarm system to become ineffective. It is recommended to use the default settings.

8.3.3 Physiological Parameter Attribute and Configuration

For non-telemetry device, you can only configure the NIBP settings (Section *Configuring NIBP Measurement Settings*) and Alarm settings (Section *Parameters Alarm Setting*). For the telemetry devices, the MFM-CMS can display the parameter attributes of ECG, SpO_2 and RESP whose settings can also be configured.

You can configure the following items for the parameter ECG of the telemetry devices: lead type, Calc. lead, pace, alarm source, filter, ECG Gain, ST Analysis, ARR Analysis, Smart LeadOff, Hum Filter and electrode setup.

You can configure the following items for the parameter SpO_2 of the telemetry devices: Sensitivity and Alarm Source (when choose PR).

You can configure the following items for the parameter RESP of the telemetry devices: RESP Lead, Apnea Time and ECG Gain.

9 Review

Via the MFM-CMS, you can review the history data of patients, which includes the list containing all patients, patient management, trend, alarm, wave, NIBP, 12-lead diagnosis, C.O. measure, PAWP and Quick Temp. By clicking on the review button in quick control area of main screen, you can enter the review interface.

9.1 Patient List

Clicking review button in quick control area of main screen and you will access the review interface. It displays the **Patient List** by default. By respectively selecting the items from the drop-down list shown at the top left corner, you can review the list of patients who have been admitted by the MFM-CMS, the list of patients who have been discharged, and the list of patients saved in the backup database.

You can select a patient from the list and click the **Patient Mgmt** tab to review detailed information of this patient. Also, you can double click the patient name in the list to open the patient management window. Choose **Trend Review**, **Alarm Review**, **Wave Review**, **NIBP Review**, **12-L Review**, **C.O. measure review**, **Quick TEMP Review**, **PAWP Review**, you can review relevant monitoring data of the patient.

There is a query column and a small inverted triangular black indicator on the top right corner of review interface. To search a patient's information, click the inverted triangular black indicator and choose one of items (such as MRN, patient's first name, patient's family name and doctor) from the drop-down list. Input patient's information related with the items and click on **Query**. If the patient information is saved, the corresponding information is displayed on the screen.

9.1.1 Patient Review

By default, the **Patient List** displays the patients who have been admitted by the MFM-CMS after entering the review interface. And also, the default items from the drop-down lists shown at the top left corner will be **Online Database Source** and **Patient Review**.

Select a patient and click **Discharge Patient**, and this patient will be discharged. The discharged patients will be transferred to the **History Patient Review** list. Refer to Section *History Patient Review* for more information.

9.1.2 History Patient Review

Respectively select **Online Database Source** and **History Patient Review** from the drop-down lists shown at the top left corner, and you can review the list of patients who have been discharged.

To delete patients, please: Select a patient > click **Delete** > input password **ABC** in popup window > click **OK** to finish deleting. The patients deleted will be completely deleted from the MFM-CMS.

CAUTION

If you delete a patient from the **History Patient Review** list, his or her data will be completely removed from the system. Before deleting, the backup operation is recommended. Please refer to chapter *Database Backup* for details.

9.1.3 Backup Patient Review

Select **Offline Database Source** from the drop-down list shown at the top left corner, and you can review the backup patient data. Refer to Section *Reviewing Backup Database* for more information.

9.2 Wave Review

The MFM-CMS can review the change process of the physiological waveform of one patient in the latest 240 hour. Select **User Maintain** > **Database Maintain** > **Waveform Storage**, and there are 96 hour and 240 hour for selection. 96 hour is the default selection.

To use waveform review, please click on **Main Screen** > **Review** > **Wave Review** or access the auxiliary screen and choose **Wave Review**. On this screen, you can:

- Review normal waveforms
- Set wave speed
- Select waveform
- Set start time and end time
- Refresh waveform
- Print

9.2.1 Reviewing Normal Waveforms

Normal waveform review is available to all parameter waveforms. In the normal waveform review window, the waveform is displayed with the same altitude and speed of the real-time waveform.

You can select **Show parameters**/**Hide parameters**. If you select **Show parameters**, and click waveform, the related parameter value will also be displayed accompanying the waveform you choose. In printing process, the NIBP value and quick TEMP value which are nearest from the waveform time can be printed out as well.

In this window, waveforms can also be presented by automatically sliding forward.

9.2.2 Reviewing ECG Waveforms

User can review **ECG waveform**. In the window, user can review the waveform containing longer time of data.

9.2.3 Setting Wave Speed

By clicking on the **Sweep** button, a list of available wave speed (i.e. **6.25 mm/s**, **12.5 mm/s**, **25 mm/s** and **50 mm/s**) will be displayed, from which you can set the width of waveforms displayed in the waveform area. Changing wave speed will affect the time length of the waveform area.

9.2.4 Refreshing Waveform

Waveform will not update automatically. Therefore, if you want to view up-to-date waveform, you have to refresh them manually. Clicking on the **Refresh** button will refresh the waveform.

9.2.5 Selecting Waveform

Click on the **Select Wave** button, and a list of available waveforms will be shown. By default, all waveforms are selected. You can deselect a waveform by ticking its check box.

NOTE:

The 240-hour full disclosure waveform storage will occupy a lot of hard disc. Therefore, the user shall be cautious to add additional waveform to the selecting waveform setup.

9.2.6 Time Setup

Click **Time Setup** button, set **Start Time** in pop-up dialog box, and click **OK** to finish.

9.2.7 Print

To print the waveform displayed on the current screen, please select **Print** on the screen to print it by the laser printer.

9.3 Alarm Review

Alarm table and waveform will be generated when the MFM-CMS makes physiological alarm notification. Alarm review helps the clinician observe the details of the monitoring information. Alarm information can be stored by the user and thus become important alarm event. User can also switch alarms by using keyboard arrow keys.

If telemetry device is connected, the alarm strip in alarm review is a 16-second waveform. If non-telemetry device is connected, the alarm strip in alarm review is consistent with the setup of the device connected which has three selections, 8 s & 16 s & 32 s.

NOTE:

A maximum of 20000 alarm information within 240 hours can be stored. If the storage space is full and there are new alarms occurring, the earliest alarm information will disappear.

9.3.1 Locking and Unlocking Alarm Information

When the user thinks that an alarm is very important, he/she can save it by locking the alarm information with a symbol √ on the alarm review interface. The symbol √ will appear to its right on this interface when the alarm is locked. The locked alarm cannot be deleted automatically. You can click on the symbol √ to unlock the locked alarm, the symbol √ will disappear.

9.3.2 Printing Alarm Information

If the user wants to print alarm table, he/ she can click on **Print** on the interface to print it by a laser printer.

NOTE:

1 The important alarm events can be deleted but not automatically .The unimportant alarm events can be automatically replaced by new alarm events when they have accumulated to a certain amount.

2 The alarm stripe displays the physiological waveform at 25mm/s when an alarm takes place.

9.3.3 Sequencing the Alarm List

You can sequence all alarms ascendingly or descendingly by clicking on the heading of any column:

- **Alarm Time**: Clicking on it will sequence all alarms ascendingly or descendingly by time.
- **Alarm Level**: Clicking on it will sequence all alarms ascendingly or descendingly by level.

At the same time, one of the following symbols will appear on the bottom of the heading:

- The symbol ▲ indicates ascending sequence, and
- The symbol ▼ indicates descending sequence.

9.3.4 Annotating Alarm

You can add notes to illuminate an alarm. To annotate an alarm, select a certain alarm stripe and you will see the title **Alarm Note** on the bottom of the alarm review interface. Move the cursor 1cm left to the title **Alarm Note** and a pop-up input box in which you can input detailed information for the alarm will appear. After you complete your notes, move the cursor out of the area of the input box, and MFM-CMS will automatically save the input information.

NOTE:

Input characters are limited to 256.

9.3.5 Filtering Alarm Events

You can filter alarm events by selecting or clearing the check boxes before the items in the **Alarm Level** list and in the **Param Select** list. The **Alarm Review** window will only display the alarm events whose alarm level /levels has/have be selected and the alarm events of selected parameters.

9.4 Trend Review

Choose **Main Screen** > **Review** > **Trend Review** or choose **Trend Review** on the auxiliary screen, and you will enter the trend review interface, through which you can store and review up to 240 hours of trend data. Change of trends can be observed through trend table and trend graph.

On this interface, you can:

- set the resolution
- view parameters selectively
- refresh the data
- print
- Time Setup, can set the starting and ending time for review.

9.4.1 Setting Resolution

You can select a time period as the resolution for viewing the graph and table as required. Options are **1 s**, **5 s**, **1 min**, **5 min**, **15 min**, **30 min**, **60 min**, **2 hours**, **3 hours**, **4 hours**, **Display Time Points for NIBP Measurements** and **Display Time Points for Quick TEMP Measurements**. To change the resolution, select **Resolution Setting** on the interface and select the desired option from the list.

9.4.2 Viewing Parameters Selectively

In the parameter list of **Param Select**, you can select modules or parameters by ticking their check boxes as required. Only the selected parameters are displayed in the graph or table.

When a parameter module is selected or unselected, all of its parameters will be selected or unselected accordingly.

9.4.3 Refreshing Data

Trend data will not update automatically. Therefore, if you want to view up-to-date trend data, you have to refresh them manually. Click on the **Refresh** button to refresh the data to up-to date. After refreshing them, the status selected and order of parameters remain unchanged.

9.4.4 Printing Trend Review

Clicking on **Trend Review** > **Print** > **Print Trend Table**/ **Print Trend Graph**, you can print the trend table or the trend graph. By default, the system will print the latest data.

9.4.5 Selecting Trend Table, Trend Graph

Select **Trend table** to review the trend table only. Select **Trend Graph** to review the trend graph only. Select **Trend Table**, **Trend Graph** to review the trend table and trend graph at the same time.

In trend table, trend data is displayed according to the selected resolution. If NIBP or quick TEMP is selected in **Param Select**, NIBP data or quick TEMP and other parameters' data within the resolution will also be displayed.

In trend graph, the y-axis scale will automatically adjust according to the value within x-axis time, in order to achieve the optimum display effect.

9.5 NIBP Review

Results of four latest NIBP measurements are displayed in the NIBP area in the **Single Bed View** window.

To review earlier NIBP measurement results, choose **Main Screen** > **Review** > **NIBP Review** or choose NIBP Review on the auxiliary screen to enter the NIBP review interface, through which you can view up to 20000 groups of NIBP measurements of a patient (within 240 hours).

The NIBP review window displays **Serial No.**, **Measure Time**, **SYS**, **DIA**, **MAP** and **PR** for each measurement. Additionally, in this window you can:

- Click **Show parameters**, and the measurement values of all physiological parameters at the measure time specified in the selected item will be shown in the lower portion of the window. If you click **Hide parameters**, these measurements values will not be displayed.
- Refresh
- Print out the current page
- Print out all pages

9.6 12-Lead Review

Choose **Main Screen** > **Review** > **12-L Review** or choose **12-L Review** on the auxiliary screen, and you can review up to 20000 groups of 12-lead analysis results of the current patient (within 240 hours) in this window.

In the **12-L Review** window, the following data is available: HR, PR Interval, QRS Duration, QT/QTC Interval, P/QRS/T, RV5/SV1, the value of RV5+SV1 and Diagnosis Result.

Select a diagnosis result from the list and select **Waveform** on the toolbar, the related 12-lead ECG waveform will be shown.

You can choose **User Maintain** > **Other Setups** to set **12-lead Wave Print Template**.

9.7 C.O. Measure Review

Choose **Main Screen** > **Review** > **C.O. Measure Review** or choose **C.O. Measure Review** on the auxiliary screen, and you can review up to 20000 groups of C.O. measurement of the current patient (within 240 hours) in this window.

In the **C.O. Measure Review** window, measure results are arranged chronologically on the left. Select a measure result and the measure value as well as the curve will be displayed on the right. A maximum of six groups of measure results can be displayed simultaneously.

At the lower part of the window, the average values of C.O and CI of the selected measure results are displayed.

You can print the selected measure results.

9.8 Quick Temp Review

Choose **Main Screen** > **Review** > **Quick TEMP Review** or choose **Quick TEMP Review** on the auxiliary screen, and you can review up to 20000 groups of Quick TEMP measurement (within 240 hours) in this window. The Quick TEMP measure result and measure time are available. You can also print the Quick TEMP measurement list.

9.9 PAWP Review

Choose **Main Screen** > **Review** > **PAWP Review** or choose **PAWP Review** on the auxiliary screen, and you can review up to 20000 groups of PAWP measurement (within 240 hours) in this window. You can also print the PAWP measurement list.

If bedside monitors have no CVP or HR, MFM-CMS will display '---'.

10 System Setup

The System Setup function is used to modify the display information at the patient sector according to the real requirements. By using this function, you can observe the waveform, parameter, and the parameter list as your desire. There are **Common Setup**, **User Maintain**, and **Factory Maintain** to be set.

10.1 Common Setup

It is mainly used to make some conventional monitoring settings, such as **Param Unit Setup**, **Color Settings**, **Display Setup**, **Help** and **Telemetry Module Switch Setup**.

10.1.1 Parameter Unit Setup

The user can change the unit of **IBP**, **NIBP**, **CO_2**, (**AG) CO_2**, (**AG) O_2**, **C.O. (TB)**, **(RM) CO_2** and **TEMP**. For example, to change the unit of IBP, please select **Main Screen** > **System Setup** > **Common Setup** > **Param Unit Setup**, and select the desired unit among **mmHg**, **kpa** and **cmH2O** from the pull-down list at the right of IBP.

10.1.2 Color Setup

The user can change the display color of all parameters and the other information of the parameter is displayed as the same color. And the information includes waveform name, gain and filter, real-time value (upper limit and lower limit), review waveform and so on. To change the color of the parameter:

1. Please select **Main Screen** > **System Setup** > **Common Setup** > **Color Setup**. Click on the **Param Select** to choose desired parameter, then choose desired color from the left color area or input desired RGB values of red, green, blue directly.
2. After this, click on **OK** to confirm.

After setting, the color displayed on **Color Setup** column is the successfully chosen color. The color on **Initial Color** column is set by default.

To get the default color, choose desired parameter from **Param Select** and click **Default Settings**, and then click **OK** to confirm.

10.1.3 Display Setup

The user can set the number of beds to be viewed on the screen. To change the display to be viewed, please select **Main Screen** > **System Setup** > **Common Setup > Display Setup** > **Display Bed Number** and choose the desired bed number **3**, **4**, **6**, **8**, **10**, **12**, **14**, **16**, **32**, **64** from the drop-down list of display bed.

You can also click the area which displays bed No., and then click **Set Idle Bed**.

There’re two routes to change the monitor’s position:

Route 1: Drag the area which displays bed No. to any position you want.

Route 2: Select ***Main Screen*** > ***System Setup*** > ***Common Setup > Display Setup*** > ***Sequence***, the monitor's position will be sequenced according to the Bed No..

The monitor is assigned to the patient sector according to the sequence of left to right and top to bottom.

NOTE:

Two screens are needed if you want to simultaneously display the information of 64 bedside monitors.

10.1.4 Telemetry Module Switch Setup

You can configure the module switch setting of the telemetry device via the MFM-CMS. Choose **Main Screen** > **System Setup** > **Common Setup** > **Telemetry Module Switch Setup**.

From the **Telemetry Device List** on the left of the setup window, choose the telemetry device for which you want to configure the module switch setting. On the right of the setup window, configure the setting as required.

10.1.5 Help

Help information is available on this interface.

10.2 User Maintain

To access the settings interface of user maintain, you have to input a user password. The default password is **ABC**.

10.2.1 Monitor Batch Settings

You can configure the alarm limit, alarm switch and alarm level for a group of monitors. You need to choose a patient type from **Adult**, **Pediat** or **Neonat** before you configure the alarm settings in **Templet of Alarm Limit Adjusting Range**. Choose the monitors needing to be configured in the right pane in which you may see a list of monitors, and click **Config**. The configuration in the left templet pane will be applied to the chosen monitors.

Besides, from the right pane, you can choose a monitor whose alarm settings will serve as the source of batch settings for other monitors. Select one monitor in the right pane and click **Obtain Monitor Configuration** to obtain its parameter alarm settings. The obtained configuration will be displayed in the left templet pane. Choose the monitors needing to be configured in the right pane and click **Config** to complete batch settings.

NOTE:

1 The function of batch setting is not available for all monitors. If the monitor is labeled as **Not Supported** in the **Compatibility** column in the right pane, this function is not available for this monitor.

2 If the patient type set in **Templet of Alarm Limit Adjusting Range** is different from the one set on the bedside monitor to be configured, the system may fail to set the configuration for the monitor.

3 The prompt message **Success** only indicates success in setting the configuration for current activated parameters on the monitor.

10.2.2 Telemetry Alarm Latch Setup

You can configure the alarm latching setting of the telemetry device via the MFM-CMS. Choose **Main Screen** > **System Setup** > **User Maintain** > **Telemetry Alarm Latch Setup**.

From the **Telemetry Device List** on the left of the setup window, choose the telemetry device for which you want to configure the latching setting. On the right of the setup window, configure the setting as required.

The latching alarm setting of the telemetry device is off by default. For telemetry device which has been offline and then online and in which the patient is admitted again, the latching alarm configuration remains the same as the last configuration used by the telemetry device.

To clear the alarms latched, please choose **Alarm Reset** from the menu in the patient sector. Refer to *Menu in the Patient Sector* for details.

10.2.3 Date/Time Setup

The user can set the correct date and time and their desired format. There are three kinds of date format: **yyyy-MM-dd**, **dd-MM-yyyy**, **MM-dd-yyyy**, two kinds of time format: **HH-mm-ss** (24 hours) and **hh-mm-ss tt** (12 hours), and three date separator: /, - and**.** To change the date and time setup, please select **Main Screen** > **System Setup** > **User Maintain** > **Date /Time Setup,** and select the desired settings from the menu**.** The time and date displayed on the main screen will also change after change the date and time setup and their format.

NOTE:

The user must restart the system to make the change effective.

WARNING

During patient monitoring, a change in date and time will influence the storage of trend data.

10.2.4 Alarm Setup for MFM-CMS

Choose **Main Screen** > **System Setup** > **User Maintain** > **Alarm Setup**

- You can configure the alarm setting for MFM-CMS.

You can set the duration in drop-down list of **Audio Pause** to **1 minute**, **2 minute**, **3 minute** or **Permanent**.

When the option is **1 minute**, **2 minute** or **3 minute**, you can click audio pause symbol in main interface to activate **Audio Pause**. System can exit the audio pause status automatically when the duration time is out, or user can click audio pause symbol again to exit.

When the option is **Permanent**, you can click audio pause symbol in main interface to activate **Alarm Mute**. The  icon is displayed at the top area of the screen. Clicking audio pause symbol again can be used to exit alarm mute status only.

- You can set alarm sound intervals for MFM-CMS.

You can set alarm sound intervals by choosing the desired intervals from the drop-down list of **High Alarm Interval (s)**, **Med Alarm Interval (s)** and **Low Alarm Interval(s)**.

- You can set alarm ringtone for MFM-CMS.

You can choose different alarm ringtone as desired from the drop-down list of **Alarm Tone**. Click **Play** to confirm. **Standard** and **Mode 1** are optional. The default option is standard.

- You can set VFIB/VTAC alarm function to On or Off (available when telemetry device is connected).

When VFIB/VTAC alarm function is set to **On** in user maintain window, VFIB/VTAC Alarm Switch in Parameter setup window can be used. In Parameter setup window, if:

a) **Alarm Switch** is **Off**, the prompt of **VFIB/VTAC OFF** will be displayed in Technical alarm area/ Prompts area;

b) **Alarm Switch** is **On**, MFM-CMS will give out alarm normally when patient has **VFIB/VTAC**.

When VFIB/VTAC alarm function is set to **Off** in user maintain window, VFIB/VTAC Alarm Switch in Parameter setup window cannot be used.

NOTE:

In audio pause or alarm mute status, though a new alarm occurs, system will not give out alarm sound.

10.2.5 Changing Language

To change the display language, please select **Main Screen** > **System Setup** > **User Maintain,** and input the correct password. Select **Language Setup** and select the desired language from the drop-down list**.**

NOTE:

The system will restart automatically to make the change effective.

10.2.6 HL7

In **User Maintain** window, users can set the interval for HL7 data to be sent and set the format of HL7 data package sent by MFM-CMS. The interval can be set to 0.5 to 120 minutes. HL7 data is sent in the format of HL7 Lower Level Protocol by default. If the item **XML** is selected, the data sent by MFM-CMS will be packed in the XML format.

NOTE:

HL7 data is sent via the port 9100 by default.

10.2.7 Database Maintain

Refer to Section *Database Backup* for more information about database backup.

10.2.8 EMR Database Maintenance

To delete the unnecessary HIS/EMR patient information, select **Main Screen** > **System Setup** > **User Maintain** > **EMR Database Maintenance**. The patients are sorted according to the status. The user can choose **Admitted in CMS/Wait for admitting/Discharged in CMS/All** to delete the unused information.

10.2.9 Other Setups

On this interface, you can:

- Set **Hospital Info.** and **Department**. The hospital information and department will be displayed at the top left corner on the main screen.
- Choose to display or conceal the grid in the View window by selecting or clearing the check box of **Display Grid on View**.
- Set **Electrode Setup** to AHA or IEC. This setting is only applicable to the telemetry device.
- Set **12-Lead Wave Print Template**.
- Return to Windows.
- Switch off the system.

10.2.10 User Password Setting

To modify the password, enter the old password in the **Old Password** field and a new one in the **New Password** field, after which you have to **Confirm new password** to complete the modification.

NOTE:

If you forget the password, please contact the technical representative of EDAN.

10.2.11 Operation Log

In **User Maintain** window, user can scan **All** operation contents which include **Modify Patient Info.** (The modifications finished on monitoring device, MFM-CMS can be scanned and EMR system can be scanned), **Clear Database**, **Delete Patient Info.**, **Discharge**, **Transfer**, **Backup**, **Battery Depleted**, **Enter Standby Mode**, **Exit Standby Mode** and so on. You also can select one of operation contents to scan. Clicking **Export** can export operation contents.

10.2.12 About

It offers information about the software compiling time and software version.

11 Alarm Management

11.1 Overview

Alarms, triggered by a physiological sign that appears abnormal or by technical problems of the monitor, are sent to the MFM-CMS by the monitors and then indicated to the users by the MFM-CMS. Alarms coming from the monitors are displayed in the patient sectors and in the single bed view window.

The alarm and prompts coming from the MFM-CMS system are displayed in the system information area on the upper screen.

NOTE:

The alarm signal will be delayed for no more than 5 seconds.

11.1.1 Physiological Information Alarm

It includes parameter alarm and arrhythmia alarm.

Physiological information alarm arouses the doctors' attention by means of visual and audible methods specified in harmonized international standard. Visual method is realized basically by the way of lightening or flicking of the color light. Audible method is realized by the sound for different levels.

Physiological alarms are implemented by alarm limits, which define a range in which a certain physiological parameter is considered to be in the normal status. When a parameter value is beyond the range, the system will consider it to be in an abnormal status and consequently give an alarm.

11.1.2 Technical Alarm

Technical alarms refer to the technical alarms of bedside monitor/ telemetry device. Technical alarms of bedside monitor/ telemetry device refer to alarms other than physiological alarms, including hardware failure, communication error, lead off, etc. For these technical alarms, the system presents four different types of audible and visual prompts.

When a group of technical alarms (for example, transducer falls off) produced by multi-parameter monitors/ telemetry device, a piece of alarm prompt information in scrolling mode will appear on the main screen of MFM-CMS. In addition, the MFM-CMS will sound corresponding alarm (high, medium or low level alarm). The corresponding bedside monitor status indicator will also show corresponding signal color (high, medium or low level alarm signal color).

11.2 Alarm Level of the Monitors

Alarm level reflects the severity of an alarm. The alarms have three groups regarding the alarm levels.

- High level alarm
- Medium level alarm
- Low level alarm

11.3 Alarm Mute

For information about how to set alarm mute, refer to Section *Alarm Setup for MFM-CMS*. Alarm mute means that when an alarm occurs, the system will not give an alarm sound but only maintain a visual prompt.

NOTE:

The alarm mute function is only valid for MFM-CMS itself. MFM-CMS cannot silence the bedside monitor's audible alarm.

11.4 Audio Pause

Audio Pause means that during a period of time, when an alarm occurs, the system will not give alarm announcement. The duration setting is introduced in Section *Alarm Setup for MFM-CMS*. By click the **Audio Pause** button on the main screen, you can activate or deactivate the audio pause function.

When the duration of alarm pause has lasted for the preset-time, the system will stop the status of alarm pause and resume normal alarm automatically.

NOTE:

The alarm pause function is only valid for MFM-CMS itself. MFM-CMS cannot pause the bedside monitor's audible alarm.

11.5 Alarm Prompt/Response

Alarm information can be prompted by means of visual and audible methods. Because the alarm information is very important and timely response to the alarm information is highly required, the MFM-CMS provides the following methods to indicate to the user the occurrence of the alarm.

- The alarm message will be displayed in the technical area or physiological area of the patient sector and of the single bed view window.

  High level alarm: displayed with red background

  Medium level alarm: displayed with yellow background

  Low level alarm: displayed with yellow background

- An asterisk or more will be displayed before the physiological alarm message to indicate the

alarm level.

High level alarm: ***

Medium level alarm: **

Low level alarm: *

- For limit alarms of the parameter, the relevant parameter value and parameter alarm limit will be respectively displayed with the color alternating between the parameter color and the alarm color.
- Alarm sound

  If the system mute, alarm mute or alarm pause setup is deactivated, the system will warn the user about the alarm with the alarm sound.

  The alarm sound can be the following in **Standard**:

  High level alarm: sound "DO-DO-DO DO-DO DO-DO-DO DO-DO";

  Medium level alarm: sound "DO-DO-DO";

  Low level alarm: sound "DO- ".

  The alarm sound can be the following in **Mode 1**:

  High level alarm: sound "Di-Di-Di-Di-Di-Di ";

  Medium level alarm: sound " Di-Di-Di ";

  Low level alarm: sound "Di- ".

11.6 Alarms for Networking Status

When the monitor/telemetry device is online, the system will indicate it with low level alarm sound.

If the monitor/telemetry device is offline without being discharged (that is improper offline), system will indicate it respectively with low level/medium level alarm sound. The alarm sound for improper offline will be given out only once.

NOTE:

In good network status, if there are no patients online, MFM-CMS will give out a high level alarm sound with intervals of 20 s.

12 Printing

12.1 Printing Report with a Printer

MFM-CMS can output the reports by equipped with a laser printer. HP LaserJet Series printers are recommended. The laser printer working with the MFM-CMS is independent of the mainframe. The printer has its independent power supply. It is connected to the mainframe via a USB interface or a network (wired or wireless).

The laser printer generates the following types of printing:

- Waveform review printing
- Alarm wave printing
- Alarm table printing
- Trend graph printing
- Trend table printing
- NIBP review printing
- Printing for drug calculation, hemodynamic calculation, oxygenation calculation, renal function calculation and ventilation calculation
- Patient information printing
- 12-lead analysis result printing
- C.O. review printing
- Quick TEMP review printing
- PAWP review printing

NOTE:

MFM-CMS only supports printing on A4 paper.

12.2 Printing Preview/ Printing Settings

12.2.1 Printing Preview

Before the reports are printed, you can preview them on the screen. You will access the preview interface after you select the function of printing. If a report consists of more than one page, you may select a certain page to preview by turning to the page you want. Besides, you can adjust the zoom setting by choosing a certain option from the drop-down list of the **SIZE.**

12.2.2 Printing Settings

Click on **Print** on the preview interface, and in the Print setup menu select the printer, the print range and the number of copies in demand and then click on **OK** to confirm it.

12.3 Exporting the PDF File

MFM-CMS can export the PDF file by installing a PDF printer software. The software PDFCreator is recommended. You can obtain the installation version of PDFCreator in the MFM-CMS installation disk. Also, you may download it from the website http://www.pdfforge.org/pdfcreator.

To export the PDF file, choose a PDF printer (for instance, PDFCreator) from the drop-down list when you select the printers, and then confirm it by clicking on **OK**.

13 Database Management

MFM-CMS provides database backup and review, which allows you to conveniently manage and maintain data.

13.1 Database Backup

To backup database, please select **Main Screen** > **System Setup** > **User Maintain,** and input the correct password. Select **Database Maintain** and click on the button **Browse** to choose a directory for backup file storage. Then click on **Backup Database** to start database backup.

NOTE:

1 Regular data backup operations are recommended.

2 During database backup, MFM-CMS automatically stops its patient monitoring.

3 If the check box indicating "**Empty local database after backup is completed"** is ticked, MFM-CMS will empty the local database after database backup is completed; whether this check box is ticked or not, MFM-CMS will restart automatically after backup is completed.

4 For a better system running, the system will display a prompt when there is excessive amount of history patient data. Please clean the history patient data manually in time. You can clean the data by item (refer to chapter *History Patient Review* for detailed operations), or clean the data all at once in batches by ticking the check box mentioned above. It is recommended to perform backup operation before cleaning up the data.

13.2 Reviewing Backup Database

MFM-CMS allows you to review the backup data at any time.

To review backup data, select **Main Screen** > **Review** > **Patient List**, and select the directory for storing backup file from the drop-down list of **Offline Database Source**. For more information about review, refer to Chapter *9 Review*.

NOTE:

1 It takes about 3 to 10 seconds for MFM-CMS to load the backup data.

2 During reviewing backup data, discharging or deleting patients is unavailable.

14 Calculation and Titration Table

14.1 General

MFM-CMS provides functions including drug calculation and titration table, hemodynamic calculation, oxygenation calculation, renal function calculation and ventilation calculation; the calculation results can be printed out. Click on **Calculation** in the status of single bed view to access the drug calculation screen.

MFM-CMS is able to save a maximum of 100 groups of results for every type of calculation. In the calculation window, you can use the **Save** button to save the calculation results and use **Calculation Result List** to review each calculation result.

14.2 Drug Calculation

From the **Drug** drop-down list, you can select one to calculate its amount, liquid volume, concentration, etc.

- Drug A
- Drug B
- Drug C
- Drug D
- Drug E
- AMINOPHYLLINE
- DOBUTAMINE
- DOPAMINE
- EPINEPHRINE
- HEPARIN
- ISUPREL
- LIDOCAINE
- NIPRIDE
- NITROGLYCERIN
- PITOCIN

NOTE:

Drug A, Drug B, Drug C, Drug D and Drug E are user-defined drugs.

The calculation procedure is listed below:

1. Confirm whether the patient type is correct and the weight is entered.
2. Select a drug to be calculated from the drug list.
3. Input correct parameter values under the direction of a doctor.
4. Select **Basic, Dose Type** and **Step** for titration table.
5. Click on the **Calc** button, the calculation result will be displayed in the drug parameter area and titration table.

WARNING

1 Be sure to input correct parameter values. The user must verify the correctness of the calculations displayed on the screen before using them.

2 The calculations in the titration table are subject to the drug calculations, therefore, the correctness of the drug calculations must be ensured. Besides, the basic, step and dose type should be ensured correct.

3 We assume no responsibility for the results arising from incorrect inputs and operations.

14.2.1 Drug Calculation Formula

Formulas for drug calculation are:

Concentration = amount / volume

Flow rate = dose / concentration

Total dose = dose × duration

Total volume = flow rate × duration

WARNING

Prior to performing drug calculation, you must confirm that the above formulas are what you need. Our company will not be liable for any consequence resulted from using inappropriate formulas.

Relationship between calculation units:

1 g = 1000 mg

1 mg = 1000 mcg

1 K unit = 1000 units

1 M unit = 1000 K units

WARNING

You must enter correct drug unit. Our company will not be liable for any consequence resulted from incorrect input.

14.2.2 Calculation of Titration Table

Calculation of titration table is included on the screen of drug calculation. The titration table is located at the lower part of the drug calculation screen. The method for calculation of titration table is:

1. The core method for the calculation of titration table is: concentration = dose / flow rate. The calculating method of titration table is to keep the fixed concentration, change the dose to calculate the flow rate or change the flow rate to calculate the dose. Concentration here is obtained from drug calculation.
2. The titration table can be displayed by way of dose and rate. You can enter the rate step from 1-10. There are four options available for dose unit: mg/hour, mg/min, mg/Kg/hour and mg/Kg/min, among which mg will vary with the unit changes in drug calculation.
3. The calculating result of titration table is displayed in the list. You can click on the scroll bar to browse more calculating results.

WARNING

The calculating result of titration table depends on the calculating result of drug. First of all, the calculating result of drug should be accurate. And then, the calculating result of titration is concerned with the input titration control parameters and the calculating formula. Therefore, you must ensure the correctness of all these mentioned operations. Our company will not be liable for any consequence resulted from improper operations.

14.3 Hemodynamic Calculation

14.3.1 Input Parameters

Abbreviation	English Full Name/Description
PAWP	Pulmonary artery wedge pressure
CVP	Central venous pressure
HR	Heart rate
AP MAP	Mean Artery Pressure
LV_D	Left Ventricular Diameter
PA MAP	Pulmonary artery mean pressure
HT	Height
WT	Weight

14.3.2 Output Parameters

Abbreviation	English Full Name/Description
BSA	Body surface area
SV	Stroke volume
SVI	Stroke volume index
SVR	Systemic vascular resistance
SVRI	Systemic vascular resistance index
PVR	Pulmonary vascular resistance
PVRI	Pulmonary vascular resistance index
LCW	Left cardiac work
LCWI	Left cardiac work index
RCW	Right cardiac work
RCWI	Right cardiac work index
LVSW	Left ventricular stroke work
LVSWI	Left ventricular stroke work index
RVSW	Right ventricular stroke work
RVSWI	Right ventricular stroke work index
EF	Ejection fraction

14.4 Renal Function Calculation

14.4.1 Input Parameters

Abbreviation	English Full Name/Description
HT	Height
WT	Weight
URK	Urine potassium
Posm	Plasm osmolality
SCr	Serum creatinine
URNa	Urinary sodium
Uosm	Urine osmolality
UCr	Urine creatinine
UUN	Urine urea nitrogen
Urine	Urine

SerNa	Serum sodium
BUN	Blood urea nitrogen

14.4.2 Output Parameters

Abbreviation	English Full Name/Description
URNaEx	Urine sodium excretion
CNa	Clearance of sodium
FENa	Fractional excretion of sodium
CH_2O	Free water clearance
URKEx	Urine potassium excretion
CCr	Creatinine clearance rate
FEUr	Fractional Excretion of Urea
Na/K	Sodium potassium ratio
CUUN	Urine urea nitrogen clearance rate
Cosm	Osmolar clearance
U/P osm	Urine to plasma osmolality ratio
BUN/SCr	Blood urea nitrogen creatinine ratio
U/SCr	Urine-serum creatinine ratio

14.5 Oxygenation Calculation

14.5.1 Input Parameters

Abbreviation	English Full Name/Description
HT	Height
WT	Weight
C.O.	Cardiac output
FiO_2	Percentage fraction of inspired oxygen
PaO_2	Partial pressure of oxygen in the arteries
$PaCO_2$	Partial pressure of carbon dioxide in the arteries
SaO_2	Arterial oxygen saturation
PvO_2	Partial pressure of oxygen in venous blood
SvO_2	Venous oxygen saturation
Hb	Hemoglobin

CaO_2	Arterial oxygen content
CvO_2	Venous oxygen content
VO_2	Oxygen consumption
RQ	Respiratory quotient
ATMP	Atmospheric pressure

14.5.2 Output Parameters

Abbreviation	English Full Name/Description
BSA	Body surface area
VO_2calc	Calculated oxygen consumption
C(a-v)O_2	Arterial venous oxygen content difference
O_2ER	Oxygen extraction ratio
DO_2	Oxygen transport
PAO_2	Partial pressure of oxygen in the alveoli
$AaDO_2$	Alveolar-arterial oxygen difference
CcO_2	Capillary oxygen content
Qs/Qt	Venous admixture
C.O. calc	Calculated cardiac output
Pa/FiO_2	PaO_2/FiO_2
$AaDO_2/PaO_2$	$AaDO_2/PaO_2$
Pa/AO_2	PaO_2/PAO_2
DO_2I	Oxygen Delivery Index
VO_2I	Oxygen Consumption Index
CaO_2 calc	Calculated Arterial oxygen content
CvO_2 calc	Calculated Venous oxygen content

14.6 Ventilation Calculation

14.6.1 Input Parameters

Abbreviation	English Full Name/Description
FiO_2	Percentage fraction of inspired oxygen
RR	Respiration rate
$PeCO_2$	Partial pressure of mixed expiratory CO_2
$PaCO_2$	Partial pressure of carbon dioxide in the arteries
PaO_2	Partial pressure of oxygen in the arteries
VT	Tidal volume
RQ	Respiratory quotient
ATMP	Atmospheric pressure
PIP	Peak Inspiratory Pressure
PEEP	Positive End-Expiratory Pressure

14.6.2 Output Parameters

Abbreviation	English Full Name/Description
Cdyn	Compliance dynamic
PAO_2	Partial pressure of oxygen in the alveoli
$AaDO_2$	Alveolar-arterial oxygen difference
Pa/FiO_2	PaO_2/FiO_2
$AaDO_2/PaO_2$	$AaDO_2/PaO_2$
Pa/AO_2	PaO_2/PAO_2
MV	Minute volume
VD	Volume of physiological dead space
VD/VT	Physiological dead space in percent of tidal volume
VA	Alveolar volume

15 CMS-WEB Observer

15.1 General

The CMS-WEB Observer system is a medical information device applied in clinical monitoring field. It can cooperate to realize remote monitoring by reviewing real-time and history data from central monitoring system through web page. A CMS-WEB network system is constructed by connecting multiple monitors and MFM-CMS central monitoring systems. Being the center of the monitoring network, the system cooperates to realize remote monitoring by collecting, processing, and analyzing the physiological information from the central monitoring systems. Medical staff can obtain patient information by visiting the server of MFM-CMS via the browser.

The CMS-WEB Observer displays patients' physiological information collected by the MFM-CMS central monitoring system. The system displays information of up to 32 bedside monitors from the MFM-CMS.

NOTE:

1. The CMS-WEB Observer is only available via the hospital local area network.
2. MFM-CMS supports the maximum of 6 accounts at the same time.

15.2 Typical Screens of the CMS-WEB

The CMS-WEB shares similar screen features with the MFM-CMS. The main screen of the CMS-WEB has three areas. At the top of the screen is the area displaying the system prompt information. The middle part is the main monitoring area. The bottom part is the system menu area. Figure 15-1 shows the main screen of the CMS-WEB.

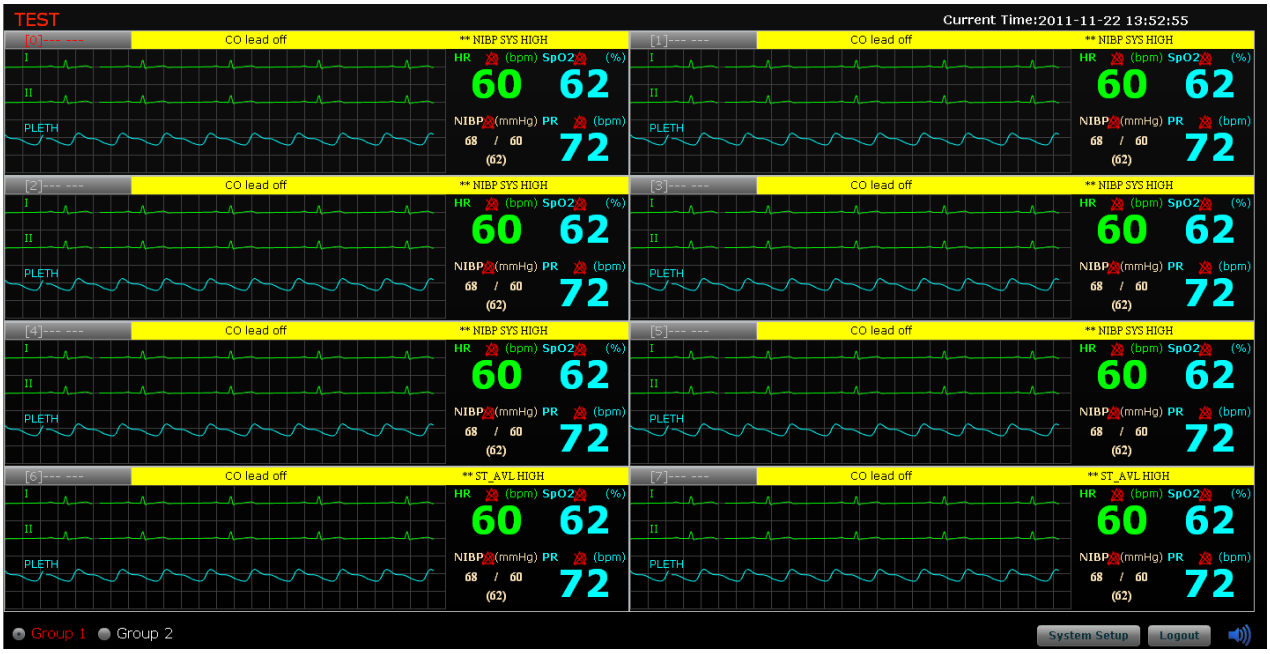


Figure 15-1 Main Screen of CMS-WEB

Structure of the main screen:

1. Information area

Displaying the hospital name and current system time.

2. Main monitoring screen

Indicating the current status of each bedside monitor:

- The onscreen bedside monitors are networked.
- The red color in the alarm area of the patient sector indicates the bedside monitor has high priority alarm.
- The yellow color in the alarm area of the patient sector indicates the bedside monitor has a medium or low priority alarm.

When four or less than four bedside monitors are networked, the layout of patient sectors will be of single row as Figure 15-2 shows:

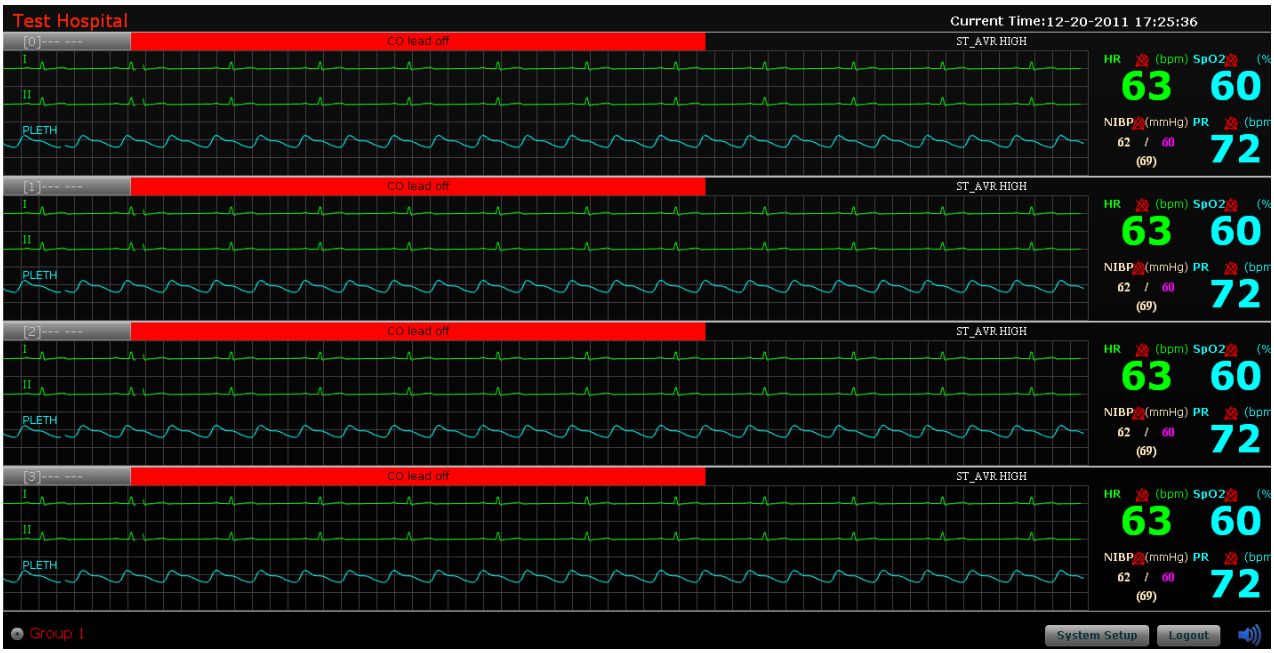


Figure 15-2

When over four bedside monitors are networked, the screen displays patient sectors as shown in Figure 15-1 with a maximum of eight bedside monitors.

NOTE:

1 The number of displayed waveforms on each patient sector will vary with the resolution of your computer monitor. The maximum number of waveforms displayed on each patient sector is four. It is recommended to use computer monitors with the resolution of 1028×1024 or 1440×900.

2 The alarms on CMS-WEB may be delayed, and the delay time depends on the actual network environment. Please refer to the displaying on MFM-CMS for alarms.

3. Main menu

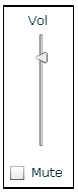
The main menu (Figure 15-3) is at the bottom of the screen. Click on it to access corresponding windows or perform corresponding functions.

Figure 15-3

If one patient sector is selected for single bed reviewing, the button **Return Main Screen** will appear at the bottom left corner, selecting which can return to the main screen.

4. Control icons

Control icon area includes the following icons:

Icons	Operating method
	Click on it to return to the main screen.
	Click on it to enter the system setup menu.
	Click on it to log out of the system.
	Click on it, the volume adjustor icon  appears. Tick the **Mute** check box, the entire system become mute until a new alarm occurs. To deselect the silence function, tick the **Mute** check box again. Additionally, the user can drag the volume adjustor to your desired volume.

15.3 Starting/ Shutting Down the System

NOTE:

Before starting the system, make sure the MFM-CMS has been installed in the computer. Otherwise, you cannot use the CMS-WEB.

15.3.1 Starting the System

Before starting the system, make sure the computer in which the CMS-WEB Observer server is installed has been installed with the IIS (Internet Information System) groupware as well. Assume that the IP address of the server is 192.168.11.138; to start the CMS-WEB, you should enter http://192.168.11.138/MFM-CMS/ into the address bar of the browser and input user name as well as password in the login window to access the system.

NOTE:

1 The default user name for administrator is “admin”; default password is “test”. You can change the user name and password after accessing the system.

2 The administrator is able to create other administrators and users. The default password for creating new users is “123456”.

15.3.2 Shutting Down the System

You can shut down the system via either of the following two methods:

Method 1: Click on the **Logout** button at the bottom right corner onscreen.

Method 2: Click on the button  at the top right corner onscreen.

15.4 System Setup

You can access the system setup menu by clicking on **System Setup** and configure the following items: **Common Setup** and **Administrators Setup**.

NOTE:

The available setup items may vary with different users due to different users’ access authority. Both **Common Setup** and **Administrators Setup** are available for the administrator while only **Common Setup** is available for general users.

15.4.1 Common Setup

15.4.1.1 Setting User Information

Select **System Setup** > **Common Setup** > **Personal Infor.**, and you can change the user name, name, gender, department, and so on.

15.4.1.2 Setting Password

Select **System Setup** > **Common Setup** > **Password Change**; you can change the login password.

15.4.1.3 Setting Parameter Unit

Select **System Setup** > **Common Setup** > **Unit Setup**; you can change the units of IBP, NIBP, CO_2, AG CO_2, AG O_2, C.O.TB and TEMP.

15.4.1.4 Setting Multi-Bed Waveform

Select **System Setup** > **Common Setup** > **Wave In Multi-bed**; you can set the physiological waveforms displayed on the patient sectors. In this window, the left column displays the waveform names from which you can choose; the right column displays the waveform names which have been selected.

- Adding a waveform to be displayed:

To add a displayed waveform, choose one from the left column and click on **Add** so that it can be added to the right column.

- Deleting a displayed waveform

To delete a displayed waveform, choose one from the right column and click on **Remove** so that it can be deleted from the waveform display area.

NOTE:

1 You can only select a maximum of 6 waveforms to be displayed on each patient sector. Also, the number of displayed waveforms is subject to the computer resolution.

2 You can only add or delete one waveform one time.

15.4.1.5 Setting Multi-Bed Parameter

Select **System Setup** > **Common Setup** > **Para In Multi-bed**; you can set the physiological parameters displayed onscreen. In this window, the left column displays the parameter names from which you can choose; the right column displays the parameter names which have been selected.

- Adding a parameter to be displayed

To add a displayed parameter, choose one from the left column and click on **Add** so that it can be added to the right column.

- Deleting a displayed parameter

To delete a displayed parameter, choose one from the right column and click on **Remove** so that it can be deleted from the screen.

NOTE:

1 You can only select a maximum of four parameters to be displayed on each patient sector.

2 You can only add or delete one parameter one time.

15.4.1.6 Setting Wave Speed

Select **System Setup** > **Common Setup** > **WaveSpeed**; you can set the speed for a selected waveform. Choose one waveform from the **Wave Name** list and the chosen one will be highlighted as shown in Figure 15-4; then select a speed from the drop-down list of **New Speed**.

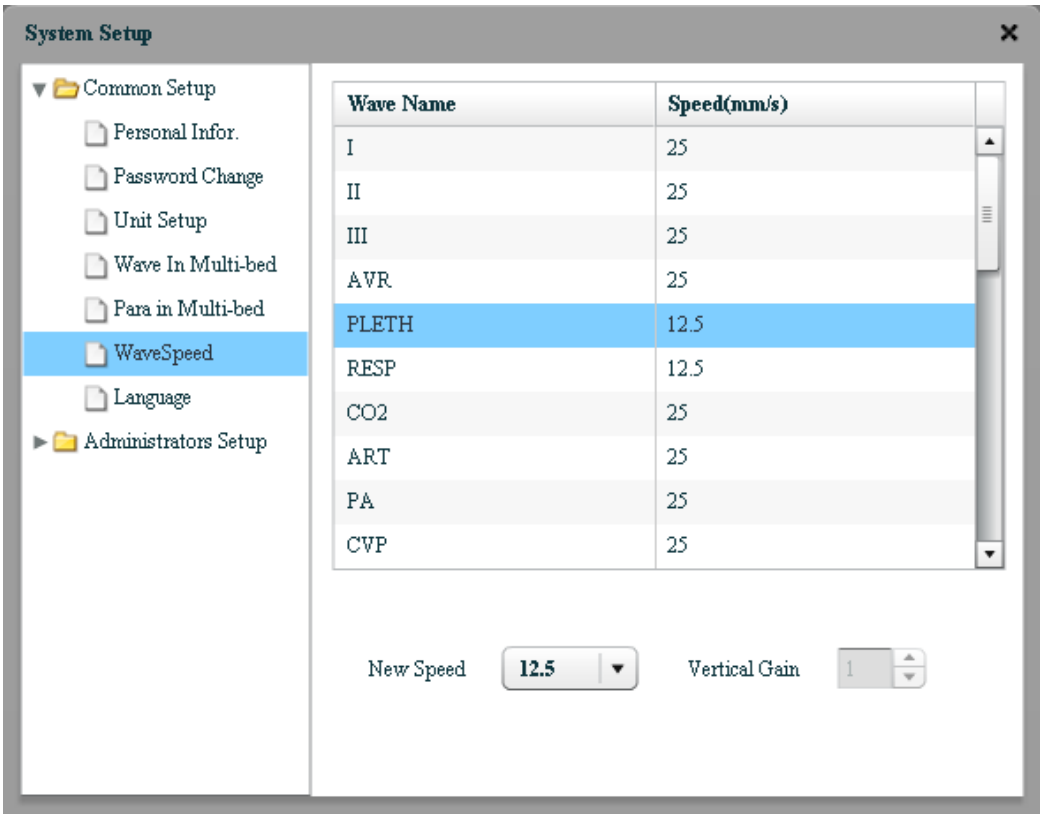


Figure 15-4 Wave Speed Setup

15.4.1.7 Setting Language

Select **System Setup** > **Common Setup** > **Language**, click on  and select a language from the drop-down list.

NOTE:

To ensure the normal display of CMS-WEB, restart the system after you finish the language configuration.

15.4.2 Administrator Setup

15.4.2.1 User Management

Select **System Setup** > **Administrators Setup** > **User Manage**; the administrator can set the user access authority.

- Creating a user

In the **User Manage** window, input the **User Name**, **Name**, **User Type**, **Gender**, **Department** and so on, click on **Insert** and a new user will be created. The default password for creating users is 123456.

- Deleting a user

Select a user to be deleted from the user list, click on **Delete** and the user will be removed.

- Modifying user information

Select a user whose information is to be modified and enter new information for the user; then click on **Modify** to complete the modification.

NOTE:
The administrator cannot modify his/her information here. Refer to the section *Setting User Information* for details.

- Resetting user password

Select a user whose password is to be reset and click on **Reset password**; confirm it by clicking on **Confirm** on the pop-up dialog box. The password will be reset to the default password.

15.4.2.2 Setting Date/Time Format

Select **System Setup** > **Administrators Setup** > **TimeFormat**, click on the button  beside **Date Format** or **Time Format** and select a format from the drop-down lists.

15.4.2.3 Setting Waveform Refresh Type

Select **System Setup** > **Administrators Setup** > **Refresh Type**; you can set the refresh type of the real-time waveforms. Two options are available: **Pen Mode** and **Move Mode**. Click on the button  and select one mode from the drop-down list.

15.5 Viewing Single Bed

Via the function of viewing single bed, you can check information of a patient. Click on any area of the patient sector and you will access the single bed window. Available items including **Patient Infor**, **Single Bed View**, **Wave Review**, **Alarm Review**, **Trend Review** and **NIBP Review** will be displayed onscreen.

15.5.1 Patient Information

You may check patient information via **Patient Infor** window. CMS-WEB Observer displays the patient information collected by the MFM-CMS. You can only view the patient information via CMS-WEB but not modify them. The readings of **Height** and **Weight** will vary with the unit selection. Click on **Print** if you need to output the patient information.

15.5.2 Single Bed View

- Multi-waveform display

Click on **Multi-lead** in the window so that you can view multiple channels of waveforms displayed onscreen. Click on it again to switch to single waveform display mode.

- Freezing waveform

Click on **Freeze** in the window so that you can freeze the waveform displayed onscreen, which may help you analyze the waveform of interest. Click on **Freeze** again to unfreeze the waveform.

15.5.3 Waveform Review

In the **Wave Review** window, you can:

- Select waveforms;
- Set wave speed;
- Refresh waveforms;
- Set the starting time for printing;
- Print waveforms.

The system allows you to print the waveform with a maximum time of two minutes. If you have not set the starting time, the system will output the latest data by default. If you have set the starting time, the system will start to output data at the point of the set time.

NOTE:

The set starting time for printing will be invalid after the data is output.

For more details about waveform review, refer to relevant content for MFM-CMS in Section *Wave Review*.

15.5.4 Alarm Review

In the **Alarm Review** window, you can:

- Refresh alarm information;
- Print alarm list;
- Print alarm strip.

For more details about alarm review, refer to relevant content for MFM-CMS in Section *Alarm Review*.

15.5.5 Trend Review

In the **Trend Review** window, you can:

- Review trend data;

- Set resolution;
- Select parameters to be reviewed;
- Refresh data;
- Print trend graph and trend list;
- Set the display mode of the trend review window;
- Set the starting time for printing.

Printing trend graph: If you have not set the starting time, the system will output the latest data by default. If you have set the starting time, the system will start to output data at the point of the set time. The system allows you to output a maximum of 600 pieces of data.

Printing trend list: If you have not set the starting time, the system will output the latest data by default. If you have set the starting time, the system will start to output data at the point of the set time. The system allows you to output a maximum of 20000 pieces of data within 240 hours.

NOTE:

The set starting time for printing will be invalid after the data is output.

For more details about trend review, refer to relevant content for MFM-CMS in Section *Trend Review*.

15.5.6 NIBP Review

In the **NIBP Review** window, you can view up to 20000 groups of NIBP measurements within 240 hours of an online patient.

The NIBP review window displays **Serial No.**, **Measure Time**, **SYS**, **DIA**, **MAP** and **PR** for each measurement. Additionally, you can:

- Refresh;
- Print.

NOTE:

1 Make sure a PDF reader has been installed in your computer, which enables you to preview and open the printing document.

2 CMS-WEB only supports printing on A4 paper. Make sure you have set the paper size to A4 in the printing setup.

3 If the main menu is not displayed onscreen after clicking on the print button and return to the CMS-WEB screen, check your browser setup. For Firefox browser, select **Tools** > **Options** > **Tabs**, and tick the check box of **Always show the tab bar**.

16 Safety

16.1 Control and Safety Index

Windows 7/ Windows 8 workstation, printer, UPS (optional), Keyboard, display and mouse should accord with the corresponding safety requirements. They are not suitable for installing in the patients' environment.

16.2 Characteristics

The standard MFM-CMS includes the following characteristics:

- Up to 240 hours of trend data storage and review
- Storage of patients' history data
- 240-hour full disclosure physiological waveforms
- 12-lead ECG display
- 12-hour short trend data
- Printing report
- Monitoring 64 patients simultaneously
- Connect patient monitor: M3, M3A, M3B, M50, M80, iM50, iM60, iM70, iM80, iM8, iM8A, iM8B, elite V8, elite V5, elite V6, iM20, iT20, iM3.
- Transfer waveforms, parameters, alarms, etc.

17 Service

If you have any question about maintenance, technical specifications or malfunctions of devices, contact your local distributor.

Alternatively, you can send an email to EDAN service department at: support@edan.com.cn.

Appendix I Specifications

A1.1 Recommended Hardware Configuration

The minimum requirements of hardware configuration for the MFM-CMS are shown as below.

<table>
<tr><td>Components</td><td>Requirements</td></tr>
<tr><td>System</td><td>Meet the IEC/EN control requirements for ITE device</td></tr>
<tr><td>PC workstation</td><td>CPU: Dual Intel Core i3 3.0 Ghz or above
Memory: 4G or above
Hard disk: 500GB or above
Display interface: 2
LAN port: 1 or above
USB port: more than one
OS: Windows 7 Pro 32/64 bit
Windows 8 Pro 32/64 bit</td></tr>
<tr><td>Keyboard</td><td>PS/2 or USB keyboard with CE mark</td></tr>
<tr><td>Mouse</td><td>PS/2 or USB mouse with CE mark</td></tr>
<tr><td rowspan="2">Display</td><td>Specifications:
<table>
<tr><td>Dimensions (inch)</td><td>Resolution (pixel)</td></tr>
<tr><td>19 (widescreen)</td><td>1440X900</td></tr>
<tr><td>*19 (regular-screen)</td><td>1280X1024</td></tr>
<tr><td>17 (regular-screen)</td><td>1280X1024</td></tr>
<tr><td colspan="2">*Recommended</td></tr>
</table></td></tr>
<tr><td>Quantity:
For 1 to32 bedside monitors/ telemetry devices: one display
For 33 to 64 bedside monitors/ telemetry devices: two displays</td></tr>
<tr><td>Printer</td><td>LaserJet</td></tr>
<tr><td>UPS</td><td>1000 W</td></tr>
</table>

Network device specifications	Structure	Ethernet 802.3
	Device	Network switch
	Transmission rate	10M, 100M
	Transmitted information	Waveforms, parameters and alarms of all networked bedside monitors
	Compatible monitors/ telemetry devices	Patient monitors/ telemetry devices complying with EDAN network protocol
	Maximum number of networked monitors/ telemetry devices	64
Speaker	Built-in speaker is recommended.	

CAUTION

Ensure that the computer hardware can meet the requirements of the software installation and running. Also, the video adapter, the audio adapter, the network adapter and their respective drivers should been installed well in the computer; otherwise, the software may not run normally.

NOTE:

1 The hardware specifications require the use of PC that complies with IEC/EN requirements for ITE equipment.

2 The configuration mentioned above is for reference and not permanent. EDAN preserves the right to change and upgrade system settings.

3 It is recommended to install the antivirus software (recommend Kaspersky software) on the computer which is used for MFM-CMS, and also keep it updated in time.

A1.2 Software Performance

Trend	240-hour trend review for each bedside monitor/ telemetry device; 12-hour short trend dynamic display for each bedside monitor/ telemetry device;
Alarm events	240-hour alarm events for each bedside monitor/ telemetry device (up to 20000 pieces)
Alarm type	Physiological Alarm Technical Alarm

Alarm mode	3 levels of audible and visual alarms
Nurse call records (from the telemetry devices are stored by MFM-CMS)	Store 100 groups
Patient call records (from the telemetry devices are stored by MFM-CMS)	Store 100 groups
Waveform storage and review	Up to 240-hour waveform for each bedside monitor/telemetry device; 96-hour is the default selection.
NIBP measurement storage and review	240-hour NIBP measurement for each bedside monitor/ telemetry device (up to 20000 pieces)
12-lead analysis results	240-hour 12-lead analysis results for each bedside monitor/ telemetry device (up to 20000 pieces)
C.O. measurements	240-hour C.O. measurement for each bedside monitor/ telemetry device (up to 20000 pieces)
Quick TEMP measurements	240-hour Quick TEMP measurement for each bedside monitor/ telemetry device (up to 20000 pieces)
PAWP measurements	240-hour PAWP measurement for each bedside monitor/ telemetry device (up to 20000 pieces)

Appendix II MFM-CMS System Alarms and Prompts

A2.1 Alarms

Alarms	Display Color	Cause	Solution
Database is full, it can't store new data, please discharge or delete patient.	Red	Less than 2G space is left in the disk for data store.	Refer to Section *History Patient Review* and delete the out-of-date patient data. Or refer to Section *Database Backup* to back up the data in another disk and delete the data in the current database.
Network is disconnected!		The host in which the MFM-CMS software is installed is not connected with the network cable.	Check the connection of the network cable and ensure the cable is well connected to the host.
Alarm Mute		The MFM-CMS is in the status of alarm mute.	Refer to Section *Alarm Mute* for information about alarm mute.
No Audio card!		The audio adapter driver is not installed in the host.	Log out of the MFM-CMS and install the audio adapter driver.
No Video card!		The video adapter driver is not installed in the host.	Log out of the MFM-CMS and install the video adapter driver.
Audio Pause		The MFM-CMS is in the status of alarm pause.	Refer to Section *Audio Pause* for information about alarm pause.

A2.2 Prompts

Prompts	Display Color	Cause	Solution
Database is full, please discharge or delete patient.	White	Less than 10G space is left in the disk for data store.	Refer to Section *History Patient Review* and delete the out-of-date patient data. Or refer to Section *Database Backup* to back up the data in another disk and delete the data in the current database.
Collecting Data…		Real-time printing	/
Number of pending patients:		Remind the user to admit the patients who has been connected to the MFM-CMS but has not been admitted.	Refer to Section *Admitting a Patient* for information about admitting patients.
No bed is online. Please check the network connecting		No monitor is connected to the MFM-CMS because no monitor is connected to the network or the network setup is incorrect.	Check if the cable is well connected with the monitor and with the switch.
Please clear history patient	White	The system will display a prompt when there is excessive amount of history patient data.	Please clean the history patient data manually in time. (please refer to chapter *Database Backup* for detailed operations)
Battery Depleted	White	The telemetry device is offline due to battery depleted.	Replace battery for telemetry device, and re-admit the patient to make online.

Appendix III Abbreviation

Abbr	**English Full Name/Description**
AG	Anaesthesia gas
Art	Arterial
AwRR	Airway respiration rate
BP	Blood pressure
CMS	Central monitoring system
CO_2	Carbon dioxide
CVP	Central venous pressure
Des	Desflurane
Dia	Diastolic
ECG	Electrocardiogram
Enf	Enflurane
Et	End-tidal
$EtCO_2$	End-tidal carbon dioxide
EtN_2O	End-tidal nitrous oxide
EtO_2	End-tidal oxygen
Fi	Fraction of inspired
$FiCO_2$	Fraction of inspired carbon dioxide
FiN_2O	Fraction of inspired nitrous oxide
FiO_2	Fraction of inspired oxygen
Hal	Halothane
Hb	Hemoglobin
HR	Heart rate
IBP	Invasive blood pressure
ICP	Intracranial pressure
IEC	International Electrotechnical Commission

Abbr	**English Full Name/Description**
Iso	Isoflurane
LAP	Left atrial pressure
MAP	Mean arterial pressure
N_2O	Nitrous oxide
NIBP	Non-invasive blood pressure
O_2	Oxygen
PA	Pulmonary artery
PAWP	Pulmonary artery wedge pressure
Pleth	Plethysmogram
PR	Pulse rate
PVC	Premature ventricular complex
RAP	Right atrial pressure
Resp	Respiration
RR	Respiration Rate
Sev	Sevoflurane
SpO_2	Pulse Oxygen Saturation
SYS	Systolic pressure
TB	Blood Temperature
TD	Temperature difference
TEMP	Temperature
USB	Universal serial bus
BIS	Bispectral index
ICG	Impedance cardiography
RM	Respiration mechanics

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