

SAADAT Co.

SAHAND & SAHAND PRO

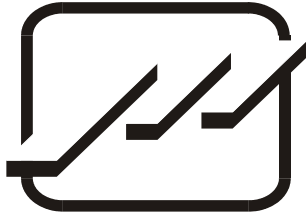
Central Monitoring System

User Manual



CE 2195

D00637-V7



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Preface

Manual Purpose

This manual provides the instructions necessary to operate the SAHAND & SAHAND PRO central monitoring system in accordance with its function and intended use. Observance of this manual is a prerequisite for proper performance and correct operation, and ensures patient and operator safety. If you have any question about the central, please contact our customer service. This manual is an integral part of the central system and should always be kept close to this system, so that it can be accessed whenever necessary.

Intended Audience

This manual is provided for the clinical medical professionals. Clinical medical professionals are expected to have working knowledge of medical procedures, practices and terminology as required for monitoring of patients.

Version Information

This manual has a version number. This version number changes whenever the manual is updated due to software or technical specification changes. The version of this manual is as follows:

Release date	Version number
Mar 2021	D00637-V7

Illustrations and Names

The illustrations and names of this document may not necessarily accord with your central system.

General warnings

The Central Monitoring System, abbreviated to CMS afterward, is intended for use only as an adjunct in patient assessment.

It must be used in conjunction with clinical signs and symptoms.

- Before using the CMS, please read all parts of this user manual.
SAADAT Company is responsible for safety, reliability and performance of this product only if the product is used according to this user manual.
- All installation operations, developments, changes, modifications, repairs, transportation and disassembly of this product should be conducted by SAADAT trained and experienced personnel;
- All cleaning operations should be conducted by trained personnel.
- The CMS software has been designed so that probability of risks arising from the software errors is minimized.
- Compliance with maintenance and transportation requirements.
- Before monitoring, check all the system components in terms of mechanical damage during transport, installation, storage and use;
- Contact Customer service in case of any problem;
- Before monitoring, make sure that the CMS equipment is switched on and functions properly;
- During monitoring, the system time should be set according to the local area time;
- Check the system time regularly;
- The SAHAND and SAHAND PRO only supports Bedsides that are manufactured by SAADAT company;
- The CMS must be inspected every two years by trained personnel, but it is recommended that the system is inspected every year. In addition, the system lifetime is 10 years.
- The EMC information of the CMS are provided in the APPENDIX I.
- Keep the CMS components free from noise, vibration, pressure, dust, corrosion, fire and explosion. Leave a space in front and back of the device for convenient operation and maintenance. In order to have sufficient ventilation, the CMS should be kept at a distance of minimum 5 cm (2 inches) from the shelf.

1. The Basics

1.1 About CMS

1.1.1 Intended Use

The CMS is intended to conduct centralized monitoring of vital signs information from multiple monitors in hospitals or medical institutions. It is not intended for home use.

- This device is intended for use by qualified clinical physicians or well-trained nurses.
- Waveforms, parameters and alarms of the CMS are only a reference for physicians and cannot be used directly for clinical treatment.
- If any displayed value is unreasonable or ambiguous, first measure patient's vital signs by the other tools and then verify the CMS performance.
- The preferred distance for monitoring is 1 m from the display screen.

1.1.2 Contraindications

None.

1.1.3 Functions

The CMS is powerful software with high performance that constructs a monitoring network by connecting bedsides. By storing, processing, analyzing and displaying the bedsides information, the CMS is capable of providing a centralized monitoring for all patients that greatly promotes the efficiency and quality of the monitoring.

Some of CMS capabilities:

- Monitoring of 32 bedsides information.
- Review of 96 hours Trend data for 16 beds and 48 hours for 32 beds in each connected bedside.
- Review of 720 alarms for each connected bedside
- Review of 1000 NIBP measurements for each connected bedside
- Review of 48 hours Disclosure for 16 beds and 24 hours for 32 beds in each connected bedside.
- Monitoring of a Bed in enlarged mode in second display (Bed View)
- Patient information management

- Alarm History
- Recording History
- Audio and visual alarms
- Recording/Printing
- Exchanging patient windows location
- Supporting several languages
- Setting waveforms/parameters color
- Providing easy settings
- Supporting two displays with high resolution (1280×1024 or 1920× 1080 (Full HD))
- LAN network (wired /wireless)
- Connection to PACS server to create and display DICOM file
- Sending NIBP measurement command to the bedside monitor
- Backing up data of each bed (Disclosure, Trend, NIBP List, Alarm List) and saving the data in the flash memory
- Inputting data via keyboard and barcode scanner
- Supporting Nurse Call

1.1.4 Components

The CMS consists of:

1. Main device
2. Second display screen
3. Input/Output devices
4. Recorder / Printer
5. Network Equipments

NOTE:

- ✓ The main device in the Sahand model consists of a display and a PC and in the Sahand Pro model all parts are integrated in just one PC.
- ✓ All the CMS components should be CE marked.

1.1.5 Network Connection

The CMS communicates with bedsides via wired/wireless network and provides centralized monitoring. A typical network model of the CMS is as follows:

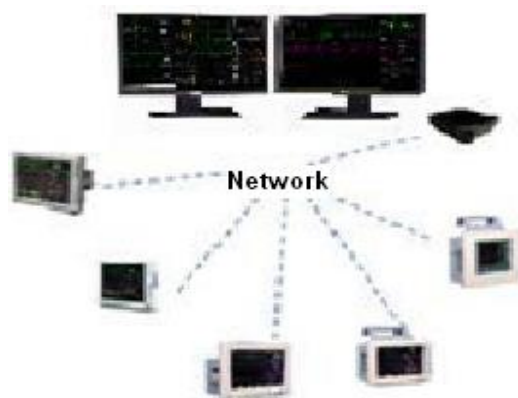


Figure 1-2 CMS network connection

1.2 Main Screen

The CMS supports single and dual-screen modes and displays 16 patient windows in each mode by default.

The following figure shows the main screen.

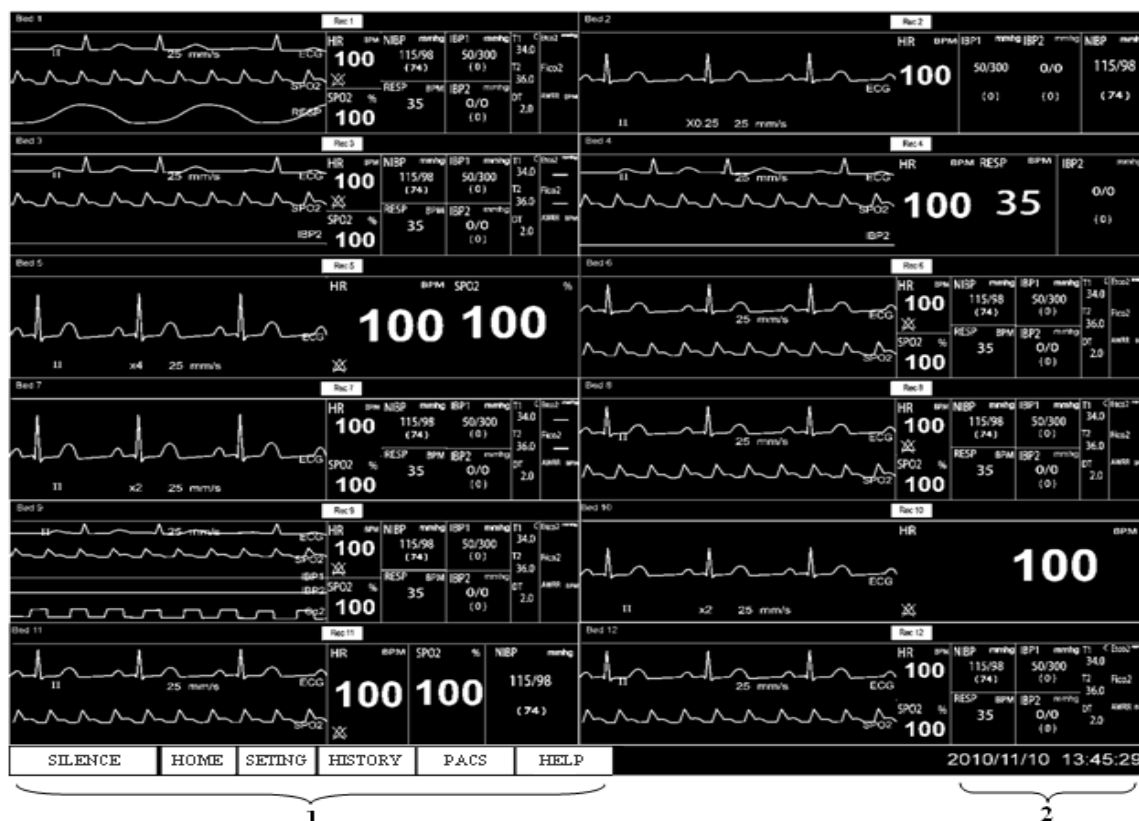


Figure 1-3 Main screen

The SILENCE, HOME, SETTING, HISTORY, PACS and HELP buttons as well as current date and time are displayed at the bottom of the screen, on the taskbar. (See No. 1 & 2 in figure 1-3)

1.3 Other Screens

1.3.1 Auxiliary Screen in Single-Screen Mode

In Single-screen mode, you can enter an auxiliary screen by clicking any button of the menu.

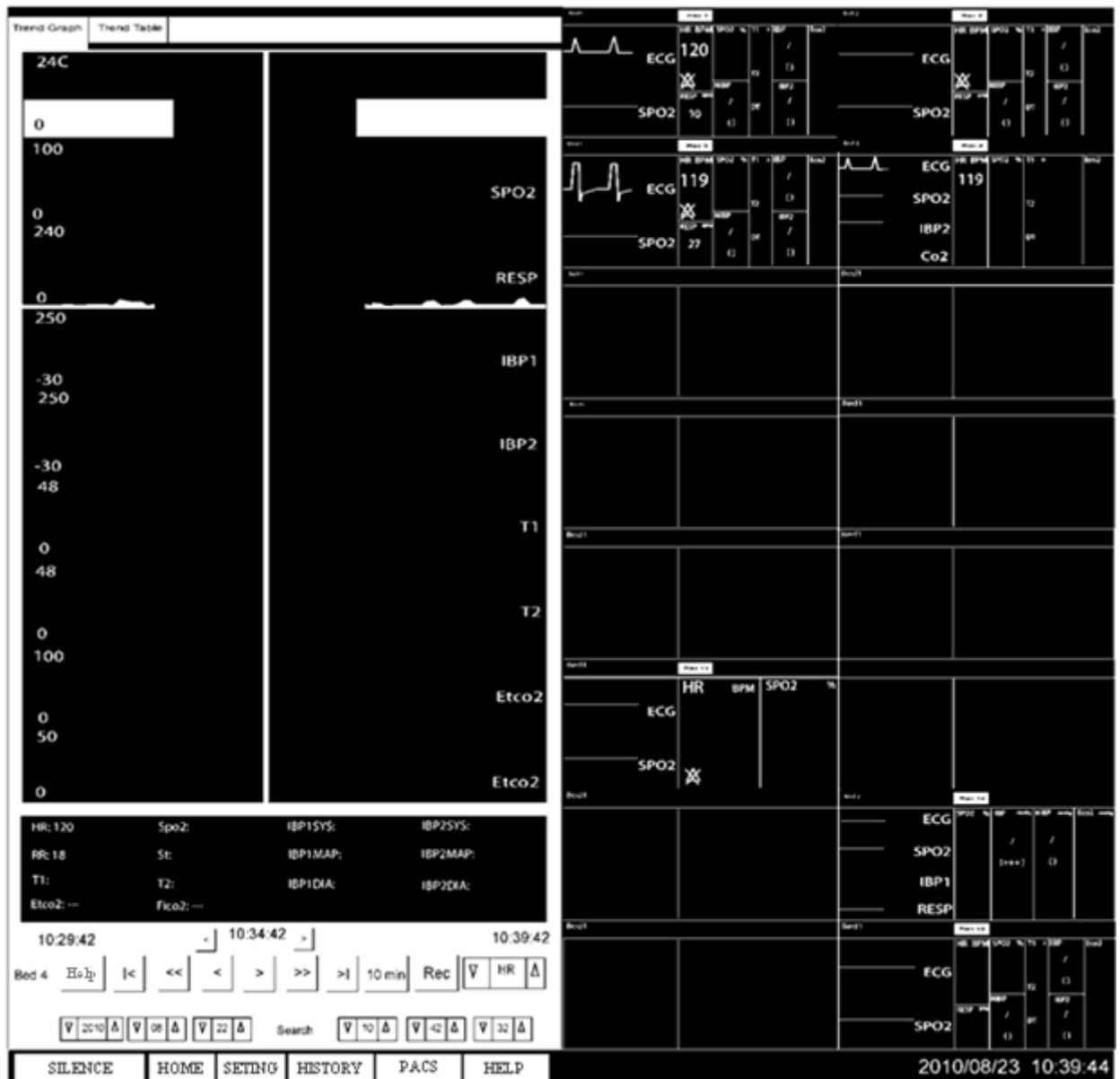


Figure 1-4 Auxiliary screen

1.4 Controls

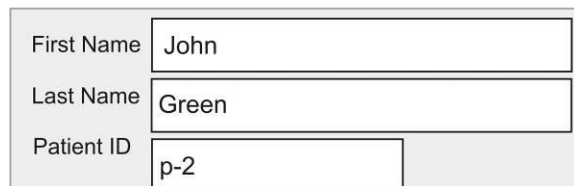
1.4.1 Mouse

The CMS is equipped with touch screen (s) and mouse.

NOTE: The right- click button of the mouse does not work. Therefore “click” in this manual refers to left-click.

1.4.2 Text Boxes

The textbox provides text entry fields that can be used to edit and display text.



First Name	John
Last Name	Green
Patient ID	p-2

Figure 1-5 Text box

1.4.3 Command Buttons

Using these buttons, you can execute defined commands.



Figure 1-6 Command buttons

NOTE: When a command button appears gray, it indicates that this command button is currently inactive.

Patient info	Trend	Disclosure
NIBP List	Alarm List	Bed Setup
Return	Bed View	

Figure 1-7 Inactive buttons

1.4.4 Selection Buttons

- Radio buttons can be used to select from a number of options.



Figure 1-8 Radio button

- Checkboxes enable the users to select multiple options.

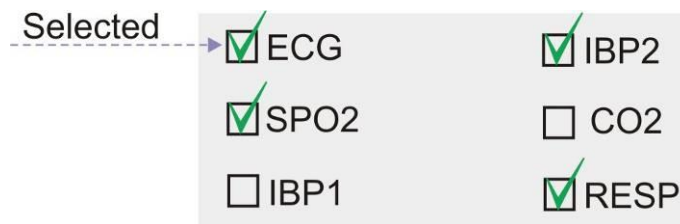


Figure 1-9 Check box

- Combo boxes enable the users to select items. The left of combo boxes displays the previous item and the right displays the next item.

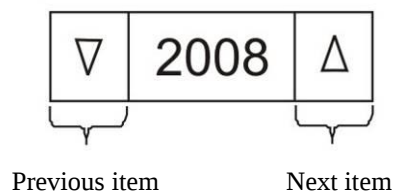


Figure 1-10 Combo Box

2. Installation

2.1 Unpacking and Inspection

WARNING

- Disposal of the packaging materials shall comply with your local requirements.
- Components of the CMS may be contaminated by microbes during transportation, storage and use.

2.2 Installation

WARNING

- The CMS should be installed by the manufacturer personnel. The copyright of SAHAND software is solely owned by POOYANDEGAN RAH SAADAT Company. No organization or individual shall resort to juggling, copying or exchanging it or to any other infringement on it in any form or by any means without due permission.

WARNING

- Do not place CMS near the strong noisy fields.
- Do not place devices that are sensitive to noise near the CMS.
- Using the CMS in the presence of flammable gases produces explosion risk.

2.3 Starting the system

NOTE:

- Before using the CMS, make sure that the touch screens have been calibrated and network cable has been connected.
- Check connection of the CMS components before monitoring, otherwise some components may fail to function properly.
- After turning the system on, it plays a sound to ensure that the system sound functions correctly. In case of selecting manufacturer logo, it appears by starting the system.

The system checks the database whenever it is starting up.

In this time the message “SYSTEM IS CHECKING DATABASE PLEASE WAIT...” will appear.



Figure 2-1 Message of database checking

If the CMS turns off because of sudden power failure, there is a possibility of crash in the CMS database. Next time you turn on the CMS, It will take a few minutes that the CMS repairs crashed database. During this time, the following messages will appear in the taskbar:

SYSTEM IS REPAIRING DATABASE PLEASE WAIT...

WARNING

- To prevent unexpected errors or consequences of a sudden power failure, it is essentially required that your CMS is equipped with an UPS.
- In lack of AC power and using the UPS, turn off the CMS manually before the UPS turns off.

NOTE:

- If network connection is interrupted, the message “Network cable is unplugged” will appear on the taskbar.
- If the CMS is unable to establish network connection (e.g. fault of network card), the message Network problem, system restarts in # s will appear on the taskbar. The system will restart after 120 seconds.
- If software activation file is not available in the CMS or the file content is invalid, “Not Licensed” will be displayed on the taskbar.

2.4 Shutting down the system

Press the power switch on the PC to shut down the system.

3. Display screen

3.1 Overview

The CMS displays up to 32 patient windows on two screens simultaneously. The number of patient windows depends on the view mode setting (See 3-4-3-1). As shown in the following figure, each CMS screen is divided into maximum eight rows and two columns of patient windows.

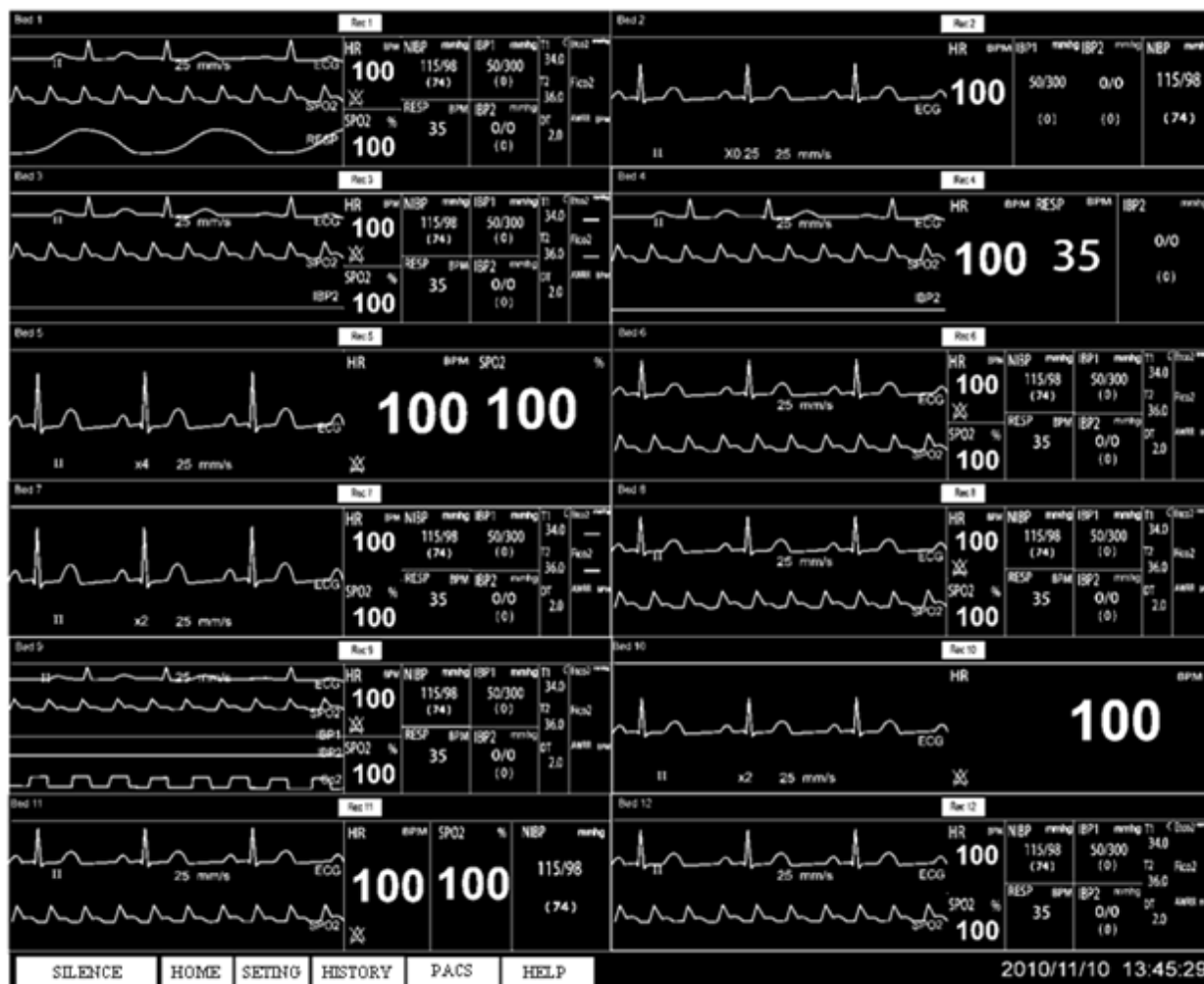


Figure 3-1 Display screen

3.2 Patient Window

Each patient window on the CMS represents one Bedside in which you can monitor patient information and vital signs.

3.2.1 Patient Window in Disconnection Status

In the process of monitoring, the patient window may be on “offline” status that it means that Bedside either is switched off or disconnected from the CMS.

In case of disconnection between the CMS and Bedside, the alarm level 3 will occur. In addition to “offline” message, “Bed Disconnect” visual alarm will be displayed until clicking SILENCE button or reconnecting the Bedside. (See chapter 5)



Figure 3-2 Disconnection status

3.2.2 Patient Window in Monitoring Status

In the monitoring status, a patient window displays real-time patient data transmitted from the Bedside. The following figure indicates that the Bedside is communicating with the CMS.

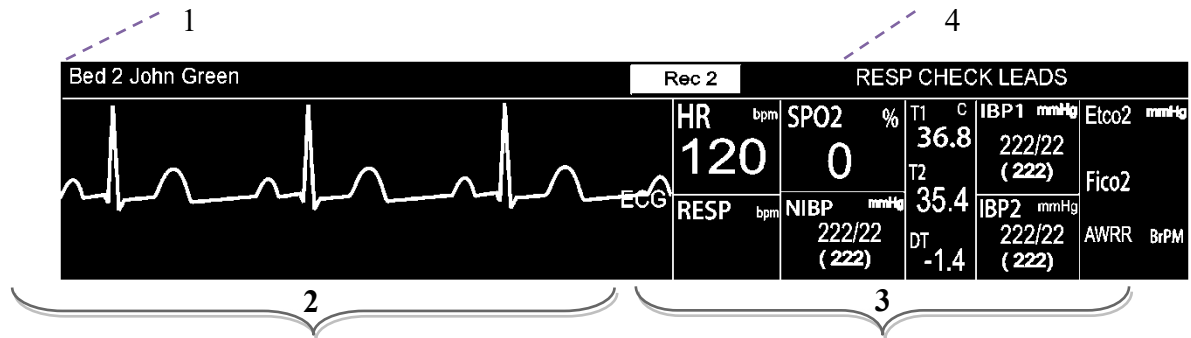


Figure 3-3 Patient window in monitoring status

1. Patient Information Area

This area is to display bed number and patient name.

2. Waveforms Area

This area is to display waveforms transmitted from the Bedsides. Click on this area to freeze the waveforms. By clicking on this area again, you can unfreeze the waveforms.

Lead, gain, sweep speed and filter are displayed along with the ECG waveform and scale value is displayed along with the IBP waveform.

NOTE:

If the bedside can send scale and label of IBP waveform to the CMS, same scale value will be displayed on the bedside and the CMS. Otherwise, default scale (-30 – 250) value and the word “IBP” will be displayed along with the IBP waveform on the CMS.

3.Parameter Area

This area is to display parameter values transmitted from the bedsides.

NOTE:

Unit of the parameters cannot be changed via the CMS (See the figure 3-4). If the unit is changed via the bedside, the CMS will display the parameters values in default units.

Parameter	Default units
HR	BPM
SPO2	%
Resp	BrPM
NIBP	mmHg
Temp	°C
IBP	mmHg
EtCo2/FiCo2	mmHg
AWRR	BrPM
BFI/BS/SQI/EMG	%

Figure 3-4 Default units of the CMS

By clicking on this area, you can call up Param Menu. If you click the "Return" button, the parameters will be displayed again.

HR bpm	Patient Info	Trend	Disclosure
	NIBP List	Alarm List	Bed Setup
	Return		Bed View

Figure 3-5 Param Menu

4. Alarm Area

This area is to display visual alarms.

3.3 Nurse Call

If the Nurse Call button is pressed on the patient monitor, the Nurse Call button will appear at the top of the patient window, and three warning beeps will sound at the same time, and then the sound will be stopped. Pressing this button on the CMS screen responds to the warning and the button is disappeared.

NOTE: If the warning is responded by pressing the Nurse Call button on the CMS, this button on the patient monitor will be deactivated for forty seconds.

3.4 Patient information

The CMS enables you to modify patient information and discharge a patient.

NOTE: After connection between the CMS and Bedside, vital signs of a new patient that transmitted from the Bedside will be saved and displayed automatically.

3.3.1 Modifying Patient Information

1. Click on “Patient Info” in Param Menu to open “Patient Info” page.
2. In this page, you can modify patient information, such as name, gender, height, blood type and etc.
3. Click the “Save” button to save the information and close the page.

The screenshot shows a web form titled "Patient information / Bed 2". The form contains the following fields and controls:

- First Name: Text input with "John" entered.
- Last Name: Text input with "Green" entered.
- Patient ID: Text input with "p-2" entered.
- Gender: Dropdown menu with "Male" selected.
- Height: Text input with "190" and a unit dropdown with "cm" selected.
- Weight: Text input with "73" and a unit dropdown with "kg" selected.
- Blood Type: Dropdown menu with "O+" selected.
- Birth Date: Three separate dropdown menus for year (1984), month (03), and day (23).
- Tel: Text input with "77492116055" entered.
- Admit Date: Three separate dropdown menus for year (2008), month (07), and day (19).
- Hospital: Text input with "3G" entered.
- Ward: Text input with "CCU" entered.
- Dr Name: Text input with "Bill Zee" entered.
- Discharge: Three separate dropdown menus for year (2008), month (07), and day (21), followed by a checkbox.
- At the bottom, there are three buttons: "Keyboard", "Save", and "Help".

Figure 3-6 Patient Info page before clicking keyboard button

NOTE: you can use hardware keyboard or on-screen keyboard to input data in the text fields of this page. If you press Keyboard button, the on-screen keyboard will appear.

Patient information/Bed 2

First Name

Last Name

Patient ID

Gender Male

Height cm Weight kg

Blood Type O+

Birth Date 03

Tel

Admit Date 2008 07 19

Hospital

Ward

Dr Name

Discharge 2008 07 21

1 2 3 4 5

6 7 8 9 0

a b c d e

f g h i j

k l m n o

p q r s t

u v w x y

z () / .

Caps Clear Delete <---

<- -> -

Discharge 2008 07 21

Figure 3-7 Keyboard

3.3.2 Discharging a patient

Discharging a patient means to terminate monitoring of that patient. To discharge a patient:

1. Click “PatientInfo”.
2. Select “Discharge” and click “Save” to close the page.

⚠ WARNING ⚠

- After discharging, if the CMS is not disconnected from the Patient monitor completely, data storage will be continued.

3.3.3 Barcode Scanner

Connect barcode scanner to the CMS and click on your intended text box in PatientInfo page. Data is read via the barcode scanner and entered in the text box.

NOTE: if number of characters of the barcode is more than the specified range, extra characters will be eliminated and the barcode will be displayed in red.

3.4 Taskbar

There are six buttons on the taskbar as shown in figure 3-8.



Figure 3-8 Taskbar items

3.4.1 SILENCE

At the left side of the taskbar, there is “SILENCE” button. Normally audio alarm is on. By clicking this button you can set the audio alarm on or off.

3.4.2 HOME

This button is used to display main screen. You can close the auxiliary screen and return to the main screen by clicking the "HOME" button.

3.4.3 SETTING

User can perform the CMS settings by clicking “SETTING” button.

3.4.3.1 View tab

By clicking the “SETTING” button and then View Tab, a page the same as opposite page is displayed. The CMS settings are:

- **View mode**

Select your favorite view mode and click the “Save” button. Then click the “HOME” button to apply setting. General structure of view mode is A*B. “A” represents the number of beds in one column and “B” represents the number of columns in the screen. You can monitor BedView or A*B on the second display with regard to view mode. Some view modes are shown in the figures 3-10 to 3-14.

▪ **Signal / Parameter color of all beds**

Select signal/ parameter and your favorite color and click “Save” button to apply the settings. You should tick the “Restore to default” check box to restore to the default mode. By selecting the “Restore all to default”, you can restore all parameters/signals to the default mode.

NOTE:

With regard to unique color of parameters/ signals, if repetitious color is selected in this page, “Invalid color” message will be displayed.

View	Recorder	Setup	Admin
☐ 2x2 Beds + BedView		☐ 2x2 Beds + 2x2 Beds	
☐ 3x2 Beds + BedView		☐ 3x2 Beds + 3x2 Beds	
☐ 4x1 Beds + BedView		☐ 4x1 Beds + 4x1 Beds	
☐ 4x2 Beds + BedView		☐ 4x2 Beds + 4x2 Beds	
☐ 5x1 Beds + BedView		☒ 5x1 Beds + 5x1 Beds	
☐ 5x2 Beds + BedView		☐ 5x2 Beds + 5x2 Beds	
☐ 6x1 Beds + BedView		☐ 6x1 Beds + 6x1 Beds	
☐ 6x2 Beds + BedView		☐ 6x2 Beds + 6x2 Beds	
☐ 7x1 Beds + BedView		☐ 7x1 Beds + 7x1 Beds	
☐ 8x1 Beds + BedView		☐ 8x1 Beds + 8x1 Beds	
☐ 8x2 Beds + BedView		☐ 8x2 Beds + 8x2 Beds	
☐ 9x1 Beds + BedView		☐ 9x1 Beds + 9x1 Beds	
☐ 10x1 Beds + BedView		☐ 10x1 Beds + 10x1 Beds	

Set color of Signal/Parameter

ECG

☐ Restore to default ☐ Restore all to default

Figure 3-9 View tab

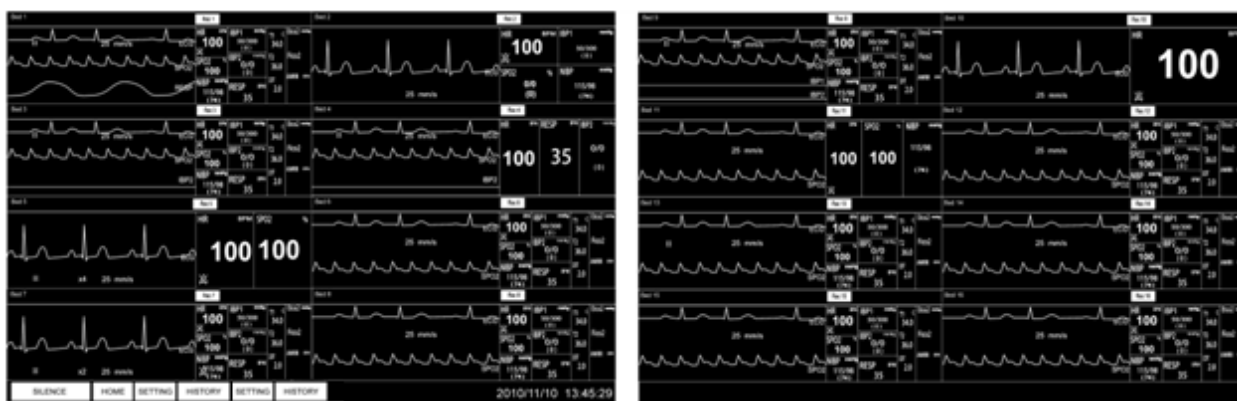


Figure 3-10 Monitoring 4×2 Beds + 4×2 Beds



Figure 3-11 Monitoring 4×2 Beds + BedView

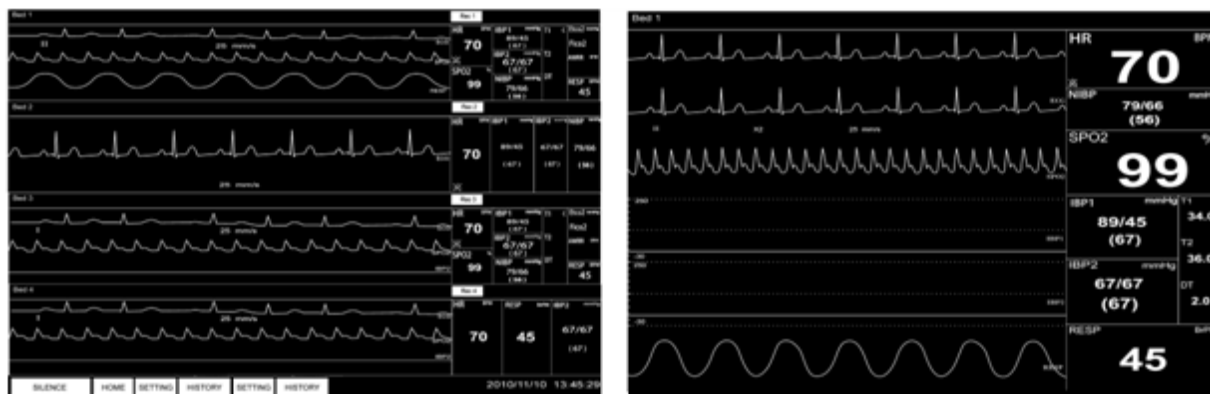


Figure 3-12 Monitoring 4×1 Beds + BedView

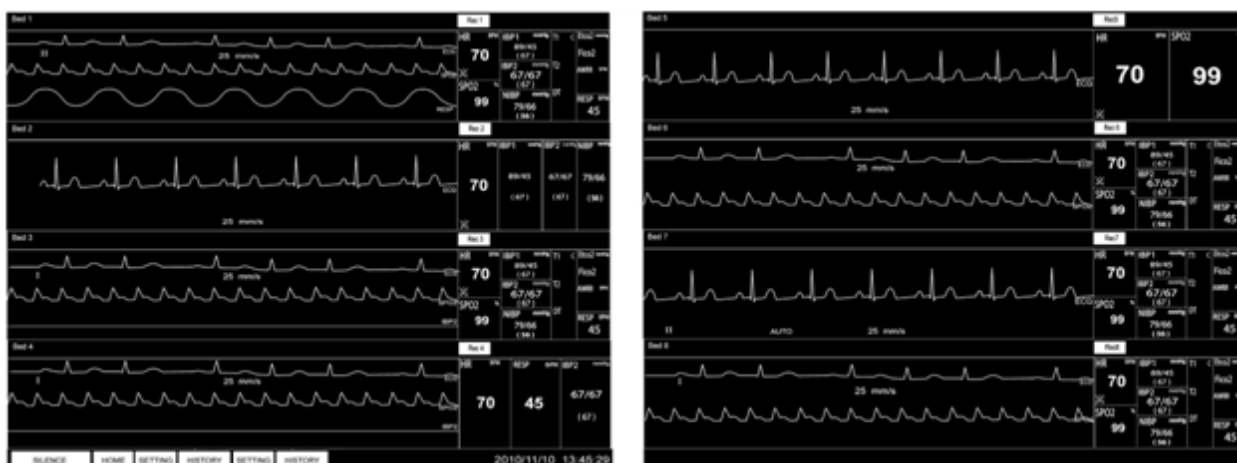


Figure 3-13 Monitoring 4×1 Beds + 4×1 Beds

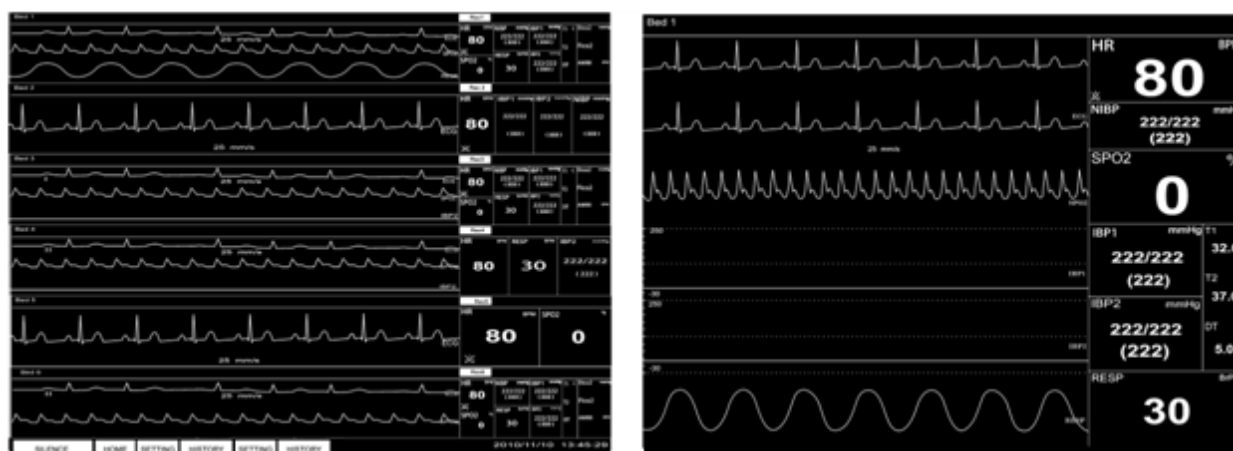


Figure 3-14 Monitoring 6×1 Beds + BedView

During changing mode, the message, “Loading..., Please wait!” is displayed.



Figure 3-15 Loading message

3.4.3.2 Recorder tab

The recorder can be set by using this tab. For more information, refer to recorder tab in clause 8-1-1.

3.4.3.3 Setup tab

By clicking the third tab, you can enter this page. After setting, click the “save” button to apply setting. Click the “HOME” to close this page.

You can set:

- Date and Time
- Language
- Thickness of waveform tracing
- Screen size
- Brightness
- System sound

The screenshot shows the 'Setup' tab selected in a menu bar with 'View', 'Printer', 'Setup', and 'Admin'. The main content area displays 'Version 2.8.3' and 'Set Date/Time of System'. Below this are input fields for Year (2020), Month (04), and Day (20), each with up/down arrows and a lock icon. Similarly, there are fields for Hour (11), Minute (46), and Second (05), also with arrows and lock icons. The 'Set Language' section shows 'English' selected. 'Set Thickness' is set to 'Normal'. 'Set Screen Size' is set to '18.5 Wide'. 'Brightness' is set to '4'. A 'Volume' slider is shown at the bottom with a bar and tick marks. At the very bottom are 'Save' and 'Help' buttons.

Figure 3-16 Setup tab

WARNING

- ✓ If you set the CMS time or date during monitoring, the following message will appear and you should turn off and on the system to apply setting.
- ✓ The time can only be set by authorized user (See chapter 3, Admin tab).
- ✓ If you set back the time or date of the CMS, some data may be missed.

Please turn off and on the system

Figure 3-17 Turn off and on message

NOTE: If the CMS is connected to NTP server, the time cannot be changed. In this condition you should contact Customer Service department to set the time.

Language

Available languages are English, Russian and Polish.

Thickness of waveform tracing

Available options are “Normal” and “Thick”.

Screen size

Different sizes of screen are available including:

17", 18.5", 19", 19" wide , 22", 23", 24", 25", 26", 27", 28", 29", 30", 31", 32", 34", 39", 42", 46", 48", 50", 55", 58", 60", 64", 70", 80", 84", 99", 102", 108", 111" and 152" .

NOTE: select this item with regard to actual size of the screen.

System sound

The system sound can be set to 11 different volumes (1-10) that default setting is 2.

If you change the volume, the moderate alarm (level 2) will be played corresponding to the adjusted volume to ensure that new setting has been applied.

(See chapter 5 for more information).

The sound pressure range has been specified on the back case label.

Brightness

The system brightness ranges from 1 to 7. Default setting for this item is 4.

3.4.3.4 Admin tab

3.4.3.4.1 General

Select Admin tab from Setting menu to access the below page. You can export and save the patient data via this page and access high-level settings.

Some capabilities of the Admin tab are intended only for trained and authorized personnel of the manufacturing company.

You can set the first bed number of the CMS by selecting “Bed Offset”.

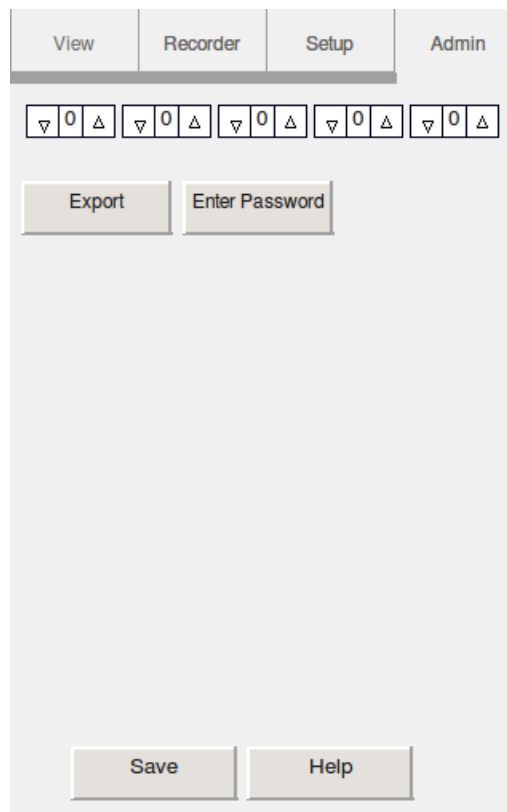


Figure 3-18 Admin tab

3.4.3.4.2 High-level accessibility

Enter password in this page and press **Log in** button to access high-level settings for 300 seconds. Pressing this button will change it to **Log out**.

Press **Log out** to disable high-level accessibility.

NOTE: high-level settings include HR alarm limits and alarm On/Off settings (See chapter 7).

NOTE: only trained and authorized personnel have access to the password.

NOTE: the icon  means high-level accessibility of the settings.

3.4.3.4.3 Export

Click on Export button to perform settings in the below page and export the patient data.

The screenshot shows the 'SAHAND Central System-Backup' window. The 'Information' section has 'Disclosure' selected. The 'Limits' section shows 'Bed' as 1, 'Start Date' as 2017-06-10, 'End Date' as 2017-06-10, 'Start Time' as 08:54:20, and 'End Time' as 08:54:20. The 'Trend parameters' section has 'HR' checked. The 'Disclosure Waveforms' section has 'ECG' checked. The 'AlarmList settings' section has 'Type' as ALL TYPES and 'Level' as ALL. The 'Export' button is highlighted.

Figure 3-19 Export page

Function

The below functions could be done via the Export page:

- Data export
- Help

Data Export

The Export page consists of five sections:

Information, Limits, Trend Parameters, Disclosure Waveforms and Alarmlist Settings

1. Information

You can select type of information for exporting in this section. Available options are:

NIBP List: to export NIBP data saved in the NIBP List.

Alarm List: to export alarm data saved in the Alarm List.

Disclosure: to export vital signs signals saved in the Disclosure.

Trend: to export parameters values saved in the Trend.

2. Limits

You can select bed number and interval in this section.

Select Bed: select a bed to export data

Start Date/Start Time: set start date and time of data export.

Start Date: set year, month and day (from the left to the right).

Start Time: set hour, minute and second (from the left to the right).

End Date/Start Time: set end date and time of data export.

End Date: set year, month and day (from the left to the right).

End Time: set year, month and day (from the left to the right).

3. Trend Parameter

By setting “Information” to the Trend, you can select data of which parameter is exported in this section. Available parameters are:

HR, SPO2, RESP, IBP1, IBP2, CO2, T1, T2

4. Disclosure Waveform

By setting “Information” to the Disclosure, you can select signal of which parameter is exported. Available signals are:

ECG , SPO2, IBP1, IBP2, CO2, RESP

5. Alarm List Settings

By setting “Information” to the Alarm List, you can select which type or level of alarms is exported. Available options are:

Type, Level

The information are exported in two formats: TEXT and PDF. You can select your desired format in Export page.

After the settings have been made, press Export button and select path of data storage from pop-up dialog box. Default location is the desktop, but you can change path of data storage via the dialog box. Press “Create Folder” to make a new folder in the current path. Default name for the folder is displayed above the page and you can rename the folder.

NOTE: The file name cannot contain the characters |, <, >, “, \ and / . If you use these characters in the file name, the file will not be saved.

There are two buttons below the dialog box.

Cancel: Press this button to cancel data saving and to close the dialog box.

Save: Press this button to save data and to close the dialog box.

Help

Click this button to access HELP of the Export page.

3.4.4 HISTORY

By clicking this button, you can call up a page including these three tabs:

- Record List
- Alarm History
- PACS History

3.4.4.1 Alarm History tab

You can review HR alarm records of each bed through this tab. Each alarm record includes the below information:

Row, Date, Time, Alarm status (on/off),
Alarm limits, Alarm silence status

Alarm history tab

You can:

- Refresh
- Page up/down
- Search
- Help

Record List		Alarm History		PACS History			
Row	Date	Time	Alarm	Limit	Silence		
1	2009-01-22	12:57:24	On	110-60	No		
2	2009-01-22	12:57:11	On	110-60	Yes		
3	2009-01-22	12:56:22	On	110-60	No		
4	2009-01-22	12:50:14	On	110-60	No		
5	2009-01-22	12:07:30	On	85-170	No		
6	2009-01-22	12:01:24	On	85-170	No		
7	2009-01-22	12:25:22	On	85-170	No		
8	2009-01-22	12:25:21	On	85-170	Yes		
9	2009-01-22	12:12:29	On	85-170	No		
10	2009-01-22	12:12:24	On	85-170	Yes		
						Refresh	
						Up	
						Down	
						Help	
Bed	▽ 1 △	Search					

Bed

▽

1

△

Search

Refresh

Up

Down

Help

Figure 3-20 Alarm History Tab

Refresh

All information of the intended bed will be displayed.

Page up/down

Page up: Pages which are after the current page (if any) will be displayed.

Page down: Pages which are before the current page (if any) will be displayed.

Search

Select the intended bed, set the time for searching and click the Search button.

Help

Click this button to access HELP of Alarm History.

3.4.4.2 Nurse Call tab

According to the Bed number, the information about Nurse Call can be reviewed. Each record includes the “Row”, time and “Date” of pressing the Nurse Call button on the Patient monitor (“Request Time”) and the time and date of responding to the alert by pressing this button on that Bed of CMS (“Response Time”).

NOTE: In case of repeated requests from the Patient monitor, records should be saved with a minimum interval of one minute for each Bed.

Nurse Call tab functions

You can:

- Refresh
- Page up/down
- Help

Refresh

All information of the intended Bed will be displayed.

Page up/down

For navigation through Nurse call history:

Up: Pages which are after the current page (if any) will be displayed.

Down: Pages which are before the current page (if any) will be displayed.

Help

Click this button to access HELP of Nurse Call.

3.4.5 PACS

The connection to PACS server will be possible through this menu if the software supports PACS connection.

There is a button for each bed to send data to PACS server. The button will only be active if Patient ID is defined in Patient Info menu of the respective bedside and the bedside is connected to the CMS.

Click a button to send ECG data and corresponding Trend data of the respective bedside to PACS server for 10 seconds. The button text (Bed #) changes to PACS: # during data transfer. While the CMS is sending data of one bedside to the server, any request from other bedsides will be handled in sequence and the button text of respective bedside will change to In Queue #. During data transfer, the PACS button text in the taskbar changes to PACS: #. # is number of bedside which its data is being sent to the server.

If Disclosure page is opened in one bed window and PACS button is pressed, Disclosure data will be sent to PACS server.



Figure 3-22- PACS Menu

Available options in this page are:

- **Help**
- **View**

Help: Click to open Help page of the PACS.

View: Click to open a browser page for connection to the PACS server and displaying DICOM files.

NOTE:

- ✓ If “Bed Offset” is changed, the first bed number will be according to the adjusted number for “Bed Offset”.
- ✓ The View button is inactive in the view modes with structure $A \times B$ Beds + $A \times B$ Beds.
- ✓ Pay attention when entering patient ID. This ID is used to create and view DICOM file, so it should be unique for each patient.
- ✓ When a patient is discharged, you should record it in patient menu with “Discharge”. If not DICOM file of new patient is not recognizable of the file of previous patient.
- ✓ If information of a patient is not used any more, you should discharge that patient. Otherwise, DICOM file of new patient will not be recognized from DICOM file of the previous patient.

3.4.6 HELP

Click this button to access HELP menu and get information about different parts of the system.

4. Bed view

4.1 Overview

The CMS enables you to view one bed in enlarged mode on the second display (Bed View screen).

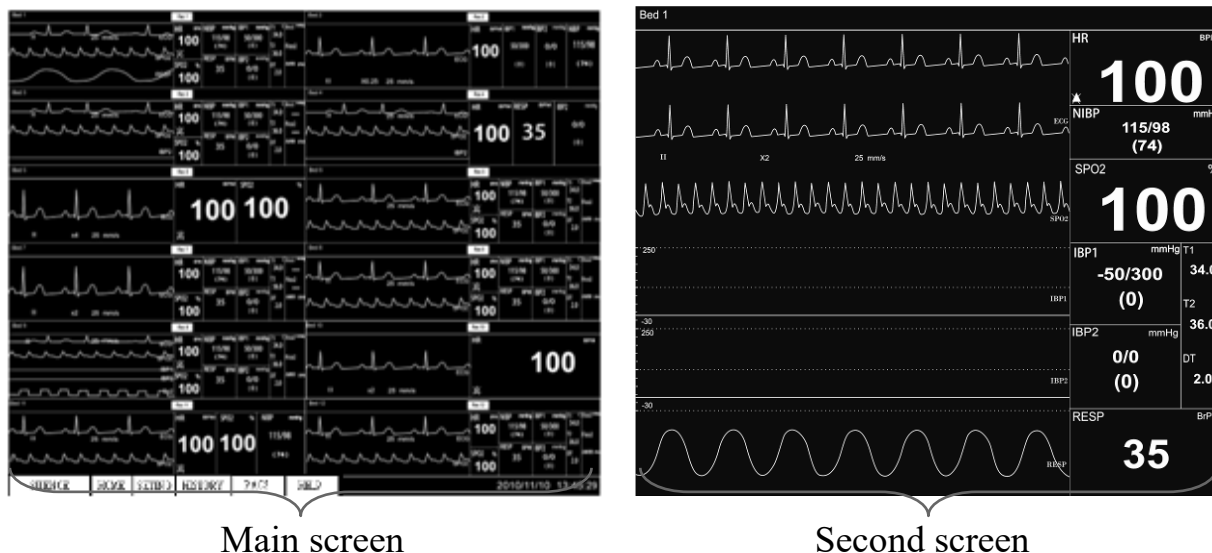
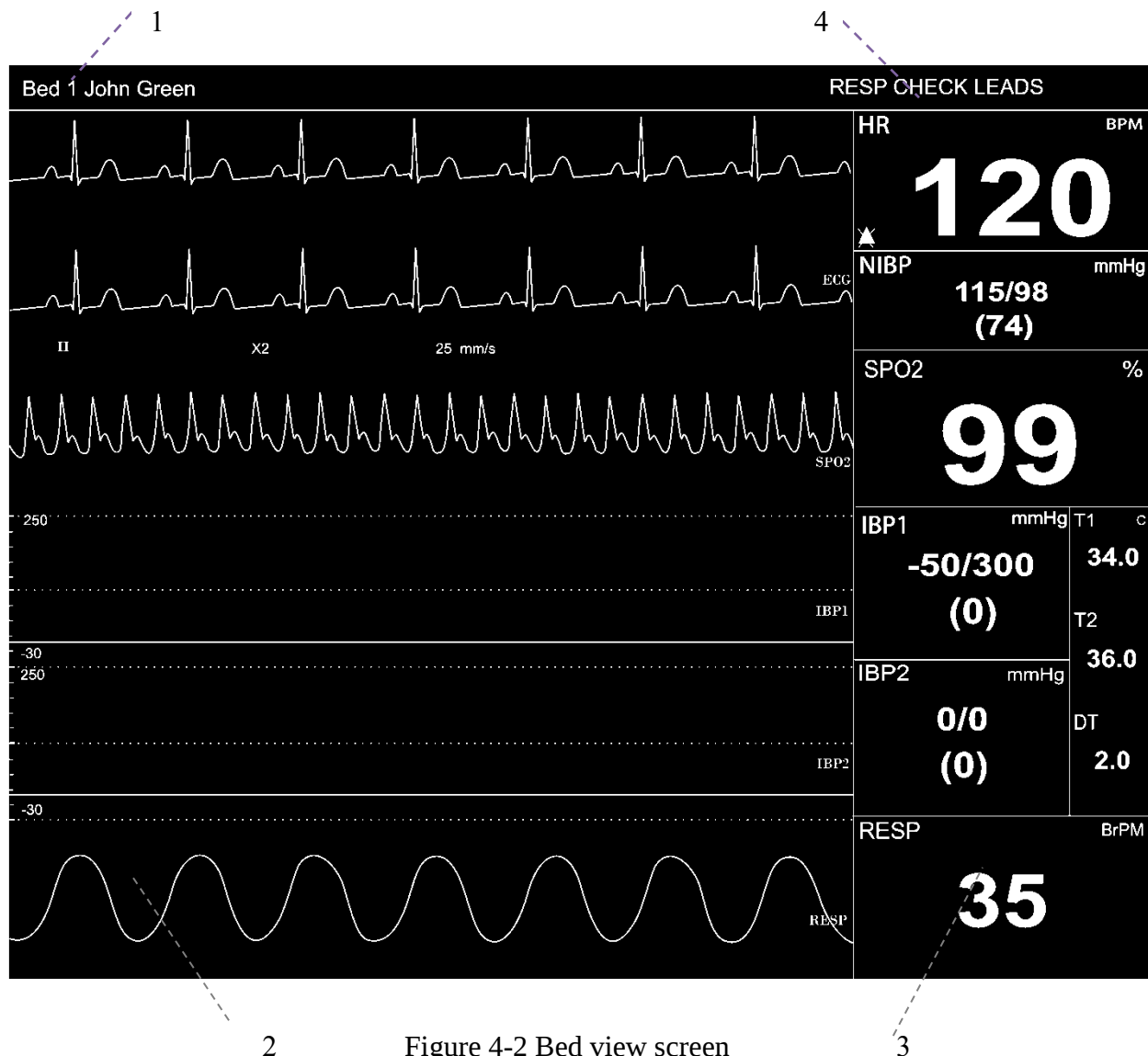


Figure 4-1 Bed View on the second screen

Click the “Bed View” in menu of a certain patient window.

NOTE: The Bed View button is inactive in the view modes with structure A×B Beds + A×B Beds.

4.2 Bed view screen



1. Patient Information Area

This area is to display bed number and patient name.

2. Waveforms Area

This area is to display waveforms transmitted from the Bedsides.

3. Parameter Area

This area is to display parameter values transmitted from the Bedsides.

4. Alarm Area

This area is to display visual alarms.

4.3 Freeze /Unfreeze waveforms

By clicking on the waveform area, you can freeze all dynamic waveforms in the waveforms area. In this status, the red message,” Frozen”, is displayed on the waveform area, and by clicking on this area again, it becomes unfrozen, and the message disappears.

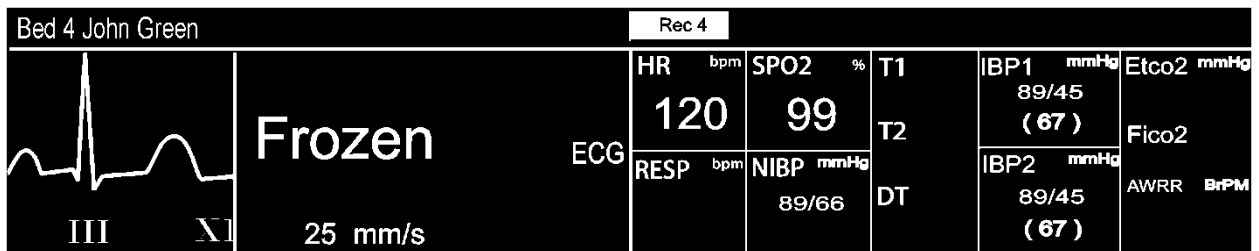


Figure 4-3 Frozen message

You can also freeze/unfreeze Bed View waveforms by clicking on the second display.

NOTE: Freezing Bed View waveforms has no effect on patient window waveforms, and vice versa.

5. Alarm Control

5.1 Alarm Structure

The alarms are triggered by abnormal vital signs (Physiological alarm), by technical problems of the bedside (Technical alarm) or by the CMS software (Systemic alarm) that the first two types of alarm will be transmitted to the CMS. The systemic alarms are intended to inform user about current status of the CMS. Visual and audio alarms are designed according to the standard IEC 60601-1-8.

■ As mentioned, the alarms are classified into the following categories:

1. Physiological alarms
2. Technical alarms
3. Systemic alarms

■ By severity, the alarms are classified into:

- level 1: High priority alarms
- level 2: Moderate priority alarms
- level 3: Low priority alarms

5.1.1 Audible alarms

The system will use different Alarm tones to indicate different alarm levels:

- High priority alarms: “DO-DO-DO—Do-Do----DO-DO-DO--Do-Do”, every 10 s.
- Medium priority alarms: “DO-DO-DO”, every 25 s.
- Low priority alarms: “DO”, every 50 s.

NOTE: When multiple alarms with different priorities occur at the same time, the system will select the alarm of highest priority and give alarm tone accordingly.

NOTE: Visual alarms can be seen from 2 m and audio alarms can be heard from 10 m.

NOTE: if alarm sound is silenced in bedsides with version 12 or later, all messages will be displayed in gray background.

5.1.2 SILENCE button

By clicking the "SILENCE" button, you can silence the alarm. If a new alarm occurs, alarm sound will be activated automatically. You can also activate alarm sound manually.

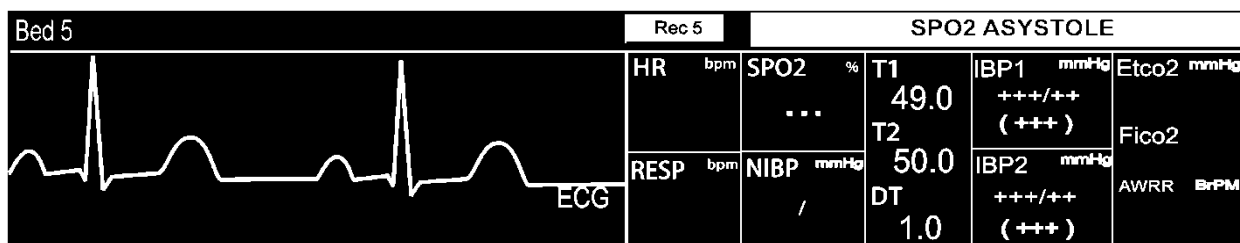


Figure 5-1 Alarm area

If you click the "SILENCE" button in normal situation, the color of the button will change, "AUDIO OFF" will appear and alarm sound will be silenced. Click again the button to return to normal status.



Figure 5-2 Alarm silence in normal status

If you click the "SILENCE" button in critical situation (e.g. RESP Apnea, Asystole, HR out of limit), the color of the button will change, the button text will change to "ALARM SILENCED" and the alarm sound will be silenced for 2 minutes (120s). If a new alarm occurs in this condition, the alarm sound will be activated automatically.

When alarm is silent in critical situation, icon  appears on the taskbar. You can return to normal status by clicking the button again and then icon will disappear.



Figure 5-3 Alarm silence in critical status

5.1.3 Visual alarms

If an alarm condition occurs for a patient, its corresponding patient window will give a visual alarm with colors indicating different alarm levels.

Priority of alarm	Background color	Font color
High (1)	“red”	“black”
Medium (2)	“yellow”	“black”
Low (3)	“cyan”	“black”

Visual physiological alarms, technical alarms of the Bedside and "Bed Disconnect" which is systemic alarm are displayed at the top of the patient window. Other systemic alarms of the CMS and the recorder error messages are displayed on the taskbar (Refer to chapter 12 for details).

NOTE: When multiple alarms occur in one window, if a level 1 alarm occurs, a message is displayed until the cause of the alarm disappears. Otherwise, level 2 and 3 alarms are displayed alternately.

5.1.4 Parameter blinking

If any physiological parameter of the patient generates an alarm, the parameter value will blink in the parameter area. When parameter value exceeds the alarm limits and alarm status is “on” in the bedside, the parameter value blinks in the CMS.

When the CMS starts up HR alarm limits cannot be set in this system and the adjusted alarm limits in the bedside are transmitted to the CMS.

NOTE: The bedside alarms are stored in the CMS and are not lost as a result of sudden power failure, turning off the CMS or disabling alarm.

NOTE: Alarm is transmitted from the bedside to the CMS with 1 sec delay (average time).

 WARNING

- If you select specific parameters to monitor, only alarms of those parameters will be enabled (See 7.1.2).
- Alarm sound should be set with regard to the patient and environment conditions in a way that the patient life is not threatened.

When an alarm occurs:

2. Check the patient condition.
3. Recognize related alarms to each module.
4. Identify the alarm cause.
5. Click “SILENCE” button, if necessary.
6. After removing the alarm cause, enable the alarm sound.

6. Information Review

6.1 Trend Review

By clicking the “Trend” button, you can access the below page and review up to 96 hours of trend data. Trend consists of Graph and Table.

6.1.1 Trend Graph

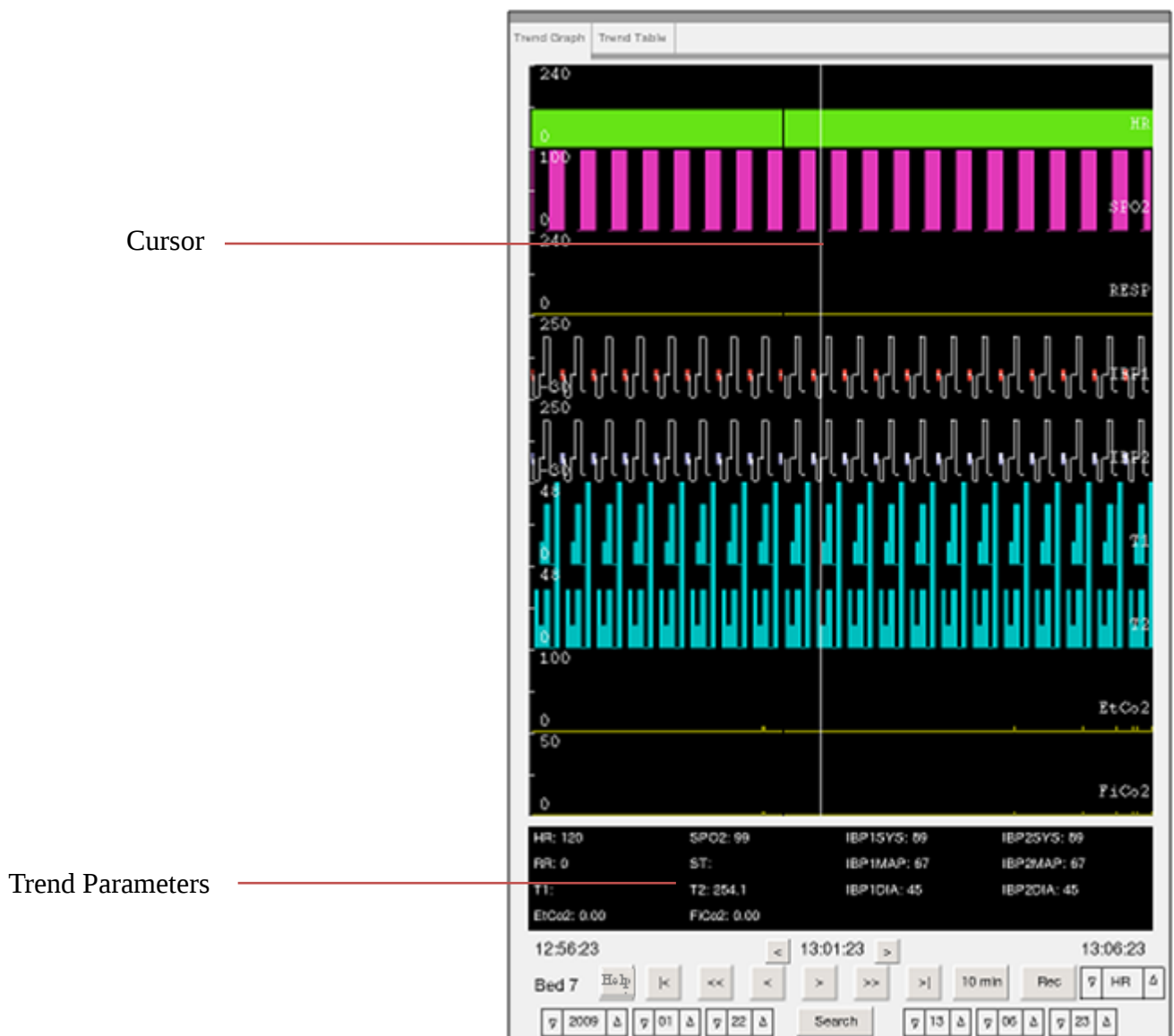


Figure 6-1 Trend Graph

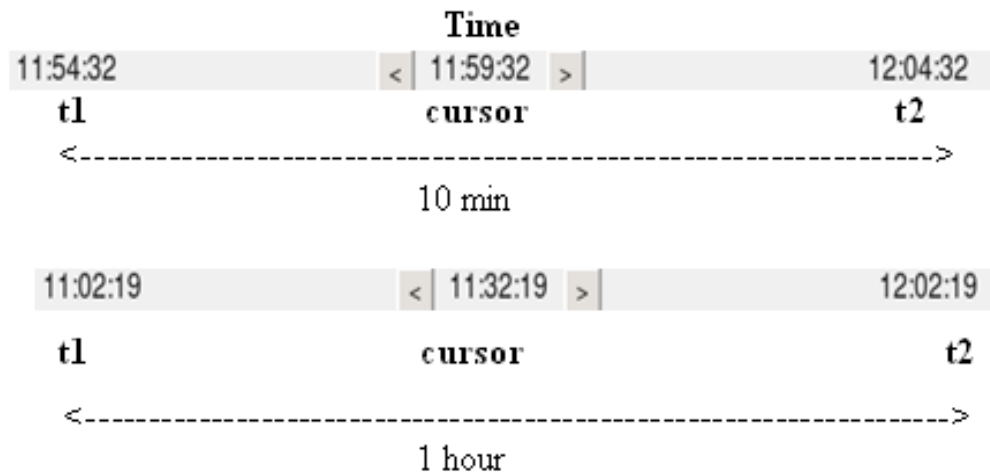
6.1.2 Trend Graph Function

In this page, you can:

- Review Trend graph and numeric parameters
- View parameters values at a certain time
- Refresh data
- Search
- Record
- Help

Review Trend graph and numeric parameters

By clicking on the trend graph, you can review the parameters values corresponding to the time of the cursor position and the adjusted time interval (10 min or 1 hour).



6-2 Time interval in Trend graph

NOTE: After saving 96 hours of Trend data in 16-bed mode or 48 hours of data in 32-bed mode if new data is saved, the earliest data will be deleted.

The following buttons will help you to search more easily:

	Displays the earliest trend data.
	Displays trend data which was recorded <u>1</u> hour before t1 and t2
	Displays trend data which was recorded <u>5</u> minutes before t1 and t2
	Displays trend data which was recorded <u>5</u> minutes after t1 and t2
	Displays trend data which was recorded 1 hour after t1 and t2
	1. Displays the recent trend data 2. Refreshes trend data manually.
	Displays Help of Trend graph.
	Moves the cursor 1s backward.
	Moves the cursor 1s forward.
	Displays trend data for interval of 10 min.
	Displays trend data for interval of 1 hour.
	Records the trend page.

Refresh Data

To refresh trend data, click  button.

Search

1. Click the search button to stop refreshing.
2. Set the time for search and click the search button.
3. T2 indicates the specified time.
4. For refreshing trend data, click  button.

Trend recording

1. Set time interval.
2. Click/touch Search button to stop refreshing
3. Choose your parameters from the combo box beside Rec button.
Selectable parameters are: HR, SPO2, RR, IBP1, IBP2, T1, T2, EtCo2, FiCo2
4. Press Rec button to start recording. Press again to stop recording.

During recording, besides parameter graph on Trend screen, patient information including date and time of recording, bed No, patient name, type and name of recording parameter, patient ID, gender, weight and height, domain, date of birth, doctor and hospital name are recorded. During recording, “Recording Trend Bed #” is displayed on the taskbar.



6-3 Trend recording message

NOTE:

Recording starts from t1 and continues to t2.

Trend printing

1. Touch/click “Search” to stop refreshing.
2. Select one page.
3. Choose your desired parameter from the combo box beside Print button.
4. Press Print button to start printing. Printing cannot be stopped.

By clicking the “Trend Table” tab, you can review Trend table that includes the following parameters values. There are 28 records in each page of the Trend table.

[First Page](#)
[Page Up](#)
[Search](#)
[2009](#)
[01](#)
[22](#)
[Bed 7](#)

[Last Page](#)
[Page Down](#)
[Help](#)
[13](#)
[00](#)
[27](#)

6.1.4 Trend Table Function

These items are available in the “Trend Table” tab:

- First page/ Last page
- Page Up/ Page Down
- Search
- Help

First page/ Last page

First page: The latest Trend data will be displayed.

Last page: The earliest Trend data will be displayed.

Page up/ page down

Page up: Pages which are after the current page (if any) will be displayed.

Page down: Pages which are before the current page (if any) will be displayed.

Search

1. Click the “search” button to stop refreshing.
2. Set the searching time and click the “Search” button.

Help

Click this button to access HELP of Trend Table.

6.2 NIBP List Review

6.2.1 Overview

You can review up to 1000 NIBP measurements of a patient by clicking the “NIBP List” button in the following page.

NIBP List displays Row, Date, Time, SYS/DIA (MAP), HR, Error.

6.2.2 Function

These items are available in the
“NIBP List” page:

- NIBP Start
- First page/ Last page
- Page Up/ Page Down
- Delete
- Delete All
- Help
- Record

[illegible]

Figure 6-5 NIBP List

NIBP Start

Sending NIBP measurement request



WARNING

Before using this function, please study NIBP chapter of the bedside's user manual and observe safety precautions.

Press NIBP Start to send measurement request to the bedside and start pressure measurement. The button will change to "NIBP Stop" during measurement. If you click on "NIBP Stop", the measurement will be stopped.

RTCP value and relevant message (if any) are displayed beside this button.

NOTE:

- ✓ Clicking on NIBP Start button will disable this button for 5 seconds.
- ✓ You cannot close NIBP List menu during measurement.
- ✓ If a bedside does not support NIBP measurement, this button will be inactive

First Page / Last Page

First page: The latest data of NIBP list is displayed.

Last page: The earliest data of NIBP list is displayed.

Page Up/ Page Down

If you want to scroll through the NIBP List, click:

- a) Page Up: To display pages which are after the current page, if any.
- b) Page Down: To display pages which are before the current page, if any.

Delete (this button is inactive)

1. Select an NIBP record from the NIBP list by clicking on that record.
2. Click the "Delete" button.

Delete All (this button is inactive)

Click this button to delete all records.

Help

Click this button to access HELP of NIBP List.

NOTE: After storage of 1000 NIBP records, by saving a new record the earliest record will be deleted.

NIBP List recording

1. Choose your desired page.
2. Press Record button to start recording. Press it again to stop recording.

Note: Start time of recording is corresponding to request time.

In addition to current page of NIBP List, patient information including date and time of recording, bed number, type of recording, patient ID, patient name, date of birth, gender, weight and height, hospital name, ward and doctor name are printed. During recording, “Recording NIBPList Bed#” is displayed on the taskbar.



6-6 NIBP List recording message

NIBP List printing

1. Choose your desired page.
2. Press Print button to start printing. Printing cannot be stopped.

6.3 Disclosure Review

6.3.1 Overview

You can review up to 48 hours of ECG waveform and numeric parameters in this page by clicking the “Disclosure” button.

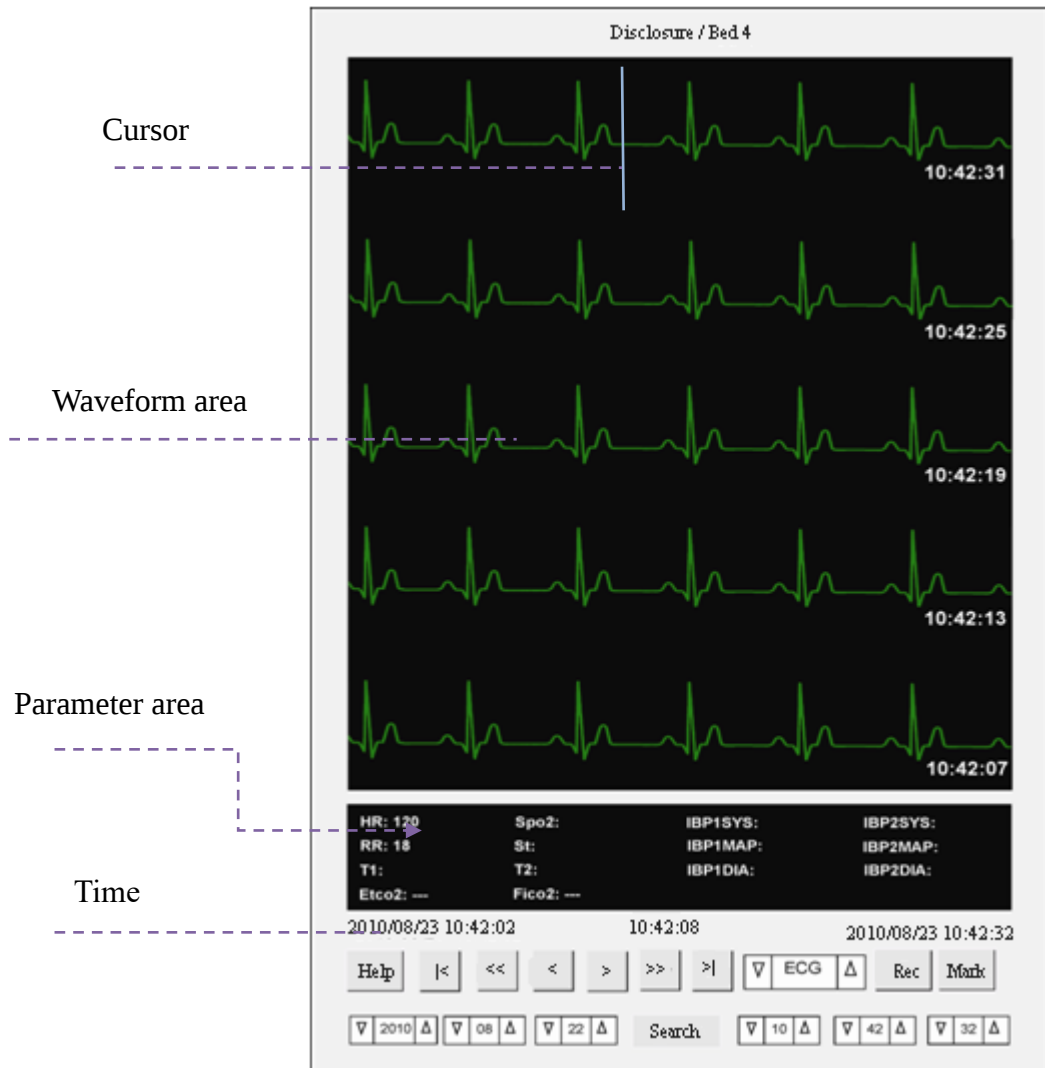


Figure 6-7 Disclosure page

Waveform Area

- This area is to display ECG waveforms for 30 s.

Parameter Area

- This area is to display these parameters values:
HR, SPO2, RR, ST, IBP1SYS, IBP1MAP, IBP1DIA, IBP2SYS, IBP2MAP,
IBP2DIA, EtCo2, FiCo2, T1, T2.

6.3.2 Function

In the “Disclosure” page, you can view parameter values at a certain time.

Reviewing parameters values at a certain time

This page is to display the disclosure data in interval of 30 seconds. The same as Trend search, you can search disclosure data at a certain time. The following buttons will help you to search more easily.

	Displays the earliest disclosure data.
	Displays disclosure data stored <u>5</u> min before t1 and t2 . (t1 and t2 are shown in figure 6-2)
	Displays disclosure data stored <u>30</u> seconds before t1 and t2.
	Displays disclosure data stored <u>30</u> seconds after t1 and t2.
	Displays disclosure data stored <u>5</u> min after t1 and t2 .
	1. Displays the most recent disclosure data. 2. Refreshes disclosure data manually.
	Displays Help of disclosure page.
	Records the disclosure page.
	Marks one point of the disclosure page.

Refresh Data

To refresh Disclosure data, click  button.

NOTE:

After saving 48 hours of Disclosure data in 16-bed mode or 24 hours of data in 32-bed mode if new data is saved, the earliest data will be deleted.

Disclosure Recording

There are two types of disclosure recording:

- a) Normal recording
- b) Recording marked area

a) Normal Recording

1. Touch/click the search button to stop refreshing.
2. Set the time to display Disclosure information.
3. Press Rec button to start recording. Press again to stop recording.

ECG signal, patient information including date and time of recording, bedside Number, type of recording, patient ID, patient name, date of birth, gender, weight and height, Trace 1, Trace 2, recording speed, ECG filter of bedside, hospital name, ward, doctor name and parameters values are recorded in normal recording.

NOTE:

- ✓ Recording starts from t1 and continues to t2. (30 S recording of ECG waveform)
- ✓ The printed values of lead, gain, and filter are related to the time of requesting the start of recording.

During recording, “Recording Disclosure Bed #” is displayed on the taskbar.



Figure 6-8 Disclosure recording message

b) Recording Marked Area

1. Press Mark button in the disclosure page to set start point of the recording. This point will be marked by a vertical red line.
2. Press Mark button again to set end point of the recording. This point will be marked by a vertical red line.
3. Press Rec button to start recording. Press again it to stop recording.

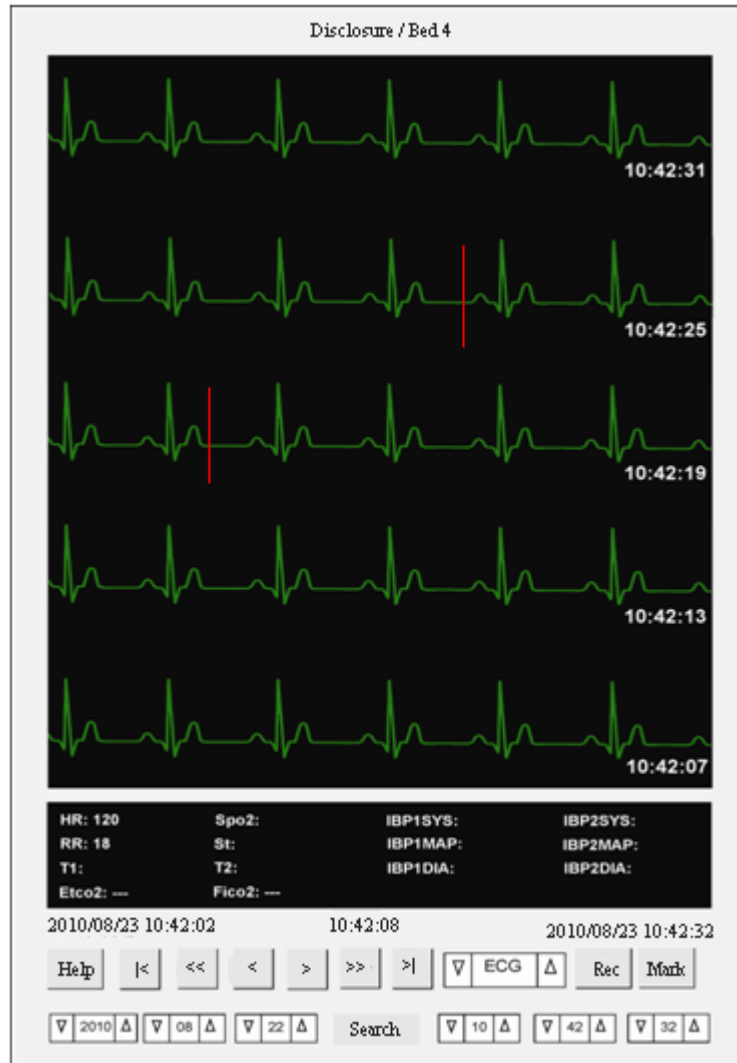


Figure 6-9 Marked points in disclosure page

During recording, ECG signal, patient information including date and time of recording, bedside Number, type of recording, patient ID, patient name, date of birth, gender, weight and height, Trace 1, Trace 2, recording speed, ECG filter of bedside, hospital name, ward, doctor name, parameters values will be recorded.

NOTE:

- Recording starts from the first marked point and continues to the second marked point.
- If you mark only one point, it will be considered as start point and the recording continues to t2 of the current page.

The recording message is the same as figure 6-8.

Disclosure printing

1. Click/touch Search button to stop refreshing
2. Select your desired time to display Disclosure data.
3. Press Print button to start printing. You cannot stop printing.

NOTE:

- ✓ Mark button is inactive in printer mode.

Help

Click this button to access HELP of Disclosure.

6.4 Alarm List Review

6.4.1 Overview

By clicking the “Alarm List” button, you can review up to 720 alarm events (10 records on each page) for each patient. Date, time, message and level of alarms are displayed in this page.

Alarm List / Bed 10

Alarm Type

▽
ALL TYPES
△

Alarm Level

▽
ALL
△

Row	Date-Time	Message	Level	Limits
1	06-06 18:08	IBP2 NO SENSOR	L	
2	06-06 18:08	IBP1 NO SENSOR	L	
3	06-06 18:08	IBP2 NO SENSOR	L	
4	06-06 17:54	IBP2 NO SENSOR	L	
5	06-06 17:54	IBP1 NO SENSOR	L	
6	06-06 17:54	IBP2 NO SENSOR	L	

First Page

Page Up

Delete

Record

Last Page

Page Down

Delete All

Help

Figure 6-10 Alarm List page

6.4.2 Function

The following functions are available in the “Alarm List”:

- Select alarm type and level
- First Page /Last Page
- Page Up/Page Down
- View alarm details in the Disclosure page
- Return to the Alarm List after observing alarm details in the Disclosure page
- Help
- Record

Select alarm type and level

Above the alarm list, there are two combo boxes to filter alarms: “Alarm Type” and “Alarm Level”.

If “Alarm Type” is set to Arrhythmia, the alarms will be filtered based on type of arrhythmia and “Alarm Level” will change to “Arr. Type”.

Available options for Alarm Type are “All Types”, “ECG”, “SPO2”, “RESP”, “NIBP”, “IBP”, “Co2”, “ARRHYTHMIA”, “ST”.

Available options for Alarm Level are “ALL”, “HIGH”, “MED”, “LOW” and “SILENCE”. Default setting for Alarm Type is “All Types” and for Alarm Level is “ALL”.

Available options for Arrhythmia are “VFIB”, “VTAC”, “RUN/AIVR”, “COUPLET”, “BIGEGENIMY”, “TRIGENIMY”, “TACHY”, “BRADY”, “AFIB”, “PAUS”, “FREQUENT PVCs”.

High-level alarm is indicated by “H”, Medium level by “M” and Low level by “L”. “S” indicates the messages with gray background (Refer to the bedside’s user manual).

In case of ECG alarm occurrence, it is possible to view HR alarm limits.

First page/ Last page

First page: The latest alarms will be displayed.

Last page: The earliest alarms will be displayed.

Page up/ page down

Page up: Pages which are after the current alarm page (if any) will be displayed.

Page down: Pages which are before the current alarm page will be displayed.

View alarm details in Disclosure page

By double clicking on each alarm event, you can view ECG waveform and related parameters values in the disclosure page. You can also view parameters values with respect to the cursor position and record them.

Return to Alarm List

After viewing alarm details, click the “Return” button in the disclosure page to return to the alarm list.

Help

Click this button to access HELP of Alarm List.

NOTE: After storage of 720 alarm events, if you save a new event, the earliest alarm event will be deleted.

- Delete and DeleteAll buttons are inactive.

Alarm List recording

1. Click/touch Search button to stop refreshing
2. Select an ECG alarm event (when no record is selected, Record button is inactive)
3. Press Record button to start recording. Press it again to stop recording.

ECG signal and information including date and time of recording, bedside Number, type of recording, patient ID, patient name, date of birth, gender, weight and height, Trace 1, Trace 2, recording speed, ECG filter of bedside, hospital name, ward, doctor name and parameters values are recorded on the paper.

During the recording, the message “Recording Manual Alarm Bed #” is displayed on the taskbar.



Figure 6-11 Alarm List recording message

7. Bed Setup

7.1 Overview

Click the Parameter area to open the respective menu. Select “Bed Setup” in this menu.

If the setting is changed and “Save” is pressed, new setting will be made in the current bed and “Bed Setup” page will be closed. Click “HOME” to close “Bed Setup” page. This page contains two tabs:

1) Bed Setting tab

Select “Save All Bed” to change “Speed”, “Freeze Record”, “Arrhythmia to PACS” and “Alarm Record” settings in all beds.

2) View Setting tab

Select “Save All Bed” to change settings of signals and parameters in all beds.

7.1.1 Bed Setting tab

The following items can be set in this page:

- ECG Lead
- ECG Gain
- ECG Speed
- HR ALARM ON/ OFF
- HR ALARM LOW limit
- HR ALARM HIGH limit
- Periodic Record
- Exchange Bed
- Alarm Record
- Freeze Record
- Arrhythmia to PACS

The screenshot shows the 'Bed Setting' tab selected. The title is 'Bed Setup / Bed 3'. The settings are as follows:

Parameter	Value	Unit	Lock
ECG Lead :	II		
ECG Gain :	AUTO	X1A	
Speed :	25	mm/s	
HR Alarm :	OFF		Locked
HR Alarm Low :	50		Locked
HR Alarm High :	150		Locked
Periodic Record :	OFF		
Exchange Bed :	---		
☐ Alarm Record ☐ Freeze Record			
☐ Arrhythmia to PACS			

Buttons at the bottom: Save, Save All Bed, Help.

Figure 7-1 Bed Setting tab

■ ECG LEAD

Available options for ECG Lead are:

I: To measure the heart rate and monitor RA – LA waveform.

II: To measure the heart rate and monitor RA – LL waveform.

III: To measure the heart rate and monitor LA – LL waveform.

aVR: To measure the heart rate and monitor $RA - (LA + LL)/2$ waveform.

aVL: To measure the heart rate and monitor $LA - (RA + LL)/2$ waveform.

aVF: To measure the heart rate and monitor $LL - (RA + LA)/2$ waveform.

V: To measure the heart rate and monitor $C - (RA + LL + LA)/3$ waveform.

NOTE: you can only select V, aVF, aVL and aVR in 5-lead ECG mode.

■ ECG Gain

To adjust the size of ECG waveform, select gain value for each lead from X0.25, X0.5, X1, X2, X4 and AUTO. In "AUTO" mode, the monitor chooses an appropriate gain automatically.

■ ECG Sweep Speed

Available options for Sweep speed are 12.5 mm/s, 25 mm/s and 50 mm/s.

NOTE: Changing sweep speed setting in the CMS does not have effect on the sweep speed setting of the bedside and vice versa.

■ HR Alarm

This item cannot be set in the CMS and bedside setting for this item is displayed. If you select ON, all alarm functions such as parameter blinking and audio alarm will be enabled.

If you select OFF, the icon  will be displayed in HR parameter area to indicate the alarm silence. When HR Alarm is activated again, the icon disappears.

NOTE:

This section can only be set by admin user (Refer to chapter 3, Admin tab).

■ HR ALARM LOW

To display low limit of HR alarm that has been set in the bedside. This item cannot be set in the CMS.

NOTE:

This section can only be set by admin user (Refer to chapter 3, Admin tab).

■ HR ALARM HIGH

To display high limit of HR alarm that has been set in the bedside. This item cannot be set in the CMS.

NOTE:

This section can only be set by admin user (Refer to chapter 3, Admin tab).

■ Periodic Record/Print

ECG signal can be recorded by recorder for 10 seconds and can be printed by printer for 40 seconds in different intervals. Available options for interval are:
(OFF, 15Min, 30Min, 1H, 2H, 4H, 8H, 12H, 24H)

In addition to ECG signal, information including date and time of recording, bedside number, type of recording, patient ID, patient name, date of birth, gender, weight and height, Trace1 and Trace2, recording speed and ECG filter of bedside, hospital name, ward, doctor name and parameters value are recorded/printed on the paper.

During the recording, the message “Recording Periodic Bed #” or “Printing Periodic Bed #” is displayed on the taskbar.



Figure 7-2 Periodic recording/printing message

■ Exchange Bed

By clicking/touching “Bed Setup” in a bed window and selecting your desired bed in “Exchange Bed”, you can transfer the selected bed to place of the current bed.

■ Alarm Record

When you select “Alarm Record” if an alarm occurs, the system will start recording automatically. The recording is initiated when HR value violates the adjusted alarm limits or ECG ASYSTOLE occurs. When ECG alarm occurs, the system records ECG waveform for 20 s.

In addition to ECG signal, information including date and time of recording, bedside number, type of recording, patient ID, patient name, date of birth, gender, weight and height, Trace1 and Trace2, recording speed and ECG filter of bedside, hospital name, ward, doctor name and parameters value are recorded on the paper.

During the recording, the message “Recording Automatic Alarm Bed #” is displayed on the taskbar.



Figure 7-3 Automatic Alarm recording message

■ Freeze Record

When you select “Freeze Record” in a patient window, the system records frozen ECG signal for 20 s. In this condition, you can freeze an abnormal ECG signal and record it.

In addition to ECG signal, information including date and time of recording, bedside number, type of recording, patient ID, patient name, date of birth, gender, weight and height, Trace1 and Trace2, recording speed and ECG filter of bedside, hospital name, ward, doctor name and parameters value are recorded on the paper.

During the recording, the message “Recording Freeze Bed #” is displayed on the taskbar.



Figure 7-4 Freeze recording message

■ Arrhythmia to PACS

If the system can connect to PACS server, upon occurrence of an arrhythmia event ECG data as well as corresponding Trend data in time of arrhythmia occurrence and other arrhythmia events (if any) will be sent to PACS server for 10 seconds.

7.1.2 View Setting tab

The following items can be set in this page:

- Waveforms
- Parameters
- Waveforms/ parameters color

The screenshot displays the 'View Setting' tab of the SAHAND Central System. The interface includes three tabs at the top: 'Bed Setting', 'View Setting', and 'HIS Setting'. The 'View Setting' tab is active. Below the tabs, there are three main sections. The first section, 'Select Signal', contains checkboxes for 'ECG', 'SPO2', 'IBP1', 'IBP2', 'CO2', and 'RESP'. The second section, 'Full Parameter', contains checkboxes for 'HR', 'SPO2', 'RESP', 'IBP1', 'IBP2', 'NIBP', 'TEMP', and 'CO2'. The third section, 'Set color of:', features a dropdown menu with 'HR' selected, a color selection box showing a bright green color, and 'Ok' and 'Cancel' buttons. At the bottom of the tab, there are two buttons: 'Restore to default' and 'Restore all to default'. At the very bottom of the window, there are three buttons: 'Save', 'Save All Bed', and 'Help'.

Figure 7-5 View Setting tab

- Selecting waveforms of the CMS main screen.

Available options are: ECG, SPO2, IBP1, IBP2, CO2, RESP

NOTE:

- With regard to the height of bed window, 2 to 5 waveforms can be selected for monitoring.
- It is not possible to select Co2 and RESP at the same time. ECG signal has been selected by default and cannot be unselected.

■ Selecting parameters of the CMS main screen

Full parameter: all parameters can be monitored.

Selectable parameters:

HR, SPO2, RESP, IBP1, IBP2, NIBP, TEMP, CO2, BFA

NOTE:

If “Full Parameter” is not selected:

- ✓ Up to 4 parameters can be selected.
- ✓ Only alarms of the selected parameters will be activated.

If “Full Parameter” is selected:

- ✓ BFA parameter is not displayed in “Full Parameter” mode.

NOTE:

If HR Source is set to SPO2 or IBP, HR will change to PR on the main screen.

■ Selecting waveforms/ parameters color

At first select parameter/waveform and then choose your desired color. Click the OK or Cancel button to confirm or cancel the setting. To restore default setting of the selected parameter/waveform, click "Restore to default". To view default color of all parameters/waveforms in a bed, select "Restore all to default".

7.1.3 HIS Setting tab

The following items can be set by admin user (Refer to chapter 3, Admin tab) in this page:

- Event to send data
- Parameters to save

Bed Setting	View Setting	HIS Setting	
Send data to HIS / Bed 3 			
Events to send data			
☐ All Alarms			
☐ ECG ☐ SPO2 ☐ RESP ☐ IBP1 ☐ IBP2			
☐ NIBP ☐ TEMP ☐ CO2 ☐ ARR			
☐ Record		Periodic	v Off Δ
☐ NIBP Measurement			
Parameters to save			
☒ Full parameter			
☐ HR ☐ SPO2 ☐ RESP ☐ IBP1 ☐ IBP2			
☐ NIBP ☐ TEMP ☐ CO2			
Save Save All Bed Help			

Figure 7-6 HIS Setting tab

■ Event to send data

1. ALL Alarms, ECG, SPO2, RESP, IBP1, IBP2, NIBP, TEMP, CO2, ARR

Upon occurrence of an alarm for each of above parameters or their relevant parameters, numeric values of parameters which are selected in the section “Parameter to save” (except NIBP) will be sent to HIS server.

2. NIBP Measurement

Select this item and measure NIBP to send Diastolic, Systolic and Mean pressures to HIS server.

3. Record

Select this item and take a record to send numeric values of the marked parameters in “Parameter to save” to HIS server.

4. Periodic

Set time interval to send numeric values of the marked parameters in “Parameter to save” to HIS server at the specified interval.

Available intervals are 15, 30 and 45 S, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50 and 55 min, 1, 2, 3, ... , 24 h.

■ Parameters to save

Available options for this section are NIBP, TEMP, CO2, Full Parameter, HR, SPO2, RESP, IBP1 and IBP2. Upon occurrence of an event for the marked parameter(s), numeric values of the parameter will be sent to HIS server.

- ✓ Numeric values of pertinent parameter(s) to a parameter will also be sent to HIS server, for example if HR is selected, numeric values of ST and PVCs will also be sent to HIS server.

NOTE:

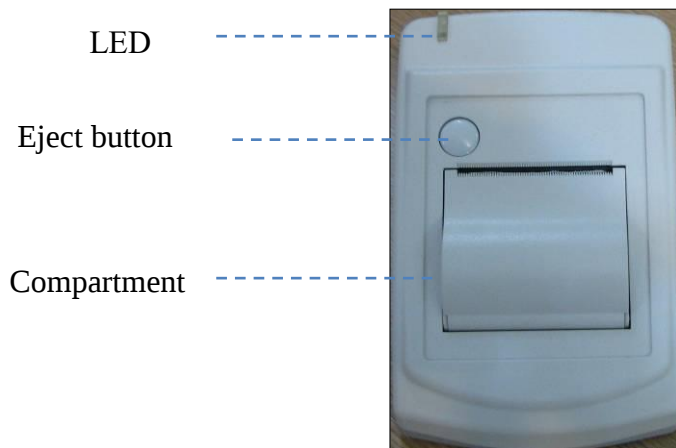
- ✓ Data of a bed will be sent to HIS server only if Patient ID is defined for that bed in PatientInfo page.
- ✓ Patient ID of each patient who accepted in the hospital must be entered carefully in the PatientInfo page. If this ID is entered incorrectly, information of a patient will be saved for other patient.
- ✓ If information of a patient is not used any more, Select Discharge from PatientInfo page and press Save button. If the previous patient is not discharged, information of new patient will be saved for the previous patient.
- ✓ NIBP values will be sent to HIS server only if :
 - 1- “NIBP Measurement” is marked.
 - 2- NIBP parameter is selected in “Parameters to save” section.
 - 3- NIBP is measured.

If each of above actions is not taken, NIBP values will not be sent to the server.

8. Recorder/Printer

8.1 Overview

SAADAT thermal recorder can be installed on the CMS.



8-1 Recorder front panel



8-2 Recorder rear panel

Recorder function

- Adjusting recording speed (12.5, 25 and 50 mm/s)
- Setting delay time (5,6, ..., 14, 15 sec)
- Recording ECG waveform
- Recording Pace pulse
- Recording via bedside
- Recording frozen ECG signal
- Automatic alarm recording

8.1.1 Recorder tab

Recorder tab was explained briefly in 3.4.3.2, more information about this tab are provided in this section.

You can select Recorder or Printer in this page. If Recorder is selected, the following page (Figure 8-3) will be displayed.

- 1- Touch / click the “Setting” on the taskbar to set the recorder.
 - 2- Touch /click “Recorder” tab.
 - 3- After setting, touch /click the “Save” button.
 - 4- To close the page, click the “HOME” button.
- **Speed:** to set recording speed. Available options are 12.5, 25 and 50 mm/s.
 - **Time:** to set recording time. Available options are 5,10, 15, 20, 25, 30 and Continuous.
 - **Trace 1** is ECG waveform.
 - **Trace 2** is off.
 - **Delay:** to set recording delay time.
 - Touch /click **Reset Recorder** to empty record list and reset the recorder.
 - Mark **Grid** to record/print in grid format.
 - The scale of ECG waveform is recorded/printed before the waveform.

The screenshot shows the 'Recorder' tab interface. At the top, there are four tabs: 'View', 'Recorder' (selected), 'Setup', and 'Admin'. Below the tabs, the following settings are displayed:

- Speed:** A dropdown menu showing '25' with 'mm/s' to its right.
- Time:** A dropdown menu showing '10 s'.
- Trace1:** A dropdown menu showing 'ECG'.
- Trace2:** A dropdown menu showing 'OFF'.
- Delay:** A dropdown menu showing '5' with 's' to its right.
- Grid:** A checkbox labeled 'Grid' that is checked.
- Mode:** A dropdown menu showing 'Recorder'.
- Buttons:** At the bottom, there are two buttons: 'Save' and 'Help'. To the right of the 'Mode' dropdown, there is a button labeled 'Reset Recorder'.

Figure 8-3 Recorder tab

NOTE:

The start time of recording depends on delay time. For example , if delay time is set to 5 s, it means that recording is done from 5 seconds before time of pressing “Rec” button.

8.1.2 Printer tab

If Printer mode is selected, the following page (Figure 8-4) will be displayed.

The screenshot shows a software interface with four tabs at the top: 'View', 'Printer' (which is selected), 'Setup', and 'Admin'. Below the tabs, there are several settings, each with a dropdown menu and a 'Reset' button (represented by a triangle icon):

- Speed: 25 mm/s
- Time: 40 s
- Trace1: ECG
- Trace2: OFF
- Delay: 40 s
- Grid: ☒ Grid
- Mode: Printer

At the bottom right of the settings area is a button labeled 'Reset Printer'. At the very bottom of the interface are two buttons: 'Save' and 'Help'.

Figure 8-4 Printer tab

- ✓ The CMS only supports laser printer.
- ✓ The size of the printer paper should be A4.
- ✓ Delay time of the printer is 40 sec and cannot be changed.
- ✓ Touch /click **Reset Printer** to empty print list and reset the printer.

8.2 Recording/Printing types

The recording is possible through the bedside and the CMS. The CMS provides two recording modes:

- Continuous recording

In this mode, the recording will continue until you stop it.

This mode is not available in the printer.

■ Normal recording/printing

In this mode, the recording will continue until the end of the adjusted interval. Available intervals are 5s, 10 s, 15 s, 20 s, 25 s, and 30 s which are set in the Recorder tab.

Other recording/printing types:

- Trend recording/printing (See 6.1.2)
- NIBP List recording/printing (See 6.2.2)
- Disclosure recording/printing (See 6.3.2)
- Alarm List recording/printing (See 6.4.2)
- Periodic recording/printing (See 7.1.1)
- Auto alarm recording/printing (See 7.1.1)
- Freeze recording/printing (See 7.1.1)

8.3 Functional and status messages of recorder

The following data is printed in header of normal and continuous recordings:

- Recording mode (Normal/Continuous)
- Date and time of recording
- Bedside number, patient ID, patient name, date of birth, gender, weight, height
- Trace 1 and Trace 2
- ECG lead and gain
- Sweep Speed and type of ECG filter in bedside
- Hospital, ward and physician name
- Parameters values

During the recording, the message “Recording Bed #” is displayed on the taskbar.



Figure 8-5 Recording message

If you touch/click the Rec button, text of the button will change to “Stop” or “In Queue #” according to the current status. The “Stop” indicates that the recording is

in progress and “In Queue #” indicates that the recording is in queue. Click “Stop” button to stop recording and return the button to the initial status.

NOTE:

- Make sure that the recorder is ON and the connections are made properly.
- Pay attention to the adjusted interval in “Recorder tab”.

Recording via bedside

You can change “Network” message on the bedside to “In Queue” by clicking Rec button. If no recording request from another bedside is in progress, this message will change to “Recording” at once. “Network” message will appear again on the bedside as recording finishes. In normal recording like continuous recording, you can click/touch “Stop” button to stop recording.

NOTE:

- In order to record via the bedside, set “INTERNAL RECORDER” to “OFF” in the bedside.
- If you do not stop continuous recording in the bedside, it will be stopped by the CMS after maximum 60 seconds.

8.4 Recorder Paper

57 mm width paper should be used for SAADAT recorder.

NOTE:

- Use only manufacturer recommended white thermo sensitive record papers, otherwise the recording quality may be poor and the thermal printhead may be damaged.
- Do not use grid paper.

It is recommended to use the paper with colored marks intended to indicate paper finish; otherwise the operator should ensure that there is sufficient paper for recording.

NOTE:

Do not use paper with edges that are pasted at the end of the roll. If they need to be used inevitably, replace them with a new paper roll as soon as possible before entire roll is used up.

⚠ WARNING ⚠

Do not touch the recorder head during recording and immediately after that because it is so hot and may result in physical injury.

⚠ WARNING ⚠

The recorder will be damaged by pulling its paper during recording.

NOTE:

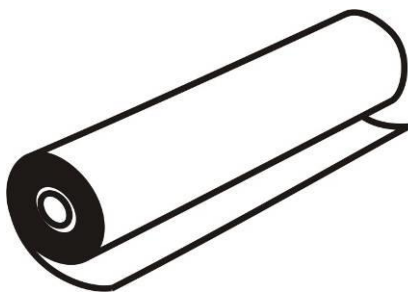
If the paper is jammed, open the recorder door and remove the paper. Do not pull the paper by force.

Loading the paper:

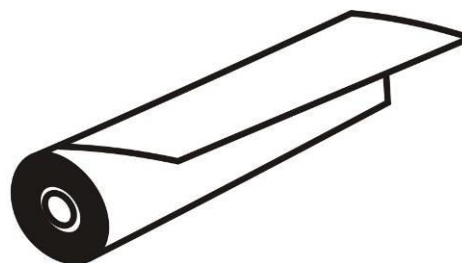
- Push the button on the recorder case to open its door.
- Insert a new roll of paper into the paper compartment.
- Close the recorder door

NOTE:

Thermo sensitive side of paper should be placed facing the head. Make sure to load the paper correctly.



a. incorrect loading



b. correct loading

Figure 8-6 Recorder paper loading

NOTE:

The paper detector may not operate properly if covered with a foreign matter. Therefore, if you find any foreign matter on the sensor, remove it and clean the sensor.

NOTE:

Be careful not to damage thermal printhead while inserting paper. Avoid touching thermal printhead.

8.5 Recorder Error Messages

If the following problems occur during monitoring, corresponding error message will be displayed.

Message	Cause	Solution
Software Error	Failure of the recorder software	Turn the recorder off and on. If the problem still exists, contact manufacturer Customer service.
Hardware Error	Failure of the recorder hardware	Turn the recorder off and on. If the problem still exists, contact manufacturer Customer service.
Door Open	The recorder door is open.	Close the recorder door.
Out of Paper	The recorder paper has been finished.	Load new roll of paper.
Printhead High Temp	The thermal head is too hot.	Stop recording for few minutes.
Printhead High Volt	Printhead voltage is high.	Turn the recorder off and on. If the problem still exists, contact manufacturer Customer service.
Printhead Low Volt	Printhead voltage is low.	Turn the recorder off and on. If the problem still exists, contact manufacturer Customer service.

9. Care & Cleaning

9.1 General Inspection

The CMS should be serviced every two years by trained personnel.

In the case of any damage, do not use the CMS. Contact the hospital biomedical equipment group or manufacturer service personnel immediately.

WARNING

- Failure on the part of the responsible hospital or institution to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazard.
- The safety checks or servicing involving any disassembly or decomposition of devices should be performed by professional service personnel; otherwise it may lead to undue equipment failure and possible health hazard.
- Turn off the CMS if no patient is to be monitored.

9.2 Cleaning and Disinfection

• General Points

Use only the substances approved by us and methods listed in this chapter to clean your equipment.

Manufacturer makes no claims regarding the efficacy of the listed chemicals or methods as a means for controlling infection. For the method to control infection, consult your hospital's Infection Control Officer or Epidemiologist. See also any local policies that apply within your hospital.

WARNING

- 1) Before cleaning the system, make sure that the equipment is switched off and disconnected from the power line.
- 2) Disinfection & Sterilization may cause damage to the device and is therefore not recommended for this device otherwise indicated in the instructions delivered with accessories or your hospital's servicing schedule.
- 3) If you see any signs of damage or deterioration in the device and its accessories, do not use it, and if necessary, contact the after-sales service company.
- 4) Allow the system to dry completely before making connections. And please make sure all connectors tightly connected to the system before using the system.
- 5) To prevent environmental pollution, the disposal of equipment shall be done in accordance with the policies of the hospital.

To avoid damage to the equipment, follow these instructions:

- **ALWAYS** wipe up the cleaning solution with a dry and soft cloth after cleaning.
- **NEVER** immerse the system or its peripheral into water or any cleaning solution.
- **NEVER** pour or spray cleaning agents directly on equipment surfaces.
- **NEVER** allow fluids drip into the casing, switches, connectors, or any ventilation openings in the equipment.
- **NEVER** use abrasive materials and erosive or acetone-based cleaners.
- **NEVER** use rough or sharp material or your fingernail to remove stubborn stains.

WARNING

Do not use ETO for disinfection.

The equipment surfaces shall be cleaned regularly. Cleaning frequency depends on the environment. If you are in an area that is heavily polluted or dusty, the equipment should be cleaned more frequently.

The equipment to be cleaned includes the host (or computer), and its peripheral devices (if applicable any I/O devices) such as display(s), printer, recorder, keyboard, mouse, network equipment, and so forth.

The following are permitted cleaning and disinfection agents:

- Water
- Mild soapy water
- Screen cleaner (for Display screen if needed)
- Low level disinfectant (if needed)

- **External Surfaces**

As required, the external surfaces of the system and its peripheral devices may be cleaned with a clean and soft cloth, sponge or cotton ball dampened with above cleaning and disinfection agents.

NOTE:

- 1) For cleaning of peripheral devices you may refer to the original manufacturer's Instructions For Use or hospital protocol for computer equipment and peripherals.
- 2) Take extra care when cleaning the screen of the display because it is more sensitive to rough cleaning methods than the housing.

- **Internal Surfaces**

_Recorder (printer head part)

Accumulation of paper powder or foreign matter between the thermal head and platen roller deteriorates the print quality. Clean the head elements and platen roller surface using alcohol and a cotton swab. Wait until the alcohol dries then close the recorder door.

 WARNING

Do not clean the recorder immediately after recording because thermal head and its surrounding area are hot during and after recording.

_Host (computer)

If needed, internal cleaning of host is recommended by a vacuum cleaner or similar device.

10. Troubleshooting

All repair operations should be carried out by the manufacturer authorized personnel, otherwise the manufacturer will not take any responsibility against eventual hazards to users and patients.

The purpose of this part is to resolve minor problems due to improper use of the CMS. Please follow audio-visual alarms and troubleshooting guide before calling Customer service.

Fault Symptoms	Possible Cause	Solution
Patient's vital signs is not displayed on the CMS	- The following items may have been switched off: • Bedside monitor • Network equipment • The CMS screen • The CMS - Network disconnection	- Check the power cable. - Make sure that the CMS equipment is switched on and connected securely. - Pay attention to the CMS messages. - Check the contrast and brightness of the CMS screen.
The system time and dynamic waveforms pause.	The system crashes due to power failure or switching off UPS	- Pay attention to the CMS messages
The system resets continuously .		- Call Customer service department.
Incorrect and abnormal vital signs	Incorrect information is displayed by the bedside.	- Measure clinical signs and symptoms by the other means and compare them with the displayed information by the bedside. If there is noticeable difference, refer to user manual (troubleshooting chapter) of S1600 and S1800 bed sides. - Do not use the system and call Customer service immediately.
Touch screen malfunction	- Touch screen cable is not connected. - Touch screen is out of calibration	- Connect touch screen cable to the back of the CMS case.
No alarm sound	Alarm silence	- Make sure that the alarm has not been silenced.
Incorrect display of information	Disconnection between the CMS and the bedside	- If the CMS equipment has been switched on and connected securely, call Customer service.
A flat line waveform is displayed and parameter value disappears.	- The module may be switched off or disconnected. - No module exists.	- Make sure that relevant module exists, is switched on and connected.

Fault Symptoms	Possible Cause	Solution
The recorder does not work	- The recorder is off - The recorder is disconnected. - Hardware or software error - The recorder is out of paper - The recorder door is open	- Pay attention to error messages. - Make sure that the recorder is switched on and functions correctly (the green LED of the recorder should light up). - Check that the recorder is connected to the CMS securely.
The recording stops before the adjusted time	- The recorder is out of paper - The recorder door is open - Network disconnection	- Pay attention to the recorder messages on the taskbar. - If the recorder equipment has been connected correctly, call Customer service.
Low quality of recording	- Inappropriate recorder paper	- Use standard and approved papers by the manufacturer.
No record can be taken by the bedside during the Central monitoring	- “INTERNAL RECORDER” is not set to OFF. - Network disconnection	- Set off “INTERNAL RECORDER” in the bedside.
No system sound	- Incorrect connection of HDMI cable	- If one monitor is used, turn off the system and connect HDMI cable to relevant socket, then turn on the system. - Call Customer service department.

11. Technical Specifications

SAHAND		SAHAND Pro
Minimum Hardware Specification		
CPU	1.1 GHz or above	
RAM	DDR3 1600 2 GB or above	
Graphic card	Two output and compatible with Linux	
Hard disk	SSD/SD card 64 GB or above	
Power supply	Varies by configuration selected	
UPS	At least 3 hours stability	Not Applicable
Interface connection	Network, Serial port, USB 2.0	
Input/Output Devices (Optional)	Mouse, Touch, Keyboard, Barcode Scanner	Mouse, Keyboard, Barcode Scanner
OS		
Operating system	Linux UBUNTU 14.04 /10.04/7.04	Linux UBUNTU 14.04
Display		
Screen size	Each full HD color TFT LCD/LED	24" Touch Screen and full HD color TFT
Resolution	1280/2560 × 1024 or 1920/3840 × 1080	1920/3840 × 1080
Number of displays	One or two (optional)	
Waveforms	ECG (I, II, III, aVR, aVL, aVF, V), SpO ₂ , Dual IBP, Resp/Co2 (All freezable)	
Signal sweep	12.5 ,25 ,50 mm/s	
Numeric Parameters	HR, SpO ₂ , Dual Temp, DT, NIBP, Dual IBP, RESP /CO ₂ (EtCo ₂ , FiCo ₂ , AWRR), BFA	
User guide	Onscreen Help	
Nurse Call		
Network		
Protocol	TCP/IP	
Connection	LAN with RJ45 interface, Ethernet 802.3 WLAN IEEE 802.11a/b/g/n, Wireless	
Bed Communication		
Number of beds	Supports up to 32 Saadat patient care monitors	
Bidirectional control	The following settings of each bedside can be changed via central monitoring system: ECG Lead, ECG Gain, HR Alarm	
Alarm		
Alarm types	Physiological, Technical, Systemic	
Alarm levels	High, Moderate, Low	
Alert	Audible-Visual alarm	
Data Review		
Trend	Review of up to 96 hours Trend, Graphic and Tabular	
Disclosure	Up to 48 hours store and review of ECG waveform	
NIBP List	Review of 1000 NIBP measurements, NIBP measurement via central monitoring system	
Alarm List	Review of 720 Alarm events	
Nurse Call	Review of 100 Nurse Call events	
Patient info	Managing Patient information	
Alarm History	Storing 100 HR alarm setting and silence status	
Export	Retrieving selected information and store them on external memory	
Communication with Hospital systems (Optional)		
PACS	Making files based on DICOM protocol and sending them on PACS server Viewing DICOM files via web browser	
HIS	Sending vital signs and alarms to HIS server based on HL7 protocol	
Recorder (Optional)		
Model	Saadat external thermal recorder	
Size	120 × 96 × 165 mm (W × H × D)	
Weight	425 g (approximately)	
Printing speed	12.5 ,25 ,50 mm/s	
Paper width	57 mm	
Trace	1 waveform (ECG)	
Recording type	Fixed time/Continuous recording, Automatic / Manual Alarm recording, NIBP List recording, Trend recording, Disclosure recording, Freeze recording, Periodic recording, Bedside Arrhythmia list recording.	
Power supply	DC 12V, 3A	
Data interface	RS232 interface	
Printer (Optional)		
Model	Laser printer	
Paper size	A4	
Printing speed	12.5 ,25 ,50 mm/s	
Trace	ECG waveform	
Printing type	Fixed time printing , Automatic / Manual Alarm printing , NIBP List printing, Trend printing, Disclosure printing, Freeze printing, Periodic printing.	
ENVIRONMENTAL CONDITION		
Temperature	Operating :	0°C to +50°C
	Storage & Transport:	-25 to 60 °C
Humidity	Operating :	20-90 % (Noncondensing)
	Storage & Transport:	10-100 % (Noncondensing)
Size & Weight		
Net Dimensions	Varies by configuration selected	573mm×52mm ×400mm
Net Weight	Varies by configuration selected	7.5 Kg

12. Alarms and Messages

The alarms are categorized into Technical, Physiological and Systemic. Error messages of the recorder have been described in the section 8.5. All physiological alarms are received from the bedside. Systemic alarms and messages are as follows:

12.1 The CMS

The CMS Systemic Alarm Message	Alarm Level	Description
Temperature is too high, the system is shutting down after #second Please call after sale service	1	The CMS temperature exceedsthe upper limit. The red message in the middle of the screen.
Bed Disconnect	2	Patient monitor is disconnected from the CMS. The yellow message is displayed above the patient window.
Recorder is disconnected	3	The recorder is off or disconnected from the CMS. The cyan message is displayed on the taskbar.
Printer is disconnected	3	The printer is off or disconnected from the CMS. The cyan message is displayed on the taskbar.

The CMS Systemic Message	Cause	Description
SYSTEM IS CHECKING DATABASE PLEASE WAIT...	Database is checked in time of the system booting	The message is displayed in form of progress bar when the system is starting up.
SYSTEM IS REPAIRING DATABASE PLEASE WAIT...	The system crashes due to sudden power failure or switching off UPS	The message is displayed in form of progress bar when the system is starting up.
LOADING ..., PLEASE WAIT!	User changes View mode	The red message on the taskbar.
Recording Bed #	The system is recording.	The red message blinks on the taskbar.
Network problem, system restarts in # s	No network connection (failure of network module)	The red message is displayed on the taskbar and the system resets after 120 sec.
Network cable is unplugged	No network connection (cable disconnection)	The red message on the taskbar.
Not Licensed	There is not software activation file in the system or its content is invalid.	The red message on the taskbar.
Delete software problem	Delete software does not run or has bug.	The red message on the taskbar.
Reset software problem	Reset software does not run or has bug.	The red message on the taskbar.

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Printer software problem	Printer software does not run or has bug.	The red message on the taskbar.
Transmit software problem	Transmit software does not run or has bug.	The red message on the taskbar.
PACS viewer software problem	PACS viewer software does not run or has bug.	The red message on the taskbar.
Invalid connection to PACS server	Interruption in PACS Server/Gateway connection	The red message on the taskbar.
Please turn off and on the system	Network, date or time settings are changed.	The red message in the middle of the screen.
Recording Trend Bed#	Trend recording is in progress.	The red message on the taskbar.
Recording Disclosure Bed#	Disclosure recording is in progress.	The red message on the taskbar.
Recording NIBPList Bed#	NIBP List recording is in progress.	The red message on the taskbar.
Manual Alarm Record	Alarm recording is in progress.	The red message on the taskbar.
Recording Periodic Bed#	Periodic recording is in progress.	The red message on the taskbar.
Recording Freeze Bed#	Freeze recording is in progress.	The red message on the taskbar.
Recording Automatic Alarm Bed #	Automatic alarm recording is in progress.	The red message on the taskbar.
Printer paper out	The printer paper is finished.	The red message on the taskbar.
Backup Software Problem	Backup software does not run or has bug.	The red message on the taskbar.
Save Software Problem	Save software does not run or has bug.	The red message in the Export menu.
Please Wait...	The software is creating file.	The red message in the Export menu.
YOU CAN CHOOSE A MAXIMUM OF TWO DAYS	The selected interval for data export exceeds 2 days.	The red message in the Export menu.
START DATE/TIME IS GREATER THAN END		The red message in the Export menu.
WARNING:THERE IS NOT ANY INFORMATION FOR THIS BED		The red message in the Export menu.
THERE IS NOT DATA IN TIME YOU SELECT		The red message in the Export menu.

ERROR IN GET BACKUP,PLEASE SELECT ONE ITEM	No parameter is selected.	The red message in the Export menu.
You are trying to set time backward you will lose data, are you sure?		The message is displayed in the Setup menu.

12.2 Physiological and Technical Alarms of Bedside

If the bedside has the ability to send alarm message and level to the CMS, alarm messages and their level will be shown by the CMS. Otherwise, the alarm messages and their levels will be according to the below table. You can see Alarm chapter of the bedside's user manual for more information.

Alarm Message	Alarm Level
ECG	
ECG NO CABLE	3
ECG SIGNAL WEAK	3
ECG ASYSTOLE	1
ECG CHECK LL OR ALL	3
ECG CHECK LA OR ALL	3
ECG CHECK RA OR ALL	3
ECG CHECK RL OR All	3
ECG CHECK RA	3
ECG CHECK LL	3
ECG CHECK LA	3
ECG CHECK C	3
HR OUT OF LIMIT	1
TEMP	
T2 OUT OF LIMIT	1
T1 OUT OF LIMIT	1
RESP	
RR OUT OF LIMIT	1
RESP CHECK LEADS	3
RESP APNEA	1
IBP1	
IBP1MAP OUT OF LIMIT	1
IBP1DIA OUT OF LIMIT	1
IBP1SYS OUT OF LIMIT	1
IBP2MAP OUT OF LIMIT	1
IBP1 NO SENSOR	3
IBP1 ADJUST SCALE	3
IBP1 STATIC PRESSURE	3
IBP1 SEARCH	3
IBP1 DEFECT	3
IBP2	
IBP2DIA OUT OF LIMIT	1
IBP2SYS OUT OF LIMIT	1
IBP2 NO SENSOR	3
IBP2 ADJUST SCALE	3

IBP2 STATIC PRESSURE	3
IBP2 SEARCH	3
IBP2 DEFECT	3
ETCO2	
ETCO2 OUT OF LIMIT	1
FICO2	
FICO2 OUT OF LIMIT	1
AWRR	
AWRR OUT OF LIMIT	1
SPO2	
SPO2 PROBE DEFECT	2
SPO2 NO PROBE	3
SPO2 PROBE OFF	2
SPO2 CHECK PROBE	2
SPO2 HIGH AMBIENT LIGHT	2
SPO2 SIGNAL WEAK	3
SPO2 ASYSTOLE	1
SPO2 OUT OF LIMIT	1
NIBP	
NIBPMAP OUT OF LIMIT	1
NIBPDIA OUT OF LIMIT	1
NIBPSYS OUT OF LIMIT	1
NIBP MODE ERROR	2
NIBP SELF TEST FAILED	2
NIBP LOOSE CUFF	2
NIBP AIR LEAK	2
NIBP AIR PRESSURE ERROR	2
NIBP SIGNAL WEAK	2
NIBP RANGE EXCEED	2
NIBP EXCESSIVE MOTION	2
NIBP OVER PRESSURE SENSED	2
NIBP SIGNAL SATURATED	2
NIBP PNEUMATIC LEAK	2
NIBP SYSTEM FAILURE	2
NIBP TIME OUT	2
NIBP MODULE ERROR	2
NIBP MODULE DEFECT	2
NIBP STOP ERROR	2
NIBP STOP PRESSED	2
NIBP LEAKAGE OK	2
NIBP NO MODULE	2
NIBP LOW BATTERY	2
CO2	
CO2 SYSTEM FAULT#	2
CO2 SENSOR STANDBY MODE	2
CO2 NO WATER TRAP	3
CO2 NO MODULE	2
CO2 NO SENSOR	3
CO2 CHECK SAMPLE LINE	2
CO2 NO ADAPTER	2
CO2 INVALID	2
CO2 INVALID AMBIENT PRESSURE	2
CO2 INVALID AMBIENT TEMPERATURE	2
CO2 ROOM AIR CALIB REQUIRED	2
CO2 ACCURACY INVALID,PLEASE ZERO	2

CO2 INLET OCCLUDE	2
CO2 EXHUST OCCLUDE	2
CO2 UNEXPECTED REVERSE FLOW	2
CO2 UNEXPECTED FORWARD FLOW	2
CO2 CULATION ERROR	2
CO2 RESP APNEA	1
CO2 REPLACE ADAPTOR	2
CO2 SAMPLING LINE CLOGGED	2
ARRHYTHMIA	
VFIB ARRHYTHMIA	1
VTAC ARRHYTHMIA	1
RUN ARRHYTHMIA	1
AIVR ARRHYTHMIA	1
COUPLET ARRHYTHMIA	1
BIGEMINY ARRHYTHMIA	1
TRIGEMINY ARRHYTHMIA	1
TACHY ARRHYTHMIA	1
BRADY ARRHYTHMIA	1
AFIB ARRHYTHMIA	1
PAUS ARRHYTHMIA	1
FREQUENT PVCs	1
RELEARN	2
CAN NOT LEARN	2
ECG NOISE	2

13. System Defaults

Menu item	Selection	Default
View menu		
Mode	2×2 Beds + BedView, 2×2 Beds + 2×2 Beds, 3×2 Beds + BedView, 3×2 Beds + 3×2Beds, 4×1 Beds + BedView, 4×1 Beds + 4×1 Beds, 4×2 Beds + BedView, 4×2 Beds + 4×2 Beds, 5×1 Beds + BedView, 5×1 Beds + 5×1 Beds, 5×2 Beds + BedView, 5×2 Beds + 5×2 Beds, 6×1 Beds + BedView, 6×1 Beds + 6×1 Beds, 6×2 Beds + BedView, 6×2 Beds + 6×2 Beds, 7×1 Beds + BedView, 7×1 Beds + 7×1 Beds, 8×1 Beds + BedView, 8×1 Beds + 8×1Beds, 8×2 Beds + BedView, 8×2 Beds + 8×2 Beds, 9×1 Beds + BedView, 9×1 Beds + 9×1Beds, 10×1 Beds + BedView, 10×1 Beds + 10×1Beds	8x2 Beds + 8x2 Beds
Recorder menu		
Speeded	12.5, 25, 50 mm/s	25 mm/s
Time	5,10,15,20,25,30s,continuous	10s
Trace1	ECG	ECG
Trace2	OFF	OFF
Delay	5-15s	5s
RecordMode	Recorder, Printer	record
Setup menu		
Language	English,Russian, Polski,	English
Set Thick	Thick, Normal	Normal
ScreenSize	17, 18.5 Wide, 19, 19 Wide, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 39, 42, 46, 48, 50, 55, 58, 60, 64, 70, 80, 84, 99, 102, 108, 111, 152	19"
Brightnss	1-7	4
SoundVolume	0-100%	30%
Help Language	English, Persian	English
Admin menu		
Company	SADAAT, PEC,INTEGRAL, MESSA, HEYER, SIARE, NOLOGO	NOLOGO
BedOffset	0-99	1
#Bed	1-32	
BaseIP		102
IPAddress		192.168.0.200
UDP_Port	40-2000	40
TCP_Port	40-2000	50
PACS Server IP		192.168.0.254
Default Gateway IP		192.168.0.16
Export menu		
Inforamation	NIBP List, Alarm List, Disclosure, Trend	Disclosure
Trend Parameters	HR, SPO2, IBP1, IBP2, CO2, T1, T2	HR
Disclosure Waveforms	ECG, SPO2, IBP1, IBP2, CO2, RESP	ECG
Alarm List Settings	Type: ALL TYPES, ECG, ARRHYTHMIA, SPO2, RESP, NIBP, IBP, Co2, ST Level: ALL, HIGH, MED, LOW, SILENCE Arr.Type: VFIB, VTAC, RUN/AIVR, COUPLET, BIGEGENIMY, TRIGENIMY, TACHY, BRADY, AFIB, PAUS, FREQUENT PVCs	Type: ALL TYPES Level: ALL
Bed Setting menu		
ECG Lead	I,II,III, aVR, aVL, aVF, V	II
ECG Gain	AUTO,X0.25,X0.5,X1,X2,X4	AUTO
Speed	12.5, 25, 50	25s
HR Alarm	OFF, ON	OFF
HR Alarm Low	30-250	50
HR Alarm High	35-255	100

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Predic Record	OFF, ON	OFF
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View Setting		
Signal	ECG, SPO2, IBP1, IBP2, CO2, RESP	ECG, SPO2
Parameter	Full parameter,HR, SPO2, IBP1, IBP2, TEMP, CO2, BFA	Full parameter
HIS Setting		
Event to send data	All Alarms, ECG, SPO2, RESP, IBP1, IBP2, NIBP, TEMP, CO2, ARR, Record, Periodic (15,30,45 s و 5,10,15,20,25,30,35,40,45,50,55 minute و 1,2,3,...,24 hour), NIBP Measurement	
Parameters to save	Full Parameter, HR, SPO2, RESP, IBP1, IBP2, NIBP, TEMP, CO2, BFA	Full parameter
Color		
HR		Green
SPO2		Violet
IBP1		Orange
IBP2		Purple
CO2		Yellow
RESP		Yellow
NIBP		White
TEMP		Sea Green
BFA		Blue

14. Patient Safety



This symbol means that consult user manual of the CMS and pay attention to the warnings and cautions.



This symbol indicates that the equipment shall be disposed of in an environmentally-friendly manner.

15. Preventive Maintenance (PM) Checklist

The preventive maintenance (PM) checklist #PL-F-25 should be completed by healthcare personnel. It should be noted that PM checklist only is used to perform systematic inspection of the equipment and will not guarantee their correct function.

SAADAT Co.				
Form No. : PL-F-25/2		PM Form (CMS)		
State:		City:	Medical center:	Ward:
Device model:		Serial number:	Installation date:	Inspection date:
No.	Test and Inspection Item	OK	NOK	N/A
Visual inspection				
1	No rip and fraying in power cables	☐	☐	☐
2	No rip and fraying in network cables	☐	☐	☐
3	No damage in RJ45 plug (for network cable)	☐	☐	☐
4	No damage or breakage in monitors, casing, internal parts, hub switch and recorder	☐	☐	☐
Touch screen				
5	Calibration and responsiveness	☐	☐	☐
Recorder				
6	Function	☐	☐	☐
7	Paper quality	☐	☐	☐
8	Printer function	☐	☐	☐
Functional test				
9	Quality of the system sound (Alarm sound)	☐	☐	☐
10	Data storage (Trend and Disclosure)	☐	☐	☐
11	No display of systemic error messages on the task bar (Delete software problem, Reset software problem and etc)	☐	☐	☐
Final decision: Pass ☐ Fail ☐				

Expert comments:

Name & signature of healthcare specialist:

Name & signature of expert:

APPENDIX I

Electromagnetic Compatibility

The CMS is considered as part of a medical electrical system. The Saadat provided system has been evaluated for electromagnetic compatibility (EMC) according to relevant standards.

All components of the CMS including the main device, displays, touch, hub switch and printer carry CE-marking according to the European Low Voltage and EMC Directives.

Note: The CMS is not suitable for installation in the Patient Care Environment.

WARNING

- Do not use cellular phone in the vicinity of the CMS. High level of electromagnetic radiation emitted from such devices may result in strong interference with the system performance.
- To prevent EMC effect on the CMS, it should not be used adjacent to or stacked with other equipment and if adjacent or stacked use is necessary, the system should be checked for normal operation in the configuration in which it will be used.

Manufacturer's declaration – electromagnetic emissions						
Component		Main PC	Display	Hub Switch	Printer	Touch
EN 60601-1-2, Clause 4.1.2						
a)	The equipment that is not ME EQUIPMENT complies with applicable international EMC standards	This sub-clause is met with its own international standards which are ITE standards in this case and have been specified in related certificate.				
b)	Both the EMISSION and IMMUNITY of the electrical equipment that is not ME EQUIPMENT have been determined not to adversely affect the BASIC SAFETY or ESSENTIAL PERFORMANCE of the ME SYSTEM; and	The CMS is installed outside the patient environment and the only connection between central unit and the bedside monitors is a TCP/IP cable for data transmission therefore the EMC properties of the CMS would not have any effect on EMC properties of patient monitors.				
c)	The EMISSION of the electrical equipment that is not ME EQUIPMENT have been determined not to cause the EMISSION of the ME SYSTEM to exceed applicable limits.					