GE HEALTHCARE CARESCAPE MONITOR B650 TECHNICAL MANUAL

Quick Links

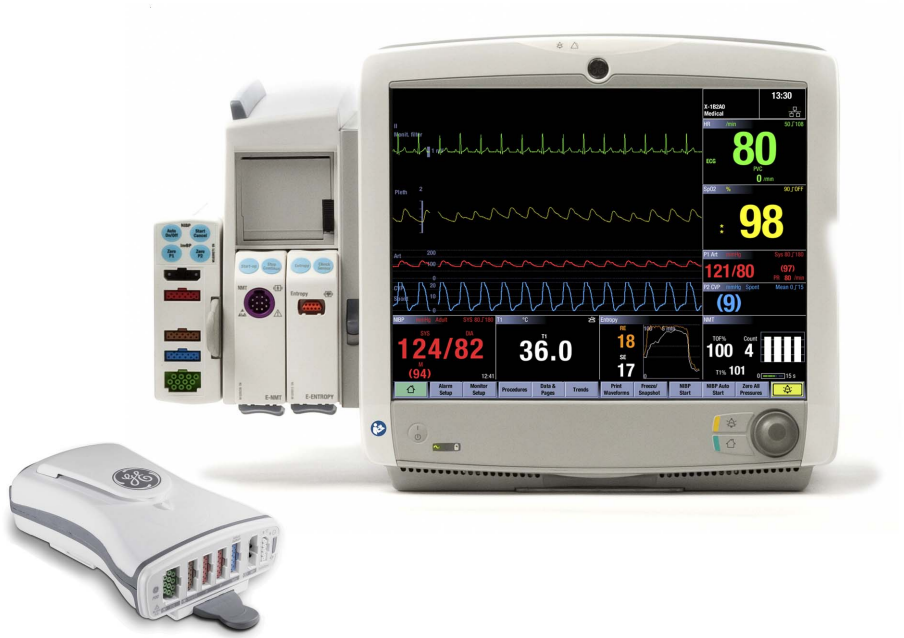
Table of Contents

GE Healthcare

CARESCAPE Monitor B650

Technical Manual

Software Version 2
Hardware Version B650 VER02



All specifications subject to change without notice.

English

2081903-001 paper

19 September 2016

The information in this manual applies to the software and hardware versions listed on the first page of this manual. Due to continuing product innovation, specifications in this manual are subject to change without notice.

Table of contents

1 About this manual

1.1 Intended use of the manual

This manual contains instructions necessary to install, maintain and service the device to the assembly level. Use it as a guide for installation, maintenance and repairs considered field repairable. The list below indicates the products (brands, models and descriptions as applicable) with which this manual is to be used:

– CARESCAPE Monitor B650

– CARESCAPE Monitor B650-LI

Chapters 1 to 7 provide an overview of the CARESCAPE Monitor B650 patient monitoring system and contains information needed for system installation.

Chapters 8 to 13 provide information for the planned and corrective maintenance of the CARESCAPE Monitor B650 main unit.

Where necessary the manual identifies additional sources of relevant information and technical assistance.

See the Module Frames and Modules Technical Manual for the planned and corrective maintenance information about the parameter modules.

See the supplemental information manual for the technical specifications, default settings and compatibility information, including electromagnetic compatibility.

See the user's manual for the instructions necessary to operate the device safely in accordance with its function and intended use.

1.2 Intended audience of the manual

This manual is intended for service representatives and technical personnel who install, maintain, troubleshoot, or repair this device.

1.3 Conventions used in this manual

Within this manual, special styles and formats are used to distinguish between terms viewed on screen, a button you must press, or a list of menu commands you must select:

- For technical documentation purposes, the abbreviation GE is used for the legal entity names, GE Medical Systems *Information Technologies* Inc. and GE Healthcare Finland Oy.
- Names of hardware keys on the equipment, keypad, remote control, and modules are written in **bold** typeface: **Start Cancel**.
- Menu items are written in ***bold italic*** typeface: ***Monitor Setup***.
- Emphasized text is in *italic* typeface.
- Menu options or control settings selected consecutively are separated by the > symbol: ***Procedures > Cardiac Output***.
- The word "select" means choosing and confirming.
- Messages (alarm messages, informative messages) displayed on the screen are written in ***bold italic*** typeface: ***Learning***.
- Note statements provide application tips or other useful information.

1.3.1 Product naming conventions

In this manual, the CARESCAPE Monitor B650 is referred to as the patient monitor.

The following naming conventions are used to refer to different modules and module categories:

- PDM: Patient Data Module
- PSM: Patient Side Module: E-PSM, E-PSMP, E-PSMW and E-PSMPW.
- E-modules: all modules with prefix E-.
- Hemodynamic E-modules: E-PRESTN, E-PRETN and E-RESTN.
- Cardiac output and SvO_2 E-modules: E-COP and E-COPSv.
- Pressure and Temperature E-modules: E-P, E-PP and E-PT.
- Continuous Cardiac Output Module: E-PiCCO.
- CARESCAPE respiratory modules: E-sCAiOV family.
- Compact airway modules: E-CO, E-COV, E-COVX, E-CAiO, E-CAiOV and E-CAiOVX.
- Single-width airway module: E-miniC
- Specialty E-modules: E-NMT, E-EEG, E-BIS and E-ENTROPY
- SpO_2 E-modules: E-NSATX, E-MASIMO

The CARESCAPE Network MC is referred as MC network and the CARESCAPE Network IX as IX network.

Menu naming varies within software packages:

- ***Admit/ Discharge*** is also used in this manual for ***Start/End*** *case* menu (in OR and PACU software).

1.4 Illustrations and names

This manual uses illustrations as examples only. Illustrations in this manual may not necessarily reflect all system settings, features, configurations, or displayed data.

Names of persons, institutions, and places and related information are fictitious; any similarity to actual persons, entities, or places is purely coincidental.

1.5 Ordering manuals

A paper copy of this manual will be provided upon request. Contact your local GE representative and request the part number on the first page of the manual.

1.6 Related documents

- the patient monitor’s user’s manual
- the patient monitor’s supplemental information manual
- Module Frames and Modules Technical Manual
- CARESCAPE Modular Monitors Software Installation Instructions
- CARESCAPE Network Configuration Guide
- CARESCAPE Wireless Network Configuration Guide
- CARESCAPE Modular Monitors Mounting Solutions
- Unity Network Interface Device (ID) Operator's Manual

- iCentral and iCentral Client Technical Reference Manual
- S/5 Network Installation Guide
- iCollect user's manual
- User documentation for displays

NOTE: The referred documents above are subject to change without notice. Please contact your local sales or service representative for possible updates.

1.7 Trademarks

Listed below are GE Medical Systems Information Technologies, Inc. and GE Healthcare Finland Oy trademarks. All other product and company names contained herein are the property of their respective owners.

GE, GE Monogram, and CARESCAPE are trademarks of General Electric Company.

MUSE, TRAM, Tram-Rac, Trim Knob, and UNITY NETWORK are trademarks of GE Medical Systems, *Information Technologies*, Inc.

D-lite and Entropy are trademarks of GE Healthcare Finland Oy.

1.7.1 Third party trademarks

Masimo SET is a trademark of Masimo Corporation.
PiCCO is a trademark of Pulsion Medical Systems SE.
WMM, WPA and WPA2 are trademarks of Wi-Fi Alliance.
Covidien, BISx, Bispectral Index, BIS, and Nellcor are trademarks of a Medtronic company.

1.8 Responsibility of the manufacturer

GE is responsible for the effects on safety, reliability, and performance of the equipment only if:

- Assembly operations, extensions, readjustments, modifications, servicing, or repairs are carried out by authorized service personnel.
- The electrical installation of the relevant room complies with the requirements of the appropriate regulations.
- The equipment is used in accordance with the instructions for use.
- The equipment is installed, maintained and serviced in accordance with the instructions provided in the related technical manuals.

1.9 Product availability

Some of the products mentioned in this manual may not be available in all countries. Please consult your local representative for the availability.

For your notes:

2 Safety information

2.1 General safety statements

See the user's manual for a list of general safety statements.

This device is intended for use under the direct supervision of a licensed health care practitioner.

Contact GE for information before connecting any devices to the equipment that are not recommended in this manual.

Parts and accessories used must meet the requirements of the applicable IEC 60601 series safety standards, and/or the system configuration must meet the requirements of the IEC 60601-1-1 medical electrical systems standard. Refer to the the patient monitor's supplemental information manual for compatible parts and accessories.

Periodically, and whenever the integrity of the product is in doubt, test all functions.

The use of *accessory* equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety of the resulting system. Consideration relating to the choice shall include:

- use of the accessory in the *patient vicinity*; and
- evidence that the safety certification of the *accessory* has been performed in accordance to the appropriate IEC 60601-1 and/or IEC 60601-1-1 harmonized national standard.

2.2 Safety message signal words

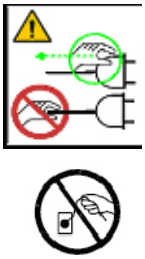
Safety message signal words designate the severity of a potential hazard.

Danger	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
Warning	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
Caution	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
Notice	Indicates a hazardous situation not related to personal injury that, if not avoided, could result in property damage.

2.3 Safety symbols

NOTE: The following safety-related symbols appear on one or more of the devices.

	General warning. This symbol is identified by a yellow background, black triangular band, and a black symbol.
	General caution sign. IEC 60601-1, 2005 edition This symbol is identified by a white background, black triangular band, and a black symbol.
	ATTENTION: Consult accompanying documents. IEC 60601-1, 1988 edition. This symbol is identified by a white background, black triangular band, and a black exclamation mark.
	Follow instructions for use. This symbol is identified by a blue background and a white symbol.
	Consult operating instructions. / Operating instructions.
	DANGER - Shock hazard. Dangerous voltage. To reduce the risk of electric shock, do not remove cover. Refer servicing to qualified service personnel. This symbol is identified by a yellow background, black triangular band, and a black symbol.
	Electrostatic sensitive device. Connections should not be made to this device unless ESD precautionary procedures are followed.
	Non-ionizing electromagnetic radiation. Interference may occur in the vicinity of this device.
	Type BF (IEC 60601-1) protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient, excluding direct cardiac application.
	Type BF (IEC 60601-1) defibrillator-proof protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient excluding direct cardiac application.

	Type CF (IEC 60601-1) protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient, including direct cardiac application.
	Type CF (IEC 60601-1) defibrillator-proof protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient including direct cardiac application.
	Safety ground. Remove power cord from the mains source by grasping the plug. Do not pull on the cable.

For your notes:

3 System overview

3.1 System introduction

The CARESCAPE Monitor B650 is a modular monitoring solution for multiple care areas and intrahospital transport within a professional healthcare facility. The patient monitor offers various hardware configurations, software options and parameter module support to expand from basic hemodynamic operations to demanding operating room applications.

The patient monitor is backwards compatible and upgradeable for the future.

3.2 System components

The CARESCAPE Monitor B650 monitoring system components are introduced below.

3.2.1 Monitor

The CARESCAPE Monitor B650 consists of a main unit and a pivoting module frame.

Main unit

The main unit consists of the following subsystems: power management, CPU, display, user interface and external interfaces.

The power management subsystem provides the operating voltages for the electronics of the device and takes care of the battery management. It consists of an AC/DC power supply, a DC/DC power management board and an optional lithium-ion battery.

The CPU board is the main board of the monitor. It takes care of the user input and acquisition data processing and displays the processed information on the screen. It controls the monitor operation and communication with the other subsystems. It also interfaces with synchronization connector, the optional WLAN card and the speaker. The main software and all platform and clinical settings are stored in a detachable flash memory.

The display subsystem consists of a 15" touchscreen LCD display that has an integrated LED backlight unit. The display controller is integrated to the CPU board.

The user interface board provides an interface between the CPU board and the keypad, Trim Knob control, alarm light board and touchscreen sensor.

There are two different configurations of the interface board. They provide connectors for peripheral devices like USB input devices, network interfaces, a secondary clone display and other devices.

Module frame

The monitor has a pivoting module frame that includes standard docking for the following multiparameter hemodynamic modules: Patient Data Module (PDM) and Patient Side Module (PSM).

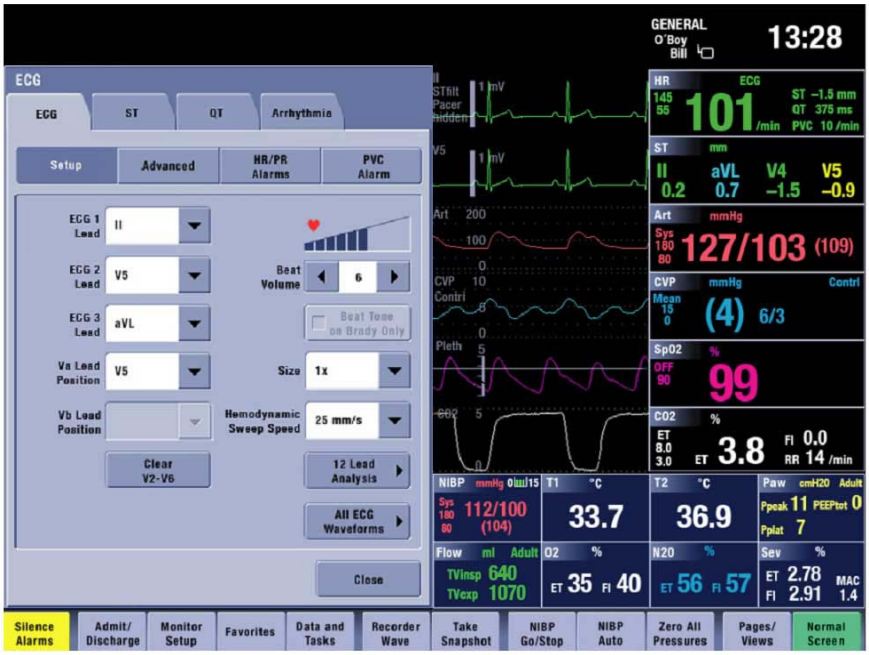
The optional E-module support extends the monitoring capabilities to other hemodynamic modules, gas measurement, brain monitoring and relaxation measurement. The optional integrated recorder enables local printing to a thermal paper. Both options also are available as field upgrades.

3.2.2 Software

The patient monitor is highly configurable and provides many monitoring possibilities with a flexible software licensing model.

The monitor supports care area specific software packages for OR, PACU, ICU, ED and NICU. Each dedicated software package provides a comprehensive feature set for the different monitoring needs and can be further extended with the optional feature licenses.

Software license model supports trial licensing and easy field upgrades with license key activation.



3.2.3 Input devices

You can connect several USB input devices to the patient monitor, including alphanumeric keyboard, mouse, remote control and barcode reader.

Refer to the patient monitor's supplemental information manual for a list of compatible USB input devices.

Keyboard

A washable, antibacterial keyboard is specified for use with the monitor. It may be connected to the monitor or display via one of the USB connectors. The keyboard allows you to enter data without using the touchscreen display.

Mouse

A standard mouse may be connected to the monitor or display via one of the USB connectors. The mouse allows you to select any on-screen items without a Trim Knob control or a touchscreen display.

Remote control

The remote control provides all patient monitor controls on a portable component with a Trim Knob control. The remote control is connected to the patient monitor via one of the USB connectors.

Barcode reader

The barcode reader can be used to scan a Technician ID and Patient Information from barcodes when admitting patients.

3.2.4 Acquisition modules

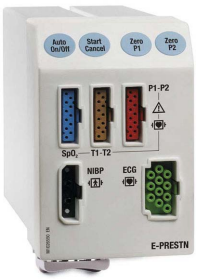
The patient monitor includes standard docking for the following multiparameter hemodynamic modules: PSM and PDM.

PSM

PDM

The optional E-module slot can occupy an E-PRESTN module.

E-PRESTN



The integrated E-module slots can occupy two single-width or one double-width E-modules at a time.

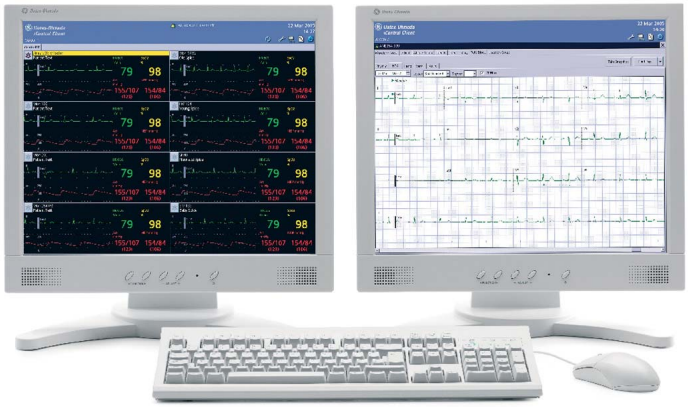
Refer to the patient monitor's supplemental information manual for a list of compatible acquisition devices and to the patient monitor's user's manual for a list of parameters each module measures.

3.2.5 CARESCAPE Network MC or S/5 Network

The patient monitor is compatible both with the CARESCAPE Network MC and the S/5 Network infrastructures. The optional WLAN support enables wireless network communication using IEEE 802.11a/b/g.

Refer to the patient monitor's supplemental information manual for a list of compatible CARESCAPE and S/5 Network devices.

The MC Network establishes communication and allows patient data to be sent to an optional CIC Pro Clinical Information Center (central station).



The S/5 Network establishes communication and allows patient data to be sent to an iCentral (central station).

3.2.6 CARESCAPE Network IX

The patient monitor may be connected to the CARESCAPE Network IX.

The IX Network provides you access for example to the MUSE server for MUSE/12SL reports and to the IX printers. It also enables centralized Webmin access for service personnel from within the hospital and the InSite with ExC remote service connectivity to GE's support center.

Refer to the CARESCAPE Network Configuration Guide for details on configuring the CARESCAPE Network.

3.2.7 Unity Network ID connectivity device

The Unity Network ID connectivity device acquires digital data from up to eight peripheral bedside devices (not necessarily manufactured by GE), processes this data and transmits the formatted data to the patient monitor.

The supported interfaces include anesthesia machines, ventilators, gas analyzers, continuous cardiac output devices, pulse oximeters, transcutaneous monitors and point-of-care blood gas monitors.

Refer to the Unity Network Interface Device (ID) Operator's Manual and the patient monitor's supplemental information manual for a list of compatible peripheral devices and to the patient monitor's user's manual for the peripheral device parameter data displayed on the patient monitor.

3.2.8 Secondary display

The patient monitor supports a secondary, clone display that is capable of displaying the same image as the integrated primary display.

The secondary display is 19" touchscreen LCD with an abbreviated keypad and a Trim Knob control. The secondary display shows visual alarms and provides connectivity to the USB input devices.

Refer to the patient monitor's supplemental information manual for a list of compatible displays.

3.2.9 Printers and recorders

The patient monitor can print to a recorder and to a laser printer.

Refer to the patient monitor's supplemental information manual for a list of compatible recorders and laser printers.

Laser printers

A laser printer can print for example waveforms, graphic and numeric trends, snapshots, events history, parameter specific printouts, stored laboratory data and calculation results and care reports. Refer to the patient monitor's user's manual for more information about printing.

The patient monitor supports printing:

- to a laser printer that is connected to the patient monitor via the IX Network or directly to the IX connector in the patient monitor.
- to a laser printer that is connected to a CIC Pro Clinical Information Center on the MC Network.
- to a laser printer that is connected to an iCentral on the S/5 Network.

Recorders

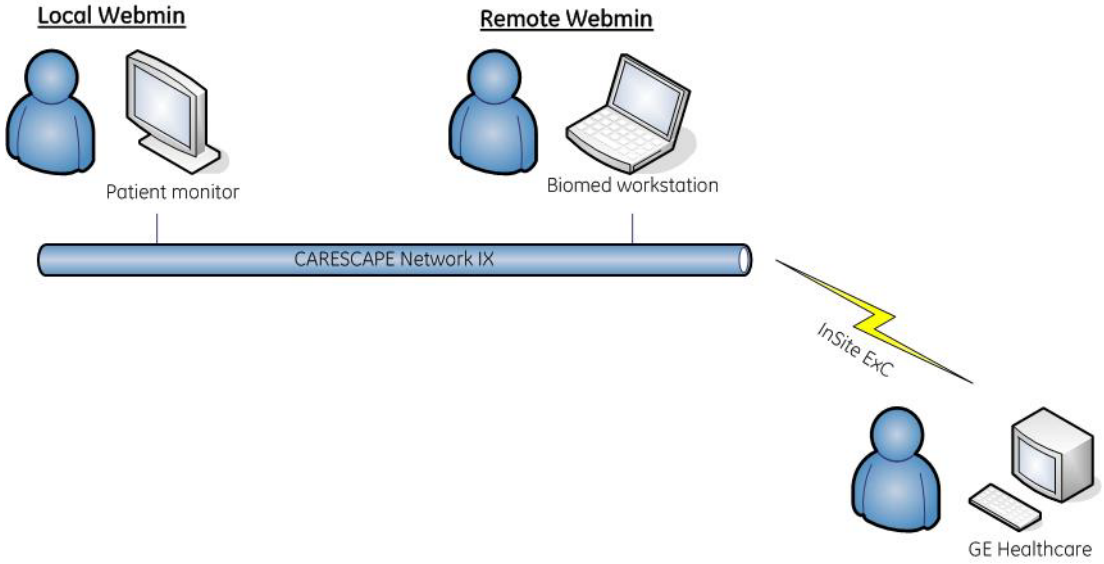
A recorder may print text, waveforms and numeric trends.

The patient monitor supports printing:

- to an integrated, local recorder (optional).
- to a PRN 50M recorder connected to another patient monitor, or to a CIC Pro Clinical Information Center, on the MC Network.

3.2.10 Service Interface

Webmin is a browser-based interface that provides service and diagnostic functions for the patient monitor. Using a web browser, the user can connect to Webmin to configure, diagnose and retrieve system information. The user can access Webmin either locally on the patient monitor or remotely over the IX Network.



Local access to Webmin

The user can access Webmin locally using the integrated browser on the patient monitor.

The other way to access Webmin locally is from a configured service PC that is connected to the patient monitor with an Ethernet crossover cable.

Remote access to Webmin

The user also can access Webmin remotely using a configured service PC over the IX Network.

InSite with ExC

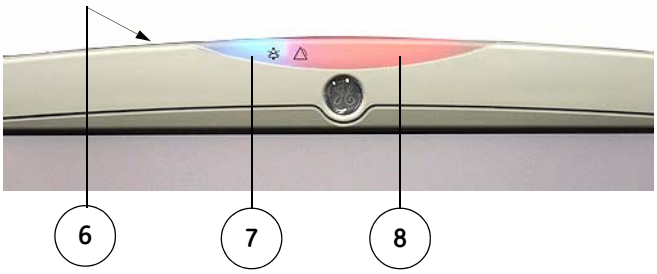
InSite with ExC provides a set of software applications to manage, diagnose and track systems at customer sites by using the Internet for secure communications between the customers' and GE's firewalls. InSite with ExC consists of Enterprise Server, which resides at GE's support center, and Remote Service Agent that resides on a system at the customer site (or on a PC controlling the system(s) at the customer site).

3.3 Controls and connectors

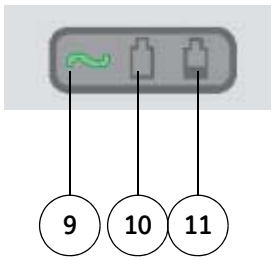
3.3.1 Front view

Display

B650 with touch screen



Alarm light



Power indicators

(1) Alarm light
(2) Power on/standby button
(3) Battery power/ mains power indicators
(4) Abbreviated integrated keypad
(5) Trim Knob control
(6) Ambient light detector lens
(7) Audio alarm paused/off area (blue)

(8) Alarm light area (blue, yellow, or red)

(9) Mains voltage indicator - the green LED is lit when the monitor is connected to AC mains.

(10) Battery use indicator - the green LED is lit when the monitor is operating on battery power.

(11) Battery charging/failure indicator - the orange LED is lit when the monitor battery is charging and flashing in case of battery failure or missing battery.

3.3.2 Side views

(1) Battery cover lock*

(2) Battery cover*

(3) Module slot* for one double-width or two single-width modules

(4) Defibrillator (ECG) and IABP synchronization (E-modules only)

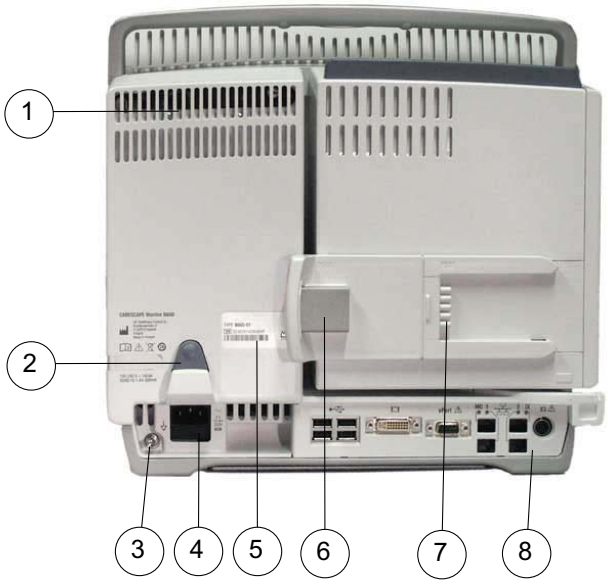
(5) Release switch for the pivoting module frame

(6) Recorder*

*) optional

NOTE: The Defibrillation synchronization connector can be used only with E-(P)RE(S)TN and E-PSM(P) modules. PDM module has its own defibrillation synchronization connector.

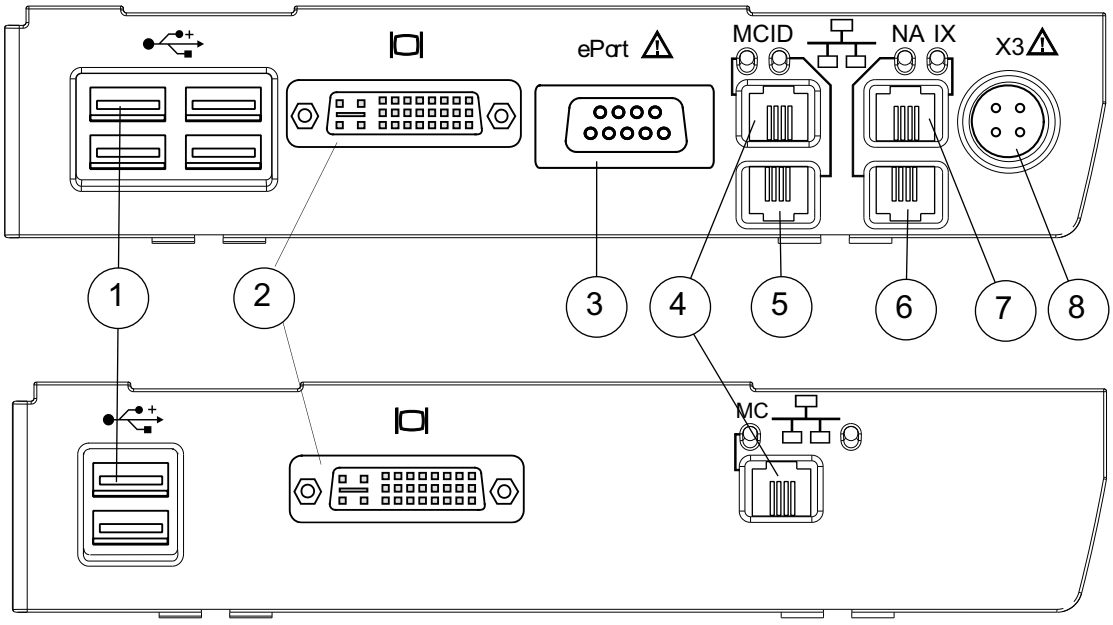
3.3.3 Rear views



(1) Power LEDs for troubleshooting
(2) Cable clamp for power cord
(3) Equipotential connector
(4) Receptacle for power cord and fuse holder
(5) Device label
(6) Slide mount with connector for PDM
(7) Slide mount with connector for PSM
(8) Advanced Interface Board or Standard Interface Board

Interface board connectors

Advanced Interface Board



Standard Interface Board

(1) USB ports (2 or 4 pcs USB 2.0 Type A connectors)
(2) DVI-I connector for a secondary display
(3) ePort connector for PDM module
(4) Network connector for the MC Network & S/5 Network
(5) Network connector for the Unity Network Interface Device (ID) connectivity device
(6) Not in use
(7) Network connector for the IX Network
(8) Remote-on connector

3.4 Service information

3.4.1 Service requirements

Follow the service requirements listed below.

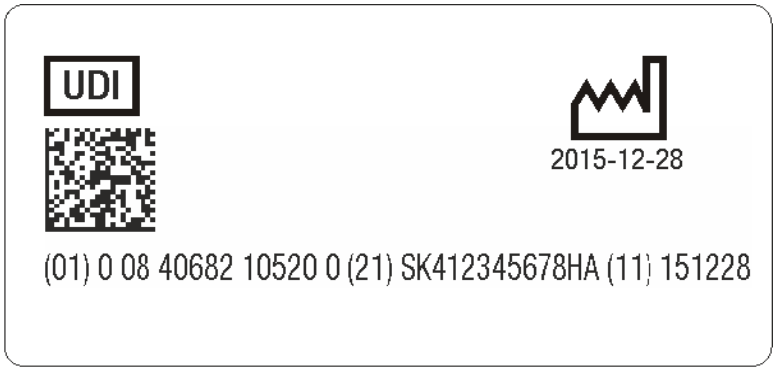
- Refer equipment servicing to GE authorized service personnel only.
- Any unauthorized attempt to repair equipment under warranty voids that warranty.
- It is the user's responsibility to report the need for service to GE or to one of their authorized agents.
- Failure on the part of the responsible individual, hospital, or institution using this equipment to implement a satisfactory maintenance schedule may cause undue equipment failure and possible health hazards.
- Regular maintenance, irrespective of usage, is essential to ensure that the equipment will always be functional when required.

CAUTION DISPOSAL - At the end of its service life, the product described in this manual, as well as its accessories, must be disposed of in compliance with the guidelines regulating the disposal of each product. If you have any questions concerning disposal of a product, please contact GE or its representatives.

3.4.2 Equipment identification

Unique Device Identifier (UDI)

Every medical device has a unique marking for identification. The UDI marking appears on the device labeling The characters used in the UDI marking represent specific identifiers.



In the example above:

Device identifier:

- (01) = GS1 global trade item number (GTIN) of the device.
- 1234567891234 = Global trade item number.

Production identifiers:

- (21) = GS1 application identifier for the serial number of the device.
- SK412345678HA = Serial number, where the first three characters represent Product Code.
- (11) = GS1 application identifier for the manufacturing date of the device.
- 151228 = Manufacturing date: year-month-day (YYMMDD).

Note that for some product types the production identifier can have other elements instead of the ones listed above:

- (10) = GS1 application identifier for the batch or lot number, followed by the batch or lot number.
- (17) = GS1 application identifier for the expiration date of the device, followed by the expiration date.

Device label

Every GE device has a unique serial number for identification. The serial number is written in a device label. A sample of the information on a device label is shown below. The product code for CARESCAPE Monitor B650-02 is SK4.

3.5 Product security

The patient monitoring software incorporates an assortment of security features designed to allow a flexible approach to safe and secure implementation, focusing on the principles of confidentiality, integrity, and availability. These features assist you in using the system in a manner that protects patient privacy and security in your setting, and also addresses expectations for the environment where the system will be used.

3.5.1 Security features

Access control

Access control is the overall mechanism used to determine and enforce the following:

- Who has access
- How individuals gain access
- When access is permitted
- What information may be accessed

Other than clinical and Webmin applications, access to other subsystems (for example BIOS) is restricted. The clinical and Webmin application interfaces have a role-based access control (for example, biomed and clinical). A user may log into these interfaces (for example, Webmin) to perform operations that are limited to the generic user. See the user and technical manuals for detailed information on available features.

Authentication

Authentication is the process of proving individual identity, and is a key element in an access control system. In the clinical and Webmin applications, there are certain features that require user authentication. To access these features, the user must log into the clinical and Webmin applications with a valid username and password.

Authorization

Authorization is the process of granting and revoking access to information, and is another key element in an access control system. Although primarily an administrative process that is driven by an organization's policies and procedures, the patient monitor contains features that will help implement and enforce an organization's method.

Both clinical and Webmin applications have an authorization mechanism to provide information to the user.

Audit

The ability to record and examine system activity is crucial to a successful information security program, as well as a regulatory requirement in most environments. The patient monitor stores system and Webmin access logs.

Malicious software protection

Vigilant defense on many levels is required to keep systems free from compromise by malicious software. Effective protection requires cooperation and partnership between GE and our customers.

Based on the Linux Operating System, the patient monitor has a built-in firewall to allow external communication to occur on a limited number of ports on the IX Network.

The following product features contribute to defense against malicious software:

- System integrity checking

  The patient monitor performs integrity checking on the root file system to detect any changes to the file system contents. Any modification to the root file system contents will generate an error to the patient monitoring software application. The patient monitoring software will then display a technical alarm to the user.
- Device design and configuration (hardening)

  The patient monitor has been hardened through the restriction and removal of user access to core operating system functionality. In addition, unneeded functionality has been removed or restricted.
- Antivirus software

  To provide seamless real-time patient monitoring, the patient monitor does not have antivirus software.
- Security updates and patching processes

  Security updates and patches cannot be applied to the CARESCAPE product without going through GE's vigorous software verification and validation process. Any software update needs will be communicated by GE.

3.5.2 Security operations

Network security

GE requires that the MC port of the patient monitor be connected to a physically or virtually dedicated CARESCAPE Network MC or S/5 Network, isolated from all other networks.

GE requires that the IX port of the patient monitor be connected to a physically or virtually dedicated CARESCAPE Network IX with controlled connection to the organization's general purpose computing network. Traffic between the organization's network and IX port of the patient monitor must be limited to the following packet flows listed below.

Inbound

Source device	Destination device	Protocol	Destination port	Use
Any	Patient monitor	icmp	N/A	ping
Customer defined		tcp	10000	Webmin
Customer defined		tcp	10001	Software transfer
DHCP server		tcp	67, 68	DHCP

Packets that are part of the communication initiated by authorized devices in the organization's network are allowed to go out of the IX Network (reflexive).

Outbound

Source device	Destination Device	Protocol	Destination port	Use
Patient monitor	Any	icmp	N/A	ping
	us1-ws.service.gehealthcare.com	tcp	443	InSite with ExC (Web Services)
	us1-rd.service.gehealthcare.com	tcp	443	InSite with ExC (Remote Tunnel)
	Printer	tcp	631	Printing
	MUSE	tcp	80	MUSE

Packets that are part of the communication initiated by the patient monitor are allowed into the IX Network (reflexive).

Wireless Network Security

The patient monitor can operate both in the wired and the wireless MC Network or S/5 Network. IX Network is wired only.

Refer to the Wireless LAN Network Installation Guide and S/5 Network Installation Guide for more information regarding the security features of the wireless MC Network and the S/5 Wireless Network, respectively.

Network Identification

The Service Set Identifier (SSID), also known as network name, identifies a particular wireless network. The patient monitors shall be configured to use the same SSID with the access points to enable wireless communication. It is recommended to configure access points not to broadcast SSID to the wireless network.

The wireless MC Network shall be logically separated to its own virtual LAN with a dedicated SSID. The S/5 Wireless Network shall have dedicated access points that are physically isolated from all other networks.

Security (Authentication and Confidentiality)

The data transmitted on the wireless network can be secured by one of the following methods:

- WEP (64-bit) (NOTE: S/5 only)
- WEP (128-bit)
- WPA-PSK (TKIP) (NOTE: MC only)
- WPA2-PSK (AES-CCMP) (NOTE: MC Only)

3.5.3 Product change management

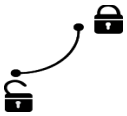
GE has rigorous software verification and validation processes. Any software update needs will be communicated by GE. The patient monitoring system, including all aspects of software, should be used as it was intended by GE.

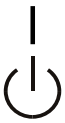
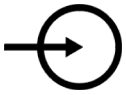
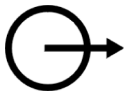
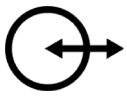
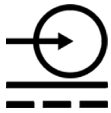
3.5.4 Communication

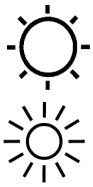
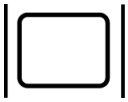
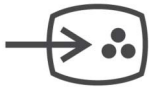
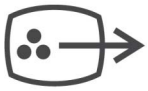
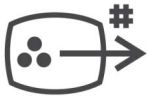
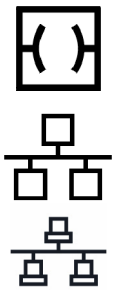
For detailed product security information, go to one of the following Web addresses:

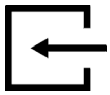
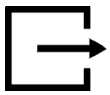
http://www.gehealthcare.com/usen/security
http://www.gehealthcare.com/usen/security/mds2.html

3.6 Equipment symbols

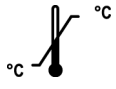
The following symbols appear on one or more of the devices.	
	Bell cancel. Audio off.
	Audio pause. Temporary audio off.
	General alarm.
	Fuse. Replace with identical type and rating fuse.
	Do not reuse.
	Battery (monitor): The flashing orange symbol indicates that there is a battery failure/missing battery.
	Battery (monitor): The solid orange symbol indicates that the battery is being charged.
	Battery (monitor). The solid green symbol indicates that the monitor is being used on battery power.
	Battery (monitor): The battery slot cover is open/closed.
	Battery (monitor): Test button on the battery to check the battery charge level.

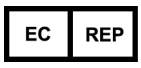
The following symbols appear on one or more of the devices.	
	Battery (monitor). Located on the battery slot cover.
	Battery (PDM).
	Communication. (PDM)
	Power indicator. (PDM)
	On/standby button.
	Standby or power indicator.
	Signal/power input.
	Signal/power output.
	Signal/power input/output (combined).
	ON. Power connection to the mains.
	Power supply connector.
	Power switch.

The following symbols appear on one or more of the devices.	
	Display brightness controls.
	Display speaker volume controls.
	DVI connector. Video output connector for digital or analog source.
	Color display connector port.
	Color video input. Video input connector for digital or analog source.
	Color video output, digital. Video output for analog source.
	Color video output. Video output for digital source.
	USB connector.
	Ethernet connectors

The following symbols appear on one or more of the devices.	
	Serial interface.
	Tram-Net and ePort connector for PDM module, E-module frame, Tram-Rac housing, and TRAM modules.
	Gas inlet.
	Gas outlet.
	Press to open.
	Zero all. (PDM)
IPX1	Degree of ingress protection. Degree of protection against harmful ingress of water: Components not marked with an IPXn code are rated as Ordinary (no protection against fluid ingress). All other IPXn rated components have the degree of protection per the 'n' rating.
	Latex free.
	D-lite/Pedi-lte: Add date.
	Home. Return to the main display.
	Alternating current. Green symbol on the B650 and B450 monitor front panel: the monitor is being used on mains power.
	Direct current.

The following symbols appear on one or more of the devices.	
	Equipotentiality. Connect device to a potential equalization conductor.
	Protective earth ground. Connectors grounded to the AC power source.
  	Defibrillator synchronization connectors.
	(WLAN) Class 2 Identifier
  	Stacking limit by number.
	Date of manufacture. This symbol indicates the date of manufacture of this device. The first four digits identify the year and the last two digits identify the month.
	Manufacturer address and date of manufacture. The first four digits identify the year, the following two digits identify the month, and the last two digits identify the day.

The following symbols appear on one or more of the devices.	
	Date of manufacture. This symbol indicates the date of manufacture of this device. The first four digits identify the year, the following two digits identify the month, and, if indicated, the last two digits identify the day.
	Manufacturer name and address.
	Batch or lot number.
lbl p/n	Abbreviation for label part number.
	Identifies the device type.
	Catalogue or orderable part number.
	Device serial number.
	Device hardware version.
	Every device has a unique marking for identification. The UDI marking appears on the device label.
	Mass of typical portable RGM (respiratory gas monitor) configuration. The indicated mass (12 kg in this example) varies per RGM configuration.
	Atmospheric pressure limitations.
	Temperature limitations.
	Humidity limitations.

The following symbols appear on one or more of the devices.	
	Keep dry. Protect from rain.
	Fragile. Handle with care.
	This way up.
	This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.
	Recycled materials or may be recycled.
	Recyclable Lithium-ion.
	Mercury. This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this system, the backlight lamps in the patient monitor display contain mercury.)
	European authorized representative.
	European Union Declaration of Conformity.
	Indicates that the product is certified for both the U.S. and Canadian markets, to the applicable U.S. and Canadian standards.
	FCC. USA only. Complies with applicable US government (Federal Communications Commission) radio-frequency interference regulations.

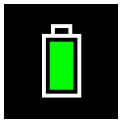
The following symbols appear on one or more of the devices.	
Rx ONLY U.S.	CAUTION U.S. federal law restricts this device to sale by or on the order of a physician.
	Russia only. GOST-R mark.
	Eurasian Economic Union countries only. Eurasian Conformity mark. Conformity to applicable technical regulations of Customs Union.
	Brazil only. INMETRO certificate.
   	NOTE: The following symbols (required by China law only) are representative of what you may see on your equipment. The number in the symbol indicates the EFUP period in years, as explained below. Check the symbol on your equipment for its EFUP period. This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products. The number in the symbol is the Environment-friendly User Period (EFUP), which indicates the period during which the toxic or hazardous substances or elements contained in electronic information products will not leak or mutate under normal operating conditions so that the use of such electronic information products will not result in any severe environmental pollution, any bodily injury or damage to any assets. The unit of the period is "Year". In order to maintain the declared EFUP, the product shall be operated normally according to the instructions and environmental conditions as defined in the product manual, and periodic maintenance schedules specified in Product Maintenance Procedures shall be followed strictly. Consumables or certain parts may have their own label with an EFUP value less than the product. Periodic replacement of those consumables or parts to maintain the declared EFUP shall be done in accordance with the Product Maintenance Procedures. This product must not be disposed of as unsorted municipal waste, and must be collected separately and handled properly after decommissioning.

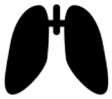
The following symbols appear on one or more of the devices.	
	This symbol indicates that this electronic information product does not contain any toxic or hazardous substance or elements above the maximum concentration value established by the Chinese standard SJ/T11363-2006, and can be recycled after being discarded, and should not be casually discarded.
	Underwriters Laboratories product certification mark.
IC	Canada only. Industry Canada certification number indicates that this product meets the applicable Industry Canada technical specifications.
CMIIT ID	China only. China Ministry of Industry and Information Technology identification number for Radio Transmission Equipment Type Approval.
	Australia only. The product complies with the applicable Australian standard and establishes a traceable link between the equipment and the manufacturer, importer or their agent responsible for compliance.
	Japan only. Approved under Japan TELEC requirements.
	Brazil only. Approved under ANATEL (Agência Nacional de Telecomunicações) requirements.
	South Africa only. Approved under ICASA (Independent Communications Authority of South Africa) requirements.
	Korea only. Approved under KCC (Korea Communications Commission) requirements.

3.7 User interface symbols

The following symbols appear in the software user interface	
	Alarm off indicator. Displays in the upper right corner of the parameter window and in the Alarms Setup menu when physiological alarms for this parameter are turned off. The symbol is not displayed at the central station or on a remote bedside monitor.
	Alarm priority indicator: High (red). Indicates a high priority alarm.
	Alarm priority indicator: Medium (yellow). Indicates a medium priority alarm.
	Alarm priority indicator: Low (cyan). Indicates a low priority alarm.
	Alarm volume icon. Adjust the minimum alarm tone volume.
	Audio alarms off indicator - Displays in the upper left corner of the alarm area when physiological audible alarms are turned off.
	Audio alarms paused indicator with countdown timer - Indicates all audio alarms are paused and the amount of time remaining for the alarm pause period displays as a countdown timer. Displays in the upper left corner of the screen.
	Pause audio alarms - Selectable from the monitor's main menu. Also an indicator of a temporarily paused active audio alarm.
	Low priority audio off alarm indicator, Displays in the upper left corner of the alarm area.
	**Only with software version 2 host build 2.0.7 or earlier:** Configuration warning. Displays when the priority setting for ***HR/PR high/low***, or ***SpO2 low*** has been set to low. Check the alarm configuration. Displays in the upper left corner of the alarm area.

The following symbols appear in the software user interface	
	**With software version 2 host build 2.0.7 or earlier:** General warning sign. Displays when the priority setting for ***HR/PR high/low***, or ***SpO2 low*** has been set to low. Displays in the: • Lower part of the parameter menu's ***Alarms*** tab • Priority column of the selected alarm in the ***Alarm Setup*** > ***Alarm Priorities***. **With software version 2 host build 2.0.8 or later:** General warning sign. Displays when the priority setting for ***Tachy/Brady PR high/low*** or ***HR/PR high/low***, or ***SpO2 low*** has been set to low, or when the low priority volume is set to 0. Displays in the: • Upper left corner of the screen • Lower part of the parameter menu's ***Alarms*** tab • Priority column of the selected alarm in the ***Alarm Setup*** > ***Alarm Priorities***.
	Reminder volume icon. Adjust the volume of the tone that sounds every two minutes when audio alarms are turned off.
	Touch volume icon. Adjust the volume of the tone that sounds when a user touches a touchscreen display.
	Home icon. Close all menus/applications displayed on the patient monitor.
	Locking setting indicator. Indicates this setting is locked and cannot be adjusted.
	Network connection indicator. Indicates the patient monitor is connected to the Local Area Network (LAN).
	Network connection indicator. Indicates the monitor is connected to the Wireless Local Area Network (WLAN).
	Network (WLAN) signal strength. The number of segments corresponds to the signal strength: four segments indicate strong signal, one segment weak signal.

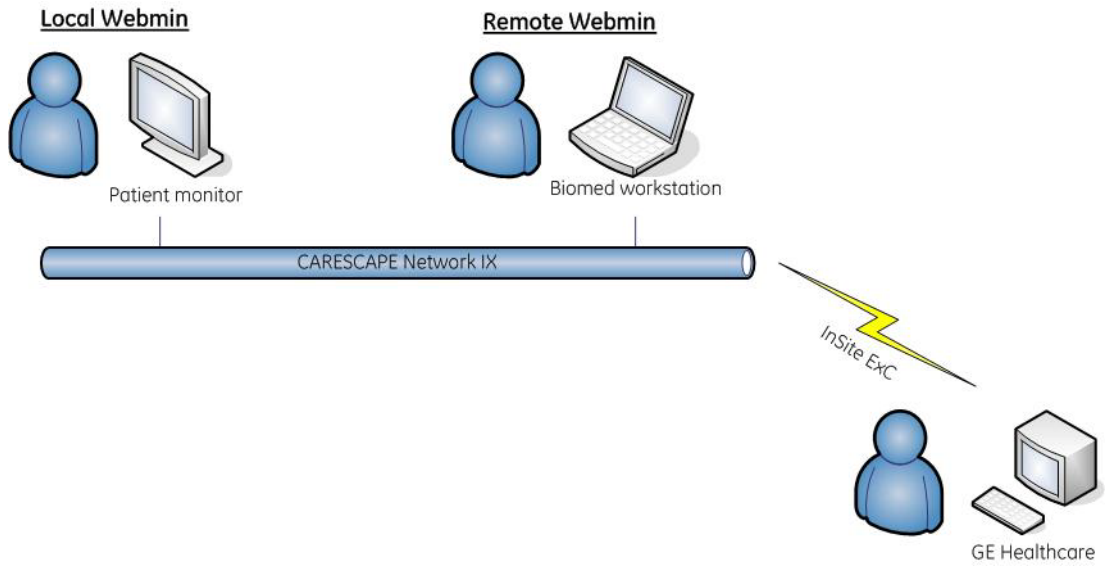
The following symbols appear in the software user interface	
	Monitor battery is full.
	Monitor battery (green). The higher the charge, the bigger the green bar within the symbol. Numbers indicate the remaining run time.
	Monitor battery (yellow). This symbol and a message indicating low battery charge appear when there is less than 20 minutes of run time left.
	Monitor battery (red). This symbol and a message indicating empty battery appear when there is less than 5 minutes of run time left.
	Monitor battery is charging. There is a white running bar inside the symbol.
	Monitor battery failure indicator. Indicates a missing battery or a battery failure.
	PDM battery charging indicator. Indicates that the PDM battery is charging.
	PDM battery gauge indicator. Indicates the charge level of the battery.
	PDM battery failure indicator. Indicates the battery is not available for use.
	Snapshot indicator. Indicates the event has an associated snapshot.
	Beat volume icon. Adjust the volume of the QRS beep tone. Also the beat source indicator. Displays next to the selected beat source.

The following symbols appear in the software user interface	
	Respiration indicator. Indicates a breath is detected by the impedance respiration algorithm.
	BIS and Entropy sensor impedance check indicator (gray). Displays for each sensor as the impedance check is in progress.
	BIS and Entropy sensor impedance check error indicator (red). Indicates the specified sensor failed the impedance check.
	BIS and Entropy sensor impedance check passed indicator. Indicates the specified sensor passed the impedance check.
	Completed NIBP volume icon. Adjust the volume of the tone that sounds when an NIBP measurement result is available.
	Manual NIBP icon. Start a manual NIBP measurement.
	Nellcor OxiMax SatSeconds indicator. Indicates the amount of time the SpO_2 saturation is outside the limits before alarms are generated.
	SpO_2 signal strength indicator. Indicates the signal strength, with three asterisks indicating the strongest signal.
	NMT Stimulus beep volume icon. Adjust the volume of the tone that sounds when a stimulus pulse is generated.
	Progress bar. Indicates the amount of time remaining until the next automatic measurement.

For your notes:

4 Using Webmin service interface

Webmin is a browser-based service interface that is used to configure the platform settings of the patient monitor and to diagnose and retrieve system information for maintenance and troubleshooting.



Local access to Webmin

You can access Webmin locally through the integrated browser on the patient monitor or from a configured service PC that is connected to the patient monitor with an Ethernet crossover cable. Depending on the monitor hardware configuration, the crossover cable is connected either to the IX connector or to the MC connector.

Remote Webmin

You can access Webmin remotely from a configured service PC that is connected to the patient monitor over the IX Network.

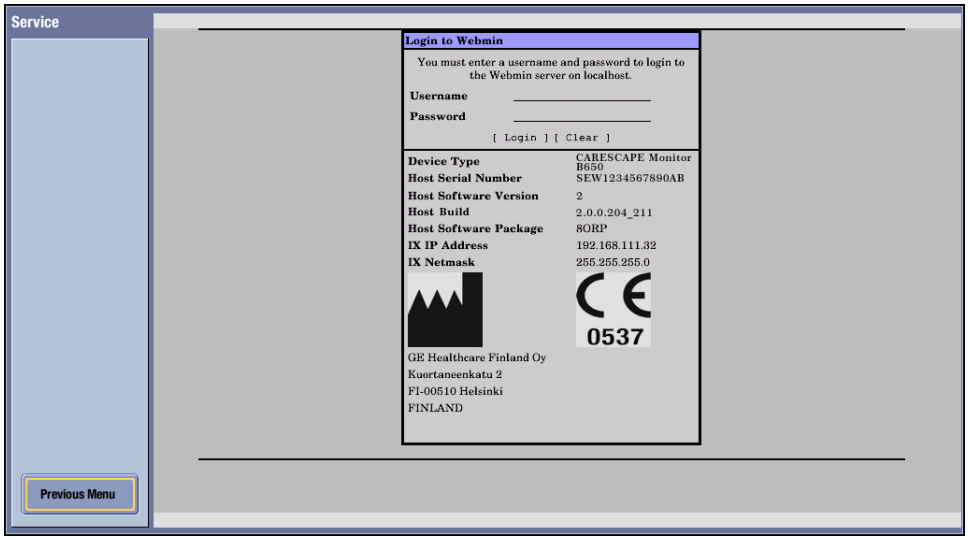
Requirements for service PC

- Network board with Ethernet port and TCP/IP network installed.
- Internet Explorer V6 or later.

4.1 Local access to Webmin using the integrated browser on the patient monitor

NOTE: A USB keyboard and mouse are needed to access the integrated Webmin browser.

1. Select ***Monitor Setup*** > ***Service***. The local browser opens and displays the ***Login to Webmin*** dialog box.



2. Continue to 4.5. Login to Webmin.

Closing Webmin

Select  to close Webmin and return to the main display.

4.2 Local access to Webmin with a service PC connected to the IX connector

You can access Webmin locally by connecting an Ethernet crossover cable between the service PC and the IX connector of the patient monitor.

NOTE: This connection method is supported only if the monitor is equipped with the Advanced Interface Board that provides both the IX and the MC connectors.

NOTE: If you disconnect the patient monitor from a live IX Network when a patient is admitted, you will temporarily lose the services provided by the IX Network, e.g., access to the IX printers and MUSE reports.

WARNING **Non-medical equipment does not provide the same level of protection against electrical shock. Do not touch the patient and any part of non-medical equipment at the same time. Some examples of non-medical equipment are laser printers and non-medical computers.**

1. Connect a service PC to the IX connector on the patient monitor using a crossover cable.
2. In patient monitor, select ***Monitor Setup*** > ***Service***. The local browser opens and displays the ***Login to Webmin*** dialog box.
3. Record the IX IP address of the patient monitor:

   IX IP address: _____

   IX Netmask: _____

NOTE: If the IX IP address field is shown as 0.0.0.0., you need to configure the patient monitor's IX Network address first. Access Webmin using the integrated browser and configure a static IP address for the IX Network.

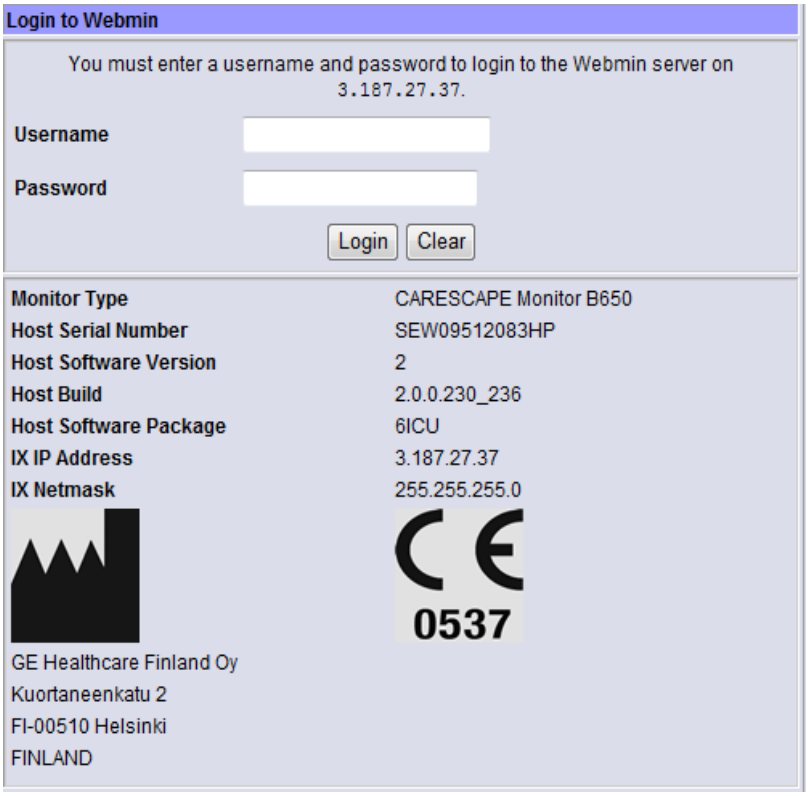
4. Configure the service PC's IP address and subnet mask to the same network segment with the patient monitor's IX Network setting.

NOTE: For more information on how to configure the IP address, refer to the PC's documentation.

5. Launch a web browser on the service PC.
6. In the ***Address*** field, type **https://[IX IP address]:10000** and press **Enter**.

NOTE: **[IX IP address]** is the IX Network IP address of the patient monitor.

The ***Login to Webmin*** dialog box displays.



7. Continue to 4.5. Login to Webmin.

Closing Webmin

1. Restore the patient monitor's original IX Network configuration and service PC's network settings if they were changed.
2. Disconnect the crossover cable from the patient monitor and from the service PC.
3. Reconnect the patient monitor back to the IX Network if applicable.

4.3 Local access to Webmin with a service PC connected to the MC connector

You can access Webmin locally by connecting an Ethernet crossover cable between the service PC and the MC connector of the patient monitor.

NOTE: This connection method is available only if the monitor is equipped with the Standard Interface Board that provides only the MC connector and the patient monitor is in a discharged state.

NOTE: Ensure that there is no patient admitted, prior to disconnecting the monitor from a live MC or S/5 Network.

NOTE: Normal patient monitoring is disabled in this connection method. You must exit the maintenance mode to re-enable the normal patient monitoring mode. (Refer to "Closing Webmin' on page 43.)

1. Connect a service PC to the MC connector on the patient monitor using a crossover cable.
2. Select ***Monitor Setup > Service calibrations.***
3. Log in with your biomed username and password and press ***Enter***.
4. Record the ***MC IP Address*** shown next to the ***Start*** Maintenance Mode –menu button:
   MC IP Address: _____

   MC Netmask: _____
5. Select ***Start*** Maintenance Mode.
   A screen saver with the text "Note: Monitor temporarily under maintenance" appears on the screen.

6. Configure the service PC's IP address and subnet mask to the same network segment with the monitor's MC Network.

NOTE: For more information on how to configure the IP address, refer to the PC's documentation.

7. Launch a web browser on the service PC.
8. In the ***Address*** field, type **https://[MC IP address]:10000** and press **Enter**.

NOTE: **[MC IP address]** is the MC Network IP address of the patient monitor.

The ***Login to Webmin*** dialog box displays.

9. Continue to 4.5. Login to Webmin.

Closing Webmin

1. You can exit the monitor's maintenance mode any time by pressing any keypad or keyboard key, using the Trim Knob, using the touchscreen or clicking a mouse button. The monitor will automatically restore the original network configuration to the S/5 or MC Network and return to the normal monitoring mode.
2. Restore the original network settings in the service PC.
3. Disconnect the crossover cable from the monitor and from the service PC.
4. Reconnect the monitor back to the S/5 or MC Network if applicable.

4.4 Remote access to Webmin using a service PC over the IX Network

NOTE: This connection method is supported only if the monitor is equipped with the Advanced Interface Board that provides both the IX and the MC connectors and the monitor is connected to a live IX Network.

1. Connect a service PC to the IX Network using a standard network cable.
2. In patient monitor, select ***Monitor Setup*** > ***Service***. The local browser opens and displays the ***Login to Webmin*** dialog box.
3. Record the IX IP address of the patient monitor:
   IX IP address: _____

IX Netmask: _____

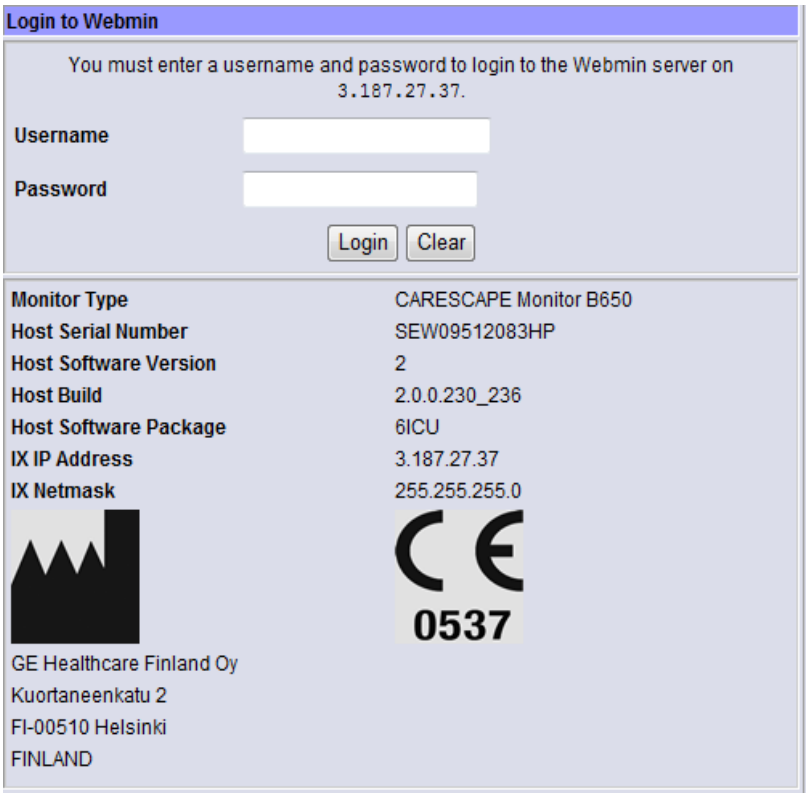
4. Configure the service PC's IP address and subnet mask to the same network segment with the patient monitor's IX Network.

NOTE: For more information on how to configure the IP address, refer to the PC's documentation.

5. Launch a web browser on the service PC.
6. In the ***Address*** field, type **https://[IX IP address]:10000** and press **Enter**.

NOTE: **[IX IP address]** is the IX Network IP address of the patient monitor.

The ***Login to Webmin*** dialog box displays.



7. Continue to 4.5. Login to Webmin.

Closing Webmin:

1. Restore the original network settings in the service PC.
2. Disconnect the service PC from the live IX Network.

4.5 Login to Webmin

1. In the ***Login to Webmin*** dialog box, type the username and password and select ***Login*** or press **Enter**.

   Username: **biomed**
   Password: **Change**<space>**Me**

NOTE: Username and password are case sensitive.

NOTE: "Change Me" is the factory default password for the username "biomed". Refer to section 7.13. Changing passwords for details on how to change the default password.

The Webmin application opens and defaults to the ***Information*** tab.

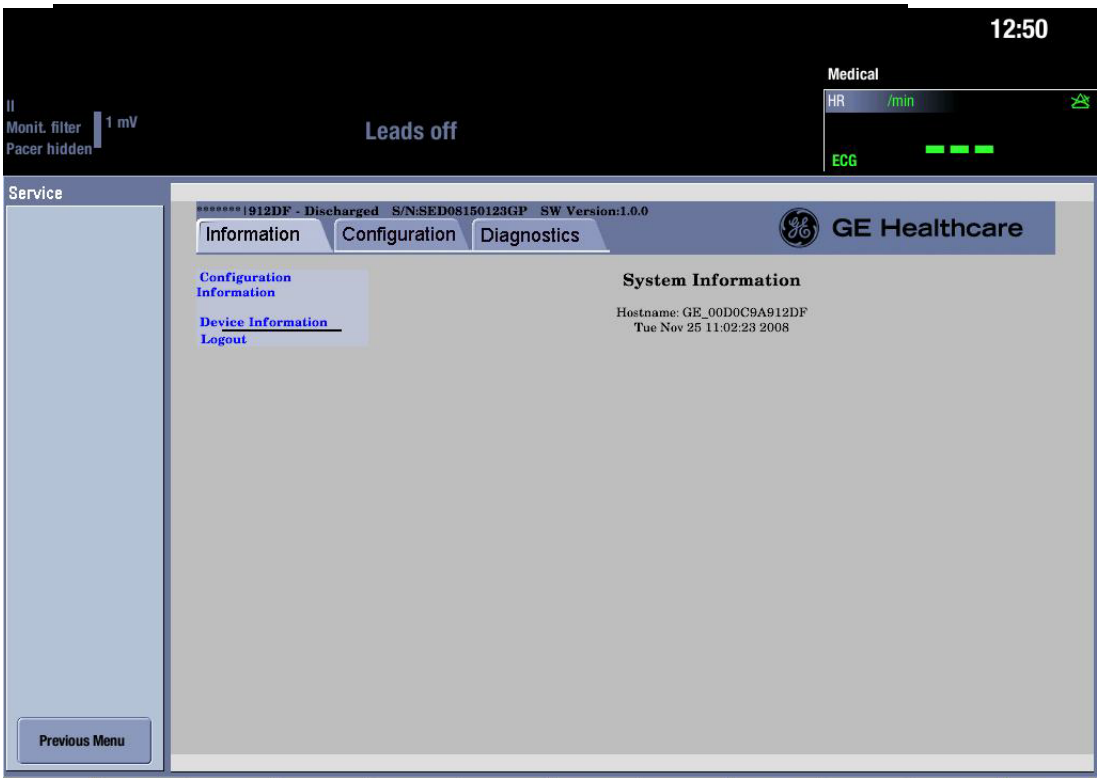


Figure 1 Webmin user interface when accessed using the integrated browser

Figure 2 Webmin user interface when accessed using the service PC

4.6 Webmin configuration modules

The Webmin service interface includes the following configuration modules. Select ***Help*** for additional information related to each Webmin module.

Webmin module	Use the module
Admit Settings	to configure Patient ID Prefix and barcode settings.
Host Asset Settings	to enter a host asset number and to view the host serial number.
Language	to select the language used in clinical user interface and to select the keyboard locale setting for the alphanumeric keyboard and the barcode reader.
Licenses	to enable and activate a software package, to enable and activate software features and to upload and activate a license file.
MUSE/12SL	to configure the host for sending and viewing 12SL information.
Modules	to configure some acquisition module specific settings after corrective maintenance, or for administrative purposes. These settings are saved to the permanent memory of the related acquisition module and the settings travel with the module from one patient monitor to another. Refer to the Module Frames and Modules Technical Manual for detailed information how to change these settings.

Webmin module	Use the module
National Requirements	to activate France specific defaults for the ECG HR adjustment range and the reminder beep behavior.
Network	to select and configure the real-time network as the MC Network (CARESCAPE Network) or S/5 Network. It also allows the user to configure the IX Network settings.
Passwords	to change the passwords for the biomed and clinical users.
Power frequency	to set the power line frequency.
Printers	to configure the patient monitor to print to up to 12 laser printers connected on the IX Network. There are sub-modules for installing a printer, deleting a printer and for printing a test page.
Remote Service	to configure and control the Insite with Exc remote service tool.
Restart	to shutdown and restart the patient monitor automatically via Webmin. NOTE: The patient must be discharged in order to enable monitor restart via Webmin.
Settings	to transfer platform and/or clinical settings from one patient monitor to another, to take backup copies of the settings to an external device and to restore the settings from an external device.
Software Management	to update patient monitor and parameter module software.
Time	to set the date and time settings.
Unit and bed name	to configure the care unit name and bed name for patient monitors that are configured to connect to the MC Network.
WLAN	to configure the WLAN client settings for the MC Network or S/5 Network.

4.7 Webmin information modules

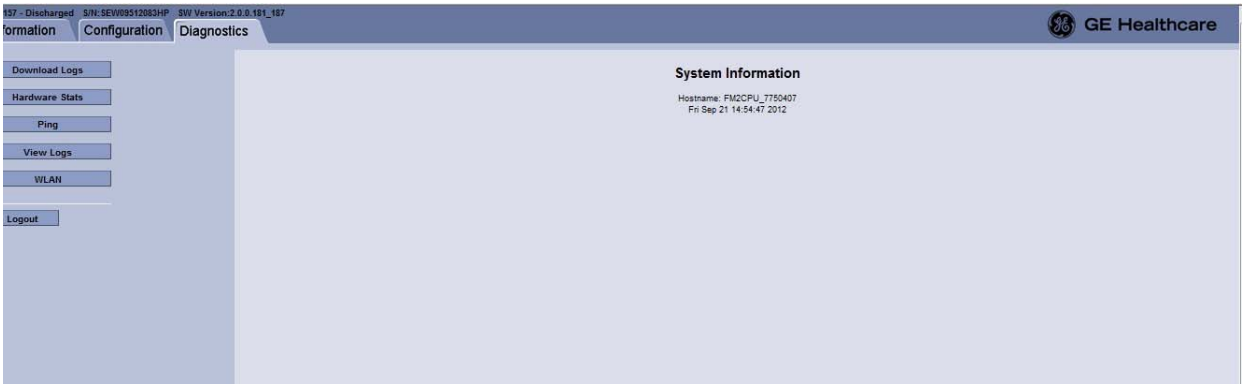
The Webmin information modules provide useful information about the patient monitor setup especially for troubleshooting.

The Configuration Information module shows the current platform configuration of the patient monitor and the connected peripheral devices.

The Device Information module shows the hardware and software information of the patient monitor and the connected peripheral devices.

4.8 Webmin diagnostics modules

Access Webmin service interface to view hardware statistics, ping a network device, view WLAN diagnostics and view or download log files.



The Hardware Statistics module displays several internal voltages, temperatures and power consumption.

Ping a TCP/IP network device- Use this Webmin feature to verify connectivity with a network device on the MC Network and IX Network.

Log files - The patient monitor collects information about different system events and errors to log files. These log files help troubleshooting problems in the patient monitor and the connected peripheral devices.

WLAN diagnostics- Use this Webmin feature for troubleshooting WLAN related problems. This Webmin module provides information about the WLAN driver, WLAN status and the detected access points.

For your notes:

5 Pre-installation requirements

This chapter specifies the pre-installation requirements for the patient monitor.

5.1 Unpacking

1. Confirm that the packing box is undamaged. If the box is damaged, contact the shipper.
2. Open the top of the box and carefully unpack all components.
3. Confirm that all components are undamaged. If any of the components is damaged, contact the shipper.
4. Confirm that all components are included. If any of the components is missing, contact your GE Healthcare distributor.

WARNING **EXCESSIVE LEAKAGE CURRENT - If the device has been transported or stored outside operating temperature range allow it to stabilize back to operating temperature range before removing it from the plastic bag.**

CAUTION PACKAGING DISPOSAL - Dispose of the packaging material, observing the applicable waste control regulations.

5.2 Compatibility check

Verify the compatibility of all system components prior to the installation of the patient monitor.

- Refer to the patient monitor's supplemental information manual for a list of compatible network and bedside devices.
- Refer to the patient monitor's supplemental information manual for a list of compatible supplies and accessories.
- Refer to the patient monitor's supplemental information manual and Unity Network Interface Device (ID) Operator's Manual to see compatible peripheral devices.

WARNING **BEFORE INSTALLATION - Compatibility is critical to safe and effective use of this device. Please contact your local sales or service representative prior to installation to verify equipment compatibility.**

WARNING **INTERFACING OTHER EQUIPMENT - Connect only items that are specified as part of the system and as compatible. For more information, see the CARESCAPE Modular Monitors Supplemental Information Manual.**

WARNING **Before connecting an interfacing module to the device, verify compatibility. Verify the connectivity of device interfaces before using the equipment. Verify the compatibility of software versions before using the equipment.**

WARNING **Do not use identical measurement modules or modules that map a measurement to the same channel or parameter window. If such modules have been connected, remove the module that has been most recently connected. You can also remove both modules and re-connect the new module after five seconds.**

WARNING **The use of accessories, transducers and cables other than those specified may result in increased emissions or decreased immunity performance of the equipment or system.**

WARNING **For detailed instructions and information regarding supplies and accessories, always refer to their own instructions for use.**

5.3 Network infrastructure

Ensure that the applicable network infrastructure is in place prior to the installation of the patient monitor.

Acquire the network configuration information from the hospital IT or the related project documentation and installation files.

5.3.1 MC Network

- The MC Network infrastructure shall be installed according to the CARESCAPE Network Configuration Guide.
- The installation site of the patient monitor shall have a wall jack and a network patch cable for the MC Network.
- Refer to the sections 7.2.2. Selecting and configuring CARESCAPE Network and 7.4. Setting unit and bed name to see the configuration information you need to have available to configure the patient monitor to the MC Network.

5.3.2 Wireless MC Network

- The wireless MC Network infrastructure shall be installed according to the CARESCAPE Wireless Network Configuration Guide.
- Ensure that the wireless coverage area is adequate for the installation.
- Refer to the sections 7.2.2. Selecting and configuring CARESCAPE Network, 7.2.4. Configuring WLAN and 7.4. Setting unit and bed name to see the configuration information you need to have available to configure the patient monitor to the wireless MC Network.

5.3.3 S/5 Network

- The S/5 Network shall be installed according to the S/5 Network Installation Guide. Refer to the iCentral and iCentral Client Service Manual for iCentral installation instructions.
- The installation site of the patient monitor shall have a wall jack and a network patch cable for the S/5 Network.
- Refer to the section 7.2.3. Selecting and configuring S/5 Network to see the configuration information you need to have available to configure the patient monitor to the wired S/5 Network.

5.3.4 S/5 Wireless Network

- The S/5 Wireless Network shall be installed according to the S/5 Network Installation Guide. Refer to the iCentral and iCentral Client Service Manual for iCentral installation instructions.
- Ensure that the wireless coverage area is adequate for the installation.

- Refer to the sections 7.2.3. Selecting and configuring S/5 Network and 7.2.4. Configuring WLAN to see the configuration information you need to have available to configure the patient monitor to the S/5 Wireless Network.

5.3.5 IX Network

- The IX Network infrastructure shall be installed according to the CARESCAPE Network Configuration Guide.
- The installation site of the patient monitor shall have a wall jack and a network patch cable for the IX Network.
- Refer to the section 7.2.2. Selecting and configuring CARESCAPE Network to see the configuration information you need to have available to configure the patient monitor to the IX Network.
- Refer to the following sections for the information you need to have available for:
  - 7.5. Configuring printers for IX printer configuration
  - 7.6. Configuring MUSE/12SL
  - 7.15.1. Configuring the remote service for Insite with Exc configuration.

5.4 Installing the mounting hardware

Ensure that all the applicable/ required mounting hardware is properly installed prior to the installation of the patient monitor:

- Mounting hardware for the patient monitor, either for a stand-alone installation or for an installation to an anesthesia machine or to a ventilator.
- Mounting hardware for the PSM module
- Mounting hardware for the PDM module
- Mounting hardware for the displays
- Mounting hardware for the Unity Network ID connectivity device

NOTE: Refer to the CARESCAPE Modular Monitors Mounting Solutions to identify the compatible mounting hardware for each system component above.

WARNING **Use only manufacturer specified mounts.**

5.5 Unity Network ID connectivity device installation

The Unity Network ID connectivity device shall be properly installed, configured and tested according to the Unity Network ID Connectivity Device Service Manual prior to connecting it to the patient monitor.

Make sure that the Unity Network ID connectivity device is configured as follows:

- IP address is 192.168.253.x, where x is a number between 2 and 254.
- Netmask is 255.255.255.0
- The location of the Unity Network ID is set to a value other than the default (XXXX-XXX). For example, BAY3|UNID3+.

Refer to the Unity Network Interface Device (ID) Service Manual for instructions on checking and changing the IP address.

5.6 Power and environmental requirements

Check the patient monitor's supplemental information manual for power and environmental requirements.

WARNING **Operation of the monitor outside the specified performance range may cause inaccurate results.**

CAUTION Do not use or store equipment outside the specified temperature, humidity, or altitude ranges.

Power requirements

- The installation site shall have hospital-grade grounded power outlets and power cords for all system components.
- Verify that the power outlet is wired correctly according to the country's electrical code standard.

WARNING **EXCESSIVE LEAKAGE CURRENT - A display or printer that is a non-medical grade device and is used within the patient environment, must always be powered from an additional transformer providing at least basic isolation (isolating or separating transformer). Using without an isolating transformer could result in unacceptable enclosure leakage currents.**

Environmental requirements

- Install the patient monitor to a location that meets the specified environmental requirements of operating temperature, humidity and atmospheric pressure.
- Set up the device in a location which affords sufficient ventilation. The ventilation openings of the device must not be obstructed.

EMI & RFI interference:

WARNING **Do not use the monitor in high electromagnetic fields (for example, during magnetic resonance imaging).**

WARNING **Other equipment may interfere with the system, even if that other equipment complies with CISPR emission requirements.**

CAUTION EMC - Magnetic and electrical fields are capable of interfering with the proper performance of the device. For this reason make sure that all external devices operated in the vicinity of the monitor comply with the relevant EMC requirements. X-ray equipment or MRI devices are a possible source of interference as they may emit higher levels of electromagnetic radiation. Changes or modifications to this device/system not expressly approved by GE may cause EMC issues with this or other equipment. This device/system is designed and tested to comply with applicable standards and regulations regarding EMC and needs to be installed and put into service according to the EMC information stated as follows: This device/system is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. Mains power should be that of a typical commercial or hospital environment. Device is compliant to Class A.

CAUTION Use of known RF sources, such as cell/portable phones, or other radio frequency (RF) emitting equipment near the system may cause unexpected or adverse operation of this device/system. Consult qualified personnel regarding device/system configuration.

- The patient monitor should be isolated from sources of strong electromagnetic and radio frequency interference.

NOTE: Refer to the patient monitor's supplemental information manual for more information.

For your notes:

6 Hardware installation

CAUTION LOSS OF MONITORING - Leave space for circulation of air to prevent the monitor from overheating. The manufacturer is not responsible for damage to equipment caused by improperly vented cabinets, improper or faulty power, or insufficient wall strength to support equipment mounted on such walls.

WARNING **The parameter modules are not able to withstand unpacked drops from a height of 1 m without damage. If a module is dropped, please service it before taking it back into use.**

WARNING **After transferring or reinstalling the monitor, always check that it is properly connected and all parts are securely attached.**

WARNING **SITE REQUIREMENTS - Do not route cables or tubing in a way that they may present a stumbling hazard.**

WARNING **EXPLOSION - Do not use this equipment in the presence of flammable anesthetics, vapors or liquids.**

WARNING **EXCESSIVE TOUCH CURRENT - To avoid excessive patient leakage current, do not simultaneously touch the patient and the electrical connectors located at the rear panel of the monitor or within the module housing or frames.**

6.1 Installing a battery into the patient monitor and the PDM module

The batteries for the patient monitor and the PDM module, if included, are shipped separately and need to be installed and fully charged prior to taking into use.

WARNING **PHYSICAL INJURY- Make sure the battery is completely inserted and the battery door is completely closed. Falling batteries could seriously or fatally injure neonatal or other vulnerable patients.**

WARNING **EXPLOSION OR FIRE -Using non-recommended batteries could result in injury/burns to the patients or users. Only use batteries recommended or manufactured by GE.**

WARNING **EXPLOSION HAZARD - Do not incinerate a battery or store at high temperatures. Serious injury or death could result.**

NOTE: Refer to section 10.4. Monitor battery maintenance in this manual for maintenance instructions of the patient monitor battery. Refer to the Module Frames and Modules Technical Manual for information about PDM battery maintenance.

6.1.1 Testing the battery charge

Before installing a battery, verify the battery's state of charge. Press the green **TEST** button on the battery. The number of charge level indicator LEDs that illuminate indicates the approximate charge remaining in the battery.

– Four LEDs illuminated: 75% – 100% of full-charge capacity.

– Three LEDs illuminated: 50% – 74.9% of full-charge capacity.
– Two LEDs illuminated: 25% – 49.9% of full-charge capacity.
– One LED illuminated: 10% – 24.9% of full-charge capacity.
– One LED flashing: < 10% of full-charge capacity remaining.

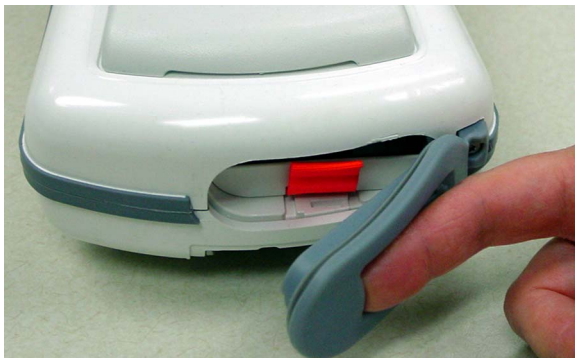
NOTE: Before taking the patient monitor into use for the first time, the battery should be fully charged. Keep the PDM connected to the patient monitor and the patient monitor connected to the AC mains until the batteries are fully charged.

6.1.2 Installing the battery into the patient monitor

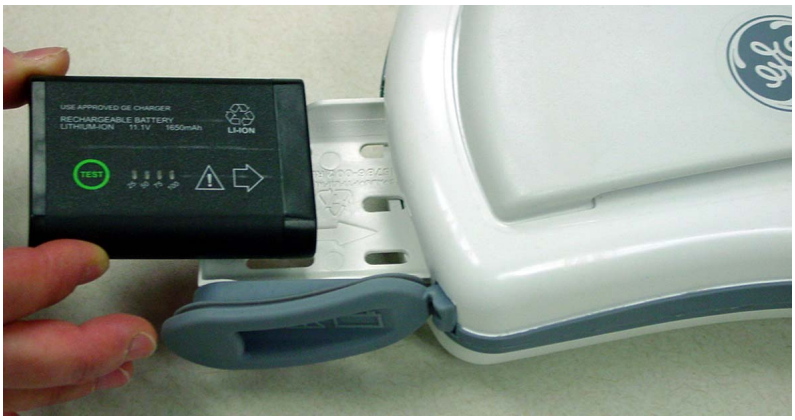
1. Open the battery cover by turning the battery cover lock 90 degrees clockwise.
2. Insert the battery with the test indicator side up and the connector end first all the way into the battery slot. To remove the battery, pull it out from the cord.
3. Push the cover back up and lock it in place by turning the lock 90 degrees counter-clockwise.

6.1.3 Installing the battery into the PDM module

1. Open the battery door by gently pulling on the battery door pull tab.



2. Pull the battery tray out of the PDM using the battery tray strap.
3. Insert the battery with the **TEST** button facing up and the arrow pointing into the PDM.



4. Press the battery door closed until it seals the battery compartment.

6.2 Mounting the patient monitor

The patient monitor has an integrated GCX mounting plate. This facilitates all mounting options for the patient monitor. Refer to the CARESCAPE Modular Monitors Mounting Solutions to identify the compatible mounting hardware for the patient monitor.

Install the patient monitor to the mounting hardware according to the installation instructions included with the mounting hardware.

WARNING **Never install equipment above the patient.**

WARNING **Use only manufacturer specified mounts.**

WARNING **To prevent liquids from entering the monitor, do not tilt the monitor more than +/-15 degrees.**

CAUTION The device/system should not be used adjacent to, or stacked with, other equipment. Consult qualified personnel regarding device/system configuration.

6.3 Connecting a secondary display

The patient monitor supports one secondary, clone display.

WARNING **Do not connect a monochrome display to the monitor. Visual alarm indicators may not appear properly.**

WARNING **The secondary display will not sound the audible alarms.**

WARNING **To prevent liquids from entering the display, do not tilt the display more than +/-15 degrees.**

WARNING **Use only manufacturer specified mounts.**

NOTE: Refer to the patient monitor's supplemental information manual for a list of compatible secondary displays.

NOTE: Refer to the display's user manual for more information about the display installation.

NOTE: Ensure that the display is installed to the mounting hardware according to the installation instructions included with the mounting hardware.

NOTE: Make sure that all cables are securely connected.

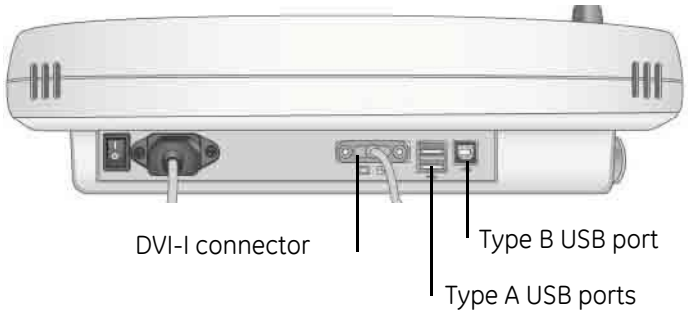
NOTE: Refer to section 7.1 for information about touchscreen calibration and display adjustments.

NOTE: All installations should be compliant with IEC 60601-1-1 and local electrical codes.

NOTE: The patient monitor with a non-medical grade display, which is IEC 60950-rated or equivalent, meets UL and IEC specifications if a medical grade isolation is used. If a non-medical grade display is to be used, the configuration must meet the IEC 60601-1-1 standard. Refer to IEC 60601-1-1 for requirements if using non-medical grade displays in the patient environment.

6.3.1 Connections to D15K and D19KT displays

The following instructions describe two methods to connect a D15K or D19KT display as a secondary display.



A) Cable length is less than 5 meters

1. Connect one end of the DVI-D to DVI-D video cable to the DVI-I connector on the bottom of the display and the other end to the DVI-I connector on the back of the patient monitor.
2. Connect the Type A plug of the standard USB cable to one of the downstream ports (Type A USB port) on the back of the patient monitor.
3. Connect the Type B plug of the standard USB cable to the upstream port (Type B USB port) on the bottom of the display.

4. Secure the USB cables connections to the displays according to the instruction included in the display package.

NOTE: A USB hub should not be used to connect the USB touchscreen to the patient monitor.

B) Cable length is 5 to 15 meters

If complete isolation is not required, this method will provide the most cost effective means of extending your USB installation. This type of installation should not be used for connections to non-medically used rooms according to IEC 60601-1-1.

Displays may be extended up to 15 meters from the patient monitor using the following cables:

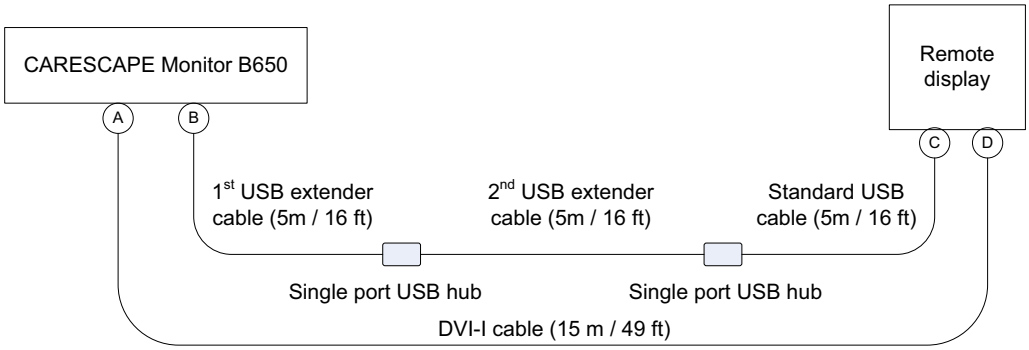
– 15-meter DVI-I to DVI-I video cable (p/n 2042766-001).
– 5-meter USB extender (p/n 2042768-001).
– Standard USB-A to USB-B cable, up to 5 meters.

Type A receptacle

USB extender

Type A plug

In the following example, two 5-meter USB extenders, plus a standard 5-meter USB cable extend the remote display up to 15 meters from the patient monitor.



A to D = DVI-D connection
B to C = USB remote (2 USB extenders required)

USB-connection:

1. Connect the Type A plug of the 1st USB extender to one of the downstream ports (Type A USB port) on the back of the patient monitor.
2. Connect the Type A plug of the 2nd USB extender to the Type A receptacle on the 1st USB extender.
3. Connect the Type A plug of the standard USB cable to the Type A receptacle on the 2nd USB extender.
4. Connect the Type B plug of the standard USB cable to the upstream port (Type B USB port) on the bottom of the display.

5. Secure the USB cables connections to the displays according to the instruction included in the display package.

Video cable:

Connect one end of the 15-meter DVI-I to DVI-I video cable to the DVI-I connector on the bottom of the display and the other end to the DVI-I connector on the back of the patient monitor.

6.4 Installing parameter modules

Refer to the patient monitor's supplemental information manual to verify compatible parameter modules and to identify the parameter modules with identical measurements.

WARNING **Ensure that the compact airway modules and CARESCAPE respiratory modules are in vertical position when used. Tilting them may result in erroneous readings.**

6.4.1 Installing a PSM or a PDM module

You can install a PSM or a PDM module either to the patient monitor or to a remote mounting solution.

Connecting a PSM or a PDM module to the patient monitor

1. Connect a module by aligning it with the insertion guides on the pivoting module frame.
2. Push the module into the frame until it clicks and stops.

Installing a PSM module to a pole mount:

Ensure that the Pole Mount for PSM is properly installed to an IV pole according to the installation guide included with the mounting hardware.

WARNING **PHYSICAL INJURY- Take care when mounting devices to an IV pole. If a device is mounted too high the IV pole may become unbalanced and tip over.**

1. Connect the PSM module to the Pole Mount for PSM as instructed in the accompanying installation guide.
2. Connect the Module Bus Adapter for PSM to the PSM connector in the patient monitor.
3. Connect the cable from the Pole Mount for PSM to the Module Bus Adapter for PSM.

Installing a PDM module to a mounting solution:

Ensure that the selected PDM mount is properly installed according to the installation instructions included with the mounting hardware.

1. Connect the PDM module to installed mounting hardware as instructed in the accompanying installation instructions.
2. Connect one end of the ePort cable to the PDM module ePort connector.
3. Connect the other end of the ePort cable to the ePort connector in the rear panel of the patient monitor.

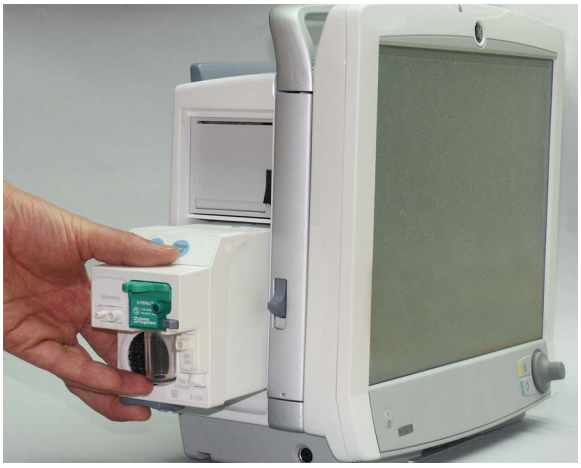
NOTE: The PDM module can be installed into a pole mount only if the monitor is equipped with the Advanced Interface Board that provides the ePort connector.

WARNING **PHYSICAL INJURY — Do not install the PDM above a patient. Make sure the battery is completely inserted and the battery door is completely closed. Falling batteries could seriously or fatally injure neonatal or other vulnerable patients.**

WARNING **PHYSICAL INJURY — Do not install the PDM above a patient. Leaks from the battery cells can occur under extreme conditions. The liquid is caustic to the eyes and skin. If the liquid comes in contact with eyes or skin, flush with clean water and seek medical attention.**

Installing E-modules to the patient monitor

1. Connect a module by aligning it with the insertion guide inside the module slot.
2. Push the module into the frame until it locks.



6.5 Connecting to the mains power

WARNING **Use only AC power cords recommended or manufactured by GE.**

WARNING **EXCESSIVE LEAKAGE CURRENT - To avoid summation of leakage currents when interfacing the device with other equipment, the devices may only be interconnected with each other or to parts of the system when it has been determined by qualified biomedical personnel that there is no danger to the patient, the operator, or the environment as a result. In those instances where there is any element of doubt concerning the safety of the connected**

devices, the user must contact the manufacturers concerned (or other informed experts) for proper use. In all cases, safe and proper operation should be verified with the applicable manufacturer's instructions for use, and system standards IEC60601-1-1 must be complied with.

When interfacing the device with other equipment, the devices may only be interconnected with each other or to parts of the system when it has been determined by qualified biomedical personnel that there is no danger to the patient, the operator, or the environment as a result.

WARNING **Do not under any circumstances remove the grounding conductor from the power plug. Always check that power cord and plug are intact and undamaged.**

WARNING **POWER SUPPLY — The device must be connected to a properly installed power outlet with protective earth contacts only. If the integrity of the protective earth conductor is in doubt, disconnect the monitor from the power line, and use it with the battery option, if available. All devices of a system must be connected to the same power supply circuit. Devices which are not connected to the same circuit must be electrically isolated when operated.**

CAUTION POWER REQUIREMENTS - Before connecting the device to the power line, check that the voltage and frequency ratings of the power line are the same as those indicated on the device's label. If this is not the case, do not connect the system to the power line until you adjust the device to match the power source. In U.S.A., if the installation of this equipment will use 240V rather than 120V, the source must be a center-tapped, 240V, single-phase circuit. This equipment is suitable for connection to public mains as defined in CISPR 11.

If a non-medical grade display is used as a display within the patient environment it must always be powered from an additional transformer providing at least basic isolation.

1. Connect power cords to the mains power supply inlet and to a wall outlet on all system components that require AC mains power input.
2. Do not power on any devices.

NOTE: Be sure that all power cords are securely connected and that they are routed through the retaining clips or cable clamps, as applicable.

6.6 Connecting to the MC Network or the S/5 Network

WARNING **MISSED ALARMS - Do not use with iCentral software with Versions 5.0.3 and earlier or with Mobile Care Server with Version 5.2 and earlier.**

WARNING **INCORRECT CALCULATIONS - Using the System with the Aware Gateway software version 1.4 or earlier could result in incorrect patient height and weight information. This could lead to incorrect drug dose calculations, hemodynamic calculations, or oxygenation calculations. Prior to installing the System, please contact the GE Healthcare Aware Gateway HL7 Integration Engineering Team or your GE Healthcare service representative to verify or update your Aware Gateway configuration.**

WARNING **EXCESSIVE LEAKAGE CURRENT - Only devices that are specified compliant with IEC 60950-1 or IEC 60601-1 may be connected to the Ethernet MC or IX ports.**

The patient monitor can be connected either to the wired MC Network or S/5 Network.

- Connect the MC Network or the S/5 Network patch cable to the network connector labelled as “MC” in the rear panel of the patient monitor.

6.7 Connecting to the IX Network

- Connect the IX Network patch cable to the network connector labelled as “IX” in the rear panel of the patient monitor.

NOTE: Connection to the IX Network is possible only if the monitor is equipped with the Advanced Interface Board.

6.8 Connecting to a Unity Network ID connectivity device

Ensure that the Unity Network ID connectivity device is properly mounted, installed and configured prior to connecting it to the patient monitor.

CAUTION INSTALLATION - To avoid accidental ingress of liquids, always mount the Unity Network Interface Device (ID) in a vertical position with the connectors at the bottom.

- Connect a Unity Network ID connectivity device to the network connector labelled “ID” in the rear panel of the patient monitor.

NOTE: Connection to the Unity Network ID connectivity device is possible only if the monitor is equipped with the Advanced Interface Board.

WARNING **Before connecting an interfacing module to the device, verify compatibility. Verify the connectivity of device interfaces before using the equipment. Verify the compatibility of software versions before using the equipment.**

CAUTION The use of the wrong interface adapter may cause improper operation of the supported peripheral device.

WARNING **SINGLE PATIENT USE - All eight serial ports of the Unity Network Interface Device (ID) must only be used on one patient.**

6.9 Connecting USB devices

NOTE: The USB-connection to a D15K or D19KT secondary display reserves one of the USB connectors in the rear panel of the patient monitor.

Connect the following devices to the USB ports in the rear panel of the patient monitor or at the bottom of a D15K or D19KT display:

- Alphanumeric keyboard
- Mouse
- Remote control
- Barcode reader

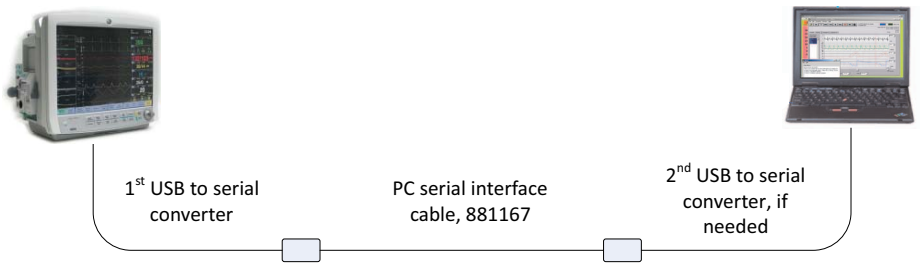
NOTE: Always use a GE-supplied barcode reader for the CARESCAPE monitors. The barcode reader comes pre-configured and is ready to connect. Refer to the included installation instructions for more details.

WARNING **Use only washable keyboard with at least IPX1 protection against ingress of water.**

6.10 Connecting iCollect and other data acquisition systems

iCollect and other data acquisition systems can be connected to one of the USB connectors in the rear panel of the patient monitor.

NOTE: Use the ATEN UC232A USB-to-serial Converter and PC serial interface cable to connect iCollect and the other data acquisition systems to the patient monitor.



NOTE: Refer to the iCollect User's Manual for more information about the iCollect.

NOTE: Contact GE Healthcare Service to get more information about interfacing other data acquisition systems to the patient monitor.

6.11 Connecting a remote-on cable

Remote-on connection allows you to power-up the patient monitor from the power switch of a GE Healthcare anesthesia machine.

1. Connect the remote-on cable to the remote-on connector labelled as "X3" in the rear panel of the patient monitor.
2. Connect the other end of the remote-on cable to the related connector in the anesthesia machine. Refer to the related product documentation for details.

NOTE: Remote-on connection is possible only if the monitor is equipped with the Advanced Interface Board that has the remote-on connector and if the anesthesia machine supports this feature.

NOTE: Remote-on connection is possible only if the anesthesia machine supports this feature.

NOTE: The remote on/standby function is disabled when the patient monitor is battery powered.

6.12 Connecting a local printer to the IX connector

You can connect a local laser printer directly to the patient monitor's IX connector with a crossover cable.

1. Connect the Ethernet cable to the IX connector labelled as "IX" in the rear panel of the patient monitor.
2. Connect the other end of the Ethernet crossover cable to the connector in the laser printer.

NOTE: Connection to a local printer is possible only if the monitor is equipped with the Advanced Interface Board that provides an IX Network connector.

NOTE: If the local printer is used within the patient environment it must always be powered from an additional transformer providing at least basic isolation.

NOTE: Refer to the printer manual on how to install and configure the printer. The printer shall be configured to communicate in the same subnet with the patient monitor's IX Network settings.

WARNING **EXCESSIVE LEAKAGE CURRENT - Laser printers are UL 60950/IEC 60950 certified equipment, which may not meet the leakage current requirements of patient care equipment. This equipment must not be located in the patient environment unless the medical system standard IEC 60601-1-1 is followed. Do not connect a laser printer to a multiple socket outlet supplying patient care equipment. The use of multiple socket outlet for a system will result in an enclosure leakage current equal to the sum of all the individual earth leakage currents of the system if there is an interruption of the multiple socket outlet protective earth conductor.**

WARNING **Non-medical equipment does not provide the same level of protection against electrical shock. Do not touch the patient and any part of non-medical equipment at the same time. Some examples of non-medical equipment are laser printers and non-medical computers.**

7 Configuration

The configuration of the patient monitor consists of platform configuration and clinical configuration.

This chapter describes how to perform the platform configuration tasks needed to take the patient monitor into use for the first time and the configuration tasks needed for administration and maintenance thereafter.

For information on how to perform the clinical configuration, including care unit settings and user profiles, refer to the patient monitor's user's manual.

7.1 Adjusting display

7.1.1 Adjusting the brightness of the integrated primary display

If needed, adjust the display brightness from the ***Monitor Setup > Brightness*** menu. Refer to the patient monitor's user's manual for more information.

7.1.2 Calibrating a touchscreen

NOTE: The touchscreen function of the integrated primary screen has been calibrated in the factory. Re-calibration is typically needed only after replacing the uDOM or the touchscreen sensor.

Calibrate the connected touchscreens, one by one, as follows:

1. Select ***Monitor Setup > Service Calibrations.***
2. In the ***Enter Password*** dialog box, type the username and password and press **Enter**.

   Username: **biomed**

   Password: **Change**<space>**Me**

NOTE: Username and password are case sensitive.

NOTE: The factory default password for the username "biomed" is "Change Me".

3. In the ***Service / Calibrations*** menu, select ***Touch Screen*** to calibrate the integrated primary display or the connected secondary display.
4. The Touch calibration screen opens.
5. Touch the calibration mark or cross hair (+) in each corner of the screen, according to the instructions shown on the screen.

7.1.3 Adjusting optional secondary display

If needed, adjust the picture on the display using the Auto Adjustment feature in the display's OSD menu. Refer to the display's user manual for details.

7.2 Configuring the network

7.2.1 Configuring hostname

1. Log in to Webmin
2. Select ***Configuration > Network > Hostname.***
   The ***Hostname Configuration*** window opens.
   The current hostname is shown in the ***Current Value*** column.

3. Enter the new hostname in the ***Change Value to*** column.

   NOTE: The hostname is a unique, 4 to 32 character long identifier of a patient monitor in the network. Use alphanumeric characters A-Z, a-z, 0-9. The hostname may include also characters "-" and "_", but it can't start or end with these characters.

4. Select ***Save***.
   The hostname configuration will take effect immediately.

7.2.2 Selecting and configuring CARESCAPE Network

To select CARESCAPE Network MC for the real-time network infrastructure:

1. Log in to Webmin.
2. Select ***Configuration > Network > Wired Interfaces***.
   The current network configuration is shown in the ***Present Configuration*** table.
3. Below ***Select Network Type*** in the ***Network Configuration*** window, select the applicable network type: ***CARESCAPE Network***.
4. Select ***Next*** to proceed on network configuration.

NOTE: When ***CARESCAPE Network*** is selected, the S/5 Network is disabled.

The patient monitor may be configured to the MC Network, or IX Network, or both.

Network connection(s)	Steps to be performed
MC Network only	5, (6) and 9
IX Network only	7, 8 and 9
Both MC and IX Network	5, (6), 7, 8 and 9

NOTE: The following IP addresses are reserved and not valid: 172.16.254.254, 172.16.255.255, 172.18.254.254, 172.18.255.255, 192.168.250.x, 192.168.252.x, 192.168.253.x, 192.168.254.1 and 192.168.254.2.

5. In the ***Network Configuration*** window below ***MC Network.***
   a. Enter a ***Static IP*** address.
   b. Enter a valid ***Netmask*** level.
   c. Select the applicable ***Speed & Duplex*** option.
6. If separate MC Network segments are connected together by a router, configure the router information below the MC static route:
   a. Enter ***Destination Address***.
   b. Enter ***Destination Netmask***.
   c. Enter an ***MC Gateway.***
7. Below ***IX Network,*** select ***DHCP*** or ***Manual Configuration***.
   If ***Manual Configuration*** is selected, enter the following information in the entry fields:
   a. Enter a ***Static IP*** address.
   b. Enter a valid ***Netmask*** level.
   c. Enter a valid ***Default Gateway***.
   d. Enter valid ***DNS Server*** addresses if applicable.
8. Select the applicable ***Speed & Duplex*** option.
9. Select ***Save***.

The network configurations will be saved and become active when the patient monitor is restarted.

7.2.3 Selecting and configuring S/5 Network

To select S/5 Network for the real-time network infrastructure:

1. Log in to Webmin.
2. Select ***Configuration > Network > Wired Interfaces***.
   The current network configuration is shown in the ***Present Configuration*** table.
3. Below ***Select Network Type*** in the ***Network Configuration*** window, select the applicable network type: ***S/5***.
4. Select ***Next*** to proceed on network configuration.

NOTE: When ***S/5*** Network is selected, the CARESCAPE Network is disabled.

The patient monitor may be configured to the S/5 Network, or IX Network, or both.

Network connection(s)	Steps to be performed
S/5 Network only	1 and 4
IX Network only	2, 3 and 4
Both S/5 and IX Network	1, 2, 3 and 4

1. In the ***Network Configuration*** window below ***S/5 Network***, enter a ***Virtual ID.***

NOTE: Valid values are within the range of 50000 to 55000, inclusive.

NOTE: The Virtual ID must be unique for each patient monitor connected to the S/5 Network.

2. Below ***IX Network***, select ***DHCP*** or ***Manual Configuration***.
   a. Enter a ***Static IP*** address.
   b. Enter a valid ***Netmask*** level.
   c. Enter a valid ***Default Gateway***.
   d. Enter valid ***DNS Server*** addresses if applicable.
3. Select the applicable ***Speed & Duplex*** option.
4. Select ***Save***.

The S/5 virtual ID change will be applied immediately. All other network configurations will be saved and become active after the patient monitor is restarted.

7.2.4 Configuring WLAN

NOTE: The network infrastructure selection, MC Network or S/5 Network, and related configuration shall be completed prior to configuring the WLAN settings.

NOTE: Wireless communication is supported only in CARESCAPE Network MC and S/5 Network. CARESCAPE Network IX does not support wireless communication.

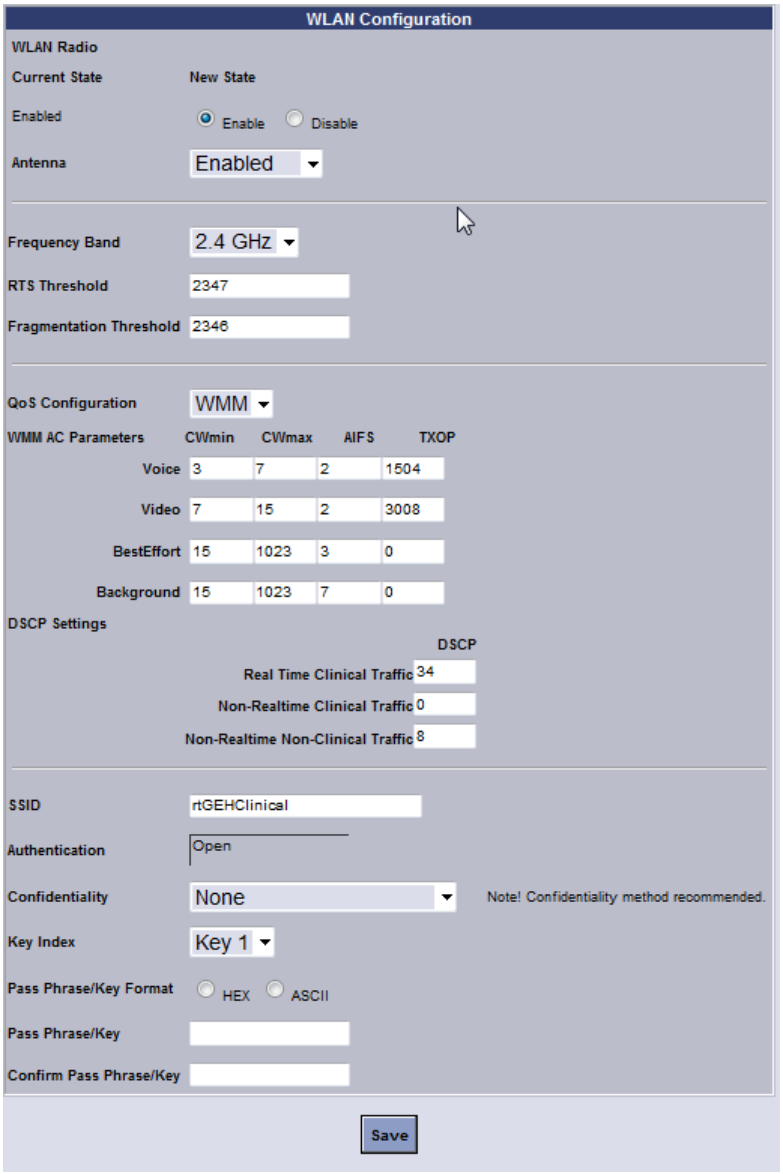
1. Log in to Webmin.
2. Select ***Configuration*** > ***WLAN***. The current status of the WLAN radio is shown below the ***Current State*** in the ***WLAN Configuration*** window.
3. Select ***Enable*** as a ***New State*** to enable the WLAN radio.

NOTE: If the WLAN radio is disabled, the WLAN radio is turned off.

4. Select ***Antenna*** as ***Enabled*** to enable both the internal antennas.

NOTE: Antenna diversity is a method used to assist in compensating for multipath interference. When set to Enabled, Antenna Diversity monitors the signal from each antenna and automatically switches to the one with the better signal.

5. Configure the appropriate WLAN settings. Note that the configurable attributes and available values are different for MC Network and S/5 Network.



WLAN Client Configuration		
Item	**Description**	**Comments**
Frequency Band	Select the frequency band to be used with the WLAN radio: - 2.4 GHzPass - 5.1 GHz - All Band (2.4 GHz & 5.1 GHz)	The WLAN radio is capable to communicate on the following frequency bands, protocols and data rates: - 2.4 GHz, IEEE 802.11b, up to 11 Mbps. - 2.4 GHz, IEEE 802.11g, up to 54 Mbps. - 5.1 GHz, IEEE 802.11a, up to 54 Mbps. NOTE: In the S/5 Wireless Network, the frequency band is fixed to 2.4 GHz and it supports 802.11b protocol only.
RTS Threshold	Configure the RTS Threshold value.	Use the default RTS Threshold value, unless otherwise specified in the wireless network design. A valid RTS Threshold is a numeric value within the range of 0 to 2347. NOTE: This option is not configurable in the S/5 Wireless Network.
Fragmentation Threshold	Configure the Fragmentation Threshold value.	Fragmentation Threshold specifies the maximum frame size a wireless device can transmit without fragmenting the frame. A valid Fragmentation Threshold is a numeric value within the range of 256 to 2346. Use the default Fragmentation Threshold value, unless otherwise specified in the wireless network design. NOTE: This option is not configurable in the S/5 Wireless Network.
QoS Configuration	Select the Quality of Service (QoS) standard used in the wireless infrastructure to prioritize the network traffic: - None (no QoS in use) - WMM (WLAN Multimedia in use)	Select QoS configuration setting as specified in the wireless network design. NOTE: This option is not configurable in S/5 Wireless Network.

WLAN Client Configuration		
Item	**Description**	**Comments**
WMM AC Parameters	Configure the WMM AC Parameters (CWmin, CWmax, AIFS, TXOP) for each access category (voice, video, best effort and background) if the QoS Configuration was selected as WMM.	WLAN Multimedia (WMM) provide basic Quality of Service (QoS) features to IEEE802.11 networks by prioritizing wireless network traffic according to four Access Categories (AC) – voice, video, best effort and background. Use the default WMM AC parameter values, unless otherwise specified in the wireless network design. Valid values: - CWmin: 3-1023 - CWmax: 7-1023 - AIFS: 0-20 - TXOP: 0-65536 (0 for Best Effort and Background) NOTE: The WMM AC parameters are configurable only if the QoS Selection was selected as WMM. NOTE: The DSCP settings are configurable only if the QoS Selection was selected as WMM. NOTE: This option is not configurable in S/5 Wireless Network.
Wireless DSCP Settings	Configure the DSCP settings for the following network traffic: - Real Time Clinical Traffic - Non-Real time Clinical Traffic - Non-Real-time Non-Clinical Traffic	Valid DSCP ranges: Real Time Clinical Data (Waveforms, Parameters, etc.) 32 - 47 Non-Real time Clinical Data (Trends, Full Disclosure, Printing, etc.) 0 - 7 Non-Real-time Non-Clinical Data (InSite, Service traffic, etc.) 8 - 23 DSCP (Differentiated Services Code Point) settings provide Quality of Service (QoS) features by prioritizing network traffic by traffic type. It uses traffic classification by placing each data packet into a limited number of traffic classes. Use the default DSCP values, unless otherwise specified in the wireless network design. Note: For Non Real-Time Clinical Data traffic on wireless, do not use DSCP values of 24-31. A risk exists that Real-Time Clinical Data and Non Real-Time Clinical Data will arrive at the same QoS value in the wired network if proper DSCP to DSCP mapping is not done at the wired to wireless interface. NOTE: This option is not configurable in the S/5 Wireless Network.

WLAN Client Configuration		
Item	**Description**	**Comments**
SSID	Enter the Service Set Identifier (SSID), also known as network name.	The SSID of the wireless client must match the SSID of the wireless infrastructure. A valid SSID includes up to 32 case-sensitive ASCII characters, including space (ASCII decimal 32 to 126).
Confidentiality	Select the Confidentiality (Data Privacy) method to be used: - None - WEP (64-bit) - WEP (128-bit) - WPA-PSK (TKIP) - WPA2-PSK (AES-CCMP)	The confidentiality method of the wireless client must match the confidentiality method of the wireless infrastructure. NOTE: The authentication method used with WEP is Open System Authentication. NOTE: The wireless MC Network supports only confidentiality methods “None”, “WEP (128-bit)”, "WPA-PSK (TKIP)" and "WPA2-PSK (AES-CCMP)" NOTE: The S/5 Wireless Network supports only confidentiality methods “None”, "WEP (64-bit) and “WEP (128-bit)”.
Key Index	Select the Key Index to be used.	The Key Index of the wireless client must match the Key Index of the wireless infrastructure. NOTE: The Key Index is selectable only if the confidentiality method selected is “WEP (64-bit)” or “WEP (128 bit)”.
Pass Phrase / Key Format	Select the Pass Phrase / Key Format: - ASCII - HEX	Select the format of entering a Pass Phrase / Key Format.

WLAN Client Configuration		
Item	**Description**	**Comments**
Pass Phrase / Key	Enter the Pass Phrase / Key for the used confidentiality method as an ASCII or HEX string as selected above: WEP (64-bit) / WEP (128-bit): - Enter a 5/13 character long ASCII string. The system will generate a 10/26 character hexadecimal security key and assign it to the currently selected Key Index. OR - Enter a 10/26 character long hexadecimal (HEX) string. This security key will be assigned for the currently selected Key Index. WPA-PSK (TKIP) and WPA2-PSK (AES-CCMP) - Enter a 8 to 63 character long (ASCII) string OR - Enter a 64 character long hexadecimal (HEX) string	The Pass Phrase / Key of the wireless client must match the Pass Phrase / Key of the wireless infrastructure. A valid ASCII Pass Phrase / Key includes only printable ASCII characters, that is space and ASCII decimals 32 to 126. However the following ASCII decimals are not valid: 34 ("), 36 ($), 39 ('), 92 (\ ), and 96 (`). A valid HEX Pass Phrase / Key may include numeric characters 0-9 and alpha characters A-F. NOTE: A Pass Phrase / Key will be displayed as 10 successive asterisk (*) characters, after it has been saved.
Confirm Pass Phrase / Key	Re-enter the Pass Phrase / Key entered above.	

6. Select ***Save*** to confirm the selections above.

If the WLAN Radio status is changed, all the WLAN configuration changes take effect on the next monitor restart. If the WLAN Radio status is not changed, all the WLAN configuration changes will take effect immediately.

7.3 Setting time and date

NOTE: In the S/5 Network, the patient monitor's date and time is automatically synchronized with the date and time of the iCentral it is connected to. You can set the date and time locally only if the patient monitor is not connected to the S/5 Network and the patient monitor is in a discharged state.

CAUTION NETWORK DEVICE TIME SYNCHRONIZATION — When adding a new device to the CARESCAPE Network, the existing devices on the CARESCAPE Network will synchronize to the new device's time. To prevent potential time synchronization issues, you should set the new device's time to be as close as possible to the time (within one minute or less) used by the existing GE devices on the CARESCAPE Network.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Time***.

3. In the ***Time Configuration*** window, in ***Configure Date and Time***, update the following fields as needed:
   - Date
   - Month
   - Year
   - Hour:Minute
   - AM/PM
   - 12/24 Hrs
4. Select ***Save***.

The manual time configuration takes effect immediately.

7.4 Setting unit and bed name

Configure the care unit name and bed name for patient monitors that are configured to connect to the MC Network.

NOTE: The unit name shall be set the same with all the patient monitors and CARESCAPE CIC Pro central stations that are connected to the same care unit in the MC Network. Bed name shall be unique to each patient monitor in the same care unit.

NOTE: Unit and bed name selections are not available if network selection is S/5.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Unit and Bed Name***.
3. In the ***Unit and Bed Name Configuration*** window, view or set the unit name and bed name for the device.

NOTE: Use only capital letters A - Z, numbers, dash (-), asterisk (*) and space ( ). The unit name may be up to seven characters long and bed name up to five characters long.

4. Select ***Save***.

The unit and bed name configuration takes effect immediately.

7.5 Configuring printers

You can configure the patient monitor to print to up to 12 laser printers connected on the IX Network. Use the Webmin sub-modules to install or delete a printer and to print a test page.

NOTE: Ensure that you have the host name(s) or IP address(es) for all the connected IX printers available. Configure the IX printers according to this information.

NOTE: Laser printers that are installed on central stations do not need to be configured using Webmin. Refer to the user's manual for details on configuring the printer.

NOTE: This Webmin module is available only if the monitor is equipped with the Advanced Interface Board that provides both the MC and the IX Network interfaces.

NOTE: Refer to the CARESCAPE Modular Monitors Supplemental Information Manual for the list of supported devices.

7.5.1 Installing a printer

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers***.
3. In the ***Sub-Modules for Printers*** menu, select ***Install Printer***.

4. Below ***Printer Configuration Information*** in the ***Install Printer*** window, provide the following information:
   a. Select either the ***Hostname*** or ***IP Address*** radio button, as applicable.
   b. In the ***Hostname*** or ***IP Address*** field, enter the printer ***Hostname*** or ***IP Address***.
   c. In the ***Printer Name*** field, enter the ***Printer Name***.
   d. Select ***Yes*** from the drop down list next to ***Test Page***.
5. Select ***Save***.
6. From the patient monitor, select ***Monitor Setup*** > ***Printing***.
7. Select the ***Devices*** > ***Setup***.
8. In the ***Printout*** menu, select what to print out (for example, ***Waveforms***, ***Alarm Waveforms***, ***Numeric Trends***, ***Reports***).
9. Below ***Location***, select the radio button next to ***Network***.
10. From the drop down list next to ***Network Device***, select the desired printer.

The change will take effect immediately.

7.5.2 Deleting a printer

NOTE: Before deleting a laser printer, check ***Monitor Setup > Printing > Devices > Status.*** If a printout is assigned to the printer to be deleted, redirect the printout to another valid printer.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers***.
3. In the ***Sub-Modules for Printers*** menu, select ***Delete Printer***.
4. In the ***Delete Printer*** window, select the printer to delete.
5. Select ***Save***.

The change will take effect immediately.

7.5.3 Printing a test page

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers***.
3. In the ***Sub-Modules for Printers*** menu, select ***Print Test Page***.
4. In the ***Print Test Page*** window, select the printer.
5. Select ***Save***.

7.6 Configuring MUSE/12SL

NOTE: MUSE viewing and the related configuration settings are available only if the monitor is equipped with the Advanced Interface Board that provides both the MC and the IX Network interfaces.

NOTE: MUSE viewing is a licensed software feature. You can configure the MUSE/12SL settings independent of the license status, but actual viewing of MUSE reports requires that the MuseView license is enabled.

Settings to send 12SL data

1. Log in to Webmin.
2. Select ***Configuration*** > ***MUSE/12SL***.
3. In the ***MUSE/12SL*** window, enter the applicable information in the following fields:

- ***Location ID*** Identifies the location ID number (within the range 0 to 599) associated with the patient monitor for searching the MUSE system.
- ***Site Number*** Identifies the site number (within the range 1 to 254) associated with the patient monitor for searching the MUSE system.

4. Select ***Save***.

These settings take effect immediately after they are submitted.

Settings to view 12SL data

1. Log in to Webmin.
2. Select ***Configuration*** > ***MUSE/12SL***.
3. In the ***MUSE/12SL*** window, enter the following:
   - ***MUSE Web Username*** Username used to authenticate with the MUSE Web to access 12-lead reports.
   - ***MUSE Web Password*** Password used to authenticate with the MUSE Web to access 12-lead reports.
   - ***Confirm Password*** The password and the confirmed password must be the same.
   - ***MUSE Web URL*** Used to locate the MUSE Web system to access 12-lead reports. Enter the URL in a valid format.
4. Select ***Save***.

These settings take effect immediately after they are submitted.

7.7 Admit settings

7.7.1 Patient ID prefix

The patient monitor will automatically generate a temporary, unique patient ID when a patient with unknown ID is admitted to the patient monitor. The patient monitor will use this temporary patient ID for all 12SL reports that are sent to MUSE until the patient is discharged from the patient monitor, or his/her patient ID is changed. The temporary patient ID is generated from the temporary patient ID prefix, care unit name, bed name, and current time.

The temporary patient ID prefix is a hospital defined prefix that is used as the first two characters in a temporary patient ID to ensure its uniqueness inside the hospital.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Admit Settings***.
3. In the ***Sub-Modules for Admit Settings*** menu, select ***Patient ID Prefix***.
4. In the ***Patient ID Prefix*** window, enter a 2-character prefix.

NOTE: Valid values are uppercase letters and numbers.

5. Select ***Save***.

All changes take effect immediately.

7.7.2 Barcode settings

Barcode settings must be configured if a barcode reader is used to input patient data to the Admit/Discharge menu.

NOTE: Acquire detailed specification of the character-delimited or the length-delimited, multi-field barcode that the hospital uses. This will configure the barcode parser correctly.

NOTE: Acquire sample barcodes, if possible, to verify the operation of the parser configuration.

NOTE: For details on barcode data requirements and restrictions, see section 7.7.5 Barcode data specifications.

1. Select the parser type.
   a. Log in to Webmin.
   b. Select ***Configuration*** > ***Admit Settings***.
   c. In the ***Sub-Modules for Admit Settings*** window, select ***Barcode Settings***.
   d. Below ***Barcode Setup*** in the ***Barcode Settings*** window, select the applicable parser type from the drop-down list:.

Parser type	Used with this type of barcode
No Parser	Simple barcode that contains one piece of information, but no data control, so there is no need for a parser.
Length Delimited Parser	Barcode that specifies the beginning position and length of each field on the barcode.
Character Delimited Parser	Barcode that specifies a special character that separates each field on the barcode.

2. Select ***Save***.

   If you selected ***No Parser***, the barcode setting configuration is complete.

   For a ***Length*** or ***Character Delimited Parser***, follow the applicable instructions.

   – 7.7.3 Configuring Length Delimited Parser information.
   or
   – 7.7.4 Configure character delimited parser information.

7.7.3 Configuring Length Delimited Parser information

Points to note

– If you configure ***Age***, you must either select the ***Age Unit*** item or one of the age units (e.g., Years, Months, Weeks, Days) below ***Fixed Option***.
– If you configure ***Height***, you must either select the ***Height Unit*** item or one of the height units (e.g., Feet, Inches, Meters, Centimeters, Millimeters) below ***Fixed Option***.
– If you configure ***Weight***, you must either select the ***Weight Unit*** item or one of the weight units (e.g., Kilograms, Grams, Micrograms, Pounds, Ounces) below ***Fixed Option***.
– For an example of admit/discharge configuration for a length delimited parser, see Example of Length Delimited Parser information on page 81.

1. In the ***Admit/Discharge Configuration*** window, enter the location and length information for each data item.

   If an item is not included in the barcode, type 0 in the item's ***Position*** and ***Length*** fields, or leave the ***Position*** and ***Length*** fields blank.

a. In the ***Position*** column, type the beginning position of the field in the data string (from 1 to 300).
b. In the ***Length*** column, type the number of characters (from 1 to 99) that the field contains.

2. For ***Gender Format***, select ***Fixed*** or ***Configured***.

   If you select ***Configured***:

   a. Type the character that identifies ***Male***.
   b. Type the character that identifies ***Female***.

3. Below ***Fixed Option***, select the applicable value:

Item	Item selection in the top part of the screen	Fixed Option selection
Height Unit	Both ***Height*** and ***Height Unit***	*Non-Fixed*.
	Height only	Select value from drop down list.
Weight Unit	Both ***Weight*** and ***Weight Unit***	***Non-Fixed***.
	Weight only	Select value from drop down list.
Age Unit	Both ***Age*** and ***Age Unit***	***Non-Fixed***.
	Age only	Select value from drop down list.

4. Scroll to the bottom of the window, and select ***Save***.

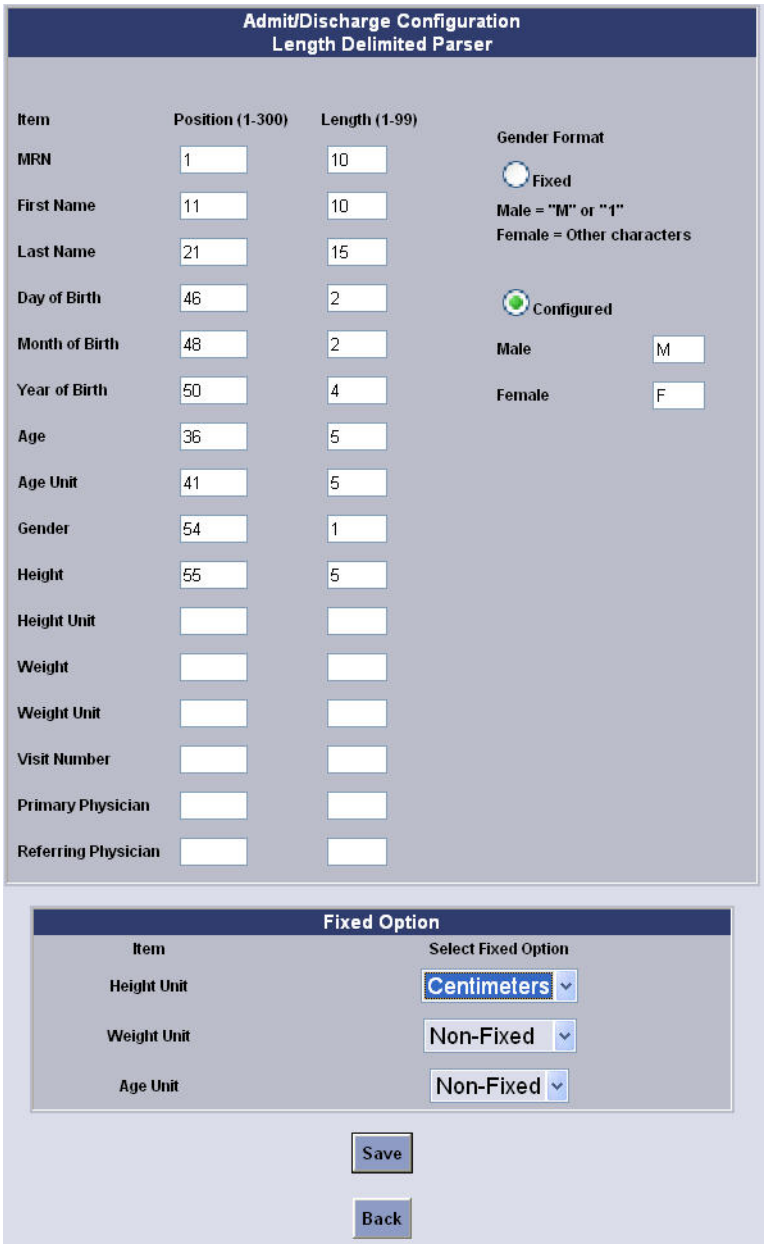
All changes take effect immediately.

Example of Length Delimited Parser information

In this example, the barcode contains 10 items. The following table lists the starting position and length of each item.

Item	Starting Position	Length
MRN	1	10
First Name	11	10
Last Name	21	15
Day of Birth	46	2
Month of Birth	48	2
Year of Birth	50	4
Age	36	5
Age Unit	41	5
Gender	54	1
Height	55	5

The following sample shows the corresponding entries in the ***Admit/Discharge Configuration*** window.



7.7.4 Configure character delimited parser information

Points to note

- If you configure ***Age***, you must either select the ***Age Unit*** item or one of the age units (e.g., Years, Months, Weeks, Days) below ***Fixed Option***.
- If you configure ***Height***, you must either select the ***Height Unit*** item or one of the height units (e.g., Feet, Inches, Meters, Centimeters, Millimeters) below ***Fixed Option***.
- If you configure ***Weight***, you must either select the ***Weight Unit*** item or one of the weight units (e.g., Kilograms, Grams, Micrograms, Pounds, Ounces) below ***Fixed Option***.
- For an example of admit/discharge configuration for a length delimited parser, see Example of character delimited parser information entry on page 83.

1. In the ***Position*** column of the ***Admit/Discharge Configuration*** window, enter the sequence number of each item included in the barcode. Use incremental numbers from 1 (the left-most field) up to 16 (the right-most field).

   If an item is not included in the barcode, leave the ***Position*** field blank for the item.

2. Below ***Field Delimiter***, in the ***Delimiter*** field, enter the special character that separates the fields on the barcode.

NOTE: Allowed characters are ASCII characters 33-126.

NOTE: Forbidden characters are control characters (ASCII characters 0-31), the space character (ASCII character 32), and ASCII characters 127 and above.

NOTE: If the character selected exists in any field in the barcode, it will be misinterpreted as a field delimiter.

3. Below ***Gender Code***, enter the codes that identify ***Male*** and ***Female***.
4. Below ***Fixed Option***, select the applicable value:

Item	Item selection in the top part of the screen	Fixed Option selection
Height Unit	Both ***Height*** and ***Height Unit***	*Non-Fixed*.
	Height only	Select value from drop down list.
Weight Unit	Both ***Weight*** and ***Weight Unit***	***Non-Fixed***.
	Weight only	Select value from drop down list.
Age Unit	Both ***Age*** and ***Age Unit***	***Non-Fixed***.
	Age only	Select value from drop down list.

5. Scroll to the bottom of the window, and select ***Save***.

All changes take effect immediately.

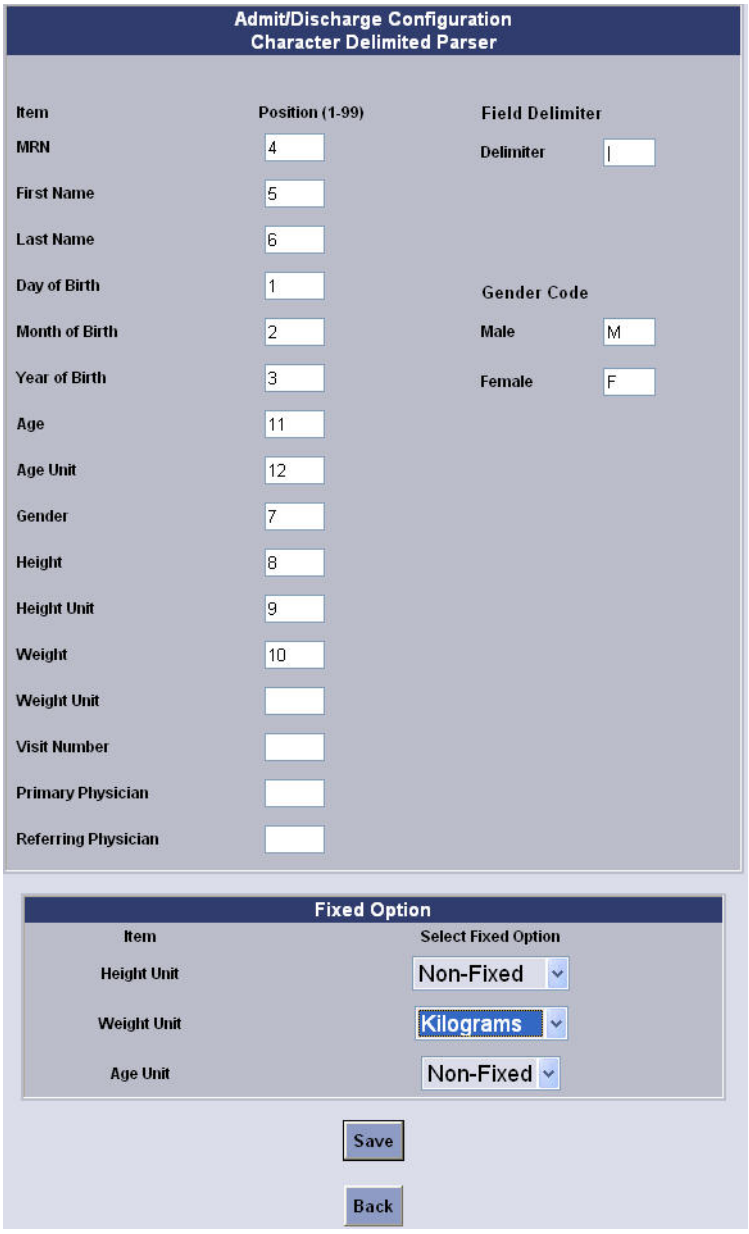
Example of character delimited parser information entry

In the following example, the barcode contains 12 items and uses the pound sign (#) as a delimiter.

Item	Sequence number of the item in the barcode
MRN	4
First Name	5
Last Name	6
Day of Birth	1
Month of Birth	2
Year of Birth	3
Age	11
Age Unit	12
Gender	7

Item	Sequence number of the item in the barcode
Height	8
Height Unit	9
Weight	10

The following sample shows the corresponding entries in the ***Admit/Discharge Configuration*** window.



7.7.5 Barcode data specifications

Points to note

– The maximum length of the entire barcode is 300.

– If the field value is longer than the maximum length indicated, the right-most characters will be truncated when the value is displayed in the ***Admit/Discharge*** menu.

  If a field contains a forbidden character, that character will be replaced with a space when it is displayed in the ***Admit/Discharge*** menu.

Item	Maximum length	Valid entries	Comments
MRN	99	Both letters and numbers	Forbidden characters are those that are not allowed by the patient monitor, including the following characters: ! " # ¤ % & /( ) = ? ` @ £ $ € { [ ] } \ * ^ _ : ; | < >
First Name	99		
Last Name	99		
Day of Birth	2	1-31	If Day of Birth is present in the barcode, then Month of Birth and Year of Birth also need to be present.
Month of Birth	2	1-12	If Month of Birth is present in the barcode, then Day of Birth and Year of Birth also need to be present.
Year of Birth	4	1880 to current year	If Year of Birth is present in the barcode, then Day of Birth and Month of Birth also need to be present.
Age	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol.
Age Unit	99	A, Y, YR, YRS (years) MO, MOS (months) WK, WKS (weeks) D, DAY, DYS (days)	
Gender	1		If gender is configured (not fixed), this must be 1 character.
Height	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol.
Height Unit	99	FT (feet) IN (inches) M (meters) CM (centimeters) MM (millimeters)	
Weight	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol.
Weight Unit	99	KG, KGS (kilograms) G, GM, GMS (grams) MCG (micrograms) OZ, OZS (ounces) LB, LBS (pounds)	
Visit Number	99	Both letters and numbers	Forbidden characters are those that are not allowed by the patient monitor, including the following characters: ! " # ¤ % & /( ) = ? ` @ £ $ € { [ ] } \ * ^ _ : ; | < >
Primary Physician	99		
Referring Physician	99		

7.8 Setting power frequency

WARNING **Incorrect power line frequency setting could adversely affect ECG and EEG processing.**

1. Log in to Webmin.
2. Select ***Configuration*** > ***Power Frequency***.
3. In the ***Power Frequency*** window, select the applicable power line frequency.
4. Select ***Save***.

The power frequency configuration takes effect immediately.

7.9 Selecting language and locale

Select the language used in clinical user interface and select the keyboard locale setting for the alphanumeric keyboard and the barcode reader.

1. Log in to Webmin.
2. Select ***Configuration*** >***Language***.
3. In the ***Language*** window, select the patient monitor language and keyboard language:
   a. Select the patient monitor language from the drop-down list and select ***Save***.
   b. Select the keyboard locale from the drop-down list and select ***Save***.

The language takes effect after the patient monitor is restarted. The keyboard locale takes effect immediately after it is submitted.

7.10 Selecting national requirements

Activate France specific defaults for the ECG HR adjustment range and the reminder beep behavior.

1. Log in to Webmin.
2. Select ***Configuration*** > ***National Requirements***.
3. In the ***National Requirement*** window, select the applicable option:

Value	Description
None	Select the normal defaults.
France	Enable the following country specific monitoring: - Heart Rate high alarm limit maximum 230. - Reminder beep will sound every 2 minutes when alarms have been silenced permanently.

4. Select ***Save***.

The national requirements changes take effect immediately.

7.11 Configuring modules

You can configure some acquisition module specific settings. The settings are saved to the permanent memory of the related acquisition module and the settings travel with the module from one patient monitor to another.

These settings are pre-configured at factory, except the ***Assets Settings***. You may need to re-configure them after corrective maintenance, or for administration purposes.

Refer to the Module Frames and Modules Technical Manual for detailed information on how to change these settings.

Webmin sub-module	Module	Description
Assets Settings	PDM	This setting allows you to view the customer assigned asset number of the PDM.
Licensing	PDM	This setting allows you to manage the PDM feature licenses.
ECG Filter Configuration	PDM	This setting allows you to temporarily disable the ECG filter of the PDM.
STP/TP/ST Settings	E-PRESTN, E-PRETN, E-RESTN, E-PSM & E-PSMP	This setting allows you configure the STP/TP/ST setting after replacing the STP board.
P/PT/PP Settings	E-P, E-PT & E-PP	This setting allows you to configure the P/PT/PP setting after replacing the STP board.

7.11.1 Module asset settings

NOTE: This configuration applies only to the PDM.

NOTE: The ***Device Serial Number*** field is view only and cannot be changed.

To set the device asset number of a PDM:

1. Log in to Webmin.
2. Select ***Configuration*** > ***Modules***.
3. In the ***Sub-Modules for Modules*** menu, select ***Assets Settings***.
4. In the ***Assets Settings*** window, enter the user-assigned asset number for the device in the ***Change Value to*** column.
5. Select ***Save***.

The change will take effect immediately.

7.12 Setting the host asset number

Enter a host asset number and view the host serial number.

NOTE: The ***Host Serial Number*** field is view only and cannot be changed.

To set the host asset number:

1. Log in to Webmin.
2. Select ***Configuration*** > ***Host Asset Settings***.
3. In the ***Host Asset Settings*** window, enter the user-assigned host asset number (up to 32 ASCII characters long) in the ***Change Value to*** column.
4. Select ***Save***.

The host asset changes take effect immediately.

7.13 Changing passwords

You can change the passwords for the biomed and clinical users.

WARNING **Control of this user's password is critical to ensure that Webmin on this device is accessed only by trained and authorized personnel. Failure to limit access of Webmin to trained and authorized personnel only may compromise patient safety and/or system performance.**

NOTE: Username and password are case sensitive. The allowed characters for "biomed" and "clinical" passwords are: alpha [A-Z, a-z], numeric [0-9], and space. The password length shall be between 8 and 16 characters.

NOTE: The user name "biomed" is common for the ***Webmin*** and ***Service Calibrations*** login screens. A change to the "biomed" password will affect both service interfaces.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Passwords***.
3. In the ***Edit User Password*** window, change the ***biomed*** or ***clinical*** user's password as required.
4. Select ***Save***.

The change will take effect immediately.

7.14 Restarting the patient monitor

You can use the Restart module in Webmin to restart the patient monitor after making configuration changes that require a manual restart to come into effect. For example after changing network or language settings, or adding activation codes for licenses.

NOTE: Loss of monitoring - This function is enabled only when the patient monitor is in a discharged state. Before restarting the patient monitor, verify that the patient is discharged from the patient monitor.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Restart***.
3. In the ***Monitor Restart*** window, select ***Restart***.

   The patient monitor will shutdown and restart automatically.

7.15 Setting up the remote service

7.15.1 Configuring the remote service

NOTE: Only available if the patient monitor is equipped with the Advanced Interface Board that provides both the MC and the IX Network interfaces.

To configure the Insite with Exc remote service tool.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Remote Service***.
3. In the ***Sub-Modules for Remote Service*** menu, select ***Configuration***.

4. In the ***Remote Service Configuration*** window, enter the applicable data:

HTTP Proxy Server Configuration		
Item	**Description**	**Comments**
Address	- If this site uses an HTTP proxy server, a specific site proxy server IP ***Address*** and ***Port*** number are required for the ***Remote Service*** communication to work. Otherwise, select ***None***. - If the HTTP proxy server requires user authorization, a specific ***Username***, and ***Password*** is required. Otherwise, select ***None***.	These values are determined by the customer.
Port		
Username and Password		

Remote Service Configuration		
Item	**Description**	**Comments**
System ID	Identifies the system to the GE back office servers.	These values are read-only and are unique.
Serial Number	Identifies the unit and is set at the time of manufacture.	
Enterprise URL	If required, designate the address of the GE backoffice servers required to communicate with the ***Remote Service Agent***.	This address should never be changed unless explicit instructions are given to do so.
Enterprise Tunnel URL	If required, designate the address of the GE backoffice servers required to communicate with the tunneling agent.	
Protocol	Identifies the protocol used to communicate with the enterprise servers.	This field is read-only and cannot be changed.

5. Select ***Save***.

The changes will take effect immediately.

7.15.2 Enabling remote service agent/ connection

After the server has been configured for remote serviceability, the remote service agent must be enabled for use.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Remote Service***.
3. In the ***Sub-Modules for Remote Service*** menu, select ***Control***.
4. In the ***Remote Service Control*** window, enable or disable the ***Service Agent*** by selecting ***Enable*** or ***Disable***.
5. Select ***Save***.

The changes will take effect immediately.

7.16 Transferring settings from one patient monitor to other patient monitors

You can transfer platform and/or clinical settings from one patient monitor to another, take backup copies of the settings to an external device and restore the settings from an external device.

1. Complete the platform and/or clinical configuration in one patient monitor.
2. Save the completed platform and/or clinical configuration settings to an external device (section 7.16.1 Saving settings).
3. Load the saved platform and/or clinical configuration settings from an external device to the destination patient monitors (section 7.16.2 Loading settings).
4. Activate the loaded platform and/or clinical configuration settings in the destination patient monitors (section 7.16.3 Activating settings).
5. Some platform settings can't be transferred from one patient monitor to another. See section 7.16.3 Activating settings for details. Configure these unaffected settings manually in the destination patient monitor following the instructions in sections 7.2 Configuring the network, 7.4 Setting unit and bed name, 7.12 Setting the host asset number and 7.17 License management.

NOTE: Clinical settings are software package and profile specific. For example, you can transfer clinical settings from a patient monitor with OR and PACU software only to other patient monitors with OR and/or PACU software, not to patient monitors with ICU, NICU and ED software.

7.16.1 Saving settings

NOTE: The patient monitor must not be configured to receive any alarm notifications from other monitors when the settings are saved.

Before saving the settings to a patient monitor that is connected to the MC or S/5 Network, make sure that the monitor is not receiving any alarm notifications from other monitors:

1. Select ***Data&Pages > Other Patients > Receive Alarms.***
2. Check that ***Change All Notifications*** is set to ***Off***.

Save the completed platform and/or clinical settings to a service PC or USB flash drive.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Save***.
4. In the ***Save Settings*** window, select the radio button next to the type of settings you want to save.
5. Select ***Save***.
6. According to your Webmin access:

a. If you are using Webmin on a service PC, you can save the settings file to any mass storage device connected to the service PC:
   - In the ***File Download*** dialog box, select ***Save***.
   - In the ***Save as*** dialog box, select the destination drive and folder and select ***Save.***

   NOTE: You may change the default filename, but do not change the file extension.

b. If you are using Webmin locally through the integrated browser, you can save the settings file to a USB flash drive that is connected to one of the patient monitor's USB ports:

– The ***Save As*** window will show you the name of the created settings file.
– Select ***Save*** to save the settings file to the USB flash drive.

NOTE: You may change the default filename, but do not change the file extension.

NOTE: Do not disconnect the USB storage device until saving is complete.

NOTE: As a factory default the ICU software package is always activated.

7.16.2 Loading settings

Load the saved platform and/or clinical settings from a service PC or USB flash drive to the patient monitor.

NOTE: The loaded settings will remain in an inactive state in the patient monitor until they are purposely activated by the user (see section"7.16.3 Activating settings").

1. Log in to Webmin.
2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Load***.
4. According to your Webmin access:

a. If you are using Webmin on a service PC, you can load the settings file from any mass storage device connected to the service PC:
   – In the ***Load Settings*** window, enter the file name or select ***Browse*** to select a file from the ***Choose File to Upload*** dialog box.
   – Select ***Upload*** to load the settings.

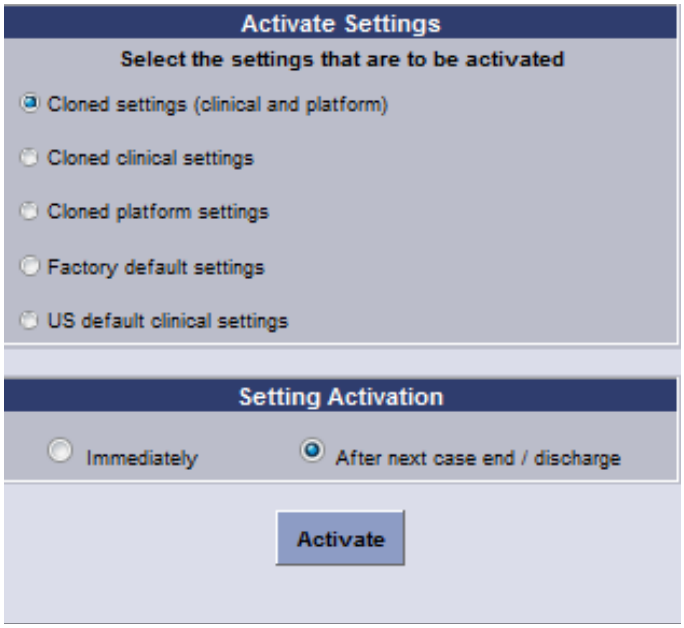
b. If you are using Webmin locally through the integrated browser, you can load the settings file from a USB flash drive that is connected to one of the patient monitor's USB ports:
   – The ***Load Settings*** window will show you the available settings files. Select the settings file to be loaded.
   – Select ***Load Settings*** to load the selected settings file from the USB flash drive.

   NOTE: Do not disconnect the USB storage device until loading is complete.

7.16.3 Activating settings

NOTE: Settings activation takes place only when the patient monitor is in a case reset / patient discharged state. If you are going to activate settings immediately, verify that the patient monitor is in a case reset / patient discharged state. You can alternatively initiate the setting activation process with a delay during an active patient case, but the new settings will activate only after the next case reset / patient discharged.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Activate***.
4. In the ***Activate Settings*** window, select the settings that you want to activate:



- Select ***Cloned settings (clinical and platform)*** to activate both the clinical and platform settings.
- Select ***Cloned clinical settings*** to activate only loaded clinical settings.
- Select ***Cloned platform settings*** to activate only loaded platform settings.

NOTE: Activation of the cloned clinical or platform settings will not effect the following settings in the target patient monitor:

– Network
– Unit and Bed Name
– Host Asset Settings
– Licenses

Remember to configure the unaffected settings manually in the target patient monitor.

NOTE: Check and manually modify the following WLAN settings after activating them in the destination monitor:

– RTS Threshold
– Fragmentation Threshold
– TXOP for Best Effort
– TXOP for Background

- Select ***Factory default settings*** to restore all platform and clinical settings back to the factory defaults.
- Select ***US default clinical settings*** to restore all clinical and platform settings back to the US specific factory defaults.

NOTE: Activation of the factory defaults and US factory defaults will leave the following settings in the target patient monitor unaffected:

- Host Asset Settings

- Licenses

5. In the ***Setting Activation***, select whether you want the new settings to take effect immediately or after the next case end / discharge:

Select	To	NOTE
Immediately	Activate the new settings Immediately.	The patient monitor must be in a case reset / patient discharged state.
After next case end / discharge	Take the new settings in use with a delay, after the next case end / patient discharge.	This option allows you to initiate the setting activation process with a delay during an active patient case. The new settings will activate only after the next case end / patient discharge.

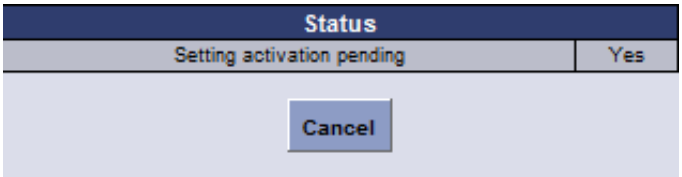
6. Select ***Activate*** to start the settings activation process.

- **If immediate settings activation was selected:**
  a. Wait until the settings activation is completed and the patient monitor has performed an automatic restart.
  b. Verify that the settings activation was successful and the patient monitor is running the activated settings.
- **If after next case end / discharge settings activation was selected:**
  a. The patient monitor will show a message ***Settings activation on next discharge/after next case end*** on the display until the next case end / patient discharge. The patient monitoring can be continued normally until then.
  b. Settings activation will start automatically after the next case end / patient discharge, unless this process is canceled by the user.
  c. Wait until the settings activation is completed and the patient monitor has performed an automatic restart.
  d. Verify that the settings activation was successful and the patient monitor is running the activated settings.

7.16.4 Canceling pending settings activation

You can cancel pending settings activation anytime while the message ***Setting activation after next case end / Setting activation after next discharge*** is shown on the display.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Settings***.
3. In the ***Sub-Modules for Settings*** menu, select ***Activate***.
4. Select ***Cancel*** to cancel settings activation.



7.17 License management

You can upload a license file that contains all acquired licenses and activation codes. Alternatively, you can enable and activate individual software packages and host software feature licenses by entering the required activation code manually.

NOTE: Contact GE Healthcare to acquire activation codes for licenses.

7.17.1 Enabling and activating host software package

NOTE: As a factory default, the ICU software package is always activated.

NOTE: You can have several software packages enabled, but only one of them can be selected active at a time.

Enter an activation code to enable the software package.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Licenses***.
3. In the ***Sub-Modules for Licenses*** window, select ***Software Package***.
4. Below ***Software Package*** in the ***Software Package*** window:
   a. From the ***Status*** drop-down list, select ***ENABLED***.
   b. Enter a valid ***Activation Code*** for the new software version.
5. Select ***Save***.
6. To activate a software package, select the desired radio button in the ***Active*** column.
7. Select ***Save***.

All license changes take effect after the next patient monitor restart.

NOTE: The software license for the active host software version is shown in the ***Software Package*** window below the ***Active Software License***. This license is typically entered before activating a new host software version, see Software Management.

WARNING **If the software package is changed, all clinical settings will reset to factory defaults.**

7.17.2 Enabling and activating host software feature licenses

Feature licenses are available either as permanent or as trial licenses. Activation codes for trial licenses are valid for 90-days.

Enter the activation code to enable a software feature.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Licenses***.
3. In the ***Sub-Modules for Licenses*** menu, select ***Host Licensing***.
4. In the ***Host License*** window, enter the activation code by the appropriate ***OPTIONAL*** host license feature.

NOTE: To activate an ***OPTIONAL-TRIAL*** license, enter the expiration date in addition to the activation code.

5. From the ***Status*** drop-down list, select ***ENABLED***.
6. Select ***Save***.

All license changes take effect after the next patient monitor restart.

7.17.3 Uploading license file

Upload a valid license file as follows:

1. Log in to Webmin.
2. Select ***Configuration*** > ***Licenses***.
3. In the ***Sub-Modules for Licenses*** window, select ***Upload License***.
4. According to your Webmin access:
   a. If you are using Webmin on a service PC, you can upload the license file from any mass storage device connected to the service PC. In the ***Upload Software Package and Host License*** window, enter the file name of the license file or select ***Browse*** to select a file using the ***Choose File to Upload*** dialog box.
   b. If you are using Webmin locally through the integrated browser, you can upload the license file from a USB flash drive that is connected to one of the patient monitor's USB ports. In the ***Upload Software Package and Host License*** window, select the license file to be uploaded.

   NOTE: Do not disconnect the USB storage device until downloading is complete.
5. Select ***Upload*** to upload the license file.
6. Verify that the information populated in the ***Software Package*** and ***Host License*** tables is accurate.

All license changes take effect after the next patient monitor restart.

7.18 Software management

Software installation consists of two main steps: software transfer and software activation.

7.18.1 Transferring software

To begin software installation, you first transfer the new software into the inactive memory partition of the patient monitor. Transfer software using the GE Healthcare Software Transfer Utility that runs on a service PC. With this application, you can transfer new software from a software CD to the patient monitors over the CARESCAPE Network IX (IX Network) or a crossover cable. The new, transferred software is inactive in the patient monitor(s) until you activate it. Alternatively you can use InSite ExC to transfer the software. You can transfer the software in the background, without affecting normal patient monitoring.

NOTE: The software CD contains both the patient monitor software and the Software Transfer Utility, the tool to install the software. Software transfer procedure is described in detail in the CARESCAPE Modular Monitors Software Installation Instruction that is delivered together with the software CD.

7.18.2 Activating the installed software

After transferring the new software to the patient monitors, take the transferred, inactive software into use by activating it.

Before you start:

- Connect the patient monitor to the AC mains during software activation. Software activation does not start if the patient monitor uses its battery.
- Verify the compatibility of the connected bedside and network devices with the new software version. Refer to the latest version of the CARESCAPE Modular Monitors Supplemental Information Manual for a list of compatible network and bedside devices.
- Contact GE Healthcare to get the latest version of the user and service documentation

- Contact GE Healthcare for any inquiries regarding the software CD and/or activation code for the new host software version.

NOTE: Loss of monitoring - Software is activated only when the patient monitor is in a patient discharged / case reset state. Normal patient monitoring is unavailable until the software activation is completed. This may take up to 10 minutes.

NOTE: The existing clinical and platform settings of the patient monitor are saved and are not affected by the activation of the new patient monitor software version. However, any new or changed clinical and platform settings in the activated patient monitor software version have their factory default values and may require manual configuration. For more information, refer to the latest version of the CARESCAPE Modular Monitors Supplemental Information Manual. Contact GE Healthcare for any inquiries regarding the software CD and/or activation code for the new host software version.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Software Management***.
   The ***Software Management*** window displays.
3. In the ***Software List***, select the software that you want to activate::

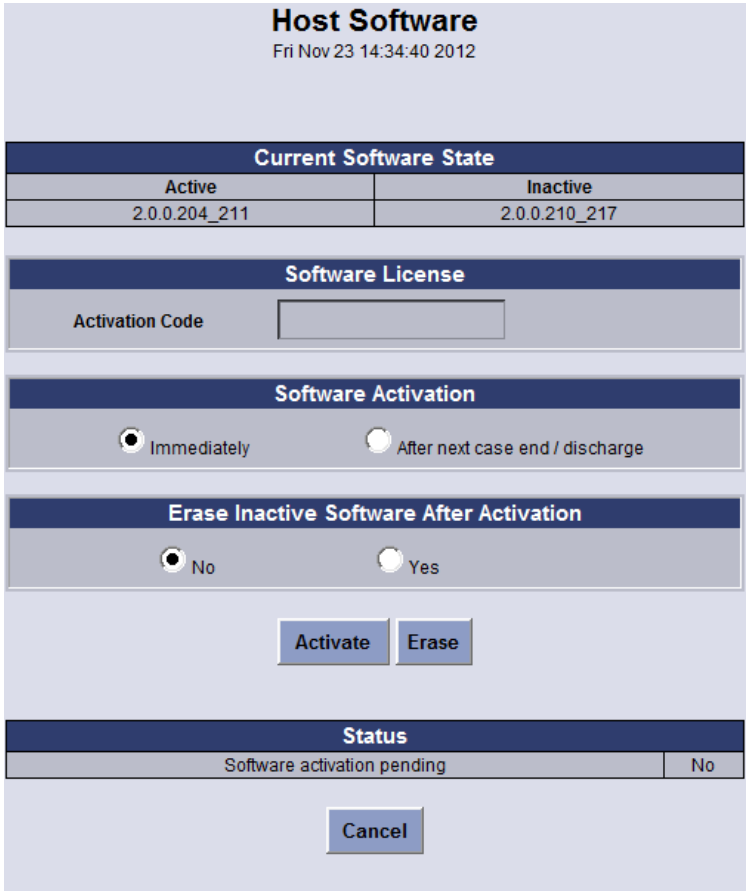
Software	Purpose of use
Host Software	Patient monitor software for the host unit including: • UIC SW for the UI board • EMBC SW for the CPU board • PMC SW for the DC/DC board
PDM Software	CARESCAPE Patient Data Module
PiCCO Software	E-PiCCO module.
sGAS Software	CARESCAPE respiratory modules, E-sCAiOV family.

4. Select ***Next***.
   The selected ***Software activation*** window appears.
5. According to the software you are activating, proceed to:
   - Activating host software immediately
   - Activating host software after next case end / discharge
   - Activating module software

Activating host software immediately

Before you start:

- Make sure the patient monitor is in a case reset / patient discharged state.



1. In the ***Host Software*** window, verify that the software you are activating is listed as ***Inactive*** in ***Current Software State***.
2. In ***Software License***, if applicable, enter the ***Activation Code*** for the new software version.
3. In ***Software Activation***, select ***Immediately***.
4. In ***Erase Inactive Software After Activation***, select:

   No - to keep the currently active software version as inactive software after the new software version is activated successfully. This option lets you restore the patient monitor to the previous software version later.

   Yes - to erase the currently active software version permanently after the new software version is activated successfully.

5. Select ***Activate*** to start the host software activation.
6. Confirm activation by selecting ***Yes*** in the Host Software window that opens.

   The patient monitor shows a screen saver that informs about the ongoing software activation:

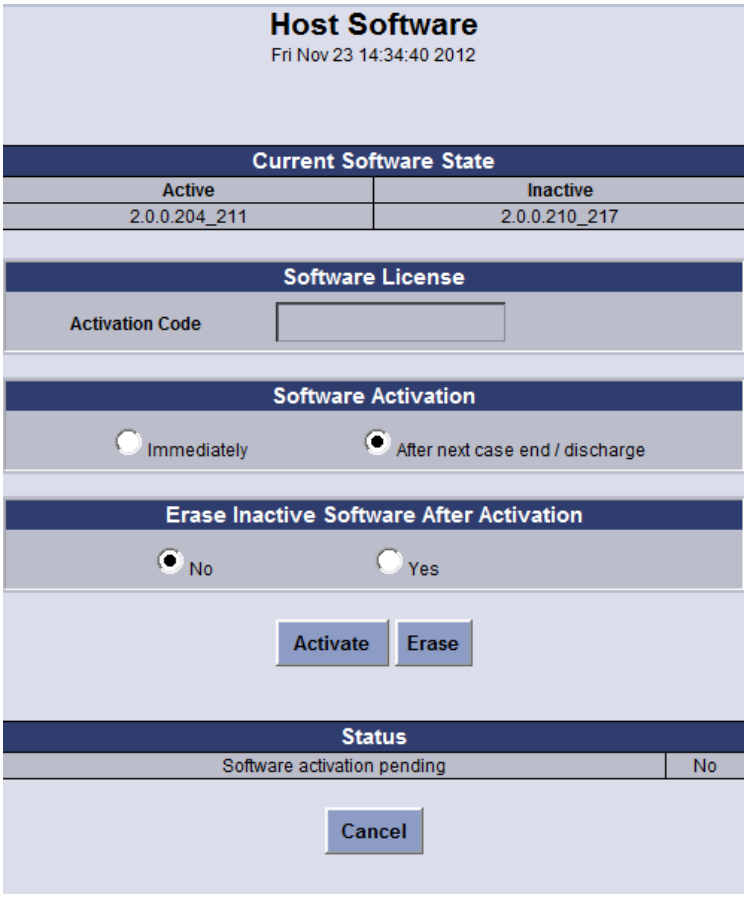
Software activation in progress. Do not disconnect any measurement modules or other peripheral devices, or shut down the monitor until the software activation is complete. Activation may take up to 10 minutes. The device will automatically restart once the software activation is complete.

NOTE: When the software is activated first time after a uDOM replacement, the screen saver does not appear.

7. Wait until the software activation completes and the patient monitor restarts automatically.
8. Verify that the software activation is successful and the patient monitor runs the activated software.

Activating host software after next case end / discharge

If you want to activate the new host software with a time delay, that is, after the next case end / patient discharge, follow this instruction. You can initiate the software activation process with a delay during an active patient case.



1. In the ***Host Software*** window, verify that the software that you activate is listed as ***Inactive*** in ***Current Software State***.
2. In ***Software License***, if applicable, enter the ***Activation Code*** for the new software version.
3. In ***Software Activation***, select ***After next case end / discharge.***

4. In ***Erase Inactive Software After Activation***, select:

   No - to keep the currently active software version as inactive software after the new software version is activated successfully. This option lets you restore the patient monitor to the previous software version later.

   Yes - to erase the currently active software version permanently after the new software version is successfully activated.

5. Select ***Activate*** to start the software activation.
6. Confirm activation by selecting ***Yes*** in the ***Host Software*** window that opens.
   The patient monitor shows a message ***Software activation after next case end / after next discharge*** on the display until the next case end or patient discharge. The patient monitoring can be continued normally until then.
7. Software activation will start automatically after the next case end / patient discharge, unless this process is cancelled before it starts.

The patient monitor informs clinical users about pending software activation by showing the message ***Software activation after next case end / after next discharge*** on the display.

The software activation starts automatically after the clinical user performs a patient discharge / case end the next time. The patient monitor shows a screen saver that informs about the ongoing software activation:

Software activation in progress. Do not disconnect any measurement modules or other peripheral devices, or shut down the monitor until the software activation is complete. Activation may take up to 10 minutes. The device will automatically restart once the software activation is complete.

NOTE: When the software is activated first time after a uDOM replacement, the screen saver does not appear.

The clinical user must wait until the software activation is complete and the patient monitor restarts automatically. If the patient monitor starts up normally and no error messages appear on the display, the activation is successful.

Activating module software

Follow this instruction when you want to:

- activate new sGAS software to a CARESCAPE Respiratory Module
- activate new PDM software to a CARESCAPE Patient Data Module
- activate new PiCCO software to a E-PiCCO Module.

Before you start:

- Make sure that the patient monitor is in a case reset / patient discharge state.
- Make sure that the target parameter module is connected to the patient monitor.

NOTE: Do not disconnect the parameter module, or shut down the patient monitor until the software activation is completed and the parameter module has restarted.

To activate module software:

1. In the ***PDM/sGAS/PiCCO Software*** window, in ***Current Software State***, verify that the software you want to activate is listed as ***Inactive***.
2. Select ***Activate*** to activate the inactive software.
3. Confirm activation by selecting ***Yes*** in the ***Host Software*** window that opens.
   The patient monitor will now start activating the module software. It will show a message "***PDM module removed***", "***Gas measurements removed***", or "***CO measurement removed***" on the patient monitor screen. This message will remain until the module software

activation is completed and the parameter module has restarted. This may take up to 15 minutes. Do not shut down the patient monitor or disconnect the parameter modules. The parameter module restarts automatically after the software activation is complete.

4. After the parameter module restarts, verify that the software activation is successful and the parameter module runs the activated software.

7.18.3 Canceling pending host software activation

You can cancel a pending host software activation at any time while the message ***Software activation after next discharge/after next case end*** is shown on the display.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Software Management*****.**
   The ***Software Management*** window opens.
3. Select ***Host Software*** from the ***Software List*** and select ***Next***.
4. In the ***Host Software*** window, below ***Status***, verify that the ***Software activation pending*** is ***Yes***.
5. Select ***Cancel***.

The pending software activation is cancelled and the patient monitor continues running the current software version.

7.18.4 Erasing an inactive software version.

You can erase an inactive host software version from the patient monitor. Erasing can prevent the activation of a wrong software version by mistake.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Software Management***.
   The ***Software Management*** window opens.
3. Select the software that you want to erase and select ***Next***.
   The selected software activation window appears.
4. Select ***Erase*** to erase the inactive software.

8 Installation checkout

The purpose of the installation checkout procedure is to ensure that the system is properly installed and configured for use.

Service personnel shall perform the following checkout procedure for the monitoring system after the hardware installation and platform configuration is completed:

- 8.1. Visual inspection
- 8.2. Electrical safety tests

  NOTE: The manufacturer has performed the electrical safety test for the patient monitor and acquisition modules during final inspection. You do not have to perform the electrical safety tests during installation checkout, if there is less than 12 months since the patient monitor was manufactured. Check the date of manufacture of the device from the device label (see section 3.4.2. Equipment identification).
- 8.3. Functional check

NOTE: Refer to chapter 10. Maintenance and checkout to see the recommended checkout procedure after corrective and planned maintenance.

8.1 Visual inspection

Perform the following visual inspection to the installed monitoring system:

- Carefully inspect the patient monitor and the connected peripheral devices for any damage.
- Verify that the patient monitor and the connected peripheral devices are properly mounted with specified mounting solutions.
- Verify that the cables between the patient monitor and the connected peripheral devices are intact, properly connected and secured to the right connectors.
- Verify that the modules are properly connected and locked.
- Verify that the pivoting module frame and battery door are properly locked.

The cleaning precautions, requirements, procedures, and recommended cleaning solutions for the patient monitor are described in the patient monitor's user's manual. For details about cleaning, disinfecting and sterilizing the accessories, see the instructions for use in the accessory package.

8.2 Electrical safety tests

Electrical safety tests provide a method of determining if potential electrical health hazards to the patient or operator of the device exist.

8.2.1 Test setup

Test conditions

Perform electrical safety tests under normal ambient conditions of temperature, humidity and pressure.

Test equipment

The test equipment required to perform electrical safety tests is listed below.

Tool	Part Number / Requirement
Safety Analyzer / Leakage Current Tester	Equivalent to the circuits shown.
Safety Test Body Kit [1)]	P/N M1155870 or equivalent

1 Instead of the test bodies included in the safety test body kit, other applicable test bodies with all pins connected together may be used.

Perform electrical safety tests using an electrical safety analyzer according to IEC 60601-1, UL 60601-1, EN 60601-1 or CSA C22.2 No. 601.1. The schematics in this section provide a general understanding of the test equipment. Actual configuration of test equipment may vary. Refer to the instructions delivered with the safety analyzer to perform each test.

The patient monitor being tested should be placed on an insulating surface.

NOTE: Before proceeding, make sure that all test equipment is properly calibrated, maintained and functioning.

NOTE: GE recommends that the qualified personnel performing the tests should record the test results of each electrical safety test, for example by using the installation / maintenance check forms included in this manual.

System setup

These instructions are intended for every component in the system. Ensure that all system components are properly connected to the patient monitor.

8.2.2 Power outlet

Verify that the power outlet is wired correctly according to the country's electrical code standard before starting the following electrical safety tests. The results of the following tests will be inaccurate unless a properly wired power outlet is used.

8.2.3 Power cord and plug

Verify that the power cord being used with the patient monitor is good. To do this, check the following:

- Inspect the power cord for wear or damage regularly. If damage is suspected, test for continuity through each conductor of the power cord connector. Replace the power cord, as necessary, with a regulatory approved cord for the country of use.

WARNING **Use only AC power cords recommended or manufactured by GE.**

8.2.4 Ground (earth) integrity

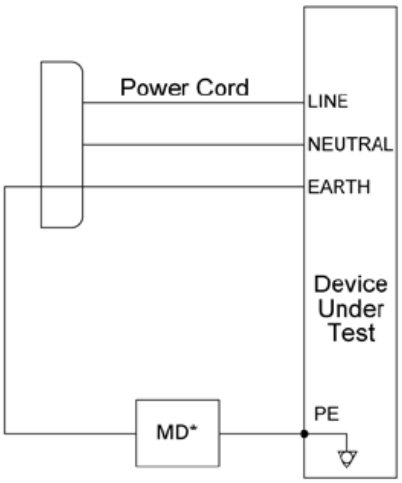
Listed below are two alternative methods for checking the ground (earth) integrity: "a) Ground continuity test" and "b) Impedance of protective earth connection". These tests determine whether the device's exposed metal and power inlet's earth (ground) connection has a power ground fault condition.

Perform either test a) or test b) in accordance to your local regulations.

NOTE: Refer to the instructions delivered with the safety analyzer to perform each test.

a) Ground continuity test

The measuring device (MD) in the diagram below may be a digital multimeter or part of the safety analyzer.



Acceptance criteria:

- For equipment without a power supply cord, the impedance between the protective earth terminal and any accessible metal part which is protectively earthed shall not exceed 0.1 ohms.
- For equipment with a power supply cord, the impedance between the protective earth pin in the mains plug and any accessible metal part which is protectively earthed shall not exceed 0.2 ohms.

b) Impedance of protective earth connection

This test is normally only required as a manufacturing production test to receive safety agency compliance. Some country agencies do require this test after field equipment repairs (i.e., Germany's DIN VDE 0751 standards). Consult your country/local safety agency if in doubt.

Check compliance as follows:

1. A current of 25A from a current source with a frequency of 50 or 60 Hz with a no-load voltage not exceeding 6 V is passed for at least 5 seconds, but not more than 10 seconds, through the protective earth terminal or the protective earth pin in the mains plug and each accessible metal part which could become live in case of failure in basic insulation.

2. The voltage drop between the parts described is measured and the impedance determined from the current and voltage drop. It shall not exceed the values indicated.

   When taking this measurement, flex the unit's power cord along its length. There should be no fluctuations in resistance.

Acceptance criteria:

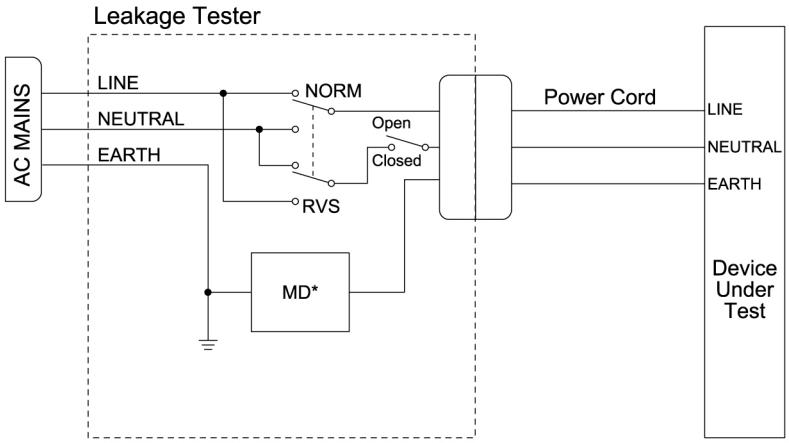
- For equipment without a power supply cord, the impedance between the protective earth terminal and any accessible metal part which is protectively earthed shall not exceed 0.1 Ohms.
- For equipment with a power supply cord, the impedance between the protective earth pin in the mains plug and any accessible metal part which is protectively earthed shall not exceed 0.2 Ohms.

8.2.5 Earth leakage current test

This test measures the current leakage flowing from the mains part through or across the insulation into the protective earth conductor of the device under test.

Perform this test both in Normal Condition (NC) and in a Single Fault Condition (SFC), where one of the supply conductors is open at a time. Perform the test with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

1. Configure the safety analyzer as follows (NC):
   – Polarity: NORMAL
   – Neutral: CLOSED

2. Power on the device under test.

3. Read and record the current leakage indicated on the safety tester.

4. Configure the safety analyzer as follows (SFC):
   – Polarity: NORMAL
   – Neutral: OPEN

5. Read and record the current leakage indicated on the safety tester.

6. Configure the safety analyzer as follows (SFC):
   – Polarity: REVERSED
   – Neutral: OPEN

7. Read and record the current leakage indicated on the safety tester.

8. Configure the safety analyzer as follows (NC):
   – Polarity: REVERSED
   – Neutral: CLOSED

9. Read and record the current leakage indicated on the safety tester.

10. Power off the device under test.

Acceptance criteria in Normal Condition (NC):

- All readings shall be less than or equal to 300 µA f*or installations that require compliance to UL 60601-1 requirements.*
- All readings shall be less than or equal to 500 µA f*or installations that require compliance to EN 60601-1 / IEC 60601-1 requirements.*

Acceptance criteria in Single Fault Condition (SFC) – one of the supply conductors open at a time:

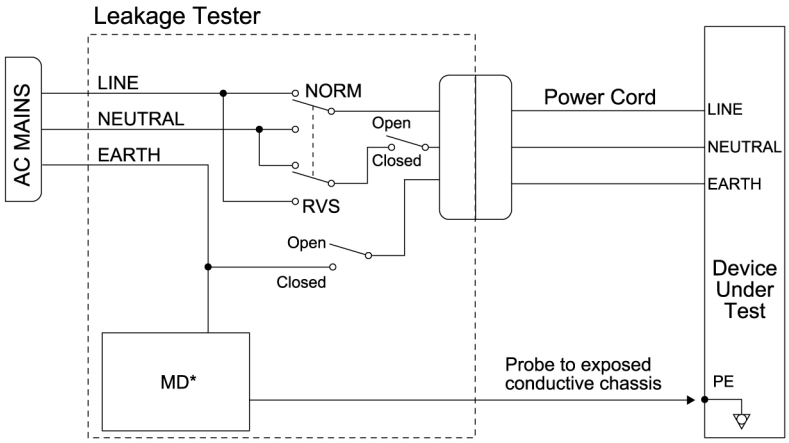
- All readings shall be less than or equal to 1 mA.

8.2.6 Enclosure leakage current (touch current) test

This test measures current leakage through the exposed conductive parts on the device under test.

Perform the test in Normal Condition (NC) and in two different Single Fault Conditions (SFC): 1) earth open and 2) one of the supply conductors open at a time. Perform the test with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

1. Configure the safety analyzer as follows (NC):
   - Polarity: NORMAL
   - Neutral: CLOSED
   - Earth (GND): CLOSED

2. Power on the device under test.

3. Read and record the current leakage indicated on the safety tester.

4. Configure the safety analyzer as follows (SFC):
   – Polarity: NORMAL
   – Neutral: OPEN
   – Earth (GND): CLOSED

5. Read and record the current leakage indicated on the safety tester.

6. Configure the safety analyzer as follows (SFC):
   – Polarity: NORMAL
   – Neutral: CLOSED
   – Earth (GND): OPEN

7. Read and record the current leakage indicated on the safety tester.

8. Configure the safety analyzer as follows (SFC):
   – Polarity: REVERSED
   – Neutral: CLOSED
   – Earth (GND): OPEN

9. Read and record the current leakage indicated on the safety tester.

10. Configure the safety analyzer as follows (SFC):
    – Polarity: REVERSED
    – Neutral: OPEN
    – Earth (GND): CLOSED

11. Read and record the current leakage indicated on the safety tester.

12. Configure the safety analyzer as follows (NC):
    – Polarity: REVERSED
    – Neutral: CLOSED
    – Earth (GND): CLOSED

13. Read and record the current leakage indicated on the safety tester.

14. Power off the device under test.

Acceptance criteria in Normal Condition (NC):

- All readings shall be less than or equal to 100 µA

Acceptance criteria in Single Fault Condition (SFC) – earth open or one of the supply conductors open at a time:

- All readings shall be less than or equal to 300 µA for *installations that require compliance to UL 60601-1 requirements.*
- All readings shall be less than or equal to 500 µA for *installations that require compliance to EN 60601-1 / IEC 60601-1 requirements.*

8.2.7 Patient leakage current tests – overview

The following table specifies the parameter modules and the related patient connectors to be tested in the 8.2.8. Patient (source) leakage current tests and in the 8.2.9. Patient (sink) leakage current tests.

Use the safety test body kit, P/N M1155870 (or equivalent), to perform patient leakage current tests. This safety test body kit contains various patient connectors where all pins are shorted out together. For information on which test body to use for each patient connector, refer to the service instructions included in the safety test body kit.

NOTE: If not otherwise stated in the table below, each test body is connected directly to the specified connector in the patient module.

Table 1 Patient connectors to be tested with each module

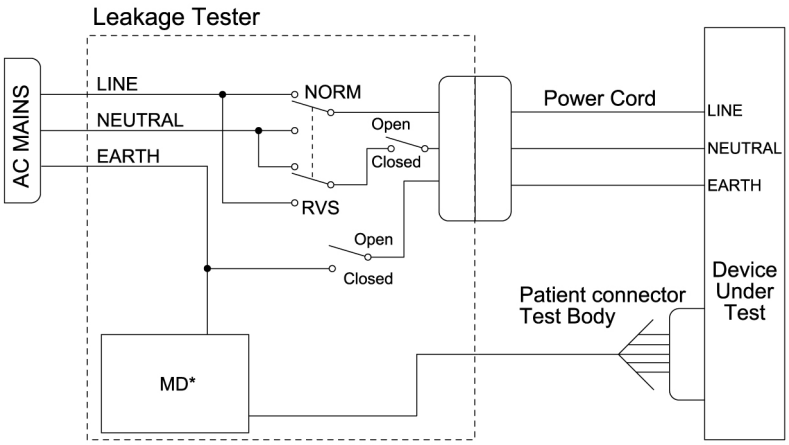
Module	Patient connector
E-PRESTN, E-PSMP, E-PSMPW	ECG & SpO2
E-RESTN, E-PSM, E-PSMW	ECG & SpO2
E-PRETN	ECG & P1
E-P, E-PT	P3/P7
E-PP	P5
E-COP, E-COPSv	P4/P8
E-PiCCO	P8
E-NSATX, E-NSAT	SpO2
E-Masimo	SpO2
E-NMT	NMT
E-BIS	1. Connect the BISx Digital Signal Processing Unit with the Patient Interface Cable (PIC+) to the E-BIS module. 2. Connect the specified test body to the PIC+ cable. NOTE: The patient isolation is in the BISx Digital Signal Processing Unit , not in the E-BIS module.
E-Entropy	1. Connect an Entropy sensor cable to the module. 2. Connect the specified test body to the Entropy sensor cable.
E-EEG	1. Disconnect the N-EEG headbox from the E-EEG module. 2. Connect the test body directly to the E-EEG module.
PDM	ECG & SpO2

8.2.8 Patient (source) leakage current tests

This procedure measures the leakage current from an applied part connector of the device to ground.

Perform the test in Normal Condition (NC) and in two different Single Fault Conditions (SFC): 1) earth open and 2) one of the supply conductors open at a time.
Perform test with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

NOTE: Perform this test for all the connected parameter modules and patient connectors specified in Table 1.

1. Configure the safety analyzer as follows (NC):
   - Polarity: NORMAL
   - Neutral: CLOSED
   - Earth (GND): CLOSED
2. Power on the device under test.
3. Read and record the current leakage indicated on the safety tester.
4. Configure the safety analyzer as follows (SFC):
   - Polarity: NORMAL
   - Neutral: OPEN
   - Earth (GND): CLOSED
5. Read and record the current leakage indicated on the safety tester.
6. Configure the safety analyzer as follows (SFC):
   - Polarity: NORMAL
   - Neutral: CLOSED
   - Earth (GND): OPEN
7. Read and record the current leakage indicated on the safety tester.
8. Configure the safety analyzer as follows (SFC):

- Polarity: REVERSED
- Neutral: CLOSED
- Earth (GND): OPEN

9. Read and record the current leakage indicated on the safety tester.
10. Configure the safety analyzer as follows (SFC):
    - Polarity: REVERSED
    - Neutral: OPEN
    - Earth (GND): CLOSED
11. Read and record the current leakage indicated on the safety tester.
12. Configure the safety analyzer as follows (NC):
    - Polarity: REVERSED
    - Neutral: CLOSED
    - Earth (GND): CLOSED
13. Read and record the current leakage indicated on the safety tester.
14. Power off the device under test.
15. Repeat this test for all the connected parameter modules and patient connectors specified in Table 1.

Acceptance criteria in Normal Condition (NC):

- All readings shall be less than or equal to 10 µA.

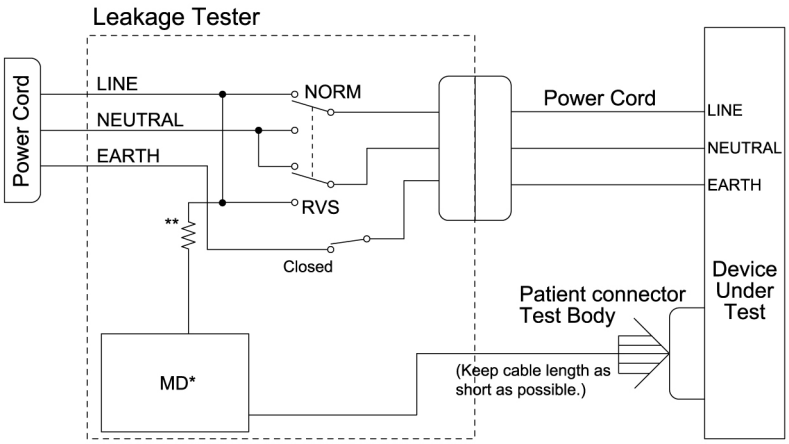
Acceptance criteria in Single Fault Condition (SFC) – earth open or one of the supply conductors open at a time:

- All readings shall be less than or equal to 50 µA.

8.2.9 Patient (sink) leakage current tests

This procedure measures the leakage current from an applied part connector of the device to ground. Perform the test in Normal Condition (NC) with normal and reverse polarity.

NOTE: Refer to the instructions delivered with the safety analyzer to perform this test.



NOTE: *The measuring device (MD) represents the network and voltage measuring instrument and its frequency characters according to IEC 60601-1.

NOTE: **According to IEC-60601, the impedance to protect the circuitry and the person performing the test, but low enough to accept currents higher than the allowable values of the leakage current to be measured.

WARNING **SHOCK HAZARD - The following step causes high voltage at the test body. Do not touch the test body.**

NOTE: Perform this test for all the connected parameter modules and patient connectors specified in Table 1.

1. Configure the safety analyzer as follows:
   – Polarity: NORMAL
   – Neutral: CLOSED
   – GND: CLOSED
2. Power on the device under test.
3. Read and record the current leakage indicated on the safety tester.
4. Configure the safety analyzer as follows:
   – Polarity: REVERSED
   – Neutral: CLOSED
   – GND: CLOSED
5. Read and record the current leakage indicated on the safety tester.
6. Power off the device under test.
7. Repeat this test for all the connected parameter modules and patient connectors specified in Table 1.

Acceptance criteria:

- All readings shall be less than or equal to 50 µA.

8.2.10 Test completion

1. Disconnect the safety analyzer from the power outlet.
2. Disconnect the test equipment from the patient monitor.
3. Disconnect the patient monitor's power cord from the leakage tester.
4. Mark this task as complete on the Appendix A. Installation check form.

8.3 Functional check

The purpose of this functional check is to ensure that the system is properly installed and configured. Cover all peripheral devices that are connected to the patient monitor by performing the applicable tests below. Skip the tests that are not applicable for the installed patient monitor.

8.3.1 Start-up

1. Turn on the patient monitor and perform a cold start.

NOTE: The patient monitor performs a cold start, when the monitor has been off for more than 15 minutes. You can force the patient monitor to perform a cold start earlier by detaching the

monitor battery and disconnecting the power cord from the wall outlet for a moment before turning the monitor on.

Verify that the patient monitor starts up normally:

- The yellow, red and blue alarm lights are lit momentarily.
- The speaker gives an audible beep.
- The normal monitoring screen appears and there are no error messages on the screen.

NOTE: Refer to section 11. Troubleshooting to see the procedure for battery conditioning and battery replacement, if you receive a ***Condition monitor battery*** or a ***Battery Failure*** message.

NOTE: Before taking the patient monitor into use for the first time, the battery should be fully charged. Keep the monitor connected to the mains until the battery is fully charged.

8.3.2 Display

Picture quality

Perform this test both for the integrated main display and for the optional secondary display.

1. Verify that all text is readable and all images are clear.
2. Verify that the brightness is good. Adjust if necessary.

Touchscreen control

Perform this test only if the integrated main display or the optional secondary display is a touchscreen.

1. Verify the operation and the calibration of a touchscreen by touching a corner of an active parameter window. Verify that the selected menu is opened.
2. Select  to close any open menu and return to the main display.

8.3.3 Device Information

1. Log in to Webmin.
2. Select ***Information > Device Information***.
3. Verify that the device information is correct:
   - The connected parameter modules are identified.
   - The connected CARESCAPE Network ID interfaces are identified.
   - The connected USB input devices are identified.
4. Stay connected to Webmin.

8.3.4 Configuration Information

1. Select ***Information > Configuration Information***.
2. Verify that the patient monitor is correctly configured:
   - The host Information is correct.
   - The active software package is correct.
   - The correct host licenses are enabled.
   - The correct PDM licenses are enabled.
   - Patient ID prefix is correctly configured.
   - Unit and Bed name are correctly configured.

- S/5 printers are correctly configured.
- IX printers and printer locations are correctly configured.
- Remote service is correctly configured.
- National requirements are correctly configured.
- Network is correctly configured.
- Power Line Frequency is correctly configured.
- MUSE/12SL is correctly configured.
- WLAN is correctly configured.

3. Log out Webmin.

8.3.5 Keypad and remote

Perform this test for the integrated keypad, for the optional secondary display with a keypad and for the optional remote controller.

1. Press any key on the touchscreen or hard key in the keypad or remote, and verify that the selected menu is opened on the screen or the selected activity is started.
2. Rotate the **Trim Knob** control in either direction to move from option to option on the display until you have an active parameter window or main menu item highlighted. Press the **Trim Knob** control once to select the highlighted option. Verify that the selected menu is opened on the screen or the selected activity is started.
3. Select **Home** hardkey to close any open menu and return to the main display.

8.3.6 Mouse

Perform this test only if a mouse is connected to the patient monitor.

1. Move the mouse until the pointer (arrow) is over an active parameter window or a main menu item you wish to select and click the left mouse button once to select it.
2. Select  to close the open menu and return to the main display.

8.3.7 Alphanumeric keyboard

Perform this test only if an alphanumeric keyboard is connected to the patient monitor.

1. Select ***Data & Pages > Admit/Discharge*** (or ***Start / End Case***).
2. Select the ***Patient tab > Edit Name & MRN***.
3. Press **Enter** to highlight the ***Medical Record Number*** field.
4. Type some text into the ***Medical Record Number*** field using the connected alphanumeric keyboard. Include some characters that are specific to the chosen keyboard locale to verify that the keyboard language configuration is correct.
5. Select  to close the open menu and return to the main display.

8.3.8 Barcode reader

Perform this test only if a barcode reader is connected to the patient monitor.

1. Select ***Data & Pages > Admit/Discharge*** (or ***Start / End Case***).
2. Select the ***Patient*** tab.
3. Scan a test barcode that is applicable to your system:

Parser Type	Test Procedure
Length Delimited or Character Delimited Parser	4. Select ***Scan from Barcode***. 5. Scan a known test barcode obtained from the hospital. NOTE: The barcode data content must be known and in compliance with the completed parser configuration. 6. Verify that the data content in the barcode is correctly populated to the related fields in the ***Patient*** and the ***Administr. Information*** tabs.
No parser	4. Select ***Edit Name & MRN*** and press **Enter** to highlight the ***Medical Record Number*** field. 5. Scan a sample barcode that only contains one piece of information (e.g., a Serial Number barcode from a module's device label). 6. Verify that the data is correctly populated into the ***Medical Record Number*** field.

7. Select  to close the open menu and return to the main display.

8.3.9 MC Network and S/5 Network

Perform the following test only if the patient monitor is connected to a wired MC Network or S/5 Network.

NOTE: Make sure that at least one other patient monitor is on the network. The other patient monitor must be in an admitted state and have an active ECG measurement with a simulator signal.

1. Check that a network symbol  is displayed in the upper right corner of the screen.
2. Select ***Data & Pages – Other Patients*** and select a patient from the list.
3. Select ***View*** and verify that a window with parameters from another patient displays on the left side of the screen.
4. Select ***Close View*** to close the window.

8.3.10 Wireless LAN

Perform the following test only if the patient monitor is connected to a wireless MC Network or S/5 Network.

NOTE: The wireless network must be properly installed and the patient monitor must be within the wireless coverage area.

NOTE: Make sure that at least one other patient monitor is on the network. The other patient monitor must be in an admitted state and have an active ECG measurement with a simulator signal.

Checkout procedure for wireless patient monitors

Check each wireless patient monitor according to the following procedure.

The purpose of this test is to ensure that each wireless patient monitor is correctly configured

1. Disconnect the network cable from the MC Network connector, if connected.
2. Check that the wireless network symbol and the signal strength symbol are shown  and that the signal strength is adequate.
3. Select ***Data & Pages – Other Patients*** and select a patient from the list.
4. Select ***View*** and verify that a window with parameters from another patient displays on the left side of the screen. Check that the waveforms are continuous and there is no data loss.
5. Select ***Close View*** to close the window.
6. Log in to Webmin.
7. Select ***Diagnostics > Ping***.
8. Type the IP address of the patient monitor you just viewed and select ***ping***. Check that the patient monitor replies to the ping command, there are no lost packets and the maximum latency is 250 ms.

   NOTE: The patient monitor withstands a maximum packet loss of 5 packets per 1 million and maximum latency of 250 ms without performance degradation.
9. Select  to return to the main display.
10. Reconnect the MC Network cable back to the MC Network connector, if applicable.

Verification procedure for wireless MC Network infrastructure

Verify the wireless MC Network infrastructure according to the procedure described in Appendix C.

The purpose of this test is to ensure the operation of the wireless network infrastructure coverage area with a wireless CARESCAPE monitor.

8.3.11 IX printers

Perform the following test only if the patient monitor is connected to a printer in the IX Network and you did not print a test page while you configured the IX printer.

1. Log in to Webmin.
2. Select ***Configuration*** > ***Printers > Print Test Page***.
3. Select the IX Printer to test.
4. Select ***Save***.
5. Verify that the test page was printed to the selected printer.
6. Repeat steps 3 to 5 for all connected IX printers.

8.3.12 Insite with EXC

Perform the following test only if the remote service is configured and enabled.

- Contact your local online support center to find out if they can view the patient monitor.

8.3.13 Test completion

Discharge Patient or ***Reset Case*** to discard any changes made to the patient monitor configuration during checkout.

- Complete the Appendix A. Installation check form.

For your notes:

9 Theory of operation

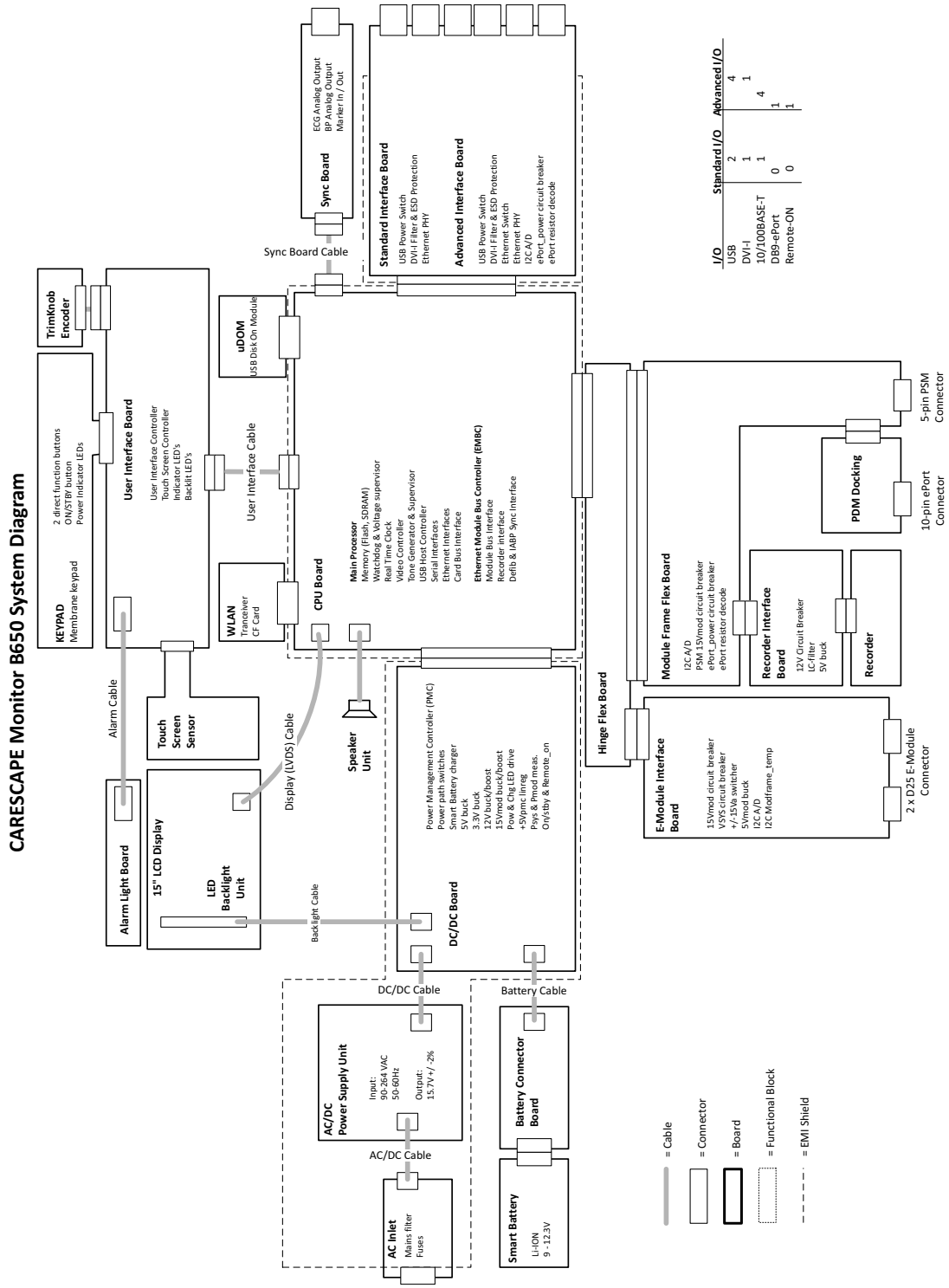


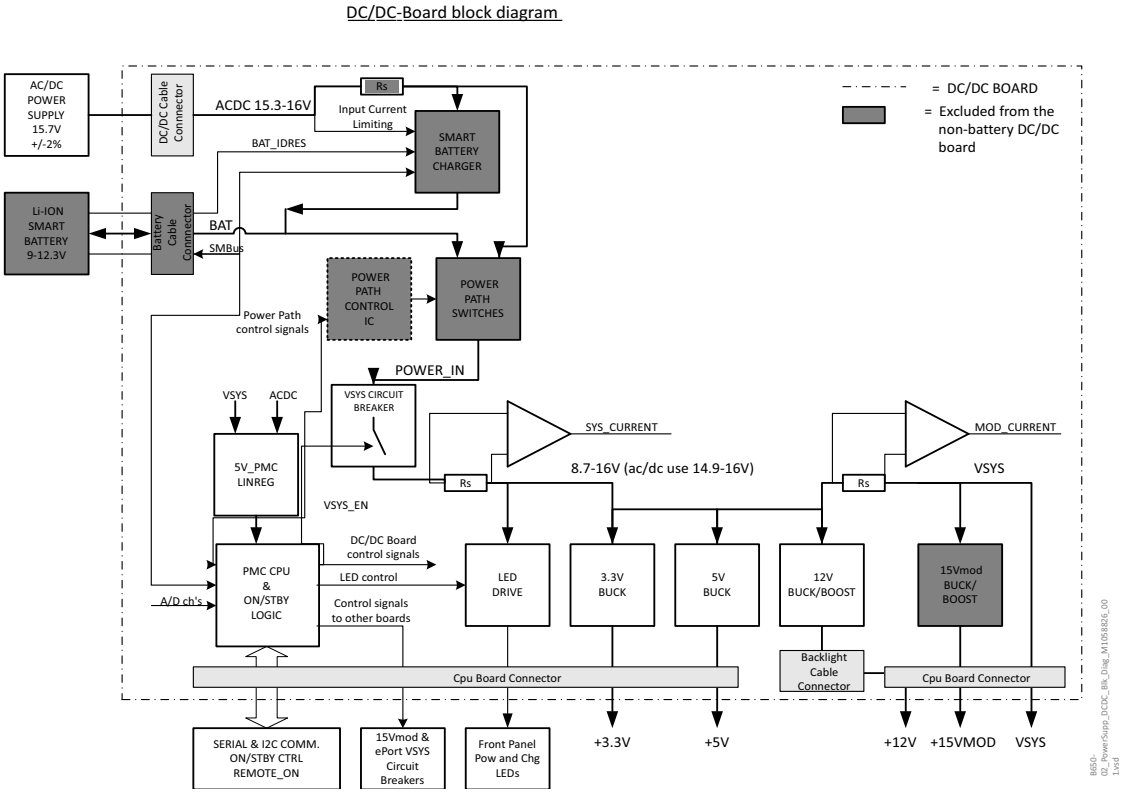
Figure 3 System block diagram

The system block diagram describes the functional units of the CARESCAPE Monitor B650.

The following sections describe the operation and interaction of the different subsystems.

9.1 Main components

9.1.1 Power management subsystem



AC/DC Power Supply Unit

The AC/DC power supply unit is a compact, medical, switched-mode power supply with a universal AC input. The high-efficiency design minimizes heat dissipation.

The AC input may vary between 90-264 Vac, 47-63 Hz single phase. It is designed to output 15.7 Vdc ± 2% and 110 W continuous output power for the DC/DC board.

The AC/DC power supply unit has over-temperature, overload and overvoltage protections. Input protection is implemented with the fuses in the AC inlet.

Battery

The patient monitor has one optional, rechargeable 11.1 V, 6210 mAh lithium-ion battery, located in the battery compartment.

The battery cable connects the battery board to the DC/DC board. The battery pack supports Smart Battery Data and it communicates with the DC/DC board using the System Management Bus (SM Bus). Battery management is handled by the DC/DC board.

DC/DC Board

There are two versions of the DC/DC board: one for models with the optional battery and one for models without battery. The non-battery version excludes the electronics needed for battery charging and power path management.

The DC/DC board converts the output voltage of the AC/DC power supply, or the battery voltage, to the following supply voltages:

- To +3.3 V supply voltage for the CPU board, LCD display, user interface board and the standard/advanced interface board using a step-down converter.
- To + 5 V supply voltage for the CPU board, user interface board and the standard/advanced interface board using a step-down converter.
- To +12 V supply voltage for the optional recorder and the LED backlight of the display using a buck-boost converter.
- To + 15VMod supply voltage for the PSM module and the E-Module interface board using a buck-boost converter. This converter is omitted in the non-battery models, where the +15VMod power line is connected directly to the VSYS voltage.
- It passes the 8.7 -16 V (in AC/DC use 14.9-16 V) VSYS supply voltage for the E-Module interface board, the 10-pin ePort connector in the PDM docking station and for the DB9 ePort connector in the advanced interface board. The power supply is capable to supply VSYS voltage only to one ePort connector at a time.
- All supply voltages have over-voltage and short-circuit protection.

The DC/DC board takes care of the battery charging and controlling of the power path switches. The power path switches select either AC/DC output voltage or battery voltage as the DC/DC board input source.

The DC/DC board PMC CPU (Power Management Controller) controls power supplies' sequencing. It measures board temperature and voltages by an internal A/D converter. System and module currents also are measured and the corresponding power consumptions calculated. PMC communicates with the CPU board via serial communication and with the battery and battery charger IC via SM Bus. I2C bus (Inter-Integrated Circuit) is used for communication with the A/D-converters and temperature sensors on the other boards of the patient monitor.

The smart battery charger acts as an SM Bus slave device that responds to charging current and charging voltage requests received via SM Bus. The charging requests are not sent directly by the smart battery, but by the PMC CPU, which first asks the values from the battery. The PMC may reduce or stop charging current if needed from the system point of view, i.e., if system power consumption or temperature would get too high. The smart battery is responsible for the charging algorithm and capacity calculation.

The battery charger has input current HW-limit feature. In a case where the input current would exceed the limit, the charger reduces the output current to keep the input within the limit. The AC/DC current for the whole system is taken through this current measurement as well. This results in the charger reducing its output current if the sum of the charger input current and system current exceeds the input limit. The purpose of this is to prevent the AC/DC power source from getting overloaded if system power rapidly increases during charging.

Cooling

The patient monitor uses convection cooling. The ventilation openings of the device are located in the rear of the monitor and below the keypad.

The AC/DC power supply unit has a heat sink that is mounted to the aluminum rear unit assembly to enhance cooling of the power supply.

9.1.2 CPU subsystem

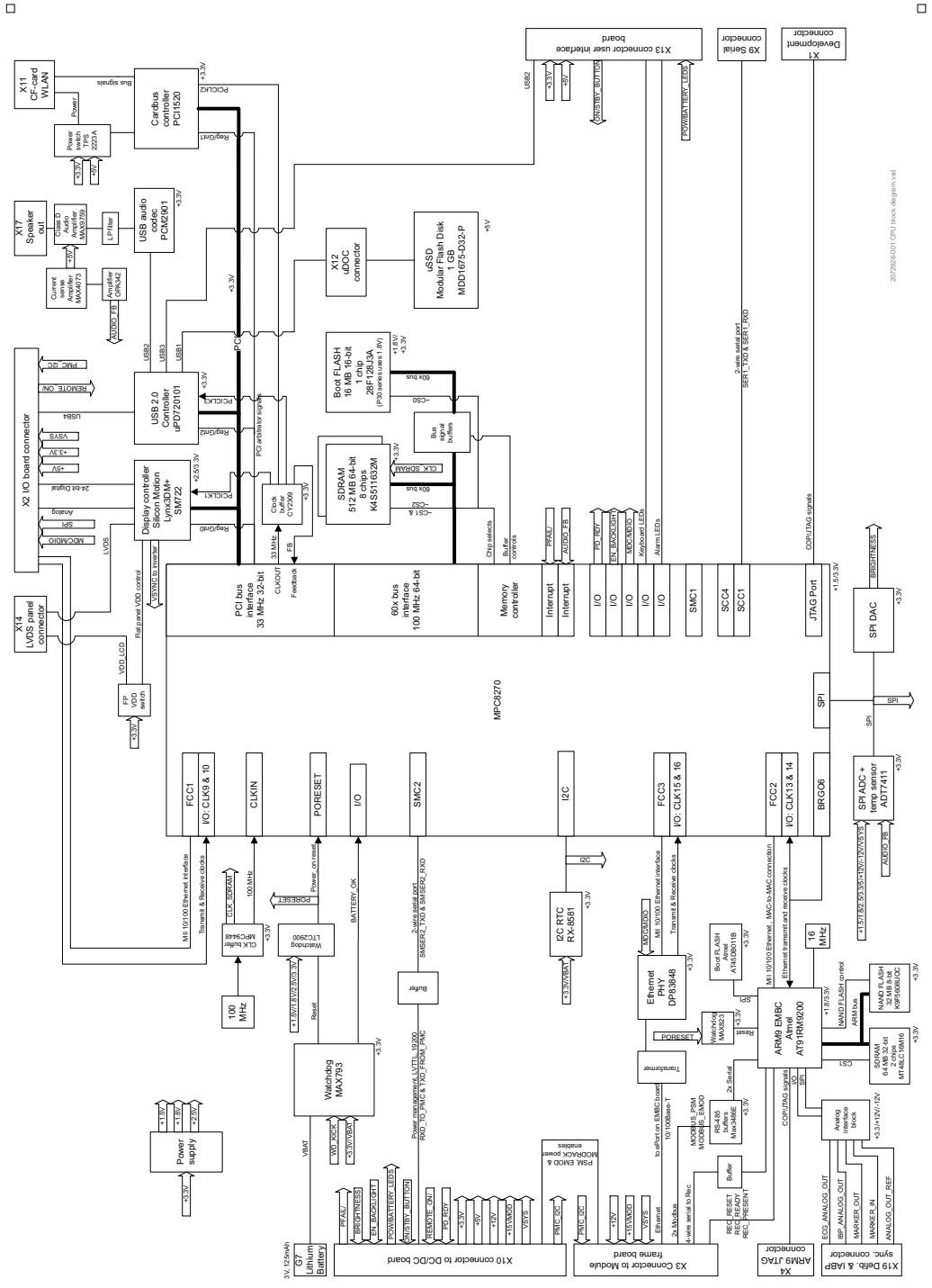


Figure 4 CPU board block diagram

Main processor and memory:

- The main processor manages the data processing of the patient monitor.
- It has non-volatile flash memory for the bootloader software and Linux kernel and volatile SDRAM memory for run time code execution and temporary data storage.
- A detachable, non-volatile flash memory, USB Disk On Module (uDOM), is used as the permanent memory for application, platform and service software and to store clinical and platform settings. The uDOM may hold two versions of the software in different partitions: inactive and active.

EMBC section:

- The Ethernet module bus controller (EMBC) section in the CPU board has its own micro controller. It has serial flash memory for the EMBC bootloader software, NAND flash for EMBC application software and Linux kernel and SDRAM for run time EMBC code execution and temporary data storage.
- The EMBC section communicates with the main processor using Ethernet communication.
- The EMBC section takes care of the following CPU services:
    - It provides serial communication for the optional built-in recorder.
    - It provides RS-485 module bus communication for the E-modules and PSM module.
    - It provides analog ECG and invasive pressure outputs and a digital marker-out signal for a user-supplied equipment, e.g., a defibrillator or an intra-aortic balloon pump.

Supply voltages:

- The CPU has converters to generate +1.5 V, + 1.8 V and +2.5 V supply voltages for the processors and +12 V and -12 V voltages for the sync connector signals from the +3.3 V received from the DC/DC board.
- The CPU board passes the supply voltages created by the DC/DC board for all other electronics in the system, except for the LED backlight of the display.

System supervision:

- Watchdog timers control the operation of the main processor and EMBC processor software execution.
- The CPU board has battery backed-up real-time clock to store system date and time.
- An I2C A/D converter and SPI temperature sensor measure the CPU supply voltages and board temperature.

Video system:

- The CPU board has a video controller that provides LVDS output to the LCD panel via the display cable and analog and digital video signals for an optional secondary display that is connected to the DVI-I connector in the interface board.
- The CPU board also provides a brightness control signal and a digital backlight enable signal for the display.

Audio system:

- The CPU board has a tone generator and audio amplifier that sends the audible alarm signals to the main speaker. Audio feedback controls the operation of the speaker.

Support for interfaces:

- A USB host controller (root hub) provides a high speed USB interface for the external USB ports in the interface boards and for the internal system components (user interface board, tone generator and for the USB Disk On Module).
- The main processor provides one link layer interface for the external RJ-45 Ethernet ports and ePort DB9 PDM interface in the interface board.
- The CPU board provides a physical layer Ethernet interface for the 10-pin ePort connector in the PDM docking station.

9.1.3 Display subsystem

The patient monitor has an integrated 15" active matrix color TFT LCD panel with an LED backlight unit. It provides wide viewing angle and supports XGA (1024 * 768 pixels) resolution.

The video controller is integrated into the CPU board. The CPU board provides LVDS output and +3.3 V supply voltage to the LCD panel via the display cable.

9.1.4 User interface subsystem

User interface board

The user interface board has a micro controller that manages the following main functions:

- It reads the user input from the keypad matrix and Trim Knob encoder and passes the information to the CPU board.
- A separate touchscreen controller digitizes the user input received from the touchscreen sensor and passes the coordinate information directly to the CPU board.
- It turns the alarm light LEDs on and off according to the information received from the CPU board.
- It digitizes the information of the ambient light sensor and passes it to the CPU board.
- It adjusts the brightness of the alarm light and keypad backlight according to the information received from the CPU board.
- It provides a back-up speaker function using a buzzer in case of a main speaker failure.
- It provides a visual and audible power failure alarm control in case of sudden system power loss.
- It passes the drive signals coming from DC/DC board via CPU board to the power indicator LEDs in the keypad.

The user interface cable connects the user interface board to the CPU board:

- The data communication method used is USB communication.
- It passes the +3.3 V and +5 V supply voltages and power indicator LEDs' status to the user interface board from the DC/DC board.
- The on/standby button press is passed to the DC/DC board via the CPU board.

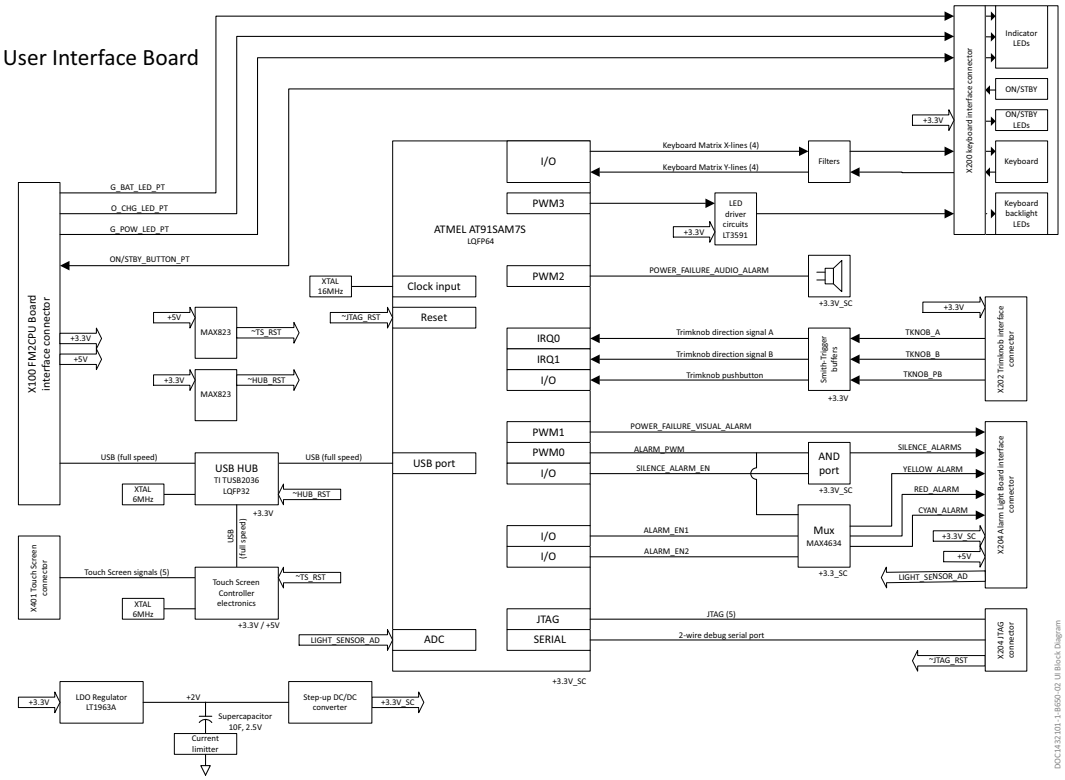


Figure 5 User interface board block diagram

Touchscreen sensor

The patient monitor has a resistive touchscreen sensor in the front of the LCD panel. The touchscreen sensor detects the presence and location of a touch within the display area and communicates the information to the touchscreen controller.

Keypad

The patient monitor has a backlit keypad board with an on/standby button, two function keys and three power indicator LEDs.

The keypad is connected to the user interface board with a connector.

Trim Knob

The Trim Knob control is a rotary-switch with a push selection operation. The Trim Knob encoder detects the direction of the Trim Knob rotation and push button use and passes that information to the CPU board via the user interface board.

Alarm light board

The right hand side of the alarm light board contains red, yellow and blue LEDs to display different priority visual alarms. The left hand side of the alarm light board has blue LEDs for the silence alarm indicator light.

The alarm light board also has a separate light sensor that is capable of measuring the ambient light intensity. The ambient light feedback can be used to auto-adjust the brightness of the keypad backlits, alarm light LEDs and the to the different ambient light conditions.

The alarm light board is connected to the user interface board with the alarm light cable.

Speaker

The main speaker is used to provide audible alarms. The speaker cable is connected directly to the CPU board. The audio signal for the speaker is generated in the CPU board using a tone generator and an audio amplifier. Audio feedback controls the operation of the speaker.

Buzzer

The buzzer is connected to the user interface board. It functions as a back-up speaker and also provides an audible power loss alarm.

9.1.5 External Interfaces

Interface boards

There are two versions of the interface board: a Standard Interface Board and an Advanced Interface Board.

Connector	Standard Interface Board	Advanced Interface Board
USB 2.0	2	4
DVI-I	1	1
10/100 BASE-T Ethernet interface (RJ-45)	1	4
ePort (DB9)	-	1
Remote-on connector	-	1

The interface boards provide the following main functions:

- They have a high speed USB hub that provides 2 to 4 downstream (Type A) USB ports for the USB input devices. The on board USB hub interfaces with the USB host controller (root hub) in the CPU board.
- It passes the analog video signals from the video controller in the CPU board to the DVI-I connector.
- The 24-bit digital video input from the video controller is converted by an on board DVI transmitter to 3 TDMS data channels (single link). These provide digital video signals to the DVI-I connector.
- It provides Ethernet interfaces:
  - The Standard Interface Board has a single Ethernet transceiver to provide a physical layer interface for 1 RJ-45 connector.
  - The Advanced Interface Board has an Ethernet switch that provides physical layer interface for 4 RJ-45 connectors and for 1 DB9 ePort connector.
  - Both boards have one link layer interface to the Ethernet controller that is integrated to the microprocessor in the CPU board.
- The Advanced Interface Board passes the remote-on signal, i.e., an on/standby signal from an external device, to the PMC CPU in the DC/DC board. The operation of the remote-on connector is disabled when the patient monitor is battery powered.
- The Advanced Interface Board has I2C A/D converter and I2C temperature sensor to measure the on board VSYS and VSYS ePort (DB9) voltage and board temperature. This information is communicated to the PMC CPU in the DC/DC board over the I2C -bus.

The Standard and Advanced Interface Boards receive +3.3 V and + 5V supply voltages from the DC/DC board via the CPU board. In addition the Advanced Interface Board receives the VSYS supply voltage.

The VSYS OPTION voltage is provided for a PDM through the DB9 ePort connector. Once the PDM is detected and if the VSYS ePort voltage is not enabled, the VSYS OPTION's circuit breaker is enabled by a control signal from the PMC.

The external connectors have ESD protection. RJ-45 connectors provide isolation.

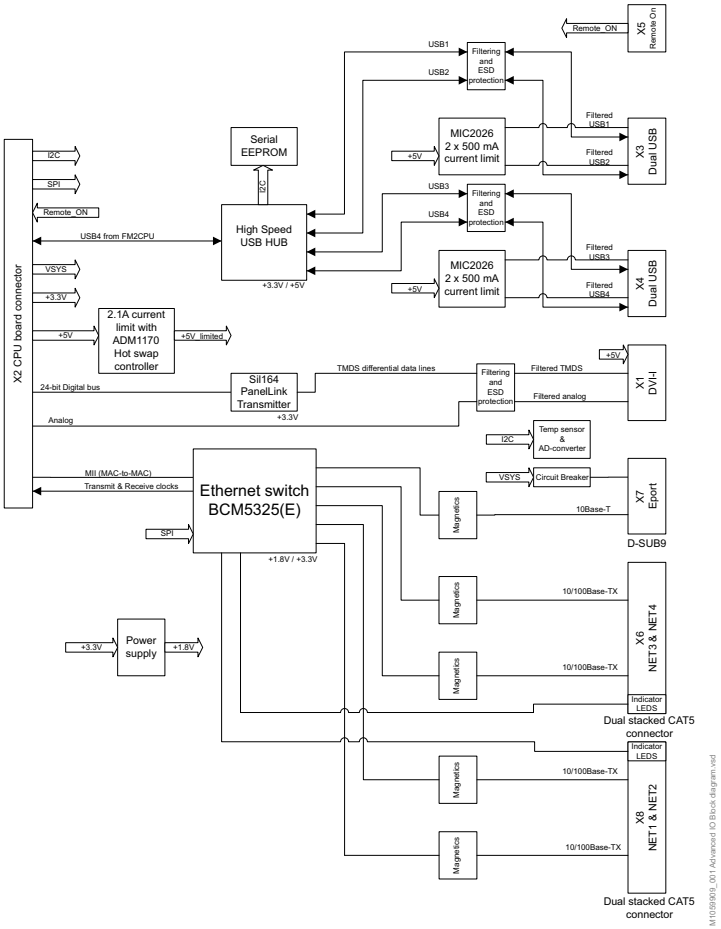


Figure 6 Advanced Interface Board block diagram

Synchronization connector

The synchronization connector provides analog ECG and invasive pressure outputs and a digital marker-out signal for external user-supplied equipment, e.g., a defibrillator or an intra-aortic balloon pump. This connector does not operate with the PDM module.

See Synchronization connector test in Maintenance chapter for details about the pin layout.

WLAN

The optional IEEE 802.11a/b/g WLAN client radio enables wireless network communication in the 2.4 and 5.1 GHz frequency bands.

The Compact Flash (CF) WLAN client radio connects to the CF socket in the CPU board. The two internal dual-band antennas are attached to the front unit assembly.

WLAN connection is activated when the monitor is not connected to a wired network through the MC port.

9.1.6 Pivoting module frame

Hinge flex board

The hinge flex board interfaces the E-module interface board and the module frame flex board to the CPU board.

Module frame flex board

The module frame flex board interfaces the recorder assembly, PDM interface and PSM interface to the hinge flex board.

The module frame flex board provides the following main functions:

- It routes the +12 V supply voltage, recorder control signals and the serial communication lines to the recorder assembly.
- It routes the RS-485 communication lines to a PSM module.
- It has a circuit breaker for the +15 VMod PSM supply voltage. The circuit breaker is enabled by a control signal set by the PMC CPU after the main CPU has requested to enable the voltage.
- It routes the Ethernet communication lines to a PDM module.
- It has a circuit breaker for the VSYS PDM supply voltage. The circuit breaker is enabled by a control signal set by the PMC CPU after a PDM ID resistor has been detected.
- The +15VMod PSM circuit breaker is enabled in start-up by a control signal received from the PMC CPU.
- The VSYS PDM circuit breaker is enabled by a control signal set by the PMC CPU after the main CPU has requested module voltages enabling, providing that the other PDM connection port is not connected.
- It has an I2C A/D converter to measure the on board (+15V MOD PSM, VSYS RACK and VSYS ePort) and recorder (+5V REC and +12 V REC) supply voltages. This information is communicated to the PMC CPU in the DC/DC board over the I2C -bus.

E-module interface board

The optional E-module interface board connects to the hinge flex board. It has two D25 male connectors that provide an interface for two single-width E-modules or for one double-width E-module.

The E-module interface board provides the following main functions:

- It routes the RS-485 communication lines from the hinge flex board to the E-modules.
- It generates a +5VMod supply voltage for the connected E-modules from the VSYS input voltage using a step-down converter.
- It generates +15Va and -15Va supply voltages for the connected E-modules from the +15VMod input voltage using a flyback converter.
- It passes the + 15VMod input voltage as a +15VD supply voltage for the connected E-modules.
- It has circuit breakers for the VSYS and +15VMod supply voltages. The circuit breakers are enabled by the PMC CPU after the main CPU has requested to enable these module voltages. The sequencing of the flyback and step-down converter is controlled by on board electronics.

- Overvoltage of the generated supply voltages will disable the VSYS and +15VMod circuit breakers.
- An I2C A/D converter and I2C temperature sensor measure the supply voltages generated for the E-modules and the board temperature. The information is communicated to the PMC CPU in the DC/DC board over the I2C -bus.

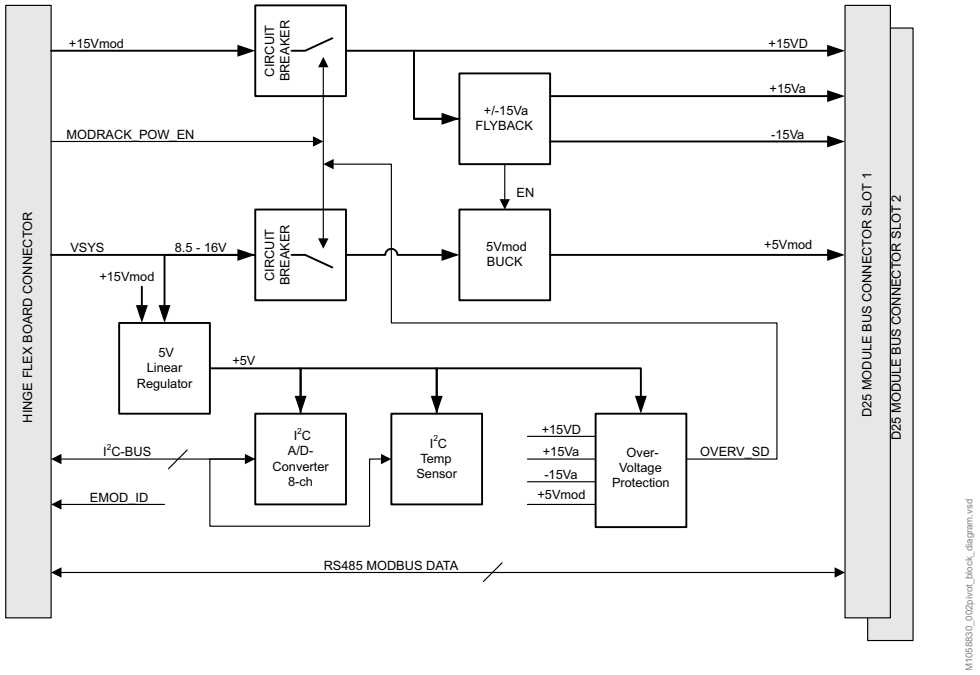


Figure 7 E-module interface board block diagram

Recorder assembly

The optional recorder assembly consists of a 50 mm recorder and a recorder board.

The recorder board interfaces the recorder to the module frame flex board. The recorder board provides the following main functions:

- It passes the recorder control signals and the serial communication lines to the recorder.
- It has a circuit-breaker and an LC-filter for the +12 V REC supply voltage.
- It has a step-down converter that generates the +5 V REC supply voltage for the recorder from the +12 V received from the DC/DC board.

PDM interface

The detachable PDM docking station interfaces to the module frame flex board.

The 10-pin PDM connector provides the VSYS ePort supply voltage and the Ethernet communication lines to the PDM module.

PSM interface

The PSM connector is part of the module frame flex board.

The PSM connector provides the +15 VMod PSM supply voltage and the RS-485 communication lines to the PSM module.

For your notes:

10 Maintenance and checkout

This chapter specifies the checkout procedure and the maintenance activities to be performed to the patient monitor after corrective maintenance and during annual planned maintenance.

WARNING **Only perform maintenance procedures specifically described in the manual.**

WARNING **Planned maintenance should be carried out annually. Failure to implement the recommended maintenance schedule may cause equipment failure and possible health hazards.**

NOTE: The manufacturer does not, in any manner, assume the responsibility for performing the recommended maintenance schedule, unless an Equipment Maintenance Agreement exists. The sole responsibility rests with the individuals, hospitals, or institutions utilizing the device.

NOTE: Refer to Module Frames and Modules Technical Manual for corrective and planned maintenance checkout procedures of the parameter modules.

NOTE: Refer to the PDM section in the Module Frames and Modules Technical Manual for the battery maintenance procedure of the PDM battery.

Corrective maintenance

Service personnel shall perform the following checkout procedure steps after any corrective maintenance, before taking the monitor back into clinical use:

Performed service activity	Required checkout procedure		
	Visual inspections (section 10.1)	**Electrical safety test (section 10.2)**	**Functional check (section 10.3)**
After detaching, replacing or upgrading: - Recorder Unit FRU / Upgrade - E-module Board FRU / Upgrade - Module Frame Assembly FRU	Yes	Yes	- 10.3.1 Start-up - 10.3.3 PSM / PDM identification - 10.3.4 E-module identification - 10.3.13 Recorder
After detaching or replacing: - PDM Docking Mechanism FRU - Module Frame Cover Unit Set FRU	Yes	No	- 10.3.1 Start-up - 10.3.3 PSM / PDM identification
After detaching, replacing or upgrading: - Standard Interface Board FRU - Advanced Interface Board FRU / Upgrade	Yes	Yes	- 10.3.1 Start-up - 10.3.6 Mouse - 10.3.7 Alphanumeric keyboard - 10.3.9 MC Network and S/5 Network
After replacing or upgrading: - Wireless LAN FRU / Upgrade	Yes	No	- 10.3.1 Start-up - 10.3.10 Wireless LAN
After replacing: - Mains Fuses FRU - Battery FRU	Yes	No	- 10.3.1 Start-up

Performed service activity	Required checkout procedure		
	Visual inspections (section 10.1)	**Electrical safety test (section 10.2)**	**Functional check (section 10.3)**
After detaching or replacing: - Front Unit Assembly FRU - User Interface Board FRU - Trim Knob and Trim Knob Encoder FRU - Keypad FRU	Yes	Yes	- 10.3.1 Start-up - 10.3.5 Keypad and remote
After detaching or replacing: - LCD Display Unit FRU	Yes	Yes	- 10.3.1 Start-up - 10.3.2. Display - 10.3.3 PSM / PDM identification
After detaching or replacing: - Rear Unit Assembly FRU - AC/DC Power Supply Unit FRU - DC/DC board FRU - CPU timekeeper battery FRU - Hinge Flex Board	Yes	Yes	- All steps, except 10.3.14 Synchronization connector test.
After replacing: - uDOM	Yes	Yes	- All steps, except 10.3.14 Synchronization connector test.
After detaching or replacing: - Base Unit - Mid-Frame Assembly FRU - CPU board	Yes	Yes	- All functional check steps.

Planned maintenance schedule

Service personnel shall perform the following checkout procedure every 12 months after installation:

1. Visual inspection (section 10.1)
2. Electrical safety tests (section 10.2)
3. Functional check (section 10.3, all steps)
4. Battery maintenance (section •)

Replace the CPU timekeeper battery every 5 years, or whenever the ***Service Monitor Error Code 0xHOST1100*** message is shown.

10.1 Visual inspection

Follow the procedure in section 8.1. Visual inspection.

10.2 Electrical safety checks

Electrical safety tests provide a method of determining if potential electrical health hazards to the patient or operator of the device exist.

Perform the following electrical safety tests described in detail in chapter 8. Installation checkout:

- 8.2.1. Test setup
- 8.2.2. Power outlet
- 8.2.3. Power cord and plug
- 8.2.4. Ground (earth) integrity
- 8.2.5. Earth leakage current test
- 8.2.6. Enclosure leakage current (touch current) test

Record the values of the tests on the Appendix B. Maintenance check form.

10.3 Functional check

10.3.1 Start-up

Follow the procedure in section 8.3.1. Start-up.

10.3.2 Display

Follow the procedure in section 8.3.2. Display.

10.3.3 PSM / PDM identification

1. Configure the ECG1 waveform field and the NIBP parameter window to the patient monitor screen with adequate priority. Connect a PSM or PDM module to the patient monitor.
2. Verify that the ECG waveform field, the NIBP parameter window and the related information appear on the patient monitor screen.

10.3.4 E-module identification

1. Log in to Webmin.
2. Select ***Information > Device Information***.
3. Verify that the information about the connected module appears in the table named as ***"Acquisition Information – E-Modules"***.

NOTE: For some parameter modules, the table does not show the actual module information, but the information of the individual subassemblies inside the module.

NOTE: You may need to refresh the Webmin screen if you have connected the module to the patient monitor after entering the ***Device Information*** Webmin screen.

10.3.5 Keypad and remote

Follow the procedure in section 8.3.5. Keypad and remote.

10.3.6 Mouse

Follow the procedure in section 8.3.6. Mouse.

10.3.7 Alphanumeric keyboard

Follow the procedure in section 8.3.7. Alphanumeric keyboard.

10.3.8 Barcode reader

Follow the procedure in section 8.3.8. Barcode reader.

10.3.9 MC Network and S/5 Network

Follow the procedure in section 8.3.9. MC Network and S/5 Network.

10.3.10 Wireless LAN

Follow the procedure in section 8.3.10. Wireless LAN.

10.3.11 IX printers

Follow the procedure in section 8.3.11. IX printers.

10.3.12 Insite with Exc

Follow the procedure in section 8.3.12. Insite with EXC

10.3.13 Recorder

1. Select ***Monitor Setup > Printing > Devices > Setup*** and configure:
   Printout: Waveforms
   Location: Local

2. Select ***Monitor Setup > Printing > Waveforms*** and configure:
   Waveform 1: II
   Waveform 2: V1

3. Select ***Monitor Setup > Printing > Waveforms > Print Waveforms*** or the related soft key in the main menu, or the ***Print Waveforms*** hard key in the keypad to start printing.

4. Verify that the recorder starts printing. Let the recorder print for approximately 10 seconds and verify the following things from the printout:
   - The header line contains the date, time and some other applicable status and configuration information.
   - The grid is clear.
   - The waveforms labels appear in the printout as configured.

Stop printing by selecting ***Monitor Setup > Printing > Waveforms > Stop Printing***, or the related soft key in the main menu.

10.3.14 Synchronization connector test

Perform this test only if an E-PSM(P)(W) or an E-(P)RE(S)TN module is in use with the patient monitor.

NOTE: This test can't be performed with a PDM module. If the patient monitor is only used with a PDM module, the synchronization connector test is not applicable.

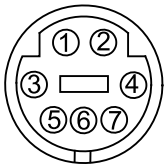
Required Tools

– E-PSM(P)(W) or E-(P)RE(S)TN module
– A multiparameter patient simulator with invasive pressure adapter cable to GE invasive pressure connector.
– 5 lead ECG trunk cable, IEC or AHA
– 5 leadwire set, IEC or AHA
– Oscilloscope
– Analog output cable (2000633-001)

NOTE: You can alternatively use the GE defib sync tester, 2040582-001, together with the Analog output cable, 2000633-001 and a multiparameter simulator to perform this test. Follow the instructions included with the tester. See analog output cable wire colors and related signals from the table below.

Connecting cables

1. Ensure that the module is connected to the patient monitor.
2. Connect the 5-lead ECG trunk cable to the green ECG connector in the module.
3. Connect the 5-leadwire sets to the trunk cable and to the simulator.
4. Connect the invasive pressure adapter cable to the simulator and the other end to the module.
5. Connect the analog output cable to the defibrillation synchronization connector in the patient monitor.
6. Connect the open wires of the other end of the analog output cable to the oscilloscope probe as described in each test. Use the figure and table below as a reference for making the connections.



Defibrillation synchronization connector		**Related wire color in the open end of the Analog output cable *)**
Pin number	**Signal**	
1	Digital defibrillator synchronization marker out signal	Black
2	Digital defibrillator synchronization marker in signal	Green
3	Common GND	Red
4	Analog GND	Blue
5	Analog GND	White
6	IP analog output	Yellow
7	ECG analog output	Grey

*) Brown wire is not connected.

Configuring the monitor

1. Configure ECG:

a. Select ***ECG1*** to the screen with waveform and adequate priority.

b. In the ***Parameter Setup > ECG > Setup***, select ***ECG1 Lead: II.***

2. Configure invasive pressure:

a. Select ***P1*** to the screen with waveform and adequate priority.

b. In the ***Parameter Setup > Invasive Pressures > P1***, select:

- ***Label: P1.***
- ***Scale (mmHg): 0-200 mmHg.***
- ***Parameter Format: Sys/Dia (Mean).***

Configuring the simulator

Refer to the simulator documentation for details on how to use and configure the simulator.

1. Configure ECG:

- ***ECG rhythm: a normal sinus rhythm***.
- ***Heart rate: 80 bpm***,
- ***Amplitude: 1 mV.***

2. Only for modules with invasive pressure: configure invasive pressure:

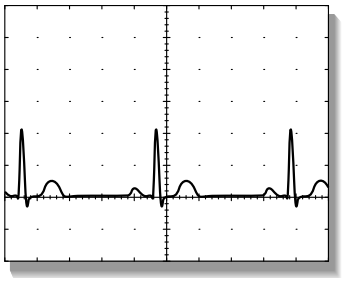
- ***Sensitivity: 5 µV/V/mmHg.***
- ***InvBP output: "0 mmHg static pressure" or "atmosphere".***

Testing the synchronization connector

1. Test the ECG analog output signal:

a. Connect the oscilloscope probe to the ECG analog output signal (grey wire) and analog ground (blue or white wire).

b. Adjust the oscilloscope Time and Volts scales:



ECG analog output signal: Grey
Analog GND: Blue or White
Probe Type: x10
Time/Division: 200 mS
Volts/Division: 0.5V

c. Verify that the ECG analog output waveform shown on the oscilloscope screen corresponds to the ECG1 waveform on the monitor screen.

2. Test the Arterial BP output signal:

NOTE: Perform this arterial BP test only if an E-PSMP, an E-PSMPW, an E-PRETN or an E-PRESTN module is in use with the patient monitor.

a. Ensure that the simulator's InvBP output channel is configured to 0 mmHg static pressure or atmosphere.

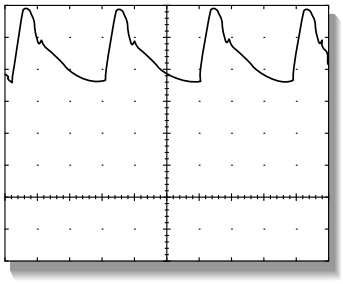
b. Press the ***Zero P1*** module key.

c. Check that a ***Zeroing*** message changes to a ***Zeroed*** message in the P1 parameter window.

d. Configure the simulator's InvBP output channel to Arterial 120/80.

e. Connect the oscilloscope probe to the InvBP output signal (yellow wire) and analog ground (blue or white wire).

f. Change the oscilloscope Volts scale:



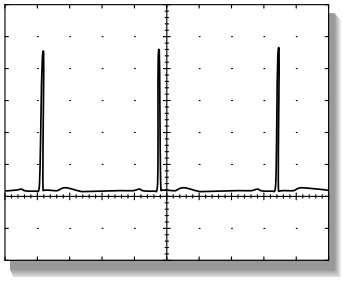
IP analog output signal: Yellow
Analog GND: Blue or White
Probe Type: x10
Time/Division: 200 mS
Volts/Division: 0.2V

g. Verify that the Arterial BP output waveform shown on the oscilloscope screen corresponds to the P1 waveform on the monitor screen.

3. Test the frequency of the Marker out signal

a. Connect the oscilloscope probe to the marker out signal (black wire) and common ground (red wire).

b. Change the oscilloscope Volts scale:

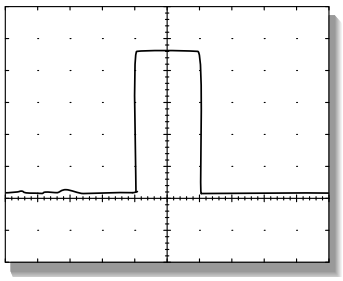


Digital defibrillator synchronization marker out signal: Black
Common GND: Red
Probe Type: x10
Time/Division: 200 mS
Volts/Division: 2V

c. Verify that the signal shown on the oscilloscope screen corresponds to the picture above.

4. Test the pulse width of the Marker out signal:

a. Change the Time scale in the oscilloscope:



Digital defibrillator synchronization marker out signal: Black
Common GND: Red
Probe Type: x10
Time/Division: 5 mS
Volts/Division: 2V

b. Verify that the signal shown on oscilloscope screen corresponds to the picture above

10.3.15 Test completion

Select ***Discharge Patient*** or ***Reset Case*** to discard any changes made to the patient monitor configuration during checkout.

- Complete the Appendix B. Maintenance check form

10.4 Monitor battery maintenance

The lithium-ion (Li-Ion) battery is a rechargeable battery containing lithium-ion cells. Each battery contains an integrated electronic fuel gauge and a safety protection circuit.

The following are facts about lithium-ion battery technology:

– The battery discharges on its own, even when it is not installed in the equipment. This discharge is the result of the lithium-ion cells and the bias current required for the integrated electronics.

– The capacity loss of the battery degrades significantly at higher temperatures.

– As the battery ages, the full-charge capacity of the battery degrades and is permanently lost. As a result, the amount of charge that is stored and available for use is reduced.

The following terms are used to define the battery capacity:

– Design capacity — The theoretical capacity of the battery cells when the battery is new.

– Full-charge capacity — The actual amount of charge the battery can store and deliver.

– Remaining charge capacity — The amount of full-charge capacity currently remaining in the battery. This is a percent of full-charge capacity.

10.4.1 Use recommendations

GE recommends the following methods to improve battery performance:

– Location — Position the equipment in a location that does not artificially increase the operating temperature of the batteries.

– Conditioning guideline — Condition the battery when a ***Condition monitor battery*** message is shown on the monitor screen. The condition cycle recalibrates the electronic fuel gauge.

10.4.2 Storage recommendations

GE recommends storing the battery outside of the device at a temperature between 20°C to 25°C (68°F to 77°F).

10.4.3 Testing the battery charge

Before installing a battery, verify the battery's state of charge. Press the green **TEST** button on the battery. The number of charge level indicator LEDs that illuminate indicates the approximate charge remaining in the battery.

– Four LEDs illuminated: 75% – 100% of full-charge capacity.

– Three LEDs illuminated: 50% – 74.9% of full-charge capacity.

– Two LEDs illuminated: 25% – 49.9% of full-charge capacity.

– One LED illuminated: 10% – 24.9% of full-charge capacity.

– One LED flashing: < 10% of full-charge capacity remaining.

10.4.4 Charging a battery

The battery is charged whenever it is installed into the patient monitor and the patient monitor is connected to an AC power source. The battery is charging both when the patient monitor is turned on and when it is in the standby mode.

Battery is charging as long as the orange battery charging LED indicator is lit.

To check the battery charge status, select ***Monitor Setup > Battery Status > Advanced***.

10.4.5 Conditioning a battery

Condition the battery when a ***Condition monitor battery*** message is shown on the monitor screen. The condition cycle recalibrates the electronic fuel gauge.

Condition the battery by fully discharging and recharging the battery twice according to the following procedure:

NOTE: The patient monitor must be in a discharged state during battery conditioning. Disconnect any acquisition modules from the patient monitor if connected.

1. Turn on the patient monitor. Disconnect the power cord from the wall outlet. Leave the patient monitor on until the battery is fully discharged and the patient monitor turns off automatically.

NOTE: Ignore the ***Monitor Battery Low*** and ***Monitor Battery Empty!*** messages when discharging the battery.

2. Reconnect the power cord to the wall outlet and turn on the patient monitor. Leave the patient monitor on until the battery is fully recharged and the orange battery charging indicator LED turns off.
3. Repeat the steps 1 and 2 once.

The battery is now conditioned and ready for use. However if the ***Condition monitor battery*** message is still shown on the patient monitor screen, repeat the conditioning cycle once more. If the problem persists, replace the battery.

NOTE: Refer to section 11.6. Battery diagnostics and 11.7. Error messages and codes for more detailed information about the battery status and operating condition.

10.4.6 Replacing a battery

Replace the battery in the following situations:

– if the ***Replace monitor battery*** message is displayed. This message indicates that the full-charge capacity of the used battery has considerably degraded compared to the design capacity of a new battery.
– if the ***Battery failure*** message is displayed.

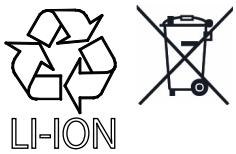
Remove the battery from the patient monitor and install a new battery according to the battery installation instructions in the Hardware Installation section

NOTE: Refer to the section 11.6. Battery diagnostics and 11.7. Error messages and codes for more detailed information about the battery status and operating condition.

NOTE: Refer to the Troubleshooting chapter for more detailed information about the battery diagnostics and error messages.

WARNING **Do not incinerate a battery or store at high temperatures. Serious injury or death could result.**

10.4.7 Battery recycling



This product contains Lithium-Ion batteries. At the end of their service life, batteries in this product must be recycled or disposed in accordance with local or national regulations. Do not dispose of batteries as trash or unsorted municipal waste. Requirements and services for recycling of batteries vary between countries.

- USA: You may follow the battery manufacturers instructions on the battery to recycle it. Alternatively, you may return GE product batteries to GE for recycling. For information about returning batteries to GE, contact your authorized GE Service representative or contact GE Equipment Services at 1-800-437-1171.
- Canada: Contact the approved battery stewardship program in your province for information on recycling your batteries.
- Other countries: Recycle batteries through your local, regional or national collective scheme in accordance with your local or national regulations.

11 Troubleshooting

The problems and solutions in this section represent only a few of the faults that you may encounter and are not intended to cover every possible problem that may occur.

This chapter focuses on troubleshooting technical problems. See the patient monitor's user's manual for troubleshooting monitoring problems and clinical configuration issues.

If the problem remains, call technical support for service. To ensure accurate problem solving, please be prepared to provide the following information:

- Problem description and the troubleshooting done so far.
- Configuration information (section "11.2.1")
- Device information (section "11.2.2")
- Service Logs (section "11.3.4")
- Error messages displayed, if any.
- Other information, as requested.

11.1 Visual inspection

Before beginning any detailed troubleshooting, complete a thorough visual inspection to be sure that:

- There is no physical damage.
- All peripheral devices are connected properly.
- The patient monitor and the connected peripheral devices are properly powered.

Also verify that the problem is not caused because of:

1. Incompatibility issue. See the patient monitor's supplemental information manual for the list of compatible devices.
2. Incorrect platform or clinical configuration. Refer to the chapter 7. Configuration in this manual for details about platform configuration and the patient monitor's user's manual for details about clinical configuration.

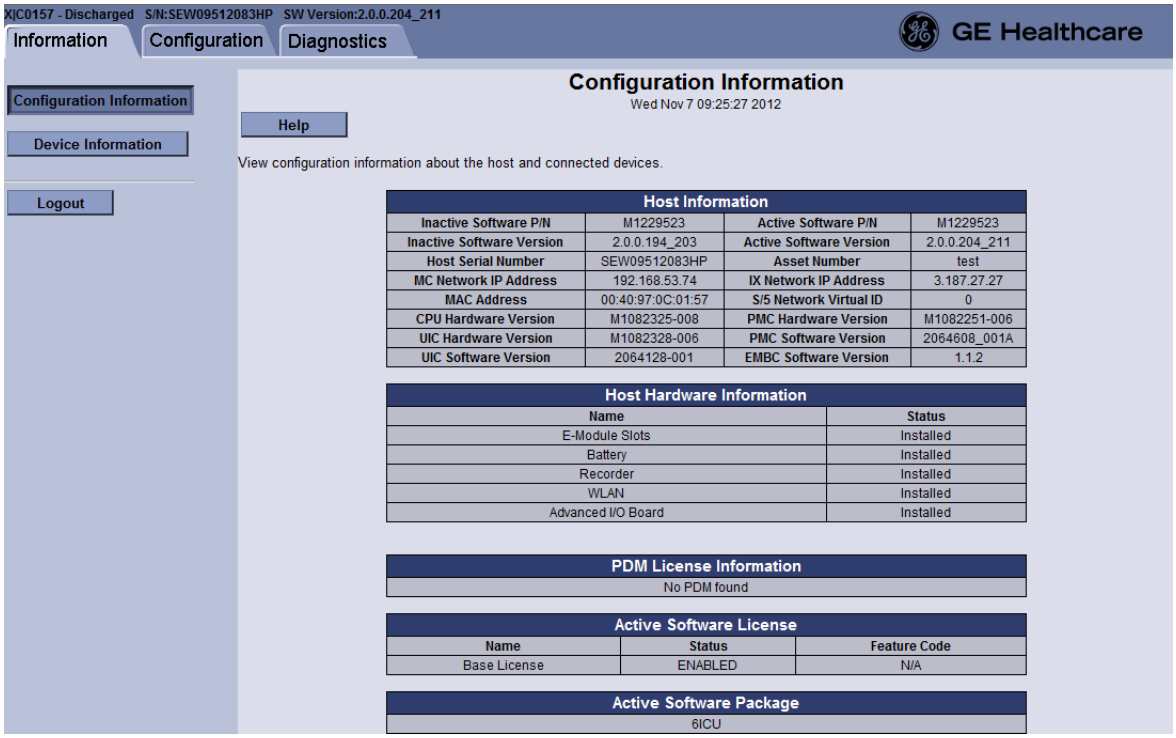
If loose parts or cable connections inside the patient monitor are suspected, disassemble the patient monitor to a level needed to perform an internal visual check. Check that:

- all screws are tightened properly
- all cables are connected properly
- there are no loose objects inside the patient monitor

NOTE: Perform the electrical safety test and the checkout procedure every time you have disassembled the patient monitor.

11.2 Webmin - Information tab

Access Webmin service interface to view configuration information and device information.



11.2.1 Configuration information

The Configuration Information module shows the current platform configuration of the patient monitor and the connected peripheral devices.

To view configuration information:

1. Log in to the Webmin.
2. Select the ***Information*** tab.
3. Select ***Configuration Information***.

4. Scroll down the page to view the configuration information:

Configuration information	
Host Information	• Active software part number and version, Inactive software part number and version, Host serial number, Host asset number, MC Network IP address, IX Network IP address, MAC address, S/5 Network virtual ID, CPU hardware version, PMC hardware version, UIC hardware version, PMC software version, UIC software version and EMBC software version.
Host Hardware Information	• Status information for E-Module Slots, Battery, Recorder, WLAN, and Advanced I/O Board hardware options.
PDM License Information	• PDM license option, status, and number of licenses.
Active Software License	• Current monitor software license in use, status and feature code.
Active Software Package	• Current software package in use.
Host License Information	• Each host license name, its current status (enabled, disabled or trial), feature code, and the expiration date for a trial license.
Default Clinical Settings	• Current default clinical settings.
Admit Settings	• Patient ID Prefix.
Unit and Bed Name	• Unit name and Bed name for CARESCAPE Network.
E-Module Information	• STP/TP/ST configuration information and P/PT/PP configuration information from E- modules.
S/5 Printers	• Printer name.
IX Printers	• Printer name, hostname or IP address.
Printer Location Information	• Printout type (Alarm Waveforms, Numeric Trends, Reports, and Waveforms) and Printer location.
Remote Service	• Proxy URL, Proxy port, Proxy username, Remote service status, System ID, Serial number, Enterprises URL, Enterprises tunnel URL, and Protocol.
Language	• Clinical user interface language.
National Requirement	• Setting for country specific alarms (None or France).
Network	• Active configuration information, including MAC address, MC Network type (IP address, Netmask, Gateway, Destination IP address, Destination netmask, and PHY configuration), and IX Network type (IP address, Netmask, Gateway, DNS server 1, DNS server 2, and PHY configuration).

Configuration information	
Power Line Frequency	• Current power line frequency setting in use.
MUSE/12SL	• Location ID, Site number, MUSE web username, and MUSE web URL.
WLAN	• Wireless LAN configuration information, including WLAN radio status, Antenna Diversity, Frequency Band, RTS Threshold, Fragmentation Threshold, Applied QoS Standard, WMM AC Parameters (for Voice, Video, Best Effort, and Background), DSCP Settings (for Realtime Clinical Traffic, Non-Realtime Clinical Traffic, and Non-Realtime Non-Clinical Traffic), SSID, Authentication method, Confidentiality method, and Key Index.

11.2.2 Device information

The Device Information module shows the hardware and software information of the patient monitor and the connected peripheral devices.

To view Device information:

1. Log in to the Webmin.
2. Select the ***Information*** tab.
3. Select ***Device Information***.
4. Scroll down the page to view the device information:

Device information	
Host Information	• Active software part number and version, Inactive software part number and version, Host serial number, Host asset number, MC Network IP address, IX Network IP address, MAC address, S/5 Network virtual ID, CPU hardware version, PMC hardware version, UIC hardware version, PMC software version, UIC software version and EMBC software version.
Host Hardware Information	• Status information for E-Module Slots, Battery, Recorder, WLAN, and Advanced I/O Board hardware options.
Active Software License	• Current monitor software license in use, status and feature code.
Active Software Package	• Current software package in use, status and feature code.
Host License Information	• Each host license name, its current status (enabled, disabled or trial), feature code, and the expiration date for a trial license.
Acquisition Information - PDM	• Active software version, Main board revision, DAS board revision, Serial number, Asset number, MAC address, IP address, Power frequency, ECG filter.

Device information	
Acquisition Information - E-Module	• Label, Software version, Control number, and Serial number.
Installed S/5 Printers	• Printer name.
Installed IX Printers	• Printer name, hostname or IP address.
Printer Location Information	• Printout type (Alarm Waveforms, Numeric Trends, Reports, and Waveforms) and Printer location.
PDM License Information	• PDM license option, status, and number of licenses.
UNITY ID Information	• Product ID, Unity Network ID software number and version, Date, Time, Device name and software version of each device connected.
USB Port Information	• Product name, Manufacturer, Vendor code, Product ID, and Serial number.

11.3 Webmin - Diagnostics tab

Access Webmin service interface to view hardware statistics, ping a network device, view WLAN diagnostics and view or download log files.

11.3.1 Hardware statistics

Hardware Statistics			
Measurement	**Current Reading**	**Lower Limit**	**Upper Limit**
+1.5V CPU Core Voltage (in mV)	1510	1300	1700
+1.8V CPU Core Voltage (in mV)	1810	1600	2000
+2.5V CPU Core Voltage (in mV)	2500	2300	2700
+12Vsync CPU Voltage (in mV)	12100	11000	13000
-12Vsync CPU Voltage (in mV)	-11600	-13000	-11000
AC/DC voltage (in mV)	15690	14000	17000
VSYS voltage (in mV)	15610	8800	17000
+15V MOD voltage (in mV)	14980	13000	17000
+12V voltage (in mV)	12550	11500	13500
+5V voltage (in mV)	5020	4600	5500
+3.3V voltage (in mV)	3350	3000	3600
+5V REC voltage (in mV)	4940	4600	5500
+12V REC voltage (in mV)	12470	11000	13500
+15V MOD PSM voltage (in mV)	14980	13000	17000
VSYS ePort voltage (in mV)	--		
VSYS RACK voltage (in mV)	15610	8800	17000
VSYS EMOD voltage (in mV)	15610	8800	17000
VSYS OPTION voltage (in mV)	--		
System power (in mW)	24450	1000	110000
Module power (in mW)	3180	0	40000
CPU temperature (in C)	41.75	10	62
DC/DC temperature (in C)	40.05	10	62
EMOD temperature (in C)	36.50	10	62
OPTION temperature (in C)	39.50	10	62

The Hardware Statistics module displays several internal voltages, temperatures and power consumption. A value is displayed in red, if the current reading exceeds a pre-determined lower or upper limit, A value is displayed either as “0” or as “--”, if it cannot be measured.

To access hardware statistics:

1. Log in to Webmin.
2. Select ***Diagnostics > Hardware Stats***.
3. Scroll down the page to view the following device information:

The controlled parameters are measured with A/D converters and temperature sensors in the specified subsystem. The measured values are then communicated over the I2C bus to the power management controller in the DC/DC board for processing, except for CPU voltages, which are both measured and processed by the CPU board.

Measurement	Description
+ 1.5V CPU Core Voltage (in mV) + 1.8V CPU Core Voltage (in mV) + 2.5V CPU Core Voltage (in mV)	These CPU core voltages are generated on the CPU board from the +3.3 V supplied by the DC/DC board.
+ 12 Vsync CPU Voltage (in mV) - 12 Vsync CPU Voltage (in mV)	These voltages are generated for the ECG and Invasive pressure analog outputs and marker-out synchronization pulse. The voltages are measured from the CPU board.
AC/DC voltage (mV)	The AC/DC voltage is generated by the AC/DC power supply unit and supplied as an input voltage to the DC/DC board. The voltage is measured from the DC/DC board. The AC/DC voltage is “0”, if the patient monitor is not connected to the AC mains. Also see section 11.4. Power management LEDs.
VSYS voltage (mV) +15V MOD voltage (mV) +12V voltage (mV) +5V voltage (mV) +3.3V voltage (mV)	These voltages are generated by the DC/DC board and they are routed via the CPU board to supply power to other internal subsystems. The + 12 V is also supplied directly to the LED backlight of the LCD display. The +15VMOD voltage is “0”, if E-module interface board is not installed. VSYS, +12V, +5V and +3.3V voltages are measured from the DC/DC board. +15VMOD is measured from the E-module interface board. Also see section 11.4. Power management LEDs.
+5V REC voltage (mV) +12V REC voltage (mV)	The +5 V REC and +12 V REC voltages are supplied for the optional thermal recorder. The +5 V REC supply voltage is generated in the recorder board by a step-down converter from the + 12 V received from the DC/DC board. The + 5 V REC and +12 V REC are measured from the module frame flex board. These voltages are “--”, if recorder is not installed.
+15V MOD PSM voltage (mV)	The +15 V MOD PSM voltage is supplied for the PSM module. The voltage is measured from the module frame flex board.

Measurement	Description
VSYS ePort voltage (mV) VSYS RACK voltage (mV) VSYS EMOD (mV) VSYS OPTION voltage (mV)	VSYS voltage is measured from the following locations:· • The VSYS ePort voltage is supplied for a PDM module that is connected to the PDM docking station. It is measured from the module frame flex board after the VSYS ePort circuit breaker. The value is shown as "--" if PDM module is not connected, or if VSYS OPTION voltage is enabled. • The VSYS RACK voltage is measured from the module frame flex board before the VSYS ePort circuit breaker. • The VSYS EMOD voltage is measured from the E-module interface board before the VSYS EMOD circuit breaker. The VSYS EMOD voltage is shown as "--", if the E-module interface board is not installed. • The VSYS OPTION voltage is supplied for a PDM module that is connected to the ePort (DB9) interface in the advanced interface board. It is measured from the advanced interface board after the circuit breaker. The value is shown as "--" if PDM module is not connected, or if VSYS ePort voltage is enabled.
System power (mW) Module power (mW)	Power consumption is measured from the DC/DC board: • System power is the total power consumption of the patient monitor taken from the AC/DC output or Battery. The battery charging power is included in system power by PMC CPU calculation. • Module power describes the total power consumption of the connected acquisition modules.
CPU temperature (°C) DC/DC temperature (°C) EMOD temperature (°C) OPTION temperature (°C)	Temperature is measured from the: • CPU board • DC/DC board • E-Module interface board • Advanced interface board The EMOD and OPTION temperatures are "0", if the related board is not installed.

11.3.2 Ping a TCP/IP network device

Use this Webmin feature to verify connectivity with a network device on the MC Network and IX Network.

1. Log in to Webmin.
2. Select ***Diagnostics > Ping***.
3. In the ***Address to Ping*** field in the Ping Command window, type the IP address of a known device on the network and select ping.

If you receive a reply, then you are able to connect to the device.

If you do not receive a reply, make sure that the patient monitor is connected to an active network.

The patient monitor withstands a maximum packet loss of 5 packets per 1 million and maximum latency of 250 ms without performance degradation.

11.3.3 WLAN diagnostics

Use this Webmin feature for troubleshooting WLAN related problems. This Webmin module provides information about the WLAN driver, WLAN status and the detected access points.

1. Log in to Webmin.
2. Select ***Diagnostics > WLAN***.
3. Scroll down the page to view the following WLAN diagnostics information.

NOTE: Some WLAN data is not updated until the monitor connects to an access point.

Log	Contents
WLAN Driver	• Driver API Version • Driver Version • Firmware Version • MAC Address

Log	Contents
WLAN Status	• WLAN radio • WLAN client IP Address • Antenna diversity mode • Center frequency (i.e., the current actual center frequency, which is associated with the operating channel number used, e.g in the 2.4 GHz band on channel 6, the displayed frequency should be 2.437 GHz.) • RTS Threshold • Fragmentation Threshold • Quality of Service: - Applied QoS standard (i.e., None or WMM) - QoS parameters (CWmin, CWmax, AIFS and TXOP) for each QoS access category (Voice, Video, Best Effort, Background) • The DSCP settings for network traffic types (Realtime Clinical Traffic, Non-Realtime Clinical Traffic, Non-Realtime Non-Clinical Traffic) • SSID (i.e., Service Set Identifier / network name) • Security status: - Authentication method (i.e., open) - Confidentiality method (i.e., None, WEP-64, WEP-128, WPA-PSK (TKIP), WPA2-PSK (AES-CCMP)) - Used Key Index (if WEP-64 or WEP-128 is used) • RF readings from the WLAN radio: - Operating channel - Transmit rate in Mbps - Transmit power in mW - Signal Level (RSSI) in terms of dBm. The minimum RSSI should be -75dBm or greater to maintain application performance. - Noise floor in dBm - Signal to Noise Ratio (SNR) in dB

<table>
<tr><th>Log</th><th>Contents</th></tr>
<tr><td rowspan="2">WLAN status</td><td>
• The current Association/Authentication status of the WLAN Radio:
<table>
<tr><th>Association/ Authentication state</th><th>Description of the state</th></tr>
<tr><td>Disconnected</td><td>The WLAN client radio is not authenticated or associated to any network infrastructure.</td></tr>
<tr><td>Authenticating</td><td>The network infrastructure is authenticating the WLAN client radio.</td></tr>
<tr><td>Authenticated</td><td>The WLAN client radio is authenticated but not yet associated to the network infrastructure.</td></tr>
<tr><td>Associating</td><td>The WLAN client radio is in the process of associating to the network infrastructure.</td></tr>
<tr><td>Connected</td><td>The WLAN client radio is connected to the network infrastructure and data is now being transmitted.</td></tr>
</table>
- Associated AP (BSSID) (i.e., the MAC Address of associated Access Point)
</td></tr>
<tr><td>
WLAN Radio transmission information:
• Packets received
• Packets transmitted
• Bytes received
• Bytes transmitted
• Receiving errors
• Transmission errors
</td></tr>
<tr><td>Detected access points</td><td>
The following information on maximum 8 detected Access Points on the same network (same SSID) is displayed:
• Signal Level (RSSI) in terms of dBm. Signal Level (RSSI) in terms of dBm. The minimum RSSI should be -75dBmor greater to maintain application performance.
• Operating channel number
• MAC Address
NOTE: If the patient monitor has associated with an Access Point, information on only the corresponding Access Point will be displayed.
</td></tr>
</table>

11.3.4 Log files

The patient monitor collects information about different system events and errors to log files. These log files help troubleshooting problems in the patient monitor and the connected peripheral devices.

The following table describes the available log files and the type of information that they collect.

Log file name	Contents
Webmin Action log	• Webmin user authentication and access related information (e.g., who accessed Webmin and when). • Webmin module settings changes (e.g., what was changed and when). • Software transfer history information, including the type and version of the transferred software, the origin and destination, and the date and time the software transfer occurred. • Host software activation information, including the host type and serial number, the type and version of the activated host software, and the date and time the host software activation occurred. • Module software activation information, including the module type and serial number, the type and version of the activated module software, and the date and time the module software activation occurred. • Settings transfer history information, including the type of the transferred settings, the origin and destination, and the date and time the settings transfer occurred. • Log file transfer history information, including the type of log that was transferred, the origin and destination, and the date and time the log file transfer occurred. • Webmin related error messages (e.g., information about EPI layer issues detected by Webmin).
EMBC Frame logs	• Date and time when the EMBC log was last updated. • Modbus 0, 1, 2, and 3 information, including the following: - System information (e.g., Sysinfo -packet) - Log information (e.g., Loginfo -packet) - Module node connection/disconnection information (e.g., Module Node Log) - Module slot information (e.g., addresses and times in the latest modbus frame) - Modbus frame statistics (e.g., total number of frames, number of synchronization errors, number of lost frames, number of unknown frames)

Log file name	Contents
PDM log	All PDM errors and messages.
System log	• OS events and errors, including operating system related information, such as clinical application startup and recovery information, power on self-test results, etc. • UIC, PMC, WLAN and battery events and errors. • InSite with ExC events and errors, including InSite with ExC agent related information.
Clinical log	• Clinical-related application events, including module (parameter) connections/disconnections, case starts/ends, cold starts, warm starts, etc. • Technical notes and errors displayed for clinical users, including all host and module related technical errors (e.g., 'Failure in Agent ID'). • Clinical alarms, including clinical application related patient alarms and their level (e.g., 'FiO_2 Low'). • Clinical user interactions, such as the host keystrokes and touchscreen selections, menu setting changes, etc. • EPI layer related errors, including information about EPI layer issues detected by the clinical application. • Host serial number and active software versions.

To download log files:

1. Log in to Webmin.
2. Select ***Diagnostics > Download Logs***.
3. Select the log(s) you want to download.
4. Select ***Download***.
5. According to your Webmin access:

a. If you are using Webmin on a service PC, you can save the log file to any storage device connected to the service PC:
   - In the ***File Download*** dialog box, select ***Save***.
   - In the ***Save as*** dialog box, select the destination drive and folder and select ***Save***.

NOTE: You may change the default filename, but do not change the file extension.

b. If you are using Webmin locally through the integrated browser, you can save the settings file to a USB flash drive that is connected to one of the patient monitor's USB ports:
   - The ***Download Logs*** window will show you the name of the created log file.
   - Select ***Download*** to save the log file to the USB flash drive.

NOTE: Do not disconnect the USB storage device until downloading is complete.

6. Send this log file to GE Service for further investigation.

To view log files:

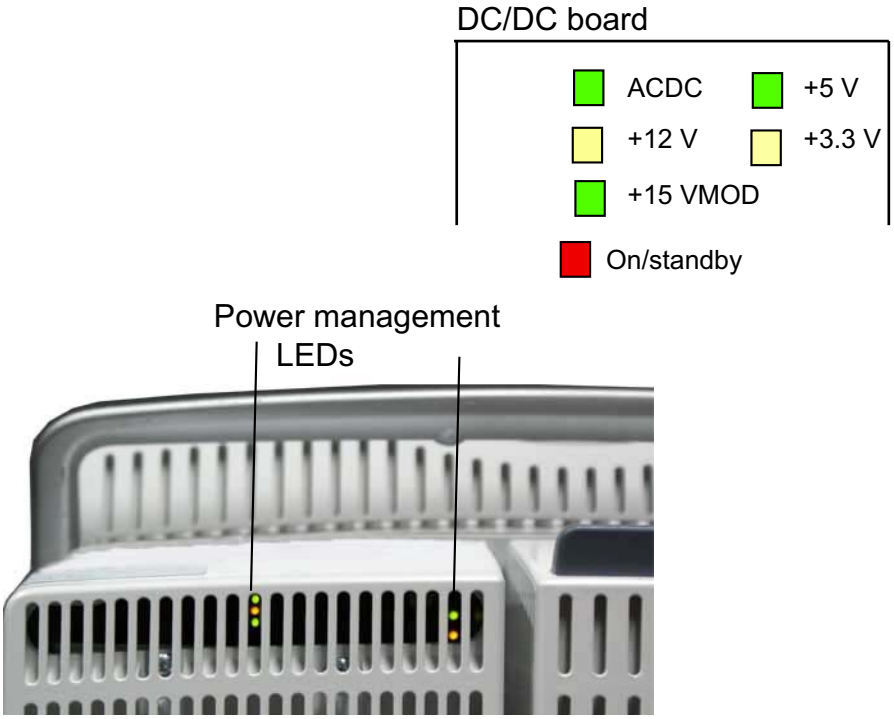
1. Log in to Webmin.
2. Select ***Diagnostics*** > ***View Logfiles***.

3. Select the log file you want to view.
4. Select the information you want to view.
   - For the Webmin Action Log, select the user, module, and timeframe and select ***Search***.
   - For the other types of logs, select the link associated with the information you want to view.

11.4 Power management LEDs

The DC/DC board includes troubleshooting LEDs that helps the user to troubleshoot start-up related problems in the patient monitor.

The troubleshooting LEDs in the DC/DC board are visible through the ventilation holes in the rear of the patient monitor (see picture below).

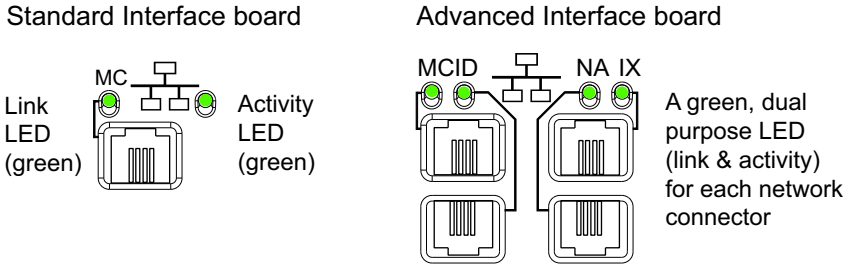


LED	Description
On/standby (red)	The red on/standby LED should be lit momentarily when the on/standby button is pressed. A lit LED normally indicates that the DC/DC power supply board recognizes that the user has pressed the on/standby button and should turn the patient monitor On/Off. If the On/standby LED is not lit when the on/standby button is pressed, check the patient monitor for any of the following problems: • Faulty keypad. • Faulty user interface board. • User interface cable is not connected to CPU board. • Faulty DC/DC board. • Faulty CPU board.

LED	Description
ACDC (green)	The green ACDC LED should be lit when the patient monitor is connected to the AC mains, even if the patient monitor is in standby mode. A lit LED indicates that the DC/DC board receives the 15.3-16 VDC from the AC/DC power supply unit. If the ACDC LED is not lit when the patient monitor is connected to live AC mains, check the patient monitor for one of the problems: • Main fuses are blown. • DC/DC cable is disconnected from DC/DC board. • Faulty AC/DC power supply unit (especially, if the patient monitor operates normally when it is battery powered). • Faulty DC/DC board (especially if the patient monitor does not operate neither on AC mains nor battery power).
+ 12 V (yellow)	These secondary voltages are created by the DC/DC board and they should be lit when the patient monitor is turned On and operates normally. If one of the secondary voltages is not present (LED not lit) when the patient monitor is turned on with the on/standby button, the DC/DC board is most likely faulty.
+ 15 VMOD (green)	
+ 5 V (green)	
+ 3.3 V (yellow)	

11.5 Network status LEDs

The interface board includes network status LEDs to help in troubleshooting network connectivity and communication problems. These LEDs are located next to each network connector in the rear of the patient monitor.



Standard Interface Board

The Standard Interface Board has 2 indicator LEDs for the MC connector:

- The Link LED is lit, when the patient monitor is physically connected to a network.
- The Activity LED is lit when the patient monitor is either transmitting or receiving data packets over the network.

Advanced Interface Board

The Advanced Interface Board has one dual purpose indicator LED for each network connector:

- The LED is lit to indicate a Link, i.e., the patient monitor is physically connected to a network.

- The LED is flashing to indicate Activity, i.e., the patient monitor is either transmitting or receiving data packets over the network.

11.6 Battery diagnostics

You can check the monitor battery status from the ***Battery Status*** menu.

1. Select ***Monitor Setup > Battery Status***

   The ***Monitor Battery Status*** menu will open.

Field	Status	Description
Time to empty (hh:mm)	hh:mm	Estimated operating time before the battery is empty.
	N/A	Battery is not connected to the patient monitor or battery is being charged.
Charge Level (%)	XX	Battery charge level compared to full capacity (in percentage).
	N/A	Battery is not connected to the patient monitor.
Slot status	"No battery"	Battery is not connected to the patient monitor.
	"No communication"	Battery is connected to the patient monitor, but battery communication failure error condition is on.
	"Failure"	Battery error condition is on.
	"Discharging"	Patient monitor is operating on battery power.
	"Charging"	Patient monitor is connected to AC mains and charging the battery.
	"Full"	Patient monitor is connected to AC mains and battery is fully charged.
Time to full (hh:mm)	hh:mm	Estimated time to charge the battery to full capacity.
	N/A	Battery is not connected to the patient monitor or battery is being discharged.
Temperature	"OK"	Battery temperature is ok.
	"Over temperature"	Battery temperature error due to high battery temperature.
	"N/A"	Battery is not connected to the patient monitor.

Field	Status	Description
Battery Quality	"OK"	The full capacity of the battery is more than 50% compared to the full capacity of a new battery.
	"Condition"	Battery requires conditioning.
	"Replace"	The full capacity of the battery is less than or equal to 50% compared to the full capacity of a new battery.
	"N/A"	Battery is not connected to the patient monitor.

2. For more detailed information, select ***Advanced*** tab**.**

Field	Description
Remaining capacity (mAh)	Remaining capacity of the battery in mAh.
Full capacity (mAh)	Full capacity of the battery in mAh.
Full capacity compared to new (%)	Full capacity of the battery compared to the nominal full capacity of a new battery.
Cycle count	The total count of charging and discharging cycles of the battery.
Voltage (V)	Battery voltage.
Current (mA)	Battery current. Positive when charging, negative when discharging.
Temperature (°C or °F)	Battery temperature.

NOTE: Refer to the Module Frames and Modules Technical Manual for information about PDM battery.

11.7 Error messages and codes

The following error messages display in the message field if there is a problem with the patient monitor.

Refer to the patient monitor's user's manual for a complete list of system messages. Refer to Module Frames and Modules Technical Manual for a list of parameter module specific error messages.

Message	Possible causes	Possible solutions
License expired	A trial license has expired.	Enable the license with a new activation code, if needed.
Configuration changes. Restart required	Pending configuration changes to platform settings that require patient monitor restart.	Power cycle the patient monitor.
Network down	No other network device observed on the MC Network.	Verify that the patient monitor is connected to an active network.

Message	Possible causes	Possible solutions
Identical unit & bed name noticed	A patient monitor with the identical unit and bed name is on the network.	Disconnect the patient monitor that has the identical unit and bed name. or Change the unit and bed name of the duplicate patient monitor unit and bed name.
Identical IP address noticed	A patient monitor with the identical IP address is on the network.	Disconnect the patient monitor that has the identical IP address. or Change the IP address of the patient monitor that has the duplicate IP address.
Service Monitor Error Code 0xHOST1001	One of the internal temperature sensors indicate the inside temperature of the patient monitor is out of specification. The message stays on screen as long as the error condition is valid.	If temperature is too high: 1. Turn off the patient monitor. 2. Let the patient monitor cool down. 3. Check that the ventilation holes are not obstructed. 4. Ensure that the patient monitor is installed to a location that meets the specified environmental requirements of operating temperature. 5. Investigate the patient monitor thoroughly for potential short circuits and other electrical faults. 6. If possible, log in to Webmin and select ***Diagnostics> Hardware Stats*** to identify the root cause for the error message. If temperature is too low (or high): If the patient monitor has been transported or stored outside the operating temperature range, allow it to stabilize back to operating temperature range before applying power.
Service Monitor Error Code 0xHOST1002	One of the internal supply voltages is out of the specification. The message stays on screen as long as the condition is valid.	Log in Webmin and select ***Diagnostics > Hardware Stats*** to identify the supply voltage that is below or above the specification limit.
Service Monitor Error Code 0xHOST1004	Disk usage exceeds 90%.	1. Back up the clinical and platform settings and print the licensing information page via Webmin. 2. Re-install software.

Message	Possible causes	Possible solutions
Service Monitor Error Code 0xHOST1100	The CPU timekeeper battery is empty.	Replace the CPU timekeeper battery.
External alarm light disconnect. Check USB connection.	1. The USB cable between the patient monitor and the secondary display is disconnected when the patient is admitted.	1. Reconnect the USB cable.
	2. Secondary display turned to standby when the patient is admitted.	2. Turn on the secondary display.
	NOTE: Select ***Audio Pause*** to acknowledge the message, if the USB cable is disconnected or the secondary display turned off on purpose.	
	3. User interface board communication failure.	3. Update UIC software (host software) or replace user interface board.
Power management failure	Power Management Controller (communication) failure.	Update PMC software (host software) or replace the DC/DC board.
Error 1: PMC update failed. Turn the monitor off and then on again.	Unexpected failure in PMC software update.	Turn the monitor off and then on again. If the error situation reoccurs, contact your local service representative.
Error 2: PMC update requires a mains supply. Plug in the power cord and turn the monitor off and then on again.	PMC software update to the DC/DC board has failed, because the patient monitor was running on battery power.	The patient monitor shall be connected to the AC mains. Plug in the power cord and turn the monitor off and then on again.
Setting activation after next case end./ Setting activation after next discharge.	Service user has initiated a delayed settings activation that will automatically take place after next case end. / next discharge.	If required, the service user may cancel the delayed setting activation. See section 7.16.4. Canceling pending settings activation
Software activation after next case end./ Software activation after next discharge.	Service user has initiated a delayed software activation that will automatically take place after next case end / next discharge.	If required, the service user may cancel the delayed setting activation. See section 7.18.3. Canceling pending host software activation

Message	Possible causes	Possible solutions
Service Monitor Activation Failed	Software activation failed.	Reactivate software. If that does not help, reinstall the software and then reactivate it.
	Setting activation failed.	Reactivate settings.
Module voltage low	• One of the supply voltages for the acquisition modules is out of specification. • An analog output voltage is out of specification.	Log in to Webmin and select ***Diagnostics > Hardware Stats*** to diagnose the problem. If there is a faulty board, replace it.
Application error: Webmin	The operating system informs that the Webmin local browser was terminated abnormally.	Select ***Audio Pause*** to acknowledge the message.
Replace monitor battery	The full capacity of the battery is less than or equal to 50% compared to the full capacity of a new battery.	Replace the monitor battery with a new one.
Battery failure	Battery failure.	Replace battery with a new one.
Condition monitor battery	Battery needs conditioning.	Condition the monitor battery. See section 10.4.5. Conditioning a battery
Battery temperature high	Battery temperature error due to faulty battery or battery management error.	Replace battery with a new one. If that does not help, replace the DC/DC board.
Speaker failure	1. Speaker cable loose.	1. Connect the speaker cable.
	2. Speaker failure.	3. Replace the speaker.
	4. CPU tone generator or audio amplifier failure.	5. Replace the CPU board.

11.8 Problems and solutions

11.8.1 Start-up failures

Problem	Possible causes	Recommended actions
Failure to turn on the patient monitor, when the following conditions apply: - The patient monitor is connected to AC mains. - The Mains voltage indicator is not lit. (see section "") - None of the power management LEDs are lit.(see section "11.4") Unable to turn on the patient monitor when it is powered from the AC mains. Monitor battery is not installed.	Power cord is loose.	Ensure that the power cord is connected properly to the wall outlet and to the patient monitor.
	Blown fuses.	Check the status of the fuses and replace them, if necessary. - Use only fuses with correct rating. - If the fuses are blown repeatedly, investigate the patient monitor carefully for possible short circuits.
	Power cord is faulty.	Check the power cord for wear and damage and replace if necessary.
	The power outlet does not meet specified requirements.	Check the power outlet being used: - Refer to the patient monitor's supplemental information manual for power requirements. - Check the power outlet being used, see section "8.2.2".
	The cable between the AC/DC power supply unit and the DC/DC board is loose or faulty.	Check that the cable is intact and properly connected to the AC/DC power supply unit and the DC/DC board. NOTE: You can easily check if the cable is properly connected to the DC/DC board by detaching the top cover.
	The cable between AC/DC power supply unit and AC inlet is loose or faulty.	Check that the cable is intact and properly connected to the AC/DC power supply unit and to the AC inlet. Ensure the grounding connection is good: - Reconnect the cable, if loose. - Replace the rear unit, if the cable is faulty.
	The AC/DC power supply is faulty.	Replace the AC/DC power supply unit.
	The DC/DC board is faulty.	Replace the DC/DC board.

Problem	Possible causes	Recommended actions
Unable to turn on the patient monitor when it is powered from the monitor battery. The patient monitor is not connected to the AC mains.	Battery Empty	Check the battery charge status, see section "6.1.1". Charge or replace the battery.
	Battery Failure or missing battery.	Check the status of the battery charge/failure indicator, see section "6.1.1". Depending on the LED status: - Insert a battery. - Replace the battery.
	Battery cable loose.	Check that the battery cable is intact and properly connected to the DC/DC board.
	DC/DC Board failure.	Replace the DC/DC board.
Failure to turn on the patient monitor, when the following conditions apply: - The patient monitor is powered up either from the AC mains or the battery. - The red on/standby button LED in the DC/DC board is not lit, when you press the on/standby button to start the patient monitor. see section "11.4". Unable to turn on the patient monitor when it is both connected to AC mains and a fully charged monitor battery is installed.	The cable between user interface board and CPU board is loose or faulty.	Check the status of the red ON/Stdby-button LED on DC/DC board when On/Stdby button is pushed. During the push LED should illuminate. If it is not illuminating, the cable between the user interface board and DC/DC board is loose or faulty, or the user interface board is faulty. Check that the cable is intact and properly connected to the user interface board and the CPU board. - Reconnect the cable, if loose. - Replace the user interface cable, if the cable is faulty.
	The keypad is faulty.	Replace the keypad.
	The user interface board is faulty.	Replace the user interface board.
	DC/DC Board failure.	Replace the DC/DC board.
	CPU failure.	The on/standby signal is routed through the CPU board, so there is a minor possibility that the CPU is faulty, if all the other things seems to work, but you are not able to start the patient monitor neither from the on/standby button or the remote-on connector.
Unable to turn on the patient monitor: - The patient monitor starts, but the primary display remains "black", i.e the backlight does not illuminate the LCD display.	Faulty DC/DC board. The DC/DC board does not supply the +12V for the LED backlight of the LCD display.	The +12V voltage created by the DC/DC board is used only for LCD display backlight and for the optional recorder. Check one of the following: - Check the status of the yellow +12 V LED in the DC/DC board, see section "11.4". - Print something to the optional, built-in recorder. - Connect a service PC to the patient monitor and log in to Webmin to check the status of the +12V voltage (mV), see section "11.3.1". If the +12 V is present and within specs, the DC/DC board is not likely to cause the problem.

Problem	Possible causes	Recommended actions
	The backlight cable between the LCD display and the DC/DC board is loose or faulty. or The LED backlight unit is faulty.	Check that the backlight cable is intact and properly connected both to the LCD display and to the DC/DC board. Replace the LCD display unit, if in doubt that the LED backlight unit is faulty.
Unable to turn on the patient monitor: - The patient monitor starts, but the primary display remains "white", i.e., the backlight illuminates the LCD display, but nothing appears on the screen. No error messages.	The display cable is damaged or loose.	Check that the display cable is intact and properly connected to the LCD display and the CPU board.
	The LCD display is faulty.	Replace the LCD display unit.
	The display controller section of the CPU board is faulty.	Replace the CPU board.
Unable to turn on the patient monitor: - The patient monitor starts, but the start-up sequence does not advance beyond the GE logo screen. Error messages may appear to the screen.	1. uDOM is missing or loose. 2. uDOM software is corrupted. 3. uDOM has incompatible software.	1) Ensure that the uDOM is properly connected and aligned to the connector in the CPU board. 2) Replace uDOM. Contact GE service for support. 3) Ensure that the attached uDOM has correct and compatible software. Contact GE service for support.
Start-up sequence does not advance beyond the GE logo screen. Error message ***Error 3: PMC update failed.*** appears to the screen.	Active PMC software version is the same as inactive PMC version.	Perform the following steps: 1. Remove the batteries and power cord from the patient monitor. 2. Wait 10 seconds 3. Re-install the batteries and plug the power cord back to the monitor. 4. Turn the monitor on and wait until the monitor restarts automatically.
Webmin login screen appears after the startup screen,	There is no host software in uDOM.	Transfer and activate host software to monitor, see section 7.18 or replace the uDOM. Contact GE service for support.

11.8.2 User interface issues

Secondary display

Problem	Possible cause	Recommended actions
Continuous beeping alarm and alarm light flashing yellow.	Mains supply is lost or the USB cable is disconnected.	Restore the mains supply or reconnect the USB cable.

Touchscreen

Problem	Possible cause	Recommended actions
Touchscreen operation inaccurate.	Touchscreen not calibrated.	Calibrate touchscreen, see section "7.1.2".
Touchscreen inoperative.	Touchscreen cable loose	Connect touchscreen cable to the user interface board.
	Faulty touchscreen sensor.	Replace the front unit assembly.

Keypad, Trim Knob, on/standby button and alarm Light issues

Problem	Possible cause	Recommended action
None of the user interface board functions work, see section "9.2.3".	UI cable loose or faulty.	Check user interface cable and replace it, if necessary.
	UI board faulty.	Replace the user interface board.
Trim Knob (only) is inoperative.	Trim Knob cable loose.	Connect Trim Knob encoder cable to the user interface board.
	Trim Knob encoder faulty.	Replace the Trim Knob encoder.
Hard keys or the power indicator LEDs in the keypad are inoperative.	Keypad is faulty	Replace keypad.
	User interface board is faulty.	Replace the user interface board.
Alarm light does not illuminate when there is an alarm condition on (audible alarms work and alarm message is visible)	Alarm light cable is loose	Connect the alarm light cable to the user interface board.
	Alarm light board or alarm light cable is faulty.	Replace the front unit assembly.
Alarm light does not illuminate during power-on self test.	"Warm start"	It is less than 15 minutes since the last power-up (warm start) and this normal operation. The alarm light illuminates during the power-on self test only if it is a cold start (more than 15 minutes from the previous start-up).

Alphanumeric Keyboard and barcode scanner issues

Problem	Possible cause	Recommended action
Wrong character is displayed when a key is pressed on keyboard.	The keyboard locale is not configured correctly.	Configure the keyboard locale correctly, see "7.9".

Wrong character is displayed when a barcode is read.	The keyboard locale is not configured correctly.	Configure the keyboard locale correctly, see "7.9".
	The barcode reader's language configuration is incorrect.	Refer to the barcode reader manual.
Barcode reader does not read a multi-field barcode correctly. (i.e., the information is not populated correctly to the fields in the Admit menu).	Barcode reader parser configuration is incorrect.	Configure the barcode settings, see "7.7.2".
	The barcode reader is incompatible with the parser configuration (field lengths, field types, delimeters, symbologies etc.).	Check the barcode information content and compare it to the current parser configuration.

Speaker / audible alarm issues

Problem	Possible cause	Recommended action
Audible alarms do not work.	Audible alarms are turned off (See ***Alarms Setup > Audible & Visual.***)	Enable audible alarms.
	Alarm volume is low.	Adjust alarm volume (***Monitor Setup > Sound Volumes***).
	Speaker failure	Replace the speaker unit.
	Speaker cable loose or faulty.	Check that the speaker cable is intact and properly connected.
	Tone generator or audio amplifier failure	Replace CPU board .

11.8.3 Incorrect system time

Problem	Possible cause	Recommended action
System time is incorrect when patient monitor is not connected to network.	CPU timekeeper battery empty	Replace CPU timekeeper battery.
	Time not configured properly	Configure date and time, see "7.3".
System time is incorrect when patient monitor is connected to MC Network.	Network device time synchronization error.	When adding a new device to the CARESCAPE Network, the existing devices on the CARESCAPE Network will synchronize to the new device's time. To prevent potential time synchronization issues, you should set the new device's time to be as close as possible to the time (within one minute or less) used by the existing GE devices on the CARESCAPE Network.
System time is incorrect when patient monitor is connected to S/5 network.	iCentral time incorrect.	Configure iCentral time master.

11.8.4 License issues

Problem	Possible cause	Recommended action
Unable to perform a function or a feature is not available.	- A license has not been purchased for the feature. - The trial license has expired for the feature. - The license is not installed properly.	See License management chapter.
Unable to view a certain feature although the license is enabled.	The software package in use does not include the feature in question. (For example, Anesthetic agent measurement is not supported by ICU software package).	1. Log in to ***Webmin > Configuration > Licenses >Software Package.*** 2. Select the correct option and select Activate.
Unable to upload a license file.	- The license file is corrupted. - The license file is for a patient monitor with a different serial number.	Log in to ***Webmin > Configuration > Licenses***. - If you have printed license information, select ***Software Package*** and ***Host Licensing***. - If you have a license file, select ***Upload License***.
The wrong software application is displayed on the patient monitor.	The wrong software application is activated for the device.	1. To view the software package that is currently activated, Log in to ***Webmin > Configuration >Licenses > Host Licensing***. 2. Make sure that the desired software application is displayed under ***Currently Active Software Package***. 3. If you need to activate a different software package, access ***Configuration > Licenses > Software Package***. 4. Select the correct option and select Activate.

11.8.5 Recorder issues

Problem	Possible cause	Recommended action
Recorder does not work.	Graph location is not configured correctly.	Check the configuration: ***Monitor Setup > Printing > Devices > Setup.***
	Recorder board failure.	Check the status of the +5 V REC and +12 V REC voltages, see section "11.3.1" Hardware statistics. If one of these above voltages is out of spec, but the +12 V exists in the DC/DC board, the recorder board is most likely faulty. Replace the recorder unit.
Recorder does not work.	Recorder failure.	Replace the recorder unit.
	CPU board failure	The serial communication for the recorder is managed by the EMBC section of the CPU board. - Check EMBC Frame logs for possible EMBC failures (see section "11.3.4"). If the cause is none of the above, the problem is most likely in the CPU board. Replace the CPU board.
Recorder works but nothing appears on the paper.	Paper installed upsidedown.	Turn the paper roll over. To test which side is active: - Place the paper on a hard surface and draw a line with a fingernail - a dark line will appear on the active (thermal) side.

11.8.6 Acquisition module problems

Problem: an acquisition module does not work with the patient monitor.
Locate first whether the problem is in the patient monitor or in the acquisition module:

1. Connect another, similar, known good module to the suspect patient monitor and check if the module works normally:
   - "Yes" => The suspect module is most likely faulty. Refer to Module Frames and Modules Technical Manual for troubleshooting instructions.
   - "No" => The problem is most likely in the patient monitor. Continue troubleshooting the problem according to the related troubleshooting chart below.

OR

Connect the suspect acquisition module to another, similar, known good patient monitor and check if the module works normally:

- "Yes" => The problem is most likely in the patient monitor. Continue troubleshooting the problem according to the related troubleshooting chart below.
- "No" => The suspect module is most likely faulty. Refer to Module Frames and Modules Technical Manual for troubleshooting instructions.

E-module issues

Possible cause	Recommended action
Incompatible module	Refer to the patient monitor's supplemental information manual document to see the list of compatible modules.
DC/DC board failure	The supply voltages for the E-module interface board are generated in the DC/DC board. Check that these supply voltages are within specs, see section "11.3.1" Hardware statistics for: - VSYS voltage (mV) - +15V MOD voltage (mV) If any of the output voltages are out of spec, the problem is most likely in the DC/DC board. Replace the DC/DC board.
The hinge flex board is loose or faulty.	Check that the hinge flex board is intact and properly connected to the CPU board and to the E-module Interface board.
E-Module interface board failure.	The E-module interface board creates the supply voltages + 15 VD, + 15 Va, - 15Va and + 5 Vmod) for the connected E-modules. Replace E-module interface board, if suspected faulty.
CPU board failure	The RS-485 communication for the E-modules is managed by the EMBC section of the CPU board. - Check EMBC Frame logs for possible EMBC failures, see section "11.3.4". If the cause is none of the above, the problem is most likely in the CPU board. Replace the CPU board.

PSM module issues

Possible cause	Recommended action
Pole mount cable loose or faulty (if the PSM module is mounted to a pole mount)	Check that the Module Bus Adapter for PSM and the connection cable is intact and properly connected to the PSM module mounted to the IV pole and to the PSM connector in the patient monitor.
DC/DC board failure	The +15VMOD supply voltage for the PSM module is generated in the DC/DC board. Check that it is within specs, see section "11.3.1" for: - +15VMOD voltage (mV) If +15VMOD voltage is out of spec, the problem is most likely in the DC/DC board. Replace the DC/DC board.
The hinge flex board is loose or faulty.	Check that the hinge flex board is intact and properly connected to the CPU board and to the module frame flex board.
The module frame flex board is loose or faulty.	Check the status of the +15 VMod PSM voltage, see section "11.3.1" Hardware statistics. If the +15 VMod PSM voltage is out of spec, but the +15VMod exists in the DC/DC board and hinge flex board is good, the problem is most likely in the module frame flex board.

Possible cause	Recommended action
CPU board failure	The RS-485 communication for the E-modules is managed by the EMBC section of the CPU board. - Check EMBC Frame logs for possible EMBC failures, see section "11.3.4". If the cause is none of the above, the problem is most likely in the CPU board. Replace the CPU board.

PDM module issues

Possible cause	Recommended action
The external ePort cable is loose or defectice. (PDM is connected to the ePort connector in advanced interface board)	Check that the external ePort cable is intact and properly connected to the PDM module and to the ePort connector in the advanced interface board.
DC/DC board failure	The VSYS supply voltage for the PDM module is generated in the DC/DC board. Check from the Webmin ***Hardware Statistics*** that the supply voltages are within specification: - VSYS voltage (mV) - VSYS_EPORT(mV) - VSYS_PDM (mV) If PDM is connected to PDM dock, DC/DC board should identify PDM and enable the VSYS_PDM circuit breaker on CPU carrier board to connect VSYS voltage to VSYS_PDM. If PDM is connected to ePORT, DC/DC board should identify PDM and enable the VSYS_EPORT circuit breaker on CPU carrier board to connect VSYS voltage to VSYS_EPORT. If VSYS voltage is out of spec, the problem is most likely in the DC/DC board. Replace the DC/DC board.
Advanced interface board failure. (PDM is connected to the ePort connector in advanced interface board)	Check the status of the VSYS OPTION voltage measured from the advanced interface board (see section "11.3.1" Hardware statistics). If the VSYS OPTION voltage is out of spec, but the VSYS voltage exists in the DC/DC board, the problem is most likely in the advanced interface board. Replace the advanced interface board.

Possible cause	Recommended action
Hinge flex board is loose or faulty. (PDM is connected to the PDM docking station)	Check that the hinge flex board is intact and properly mounted to the CPU board and to the module frame flex board.
Module frame flex board faulty. (PDM is connected to the PDM docking station)	Check the status of the VSYS RACK and VSYS ePort, see section "11.3.1" Hardware statistics. If the VSYS RACK and VSYS ePort voltage is out of spec, but the VSYS exists in the DC/DC board, the problem is most likely in the module frame flex board.
CPU board failure	The Ethernet communication for the PDM module is managed by the CPU board. Check PDM Log for possible PDM errors messages, see section "11.3.4". If the cause is none of the above, the problem is most likely in the CPU board. Replace the CPU board.

11.8.7 CARESCAPE Network communication issues

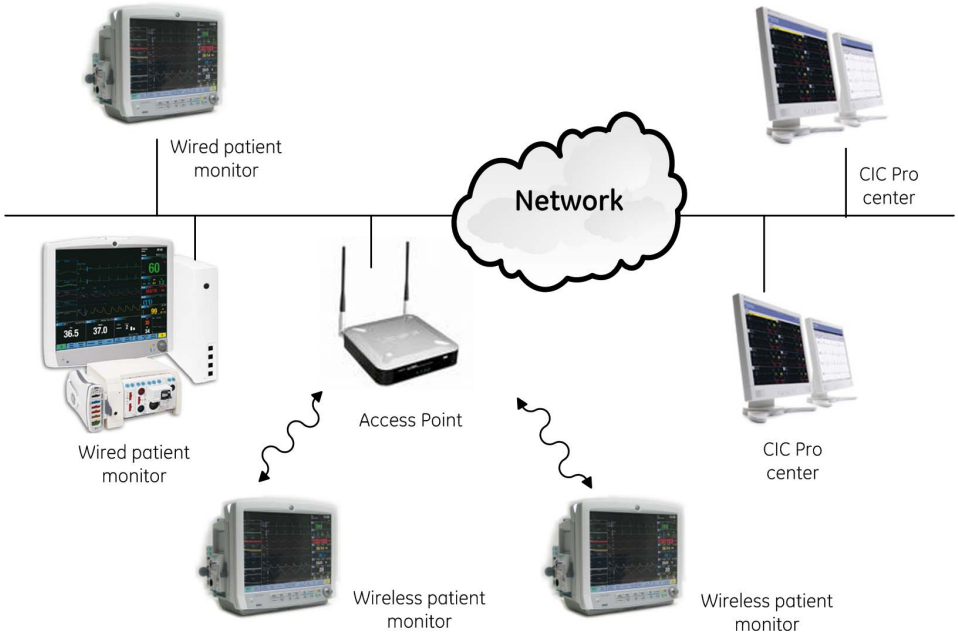
Traffic types

Two main types of communication occurs in the CARESCAPE Network: Broadcast and Unicast.

- Broadcast traffic is sent from one device to all devices on the network. Examples of CARESCAPE broadcast traffic are device discovery, alarms, and time synchronization.
- Unicast traffic is sent from one device to another specific device on the network. An example of CARESCAPE unicast traffic is patient waveforms.

Flow

- Upstream broadcast: The patient monitor sends broadcasts to other network devices.
- Downstream broadcast: The patient monitor receives broadcasts from other network devices.



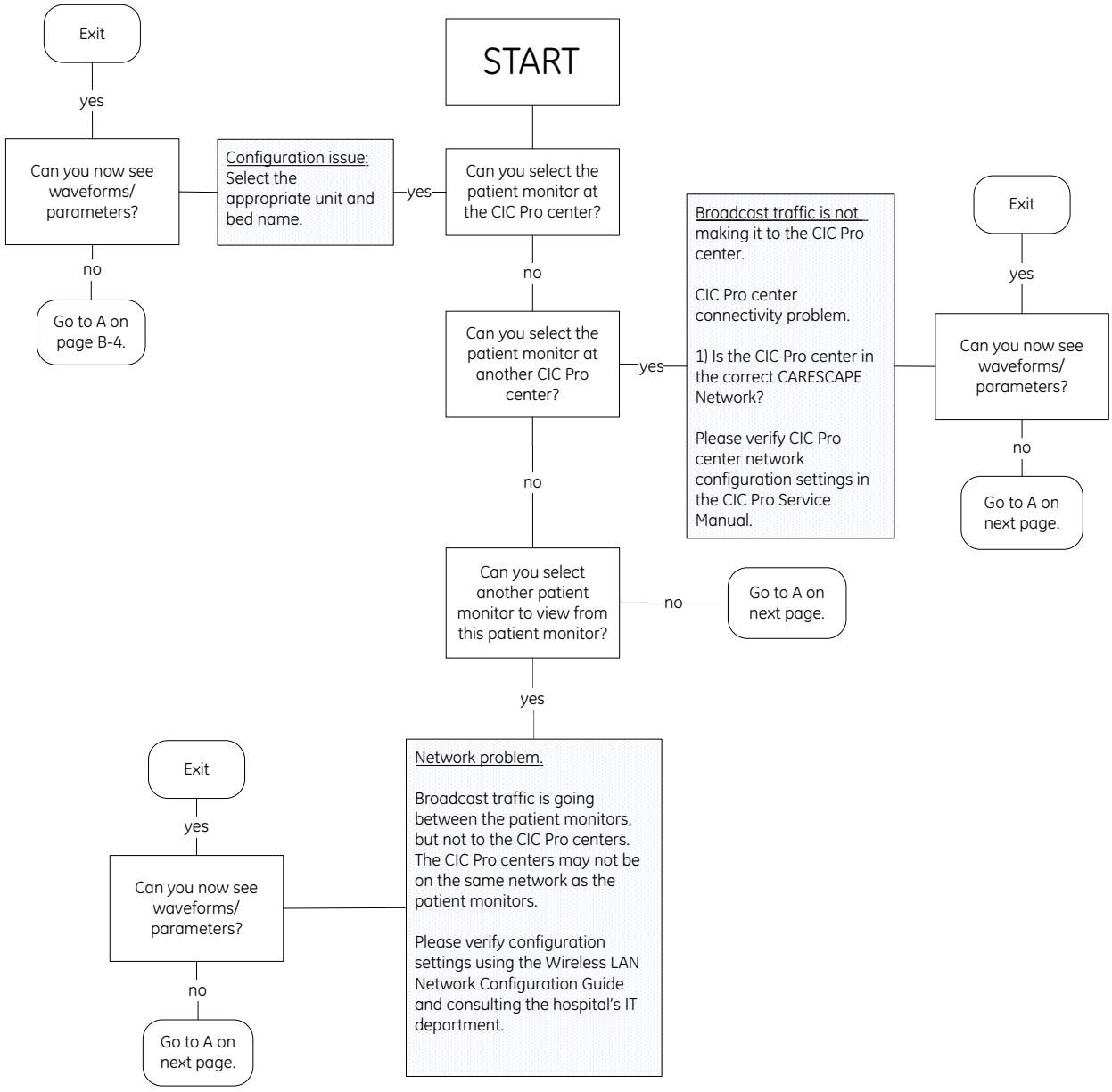
Types:
- Broadcasts (discovery, alarms, time)
- Unicasts (waveforms, ping)

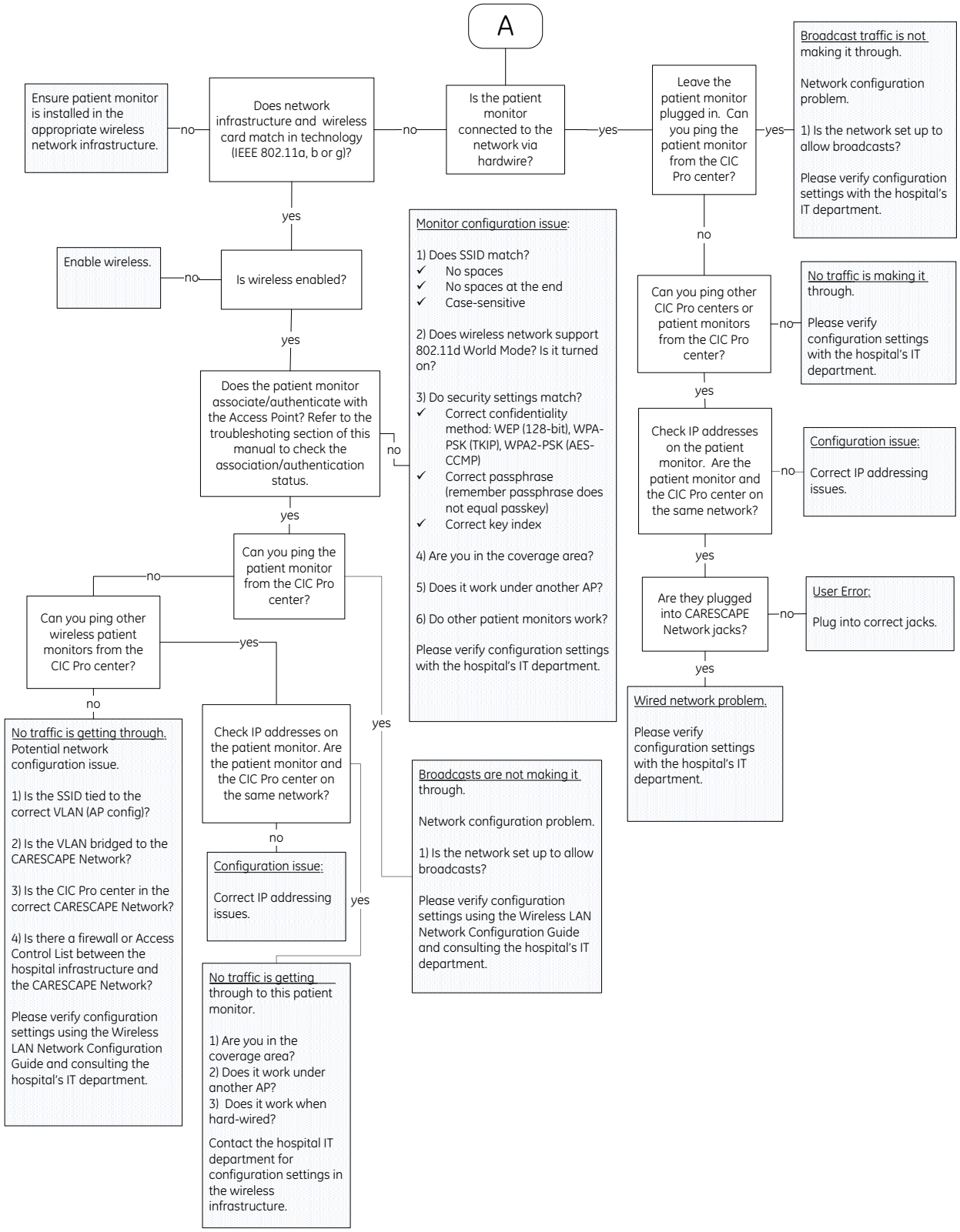
Mediums:
- Wired
- Wireless

Flow:
- Upstream Broadcast
- Downstream Broadcast
- Bi-Directional Unicast

Combinations:
- Wired Broadcast
- Wired Unicast
- Wireless Broadcast
- Wireless Unicast

Problem: No waveforms or parameters are displayed at the CIC Pro center




A
Is the patient monitor connected to the network via hardwire?
yes
Leave the patient monitor plugged in. Can you ping the patient monitor from the CIC Pro center?
yes
Broadcast traffic is not making it through.
Network configuration problem.
1) Is the network set up to allow broadcasts?
Please verify configuration settings with the hospital's IT department.
no
Can you ping other CIC Pro centers or patient monitors from the CIC Pro center?
no
No traffic is making it through.
Please verify configuration settings with the hospital's IT department.
yes
Check IP addresses on the patient monitor. Are the patient monitor and the CIC Pro center on the same network?
no
Configuration issue:
Correct IP addressing issues.
yes
Are they plugged into CARESCAPE Network jacks?
no
User Error:
Plug into correct jacks.
yes
Wired network problem.
Please verify configuration settings with the hospital's IT department.
no
Does network infrastructure and wireless card match in technology (IEEE 802.11a, b or g)?
no
Ensure patient monitor is installed in the appropriate wireless network infrastructure.
yes
Is wireless enabled?
no
Enable wireless.
yes
Does the patient monitor associate/authenticate with the Access Point? Refer to the troubleshoting section of this manual to check the association/authentication status.
no
Monitor configuration issue:
1) Does SSID match?
✓ No spaces
✓ No spaces at the end
✓ Case-sensitive
2) Does wireless network support 802.11d World Mode? Is it turned on?
3) Do security settings match?
✓ Correct confidentiality method: WEP (128-bit), WPA-PSK (TKIP), WPA2-PSK (AES-CCMP)
✓ Correct passphrase (remember passphrase does not equal passkey)
✓ Correct key index
4) Are you in the coverage area?
5) Does it work under another AP?
6) Do other patient monitors work?
Please verify configuration settings with the hospital's IT department.
yes
Can you ping the patient monitor from the CIC Pro center?
no
Can you ping other wireless patient monitors from the CIC Pro center?
yes
Check IP addresses on the patient monitor. Are the patient monitor and the CIC Pro center on the same network?
no
Configuration issue:
Correct IP addressing issues.
yes
No traffic is getting through to this patient monitor.
1) Are you in the coverage area?
2) Does it work under another AP?
3) Does it work when hard-wired?
Contact the hospital IT department for configuration settings in the wireless infrastructure.
yes
Broadcasts are not making it through.
Network configuration problem.
1) Is the network set up to allow broadcasts?
Please verify configuration settings using the Wireless LAN Network Configuration Guide and consulting the hospital's IT department.
no
No traffic is getting through.
Potential network configuration issue.
1) Is the SSID tied to the correct VLAN (AP config)?
2) Is the VLAN bridged to the CARESCAPE Network?
3) Is the CIC Pro center in the correct CARESCAPE Network?
4) Is there a firewall or Access Control List between the hospital infrastructure and the CARESCAPE Network?
Please verify configuration settings using the Wireless LAN Network Configuration Guide and consulting the hospital's IT department.

11.8.8 S/5 Network communication issues

Check the following things before proceeding with any detailed network troubleshooting:

- Check status of the wired and wireless network connection indicators and the WLAN signal strength indicator, for reference see "3.7".
- Check status of network status LEDs. Check network compatibility. Refer to the patient monitor's supplemental information manual.
- Check that each patient monitor has been assigned a unique Virtual ID key, see "7.2.3".

Wired S/5 network

Problem	Possible cause	Recommended action
Bedside monitor doesn't register to the Monitor Network - all bedside monitors affected.	The problem is related to the iCentral, or to the cabling between the iCentral and the hub/switch.	• Proceed to the iCentral troubleshooting. • Check the cabling between the iCentral and the hub/ switch.
Bedside monitor doesn't register to the Monitor Network – only one patient monitor or some of the bedside monitors affected.	The problem is related to the bedside monitor, or to the cabling between the bedside monitor and the hub/switch.	• Check the patient monitor(s)' network configuration. • Check the cabling between the bedside monitors and the hub.
	The problem is related to network setup: the bedside monitor(s) is/are missing from the network setup.	• Check the iCentral network setup.
	The problem is related to view setup: the bedside monitor(s) is/ are missing from the view setup.	• Check the iCentral view setup.

Wireless S/5 network

Problem	Possible cause	Recommended action
No wireless connection - the patient monitor does not associate/authenticate with the Access Point, see section "11.3.3" for WLAN diagnostics.	Patient monitor is out of wireless coverage area.	• Contact the hospital IT department to check the wireless coverage area.
	WLAN radio is disabled.	• Enable WLAN radio, see section "7.2.4".
	Incompatible wireless network infrastructure.	• Check that the patient monitor is installed to the appropriate wireless network infrastructure (IEEE 802.11b).
	SSID mismatch between patient monitor and access point.	• Enter correct SSID, see section "7.2.4".
	Security settings mismatch between patient monitor and access point: • Incorrect or incompatible confidentiality method • Incorrect Pass Key • Incorrect key index	• Contact the hospital IT department for correct security settings and then update the patient monitor configuration, see section "7.2.4". • Check that the used security method is none, WEP-64 or WEP-128. • Select correct confidentiality method. • Ensure Pass Key used is correct. • Select correct key index.
	Access control list is in use in the access point. The patient monitor is blocked out.	• Contact the hospital IT department to update the access control.

12 Disassembly and reassembly

12.1 Disassembly guidelines

Field repair of the patient monitor is limited to replacing Field Replaceable Units (FRUs). See chapter 13. Service parts for a detailed list of available FRUs. Attempting a field repair on a printed circuit board, or a factory sealed component or assembly could jeopardize the safe and effective operation of the monitor.

NOTE: Only a qualified service technician should perform field replacement procedures.

NOTE: Perform the checkout procedure described in chapter 10. Maintenance and checkout always after doing any disassembly of the patient monitor.

12.1.1 ESD precautions

All external connectors of the patient monitor are protected against ESD damage. However during service of the patient monitor, exposed components and assemblies inside the patient monitor are susceptible to ESD damage. Human hands, non-ESD protected work stations or improperly grounded test equipment can cause ESD damage. The following guidelines do not fully guarantee static-free workstation, but can greatly reduce the potential for failure of any electronic assemblies being serviced:

- Discharge any static charge you may have built up before handling semiconductors or assemblies containing semiconductors.
- A grounded, antistatic wristband or heel strap should be worn at all times while handling or repairing assemblies containing semiconductors.
- Use properly grounded test equipment.
- Use a static-free work surface while handling or working on assemblies containing semiconductors.
- Semiconductors and electronic assemblies should be stored only in antistatic bags or boxes.
- Handle all PCB assemblies by their edges.
- Do not remove semiconductors or assemblies containing semiconductors from antistatic containers until absolutely necessary.
- Do not slide semiconductors or electrical/electronic assemblies across any surface.
- Do not touch semiconductor leads unless absolutely necessary.
- Do not flex or twist a circuit board.

WARNING **Pins of connectors identified with the ESD warning symbol should not be touched. Connections should not be made to these connectors unless electrostatic discharge (ESD) precautions are used.**

12.1.2 Reassembly precautions

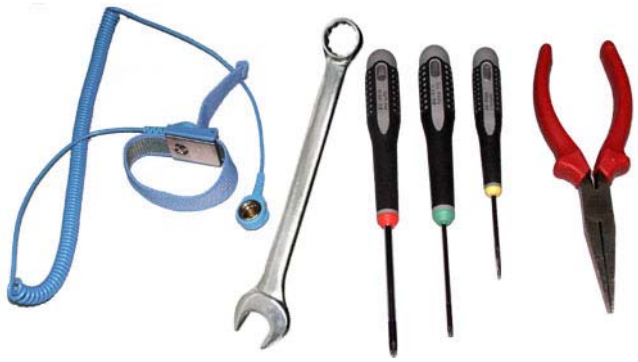
Pay attention to the following precautions when reassembling the monitor:

- Note the positions of any wires, cables or connectors. Mark them, if necessary, to ensure their correct reassembly.
- Save and set aside all hardware for reassembly

- GE recommends using the new fasteners (screws, washers, etc.) in the FRU kits rather than reusing the old fasteners. Some fasteners are not intended to be re-used more than three times.
- Use only new screws when attaching parts into light metal parts. Before fastening a screw, turn it counterclockwise until it drops into an existing thread pattern.
- The maximum torque values for use with each screw and nut in reassembly are shown in brackets in the end of each disassembly step.
- When attaching self-tapping screws to light metal parts without existing threads (new light metal FRU parts), you should use a higher torque than is recommended for reassembled parts, but still not more than 1.6 Nm.

NOTE: It is not required to use a torque wrench or torque screwdriver when reassembling the monitor using the recommended standard hand tools. Ensure visually that the screws are properly attached. Avoid overtightening the screws as this may damage the existing thread patterns. However, when using battery-operated tool, ensure that it is equipped with torque limiter and the torque is properly adjusted.

12.1.3 Required tools



- insulated crosshead screwdriver
- insulated Torx T10 screwdriver
- insulated flat blade screwdriver (width 2.5 mm / 0.1 in)
- pliers
- antistatic ESD wristband
- spanner size 11 mm

WARNING **Due to possible high voltage present, use an insulated screwdriver at all times.**

12.1.4 Before disassembly

WARNING **PATIENT MONITORING INTERRUPTION — Make sure a patient is not being monitored while servicing the equipment.**

WARNING **DISCONNECTION FROM MAINS - When disconnecting the device from the power line, remove the plug from the wall outlet first. Then you may disconnect the power cord from the device. If you do not observe this sequence, there is a risk of coming into contact with line voltage by inserting metal objects, such as the pins of leadwires, into the sockets of the power cord by mistake.**

WARNING **SAFETY GROUND - Remove power cord from the mains source by grasping the plug. Do not pull on the cable.**

WARNING **ELECTRIC SHOCK - Always unplug the grounded cables when not in use. Leaving them connected could result in an electric shock from the ground contact in the other end.**

1. Turn the monitor off from the **On/standby** button.
2. Disconnect the monitor power cord, first from the wall outlet and then from the monitor.
3. Remove the battery. Unlock the battery cover by turning the battery cover lock 90° clockwise and pull the battery out.
4. Disconnect all external cables connected to the monitor.
5. Detach all parameter modules from the Module Frame.
6. Detach the monitor from the mount if installed.

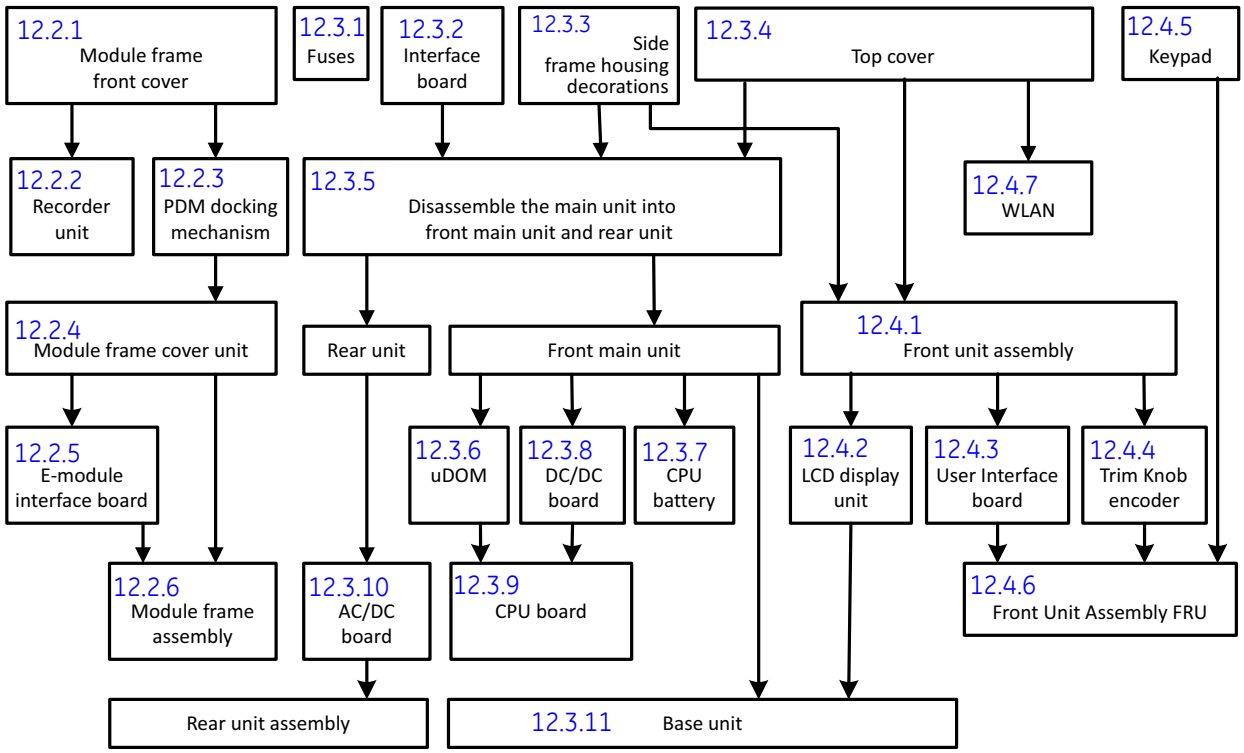
NOTE: If you disconnect the monitor from the AC power source and remove the battery prior to turning the monitor off, the monitor will start alarming about power loss situation. Silence this alarm by pressing the **Silence alarm** button.

When re-installing the battery, make sure that the charge level indicator LEDs are facing upwards and push the battery in all the way. Close the battery cover lock by turning it 90° counter-clockwise.

Disassembly workflow

Use this workflow diagram to find the simplest way to disassemble the required parts of the monitor. Numbers in the diagram refer to the sections in this chapter.

Follow the arrows from the top down to the required part and disassemble the monitor by following the steps in between.



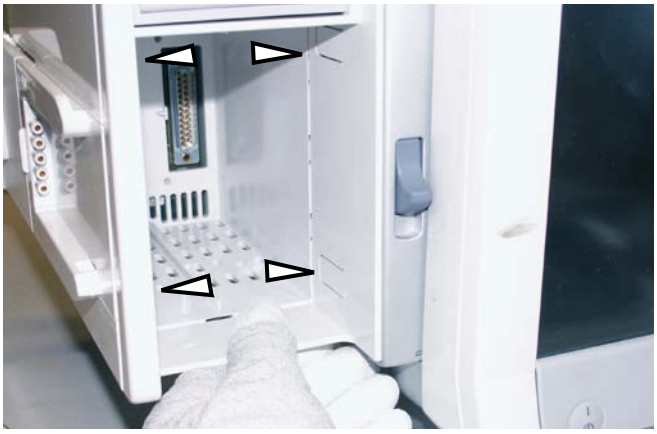
12.2 Module frame disassembly

12.2.1 Detaching the module frame front cover

A) Monitors with the E-module option

1. Press down the Module Frame release knob and turn the Module Frame to a 90° angle, so that the Module Frame faces to the front.

2. Release the two snaps on the top of the cover unit:
   - press (strongly) with your thumb on the middle of the Module Frame cover unit's front edge.
   - pull out the front cover a little with the other hand.



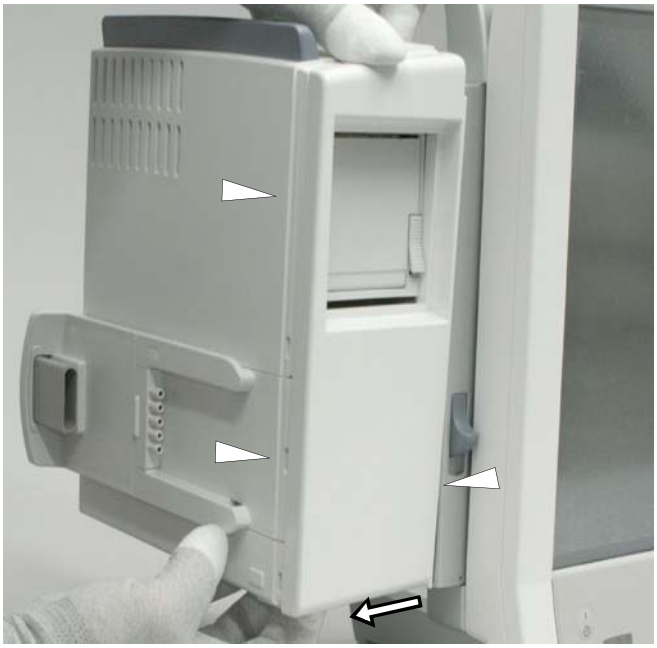
3. Release the four snaps in the inner side of the E-module slot by pressing them (inwards) with your finger. Release first the topmost two snaps and then the lowest two snaps.
4. Detach the cover unit.

B) Monitors without the E-module option

1. Press down the Module Frame release knob and turn the Module Frame to a 90° angle, so that the Module Frame faces to the front.

2. Release the two snaps on the top of the cover unit:
   - press (strongly) with your thumb on the middle of the Module Frame cover unit's front edge.
   - pull out the front cover a little with the other hand.

3. Press with finger from the top of the PDM docking rail.



4. Shift the front cover slightly down and to the left by pulling the hole in the bottom plate to release the two snaps on left side and one on the right side of the front cover.
5. Detach the cover unit.

12.2.2 Detaching the Recorder Unit

Disassemble first:

a. 12.2.1. Detaching the module frame front cover

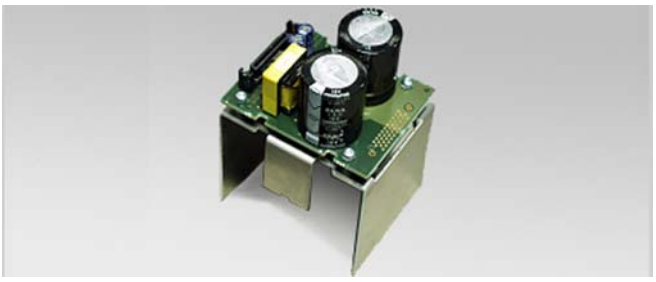
1. Open the recorder door and remove the paper roll if installed.
2. Unscrew the two crosshead screws inside the recorder. Note that the screws cannot be removed. Torque [1.2 Nm]

NOTE: Be careful not to damage the Hinge Flex Board on the right of the recorder.

3. Pull the recorder carefully out of the Module Frame.

NOTE: If you find it difficult to detach you also can detach the recorder by removing the Modules Frame cover unit, see section 12.2.4.

4. Release the snaps in the recorder EMC cover with a flat blade screwdriver while simultaneously pulling the bottom plate of the EMC cover.
5. Pull the EMC cover with the recorder board out of the Module Frame.



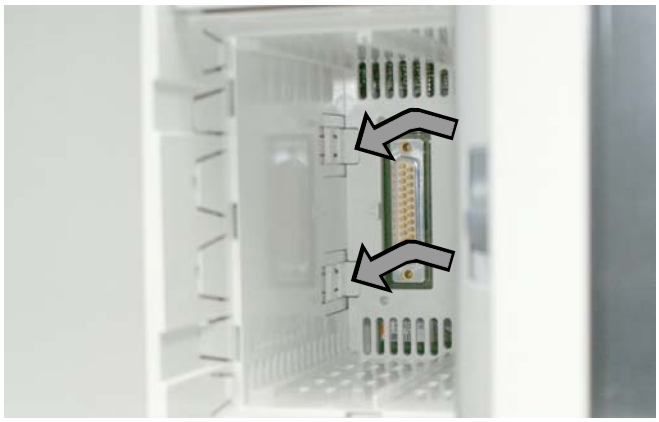
When reassembling, the recorder unit can be installed into the Module Frame as a whole.

NOTE: Ensure that the recorder unit is firmly installed to the recorder connector and both snaps in the EMC cover lock properly.

12.2.3 Detaching the PDM docking mechanism

Disassemble first:

a. 12.2.1. Detaching the module frame front cover



1. Release the two latches on the inner left side of the Module Frame by first pressing the snaps and then sliding the latches towards you.

2. Turn the PDM Docking Mechanism to a 30° angle to detach it from the Module frame flex board connector.

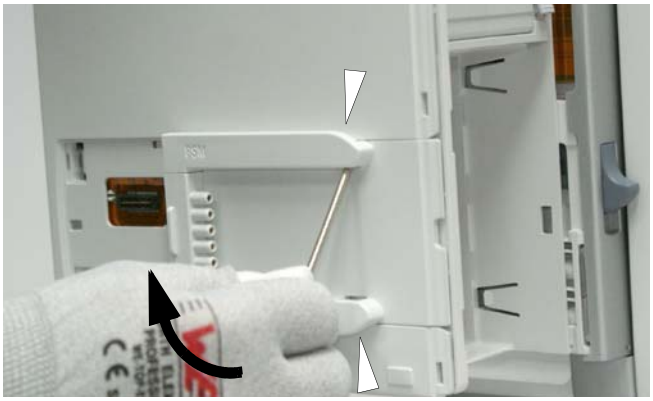
- Reassemble in reverse order.

12.2.4 Detaching the Module Frame cover unit

Disassemble first:

a. 12.2.1. Detaching the module frame front cover

b. 12.2.3. Detaching the PDM docking mechanism, if installed.



1. Release the two snaps inside the holes of the frame cover using a flat blade screwdriver.

2. Pull the cover backwards to detach it.

- Reassemble in reverse order.

12.2.5 Detaching the E-module Interface Board

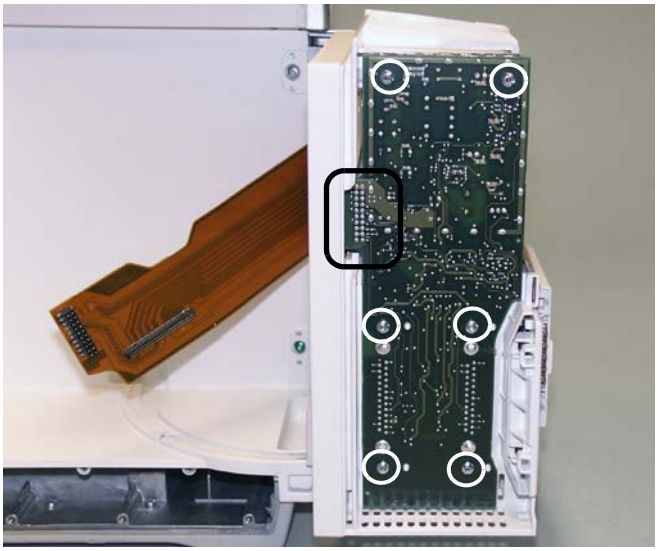
Disassemble first:

a. 12.2.1. Detaching the module frame front cover
b. 12.2.3. Detaching the PDM docking mechanism
c. 12.2.4. Detaching the Module Frame cover unit

1. Detach the Module Frame back plate. Release the snaps with a flat blade screwdriver and detach the plate.

2. Disconnect the Hinge Flex Board from the Module Frame connectors.

NOTE: Handle the flex board with care when disconnected. Do not twist it or bend it down.



3. Remove the six T10 screws mounting the E-module Interface Board. Torque [0.6 Nm]

NOTE: When reassembling, do not use excessive force to avoid damaging the plastic threads.

4. Detach the board from the Module Frame unit. Pay attention to the connector on the left side of the board.

- Reassemble in reverse order.

12.2.6 Detaching the Module Frame assembly

Disassemble first:

a. 12.2.1. Detaching the module frame front cover
b. 12.2.3. Detaching the PDM docking mechanism
c. 12.2.4. Detaching the Module Frame cover unit
d. 12.2.5. Detaching the E-module Interface Board: steps 1 and 2 only.

1. Remove the T10 screw. Torque [0.6 Nm]

2. Release the snap behind the flex cable. Lift the flap with a flat blade screwdriver.
3. Pull the Module frame Assembly to detach it from the Module Frame wall.

NOTE: When reassembling, check that the connector is intact.

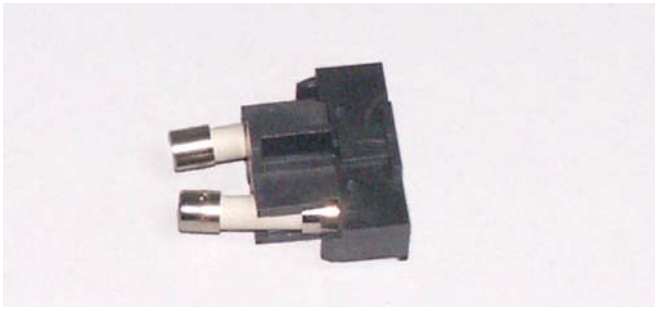
- Reassemble in reverse order.

12.3 Main unit disassembly

12.3.1 Replacing the mains fuses

The mains fuses are situated on the back of the monitor, below the mains connector.

1. Lever the screwdriver against the cable holder to release the fuse holder and pull it out of the frame.



2. Pull the fuses out of the fuse holder and insert new ones.

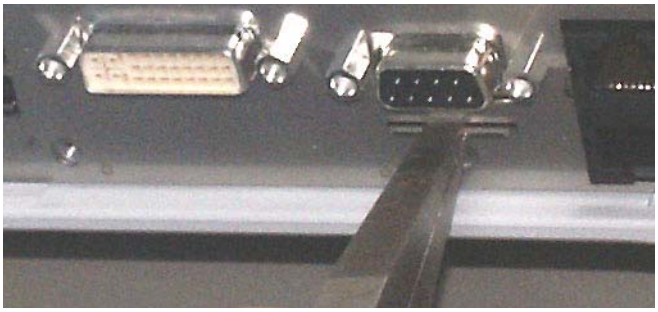
3. Push the fuse holder all the way in until it snaps to its place.

12.3.2 Detaching the Interface Board

1. Detach the Interface Board cover plate from the frame by releasing the snaps with a flat blade screwdriver.

2. Remove the six T10 screws that hold the Interface Board to the main unit. [Torque 0.8 Nm]

NOTE: At first reassemble the screws in the middle.



3. Pull the Interface Board out of the main unit with pliers.

NOTE! Pull with the pliers from the plate on the interface board panel.

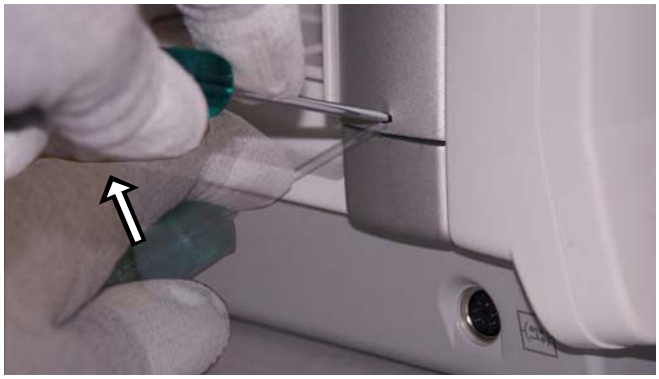
- Reassemble in reverse order.

12.3.3 Detaching the Frame Side Housing Decorations

NOTE: Be careful not to damage the decoration while disassembling.

1. To detach the Right Frame Housing Decoration:

- Release the snaps at the bottom part of the decoration with a flat blade screwdriver.
- Lift the decoration a little more to release the rest of the snaps and detach the decoration.

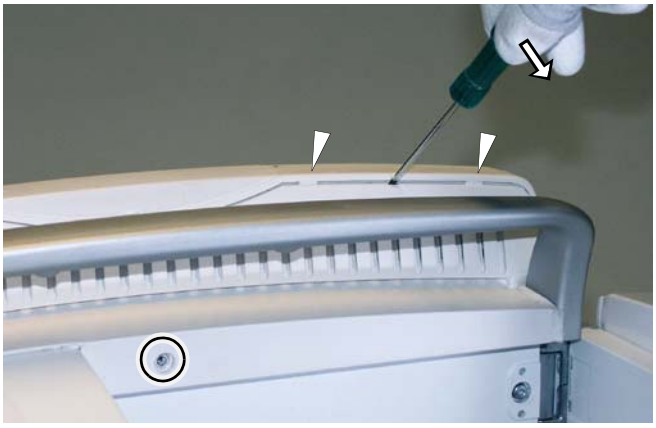


2. To detach the Left Frame Housing Decoration:

- Release the snap at the bottom part of the decoration by pressing it down with a flat blade screwdriver.
- Lift the decoration a little more to unlock the rest of the snaps and detach the decoration.

- Reassemble in reverse order.

12.3.4 Detaching the Top Cover



1. Press down the Module Frame release knob and turn the Module Frame to a 90° angle, so that the Module Frame slot faces to the front.

2. Remove the T10 screw located behind the Module Frame. [Torque 0.8 Nm]
3. Detach the Top Cover by releasing the four snaps with a flat blade screwdriver.

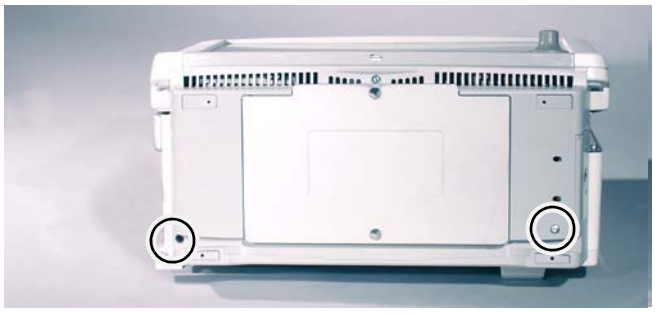
Reassemble in reverse order.

Grease the rubber gasket of Top Cover to reassemble it smoothly.

12.3.5 Disassembling the main unit into Rear and Front units

Disassemble first:

a. 12.3.2. Detaching the Interface Board
b. 12.3.3. Detaching the Frame Side Housing Decorations
c. 12.3.4. Detaching the Top Cover



1. Set the monitor lying on its back and remove the two screws (T10) from the bottom. [Torque 0.8 m]

- NOTE: Be careful not to break the PDM docking mechanism. Consider detaching it according to section 12.2.3.

2. Set the rear side of the Main Unit facing you.
3. Remove the three T10 screws from the left side. [Torque 0.8 Nm]
4. Remove the two T10 screws from the right side next to the Module Frame hinges. [Torque 0.8 Nm].

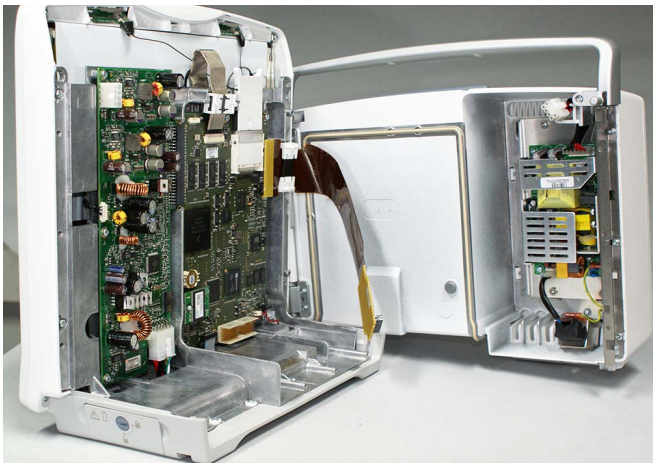
5. Detach the Module Frame back plate and disconnect the Hinge Flex Board from the Module Frame connectors, see section 12.2.5.

NOTE: Handle the Hinge Flex Board with care when disconnected. Do not twist it or bend it down.

6. Carefully lead the Hinge Flex Board through the opening, and turn the Module Frame against the main unit.

7. Pull the Front Unit away from the rear unit just enough so that you can detach the DC/DC cable from the DC/DC Board.

NOTE: When reassembling, check that the cable is connected properly.



8. Detach the rear unit from the Front Unit.

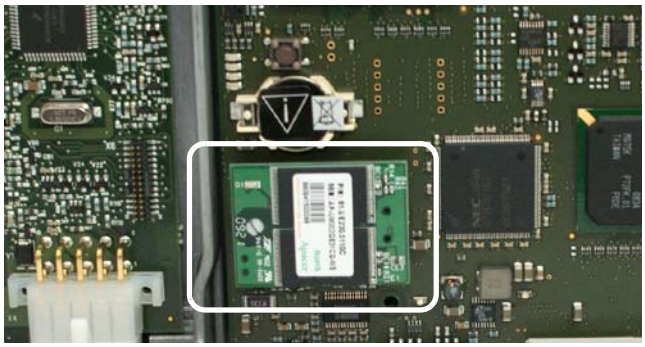
Reassemble in reverse order.

NOTE: The Front Unit is unstable when detached from the Rear Unit and may easily tilt forward.

12.3.6 Detaching the uDOM

Disassemble first:

a. 12.3.2. Detaching the Interface Board
b. 12.3.3. Detaching the Frame Side Housing Decorations
c. 12.3.4. Detaching the Top Cover
d. 12.3.5. Disassembling the main unit into Rear and Front units



1. Detach the uDOM from the CPU connector.

NOTE: uDOM, disk on module is the permanent memory of the patient monitor. The software, licenses and clinical and service configurations are stored to the uDOM.

- Reassemble in reverse order.

uDOM replacement:

Contact GE Service if you doubt that the uDOM is defective and needs to be replaced. Some of the configuration steps required after uDOM replacement can be performed only by GE service.

Provide the following information:

a) Monitor Type

b) Serial Number

c) Software version installed, if available.

12.3.7 Replacing the CPU timekeeper battery

Disassemble first:

a. 12.3.2. Detaching the Interface Board
b. 12.3.3. Detaching the Frame Side Housing Decorations
c. 12.3.4. Detaching the Top Cover
d. 12.3.5. Disassembling the main unit into Rear and Front units

1. Detach the CPU timekeeper battery from the CPU board with a flat blade screwdriver.

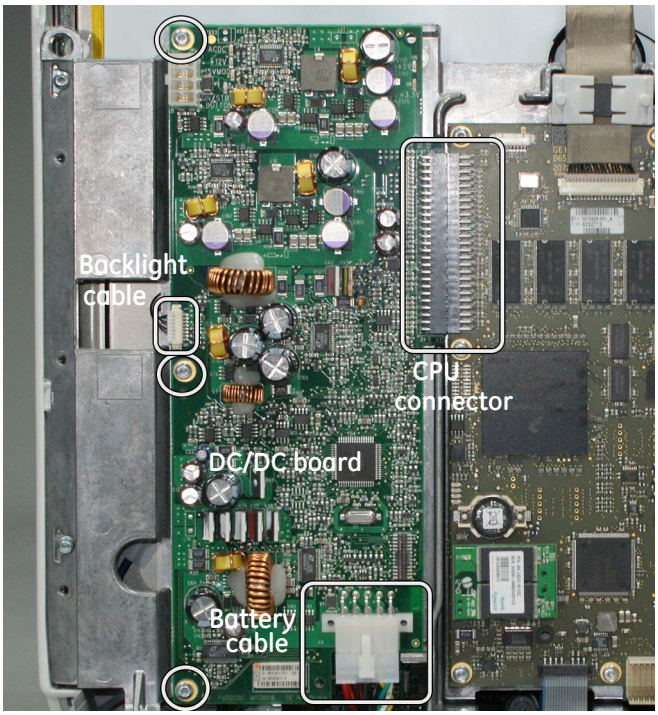
- Reassemble in reverse order.
- To avoid network device time synchronization issues, remember to readjust the time and date before you connect the monitor to network. For details, see 7.3. Setting time and date.

NOTE: Dispose of the battery according to local, state or country laws.

12.3.8 Detaching the DC/DC board

Disassemble first:

a. 12.3.2. Detaching the Interface Board
b. 12.3.3. Detaching the Frame Side Housing Decorations
c. 12.3.4. Detaching the Top Cover
d. 12.3.5. Disassembling the main unit into Rear and Front units



1. Disconnect the Battery cable and the Backlight cable from the DC/DC Board.
2. Remove the three T10 screws that hold the DC/DC Board to the mid-frame.
3. Disconnect the DC/DC Board from the CPU board connector.
4. Detach the DC/DC Board.

When reassembling:

- Assemble the CPU Board first if detached.
- Connect the Battery cable.
- Slide the DC/DC board to connect the CPU connector.
- NOTE: Do not bend the DC/DC board when reassembling.
- Connect the Backlight cable and the three T10 screws. [Torque 0.8 Nm].

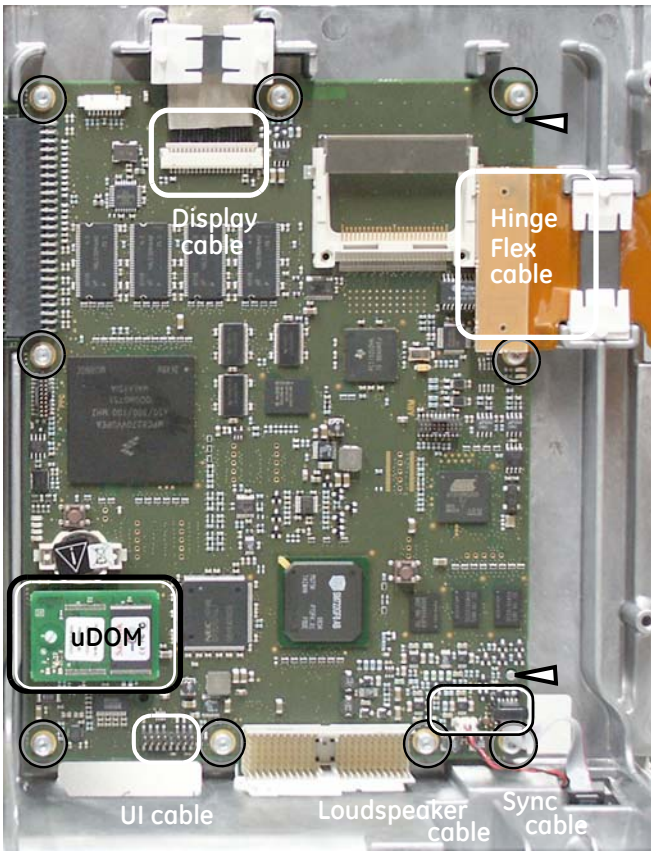
Reassemble the Rear Unit and the Front Unit in reverse order.

NOTE: After replacing the DC/DC Board, during the first start-up, the patient monitor will automatically check the UIC software version in the replaced DC/DC board and update the software if necessary. Wait for 5 minutes to see if the software update is initiated and do not interrupt the process.

12.3.9 Detaching the CPU Board

Disassemble first:

a. 12.3.2. Detaching the Interface Board
b. 12.3.3. Detaching the Frame Side Housing Decorations
c. 12.3.4. Detaching the Top Cover
d. 12.3.5. Disassembling the main unit into Rear and Front units
e. 12.3.8. Detaching the DC/DC board



1. Detach the WLAN card from the CPU if installed.

NOTE: Be careful not to damage the antenna cables.

2. Detach the uDOM.

IMPORTANT: Detach the original uDOM and attach it to the new CPU Board.

The software, licenses and clinical and service configurations are stored in the uDOM.

3. Detach the Hinge Flex Board and the Display Cable from the CPU Board.

NOTE: Be careful not to damage the Hinge Flex Board.

4. Detach the Sync cable, the Loudspeaker cable, and the U/I cable from the CPU Board.
5. Remove the nine T10 screws that hold the CPU Board to the mid-frame.
6. Detach the CPU Board. [Torque 0.8 Nm]

Reassemble in reverse order.

- Insert the WLAN card into the card slot.
- Place the antenna cables carefully inside the cover.

NOTE: Center align the user interface cable carefully to the connector in the CPU Board and/or User Interface Board.

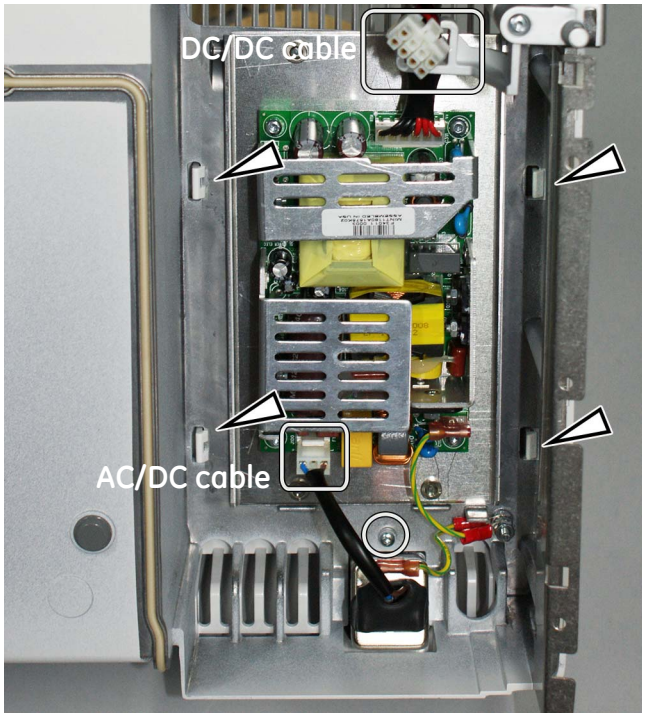
◁ Note the alignment pins to set the CPU Board in the right place.

NOTE: After replacing the CPU Board, during the first start-up, the patient monitor will automatically check the EMBC software version in the replaced CPU Board and update the software if necessary. Wait for 5 minutes to see if the software update is initiated and do not interrupt the process.

12.3.10 Detaching the AC/DC board and rear unit assembly

Disassemble first:

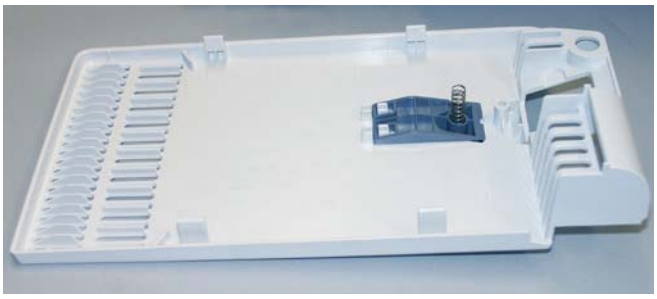
a. 12.3.2. Detaching the Interface Board
b. 12.3.3. Detaching the Frame Side Housing Decorations
c. 12.3.4. Detaching the Top Cover
d. 12.3.5. Disassembling the main unit into Rear and Front units



1. Detach the DC/DC cable from the cable holder.
2. Detach the AC/DC cable and the protective earth cable from the AC/DC Board.
   Use pliers, if needed.
3. Remove the T10 screw that attaches the housing back cover to the Rear Unit Assembly. [Torque 0.8 Nm]
4. ◅ Release the four snaps that are located on both side of the AC/DC board.

5. Detach the housing back cover.

NOTE: The loose cable clamp and spring may fall when detaching the back cover.



6. Remove the four T10 screws mounting the AC/DC board to the back plate.
   [Torque 1.6 Nm]
   Hold the AC/DC board to prevent it from falling.

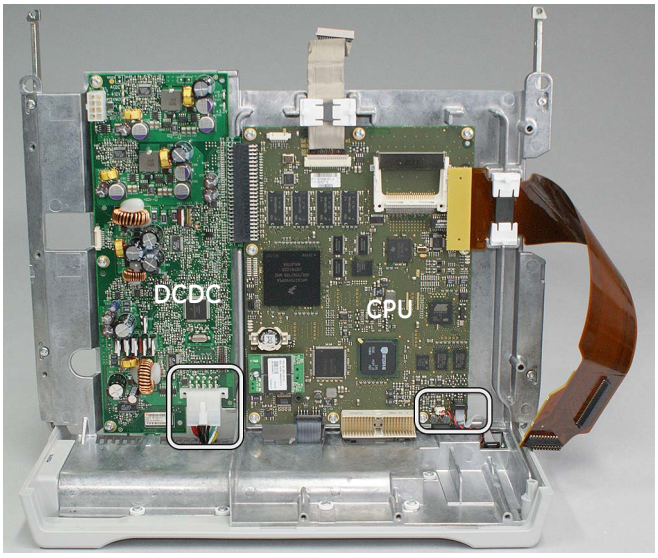
Reassemble in reverse order.

- Attach the 4 screws that mount the AC/DC board [Torque 1.6 Nm].
- Ensure the cable clamp and the spring are in place.
- Reattach the housing back cover so that the 4 snaps locks.
- Attach the 1 screw that mounts the housing back cover.
- Reconnect the AC/DC cable and the protective earth cable to the AC/DC board.
- Place the DC/DC cable in the cable holder.

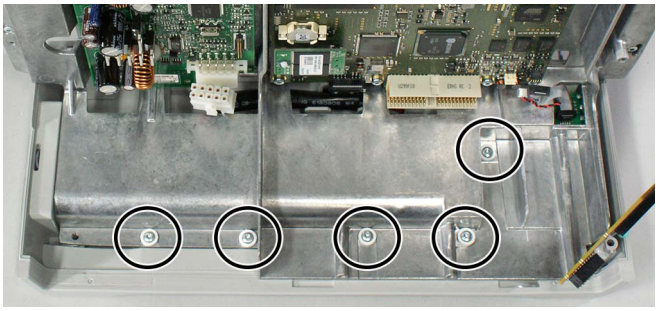
12.3.11 Detaching the Base unit

Disassemble first:

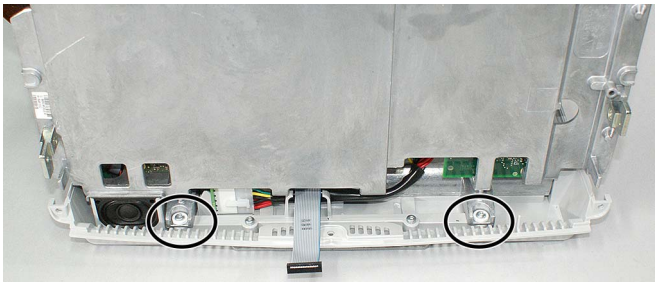
a. 12.3.2. Detaching the Interface Board
b. 12.3.3. Detaching the Frame Side Housing Decorations
c. 12.3.4. Detaching the Top Cover
d. 12.3.5. Disassembling the main unit into Rear and Front units
e. 12.4.1. Detaching the Front Unit Assembly
f. 12.4.2. Detaching the LCD Display Unit



1. Disconnect from the CPU board:
- the Sync cable
- the Loudspeaker cable
2. Disconnect from the DC/DC Board:
- the Battery cable

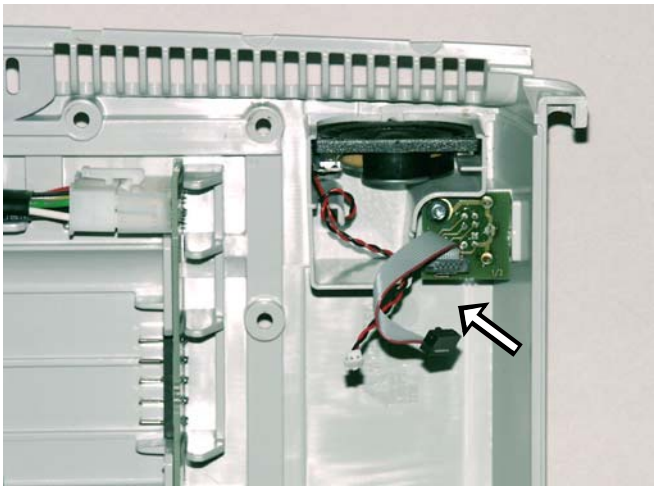


3. Remove the five T10 screws with washer insulators mounting the Base Unit to the mid-frame. [Torque 0.8 Nm]



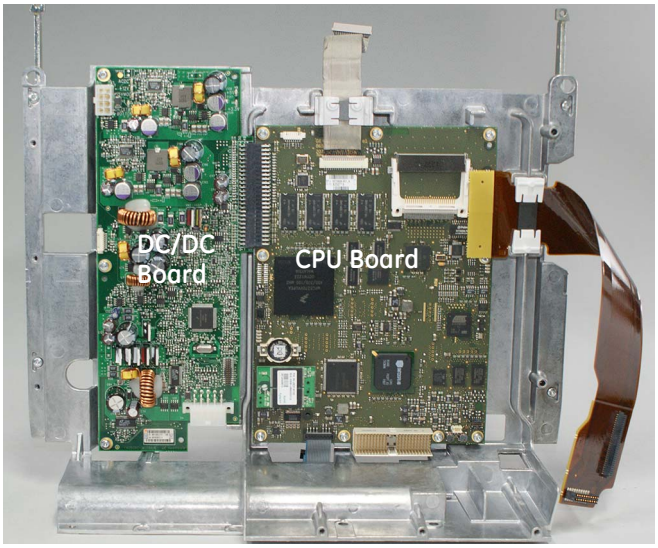
4. Remove the two T10 screws with washer insulators mounting the Base Unit to the mid-frame. [Torque 0.8 Nm]

5. Detach the mid-frame from the Base Unit by lifting it up carefully.



Reassemble in reverse order.

NOTE: Pay attention to the cables when reassembling. Check that they go through the right holes in the mid-frame when attaching the Base Unit. Be especially careful to check the loudspeaker cable (see the figure).



6. To replace the mid-frame, detach:
   - 12.3.8 DC/DC
   - CPU

- Reassemble in reverse order.

12.4 Front Unit Assembly

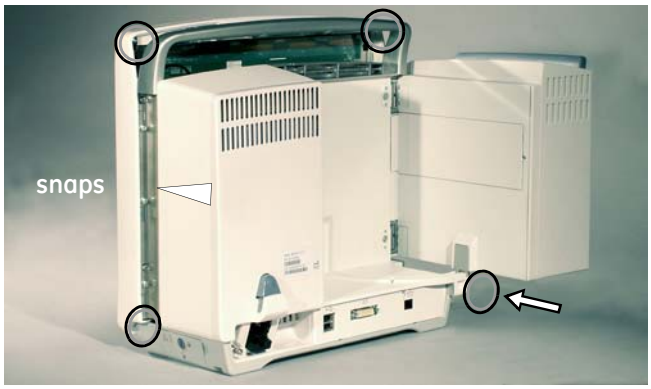
12.4.1 Detaching the Front Unit Assembly

Disassemble first:

a. 12.3.3. Detaching the Frame Side Housing Decorations

b. 12.3.4. Detaching the Top Cover

1. Remove the T10 screw at the bottom of the frame. [Torque 0.6 Nm]



2. Remove the four T10 screws in the top and bottom corners behind the Display Unit. [Torque 0.6 Nm]
3. Release the two snaps, one on each side of the monitor. The snaps are located in the middle behind the Right and Left Housing Decorations.
4. Detach the WLAN card from the CPU if installed.

NOTE: Be careful not to damage the antenna cables.

5. Detach the Front Unit Assembly.

6. Disconnect the U/I cable from the User Interface Board.

- Reassemble in reverse order.

NOTE: Do not leave any dust or dirt between the LCD Display and the plastic display cover, or the picture quality might deteriorate.

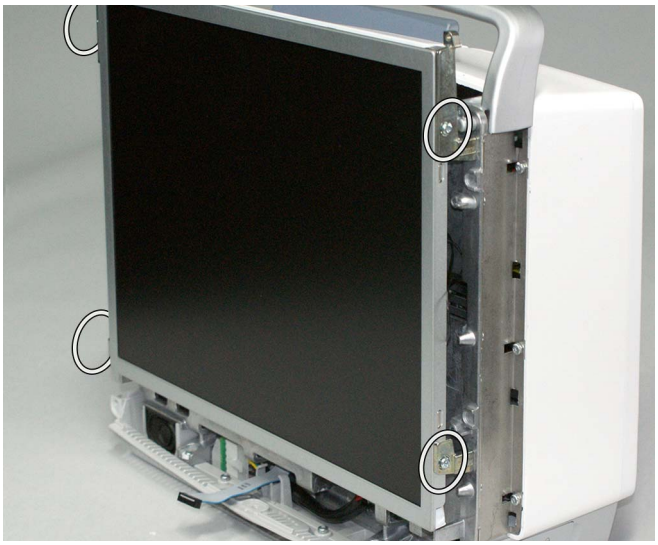
NOTE: Center align the user interface cable carefully to the connector in the CPU board and/or User Interface Board.

NOTE: The keypad may be damaged when it is detached from the Front Unit Assembly. It is advised not to reuse the old keypad, but to order a new one and replace it simultaneously with the Front Unit Assembly.

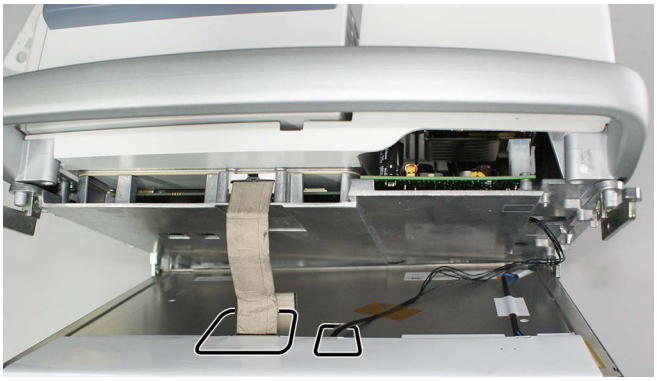
12.4.2 Detaching the LCD Display Unit

Disassemble first:

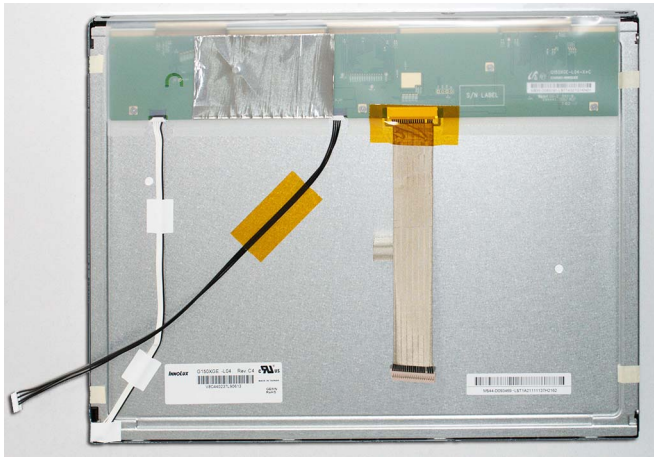
a. 12.3.3. Detaching the Frame Side Housing Decorations
b. 12.3.4. Detaching the Top Cover
c. 12.4.1. Detaching the Front Unit Assembly



1. Remove the four T10 screws with washers, two on both sides of the LCD Display and detach the display from the frame. [Torque 0.6 Nm]



2. Detach the LVDS cable from the LCD display.
3. Detach the Backlight cable from the LCD display.



NOTE: The LCD Display Unit FRU includes the display cable and the backlight cable. Preferably use the original display and backlight cables if they seem to be visually undamaged. In case you need to replace the display cable or backlight cable, you need to additionally detach the rear unit assembly to be able to detach the display cable from the CPU board, or backlight cable from the DC/DC board.

- Reassemble in reverse order.

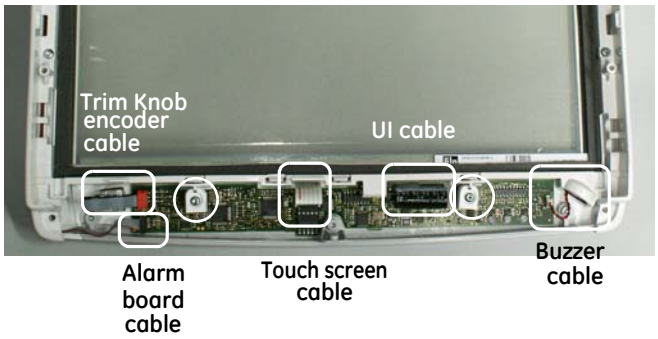
NOTE: Do not leave any dust or dirt between the LCD Display and the plastic display cover, or the picture quality might deteriorate.

NOTE: Dispose of the display according to local, state or country laws.

12.4.3 Replacing the User Interface Board

Disassemble first:

a. 12.3.3. Detaching the Frame Side Housing Decorations
b. 12.3.4. Detaching the Top Cover
c. 12.4.1. Detaching the Front Unit Assembly



1. Detach 2 screws and the PCB mounting parts.
2. Detach cables from User Interface Board:
   - the Alarm Board cable
   - the Trim Knob Encoder cable
   - the Buzzer cable
   - the touchscreen sensor
3. Detach the User Interface Board.

- Reassemble in reverse order.

NOTE: When reassembling align the UI board connector to the keypad connector.

NOTE: The User Interface Board FRU includes the UI cable. Preferably use the original UI cable if it seems to be visually undamaged. In case you need to replace the UI cable, you need to additionally detach the rear unit assembly to get access to the CPU board and be able to connect the UI cable to the CPU board.

NOTE: After replacing the User Interface Board, during the first start-up, the patient monitor will automatically check the UIC software version in the replaced user interface board and update the software if necessary. Wait for 5 minutes to see if the software update is initiated and do not interrupt the process.

12.4.4 Replacing the Trim Knob and Trim Knob Encoder

Disassemble first:

a. 12.3.3. Detaching the Frame Side Housing Decorations
b. 12.3.4. Detaching the Top Cover
c. 12.4.1. Detaching the Front Unit Assembly

To replace the Trim Knob:

1. Pull the Trim Knob off from the front side.
2. Detach the nut and washer from the front side using the 11 mm wrench. [1.6 Nm]
3. Detach the Trim Knob Encoder Cable from the User Interface Board.
4. Detach the Encoder from the back of the Front Unit.

- Reassemble in reverse order.

NOTE: When reassembling, position the encoder as shown in the picture.

12.4.5 Replacing the Keypad

1. Pull the Trim Knob off.
2. Tear the Keypad panel from the Front Unit, starting from the upper left corner.

NOTE: Try to leave as little glue as possible to the front frame cover. If any glue remains clean the surface with water-diluted alcohol.

Assembling the keypad:

- Remove the release liner of the keypad.
- Place the hole at right end of the keypad to the Trim Knob shaft. Then carefully guide the lower edge against the cover edging.

3. Tear the membrane keypad from the Front Unit and detach the keypad connector that connects it to the User Interface Board.

Assembling:

- Clean the glue from the surface.
- Remove the release liner from the membrane keypad.
- Connect the membrane keypad connector first and direct the membrane into place.
- Pat the membrane keypad carefully to stick it to the front cover.
- Assemble the Keypad.

12.4.6 Replacing the Front Unit Assembly FRU

Disassemble first:

a. 12.3.3. Detaching the Frame Side Housing Decorations
b. 12.3.4. Detaching the Top Cover
c. 12.4.1. Detaching the Front Unit Assembly
d. 12.4.3. Replacing the User Interface Board
e. 12.4.4. Replacing the Trim Knob and Trim Knob Encoder
f. 12.4.5. Replacing the Keypad

1. If WLAN is installed. Detach carefully the WLAN antennas from the Front Unit.

NOTE: Be careful not to bend the antenna boards or damage the antenna cables.

Reassemble in reverse order.

NOTE: When replacing the Front Unit Assembly, always replace the Keypad panel and keypad with new ones, as they may damage when detached.

NOTE: The antennas are attached to the Front Unit with double-sided tape. New tape is included in the Front Unit Assembly FRU. Use this tape when reattaching the antenna boards to the Front Unit.

NOTE: Place the antenna cables carefully as shown in the pictures on 12.4.7.

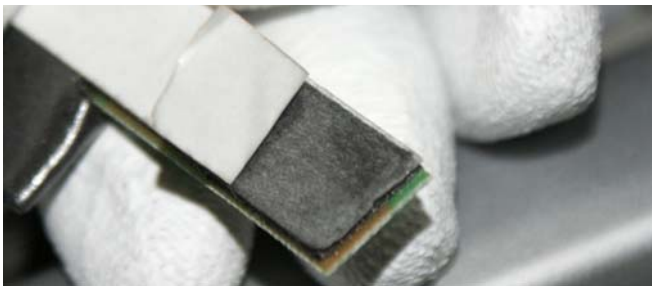
12.4.7 Replacing the WLAN Assembly FRU

Disassemble first:

a. 12.3.4. Detaching the Top Cover

1. Attach the WLAN card to the CPU board card slot as shown in the picture.

NOTE: Be careful not to bend the antenna boards or damage the antenna cables.



2. Peel off the paper release liner from the antenna board mounting tape one at a time (see steps 3 and 4 below).

NOTE: Be careful not to peel off the thin adhesive layer, too.

3. Make sure the contact area for the antenna board adhesive in the Front Unit Assembly is clean and free of grease. Attach the antenna board with the longer black antenna cable to left side of the Front Unit Assembly as shown in the picture. Make sure the antenna board is firmly attached to the Front Unit Assembly. Align the loop in the antenna cable carefully between the display and the aluminum Mid-Frame as shown in the picture. The orientation of the antenna cable is important to ensure reliable wireless communication.

4. Make sure the contact area for the antenna board adhesive in the Front Unit Assembly is clean and free of grease. Attach the antenna board with the shorter grey antenna cable to right side of the Front Unit Assembly as shown in the picture. Make sure the antenna board is firmly attached to the Front Unit Assembly. Align the loop in the antenna cable carefully between the display and the aluminum Mid-Frame as shown in the picture. The orientation of the antenna cable is important to ensure reliable wireless communication

NOTE: Place the antenna cables carefully as shown in the pictures.

Reassemble the Top Cover.

Grease the rubber gasket of Top Cover to reassemble it smoothly.

For your notes:

13 Service parts

NOTE: Perform the checkout procedure steps described in chapter 10. Maintenance and checkout after you have replaced any service parts.

13.1 Ordering parts

To order parts, contact GE. Contact information is available at www.gehealthcare.com. Make sure you have all necessary information at hand.

13.2 List of FRUs

#	FRU/Item part number	FRU/Item description	FRU content
1	M1133991	FRU, Recorder Unit, B650	- Includes GSI thermal printer, recorder interface board, aluminum EMC shield and 4 mounting screws
2	M1133992	FRU, E-Module Interface Board, B650	- Includes E-module interface board with 6 mounting screws
3	M1133993	FRU, PDM Docking Mechanism, B650	- Complete PDM docking mechanism
4	M1133994	FRU, Module Frame Cover Unit Set, B650	- Includes 4 different module frame front covers, module frame cover unit and module frame back plate with its mounting screw
5	M1133995	FRU, Module Frame Assembly, B650	- Includes module frame assembly with module frame flex board and grounding plate
6	2077328-001	FRU, Standard Interface Board, B650 VER02	- Includes standard interface board (2 USB, 1 RJ-45 & 1 DVI-I), related cover plate with labeling and 6 mounting screws
7	2077329-001	FRU, Advanced Interface Board, B650 VER02	- Includes advanced interface board (4 USB, 4 RJ-45, DVI-I, ePort & Remote On) , related cover plate with labeling and 6 mounting screws
8	2067856-001	FRU, AC/DC Power Supply Unit, B650 VER02	- AC/DC power supply, the DC/DC cable and 4 mounting screws.
9	M1168221	FRU, Mains Fuses (10 pcs), B650	- FUSE, 4A, T, 250V, 5x20mm, high breaking capacity 1500A, IEC, UL/CSA, CCC
10	2073137-001	FRU, Rear Unit Assembly, B650 VER02	- Complete rear unit assembly with handle unit and module frame mounting wall, hinges and release mechanism. Includes also AC inlet with fuses and wiring to AC/DC power supply unit, equipotential connector, cable clamp for power cord and mounting screws. - Excludes the plastic part that has device plate and other labeling

#	FRU/Item part number	FRU/Item description	FRU content
11	2067857-001	FRU, Front Unit Assy for Touchscreen Model, B650 VER02	- Includes front unit assembly with touchscreen sensor, alarm light lens, board & cable, buzzer unit and 7 mounting screws. Includes also 2 WLAN mounting tapes to re-mount antenna boards. - Excludes user interface board (ref. 2067858-001), trim knob (ref. M1178254) and the keypad (see table). NOTE: Always order the front unit assembly FRU always with a new keypad.
13	2067858-001	FRU, User Interface Board, B650 VER02	- Includes user interface board, user interface cable and 2 mounting screws with PCB fastening parts
14	M1178254	FRU, Trim Knob and Trim Knob Encoder, B650	- Includes the gray trim knob, trim knob encoder w. cable and mounting parts (nut and washer)
15	2073131-001	FRU, LCD Display Unit, B650 VER02	Includes: - LCD display with LED backlight unit and 4 mounting screws - Backlight cable - Display (LVDS) cable
17	M1168229	FRU, WLAN Assembly, B650	- Includes radio card with antenna cables, antenna boards and mounting tapes
18	M1168230	FRU, DC/DC Board for Battery Model, B650	- Includes DC/DC board for battery models with mounting screws. No cables.
19	M1168232	FRU, DC/DC Board for Models w/o Battery, B650	- Includes DC/DC board for non-battery models with mounting screws. No cables.
20	2073134-001	FRU, CPU Board w/o uDOM, B650 VER02	- Includes CPU timekeeper battery (CR-1632) and 9 mounting screws. - Excludes the USB Disk on Module (uDOM) with software and all cables.
21	M1168350	FRU, CPU Timekeeper Battery (5 pcs), B650	- CR-1632 lithium battery
22	M1168312	FRU, Base Unit for Battery Model, B650	- Includes base unit for battery model, battery door, battery board, battery cable, speaker unit, sync board unit and GCX mounting plate
23	M1168336	FRU, Base Unit for Models w/o Battery, B650	- Includes base unit for non-battery model, speaker unit, sync board unit and GCX mounting plate
24	2073135-001	FRU, Mid-Frame Assembly, B650 VER02	- The mid-frame assembly includes the 4 mounting brackets for the LCD display and the 7 mounting screws and insulator plates to mount it to the bottom unit
27	M1168356	FRU, Battery, B650	Model: Flex-3S3P rechargeable lithium-ion battery

#	FRU/Item part number	FRU/Item description	FRU content
28	2067859-001	FRU, Cable Kit, B650 VER02	Includes the following parts: - Hinge flex board with ferrites - Display (LVDS) cable with ferrites - Backlight cable - User interface cable - DC/DC cable - Speaker unit - Sync board unit - battery board & cable
29	M1168340	FRU, Plastics Kit, B650	Includes the following plastic parts: - Module frame back plate - Right frame housing decoration - Left frame housing decoration - Top cover - Alarm lens - Battery door unit - Cable clamp for power cord (w. spring) - Cover plate for advanced interface board - Cover plate for standard interface board
30	M1168341	FRU, Hardware Kit, B650	- The hardware kit includes a complete set of fastening parts (screws, nuts, washers & plastic PCB mounting parts) and the display mounting brackets.
31	M1168360	FRU, Keypad, Touchscreen model, Universal, B650	- Includes the membrane keypad and the keypad panel with labelling (3 keys)

For your notes:

APPENDIX A: Installation check form

CARESCAPE Monitor B650

Customer	Monitor type B650-	S/N
Service record #	Software version	
Service engineer		

Prior to testing verify all equipment is calibrated via "Cal" labeling and record Cal Due Dates

Measuring equipment / test gases used:				
Equipment / tool / gas:	Manufacturer:	Model/Type/Part No:	Serial Number/ID:	Cal Due Date:

PASS = Test passed **N.A. = Test not applicable** **FAIL = Test failed**

Visual inspection	**Observed result**	**PASS**	**FAIL**
The monitor and the connected peripheral devices are undamaged.		☐	☐
The monitor and the connected peripheral devices are properly mounted with specified mounting solutions.		☐	☐
The cables between the patient monitor and the connected devices are intact, properly connected and secured to the right connectors.		☐	☐
The modules are properly connected and locked.		☐	☐
The pivoting module frame and battery door are properly locked.		☐	☐

Electrical safety tests				
Date of manufacture of the device:				
Is there less than 12 months since the device was manufactured?				
Yes: ☐	Yes: you do not have to perform the electrical safety tests. To continue the installation check, mark the electrical safety test completion N.A. and proceed to Functional check. If available, attach the original electrical safety test results to this check form.			
No: ☐	No: continue to perform the electrical safety tests.			
Power outlet is correctly wired.				☐ ☐
Power cord and plug are undamaged and all conductors are properly connected.				☐ ☐
Ground (earth) integrity		Observed result	Acceptance criteria	**PASS N.A. FAIL**
a.) Ground continuity test	without power cord		≤ 0.1 ohms	☐ ☐ ☐
	with power cord		≤ 0.2 ohms	☐ ☐ ☐

b.) Impedance of protective earth connection	without power cord		≤ 0.1 ohms	☐ ☐ ☐
	with power cord		≤ 0.2 ohms	☐ ☐ ☐
Earth leakage current test				
Normal Condition (NC)	Polarity: Normal		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
Single Fault Condition (SFC)	Polarity: Normal		≤ 1 mA	☐ ☐ ☐
	Polarity: Reversed		≤ 1 mA	☐ ☐ ☐
Normal Condition (NC)	Polarity: Reversed		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
Enclosure leakage current (touch current) test				
Normal Condition (NC)	Polarity: Normal		≤ 100 µA	☐ ☐ ☐
Single Fault Condition (SFC)	Ground closed Polarity: Normal		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
	Ground open Polarity: Normal		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
	Ground open Polarity: Reversed		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
	Ground closed Polarity: Reversed		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
Normal Condition (NC)	Polarity: Reversed		≤ 100 µA	☐ ☐ ☐

Module type:	**S/N**	**Observed result**		**Acceptance criteria**	**PASS N.A. FAIL**
		ECG	**SpO2/ InvP**		
Patient (source) leakage current tests, using a test body					☐ ☐ ☐
Normal Condition (NC)	Polarity: Normal			≤ 10 µA	☐ ☐ ☐
Single Fault Condition (SFC)	Ground closed (normal)			≤ 50 µA	☐ ☐ ☐
	Ground open (normal)			≤ 50 µA	☐ ☐ ☐
	Ground closed (reverse)			≤ 50 µA	☐ ☐ ☐
	Ground open (reverse)			≤ 50 µA	☐ ☐ ☐
Normal Condition (NC)	Polarity: Reserved			≤ 10 µA	☐ ☐ ☐
Patient (sink) leakage current tests	Polarity: Normal			≤ 50 µA	☐ ☐ ☐
	Polarity: Reserved			≤ 50 µA	☐ ☐ ☐

Module type	S/N	Observed result	Acceptance criteria	PASS N.A. FAIL
Patient (source) leakage current tests, using a test body				☐ ☐ ☐
Normal Condition (NC)	Polarity: NORMAL		≤ 10 µA	☐ ☐ ☐
Single Fault Condition (SFC)	Ground closed (normal)		≤ 50 µA	☐ ☐ ☐
	Ground open (normal)		≤ 50 µA	☐ ☐ ☐
	Ground closed (reverse)		≤ 50 µA	☐ ☐ ☐
	Ground open (reverse)		≤ 50 µA	☐ ☐ ☐
Normal Condition (NC)	Polarity: Reserved		≤ 10 µA	☐ ☐ ☐
Patient (sink) leakage current tests	Polarity: NORMAL		≤ 50 µA	☐ ☐ ☐
	Polarity: Reserved		≤ 50 µA	☐ ☐ ☐

Electrical Safety Test completion	☐ ☐ ☐

Functional check	Observed result	Acceptance criteria	PASS N.A. FAIL
Start-up		Monitor starts up normally.	☐ ☐ ☐
Display: Picture quality		Text is readable, images are clear and brightness is good.	☐ ☐ ☐
Display: Touchscreen control		Touchscreen is correctly calibrated and operates correctly.	☐ ☐ ☐
Device Information		Device information is correct.	☐ ☐ ☐
Configuration Information		Monitor is correctly configured.	☐ ☐ ☐
Keypad and remote: Hard key		Selected menu opens and selected activity starts.	☐ ☐ ☐
Keypad and remote: Trim Knob		Selected menu opens and selected activity starts.	☐ ☐ ☐
Mouse		Selected menu opens and selected activity starts.	☐ ☐ ☐
Alphanumeric keyboard		Keyboard language configuration is correct.	☐ ☐ ☐
Barcode reader		Data is correctly populated.	☐ ☐ ☐
MC Network and S/5 Network		Network symbol and other monitor's patient data is correctly shown on the screen.	☐ ☐ ☐
Wireless LAN		WLAN network symbol and other monitor's patient data is correctly shown on the screen.	☐ ☐ ☐

Functional check	Observed result	Acceptance criteria	PASS	N.A.	FAIL
IX printers		Test page is printed to the selected printer.	☐	☐	☐
Insite with EXC		The patient monitor is active on Insite with EXC back office.	☐	☐	☐
Test completion			☐	☐	☐

Notes

Used service parts			

Signature	Date

APPENDIX B: Maintenance check form

CARESCAPE Monitor B650

Customer	Monitor type B650-	S/N
Service record #	Software version	
Service engineer	Module type	S/N
Planned maintenance ☐ Corrective maintenance ☐	Start date	

Prior to testing verify all equipment is calibrated via "Cal" labeling and record Cal Due Dates

Measuring equipment / test gases used:				
Equipment / tool / gas:	Manufacturer:	Model/Type/Part No:	Serial Number/ID:	Cal Due Date:

PASS = Test passed **N.A. = Test not applicable** **FAIL = Test failed**

Visual inspection	**Observed result**	**PASS**	**FAIL**
The monitor and the connected peripheral devices are undamaged.		☐	☐
The monitor and the connected peripheral devices are properly mounted with specified mounting solutions.		☐	☐
The cables between the patient monitor and the connected devices are intact, properly connected and secured to the right connectors.		☐	☐
The modules are properly connected and locked.		☐	☐
The pivoting module frame and battery door are properly locked.		☐	☐

Electrical safety tests						
Power outlet is correctly wired.				☐		☐
Power cord and plug are undamaged and all conductors are properly connected.				☐		☐
Ground (earth) integrity		Observed result	Acceptance criteria	**PASS**	**N.A.**	**FAIL**
a.) Ground continuity test	without power cord		≤ 0.1 ohms	☐	☐	☐
	with power cord		≤ 0.2 ohms	☐	☐	☐
b.) Impedance of protective earth connection	without power cord		≤ 0.1 ohms	☐	☐	☐
	with power cord		≤ 0.2 ohms	☐	☐	☐
Earth leakage current test						
Normal Condition (NC)	Polarity: Normal		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐	☐	☐

Single Fault Condition (SFC)	Polarity: Normal		≤ 1 mA	☐ ☐ ☐
	Polarity: Reversed		≤ 1 mA	☐ ☐ ☐
Normal Condition (NC)	Polarity: Reversed		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
Enclosure leakage current (touch current) test				
Normal Condition (NC)	Polarity: Normal		≤ 100 µA	☐ ☐ ☐
Single Fault Condition (SFC)	Ground closed Polarity: Normal		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
	Ground open Polarity: Normal		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
	Ground open Polarity: Reversed		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
	Ground closed Polarity: Reversed		≤ 500 µA *EN /IEC* ≤ 300 µA *UL*	☐ ☐ ☐
Normal Condition (NC)	Polarity: Reversed		≤ 100 µA	☐ ☐ ☐
Electrical Safety Test completion				☐ ☐ ☐

Functional check	**Observed result**	**Acceptance criteria**	**PASS N.A. FAIL**
Start-up		Monitor starts up normally.	☐ ☐ ☐
Display: Picture quality		Text is readable, images are clear and brightness is good.	☐ ☐ ☐
Display: Touchscreen control		Touchscreen is correctly calibrated and operates correctly.	☐ ☐ ☐
PSM / PDM identification		Hemodynamic parameter data appears on the screen correctly.	☐ ☐ ☐
E-module identification		E-module parameter data appears on the screen correctly.	☐ ☐ ☐
Keypad and remote: Hard key		Selected menu opens and selected activity starts.	☐ ☐ ☐
Keypad and remote: Trim Knob		Selected menu opens and selected activity starts.	☐ ☐ ☐
Mouse		Selected menu opens and selected activity starts.	☐ ☐ ☐
Alphanumeric keyboard		Keyboard language configuration is correct.	☐ ☐ ☐
Barcode reader		Data is correctly populated.	☐ ☐ ☐
MC Network and S/5 Network		Network symbol and other monitor's patient data is correctly shown on the screen.	☐ ☐ ☐
Wireless LAN		WLAN network symbol and other monitor's patient data is correctly shown on the screen.	☐ ☐ ☐

Functional check	Observed result	Acceptance criteria	PASS	N.A.	FAIL
IX printers		Test page is printed to the selected printer.	☐	☐	☐
Insite with EXC		The patient monitor is active on Insite with EXC back office.	☐	☐	☐
Recorder		The header line contains the correct information. The grid is clear. The waveforms labels appear in the printout as configured.	☐	☐	☐
Synchronization connector test		ECG, Arterial BP, and Marker Out signals are correct.	☐	☐	☐
Test completion			☐	☐	☐

Notes

Used service parts			

Signature	Date

For your notes:

APPENDIX C: Verification procedure for wireless MC Network infrastructure

Purpose and scope

The purpose of this verification procedure is to test the operation of the wireless network infrastructure with a wireless CARESCAPE monitor, the transport monitor.

To verify the operation, you move the transport monitor throughout the predetermined wireless coverage area and observe that a constant ECG waveform from a stationary wired patient monitor is displayed in the bed-to-bed view of the wireless CARESCAPE monitor during the transport.

Due to the dynamic nature of a wireless environment this test provides only a snapshot of the wireless network at the time of performing the test. This is not a comprehensive test that covers all possible use situations, network traffic situations, radio frequency interferences or takes into account possible other changes in the wireless environment.

Test equipment and documentation needed

Ensure that you have the following equipment and documentation available.

CIC Pro:

- CIC Pro Clinical Information Center with full disclosure license.

NOTE: CIC with full disclosure license is optional. It is needed for documentation and reporting purposes only. It enables you to view afterwards potential network connectivity issues between the transport monitor and the wireless MC Network, and to print reports about waveform loss situations.

Wired CARESCAPE monitor, the stationary monitor:

- A CARESCAPE monitor with wired MC Network connection.
- A PDM or PSM module.
- A compatible 5-lead ECG trunk cable and 5-leadwire set.
- A patient simulator.

NOTE: You can alternatively use compatible Dash, Solar or S/5 monitor as a stationary monitor. Check the patient monitor's supplemental information manual for software compatibility.

Wireless CARESCAPE monitor, the transport monitor:

- CARESCAPE monitor with wireless MC Network connection.
- A PDM or PSM module. *)
- A compatible 5-lead ECG trunk cable and 5-leadwire set. *)
- A battery operated patient simulator. *)
- Service PC (laptop) with a crossover Ethernet cable.
- A plastic roll cart for the patient monitor, service PC and the simulator. To avoid RF impairment, do not use metal roll carts.

NOTE: *) The PDM/PSM module, ECG cables and the patient simulator for the wireless CARESCAPE monitor are needed only, if a CIC with full disclosure license is available in the MC Network.

Documentation about the Wireless LAN infrastructure:

- GE WLAN pre-quote questionnaire with all applicable attachments.
- Wireless LAN design documentation, including site survey results.

Test plan

Each wireless installation is unique. As it is often impractical and uneconomical to verify the whole wireless coverage area and all the installed access points, prepare a site specific test plan that covers the areas that are most likely to encounter issues with the wireless communication.

Utilize the information provided in the pre-quote questionnaire, existing design documentation and site survey results, and discuss with the hospital IT specialists and clinical staff to identify the areas that are the riskiest for poor wireless communication, and prepare a test plan accordingly.

Take into account the following aspects when preparing a test plan.

- Identify areas with known or obvious low signal strength.
- Identify areas with known sources of radio frequency interference, causing high noise floor and/or poor signal-to-noise ratio.
- Identify the special characteristics in the building layout (floors, wings patient rooms) and construction material used.
- Identify the time and areas of congestion, with high number of wireless clients and a lot of network traffic.
- Identify intended clinical workflow paths, including bedside locations and transport routes.

Prepare the test plan by documenting the intended walking path and test points to the floor plan, preferably to copy of a site survey document that shows the wireless coverage area, the location of wireless access points, signal strengths and sources of known radio frequency interferences.

NOTE: In the sample floor plan below, EG1- EG20 represent possible test points. Take into account in your plan that some rooms and areas may not be accessible at the time of performing the survey.

Test setup

The patient monitors and the CIC Pro shall be installed, configured and tested to operate in the same MC Network.

CIC Pro:

- Configure the CIC to capture full disclosure data from the wireless CARESCAPE monitor. Refer to CIC Pro Clinical Information Center Service Manual and CIC Pro Clinical Information Center Operator's Manual for detailed instructions.

Wired CARESCAPE monitor, the stationary monitor

Setting up the connections:

1. Connect a PDM or PSM module to the patient monitor.
2. Connect the ECG cables to the module and to the patient simulator.
3. Turn on the patient monitor and the patient simulator.

Configuring the patient simulator:

Refer to the simulator documentation for details on how to use and configure the simulator.

4. Configure the patient simulator to output ECG waveform with:
   - ECG rhythm: a normal sinus rhythm
   - Heart rate: 80 bpm
   - Amplitude: 1 mV

Configuring the patient monitor:

5. Select ECG1, ECG2 and ECG3 waveform fields to the screen with adequate priority.
6. In the ***Parameter Setup > ECG > Setup***, select:
   - ***ECG1 lead: II***
   - ***ECG2 lead: V1***
   - ***ECG3 lead: aVL***.
7. Start a patient case / admit a patient in ***Data & Pages > Admit/Discharge*** menu.

Wireless CARESCAPE monitor, the transport monitor

NOTE: The PDM/PSM module, ECG cables and the patient simulator for the wireless CARESCAPE monitor are needed only, if a CIC with full disclosure license is available in the MC Network. If CIC with full disclosure license is not available, skip steps 2, 3, 4, 7 and 8.

NOTE: Ensure that the patient monitor battery, the service PC battery and the patient simulator battery are fully charged.

Setting up the connections:

1. Set up the CARESCAPE monitor and the service PC on a roll cart.
2. Connect a PDM or PSM module to the patient monitor.
3. Connect the ECG cables to the module and to the patient simulator.
4. Connect the service PC to the patient monitor IX port using the Ethernet crossover cable.
5. Turn on the patient monitor, the service PC and the patient simulator.

Configuring the patient simulator:

Refer to the simulator documentation for details on how to use and configure the simulator.

6. Configure the patient simulator to output ECG waveform with:
   – ECG rhythm: a normal sinus rhythm
   – Heart rate: 80 bpm
   – Amplitude: 1 mV

Configuring the patient monitor:

7. Configure the ECG1, ECG2 and ECG3 waveform fields to the monitor screen with adequate priority.
8. In the ***Parameter Setup > ECG > Setup***, select:
   – ***ECG1 lead: II***
   – ***ECG2 lead: V1***
   – ***ECG3 lead: aVL***.
9. Start a patient case / admit a patient in ***Data & Pages > Admit/Discharge*** menu.
10. Select ***Data & Pages > Other Patients***. Select the unit and bed name of the stationary monitor and then select ***View***.

Configuring the service PC:

11. Login to Webmin.
12. Select ***Diagnostics > WLAN***.

NOTE: The WLAN information shown in Webmin Diagnostics page is static. Press **F5** to refresh the web browser and to see up-to-date WLAN diagnostics data.

Test execution

Execute the test procedure according to the test plan. Contact the nursing staff to ensure access to the needed areas before starting the test.

1. Move the roll cart to the starting point of the planned test route.
2. Stop at each test point and perform the following tasks:

a. On the transport monitor:
   - Verify that ECG waveforms from the remote, stationary patient monitor display in the bed-to-bed view without any losses.

b. On the service PC: Refresh Webmin view by selecting **F5** and:
   - Identify the Access Point the patient monitor is connected to.
   - Verify that the ***Signal level (RSSI)*** in dBm is greater than or equal to -60 dBm.
   - Verify that the ***Transmit Rate in Mbps*** is greater than or equal to 5.5 Mbps.

c. Mark the network time, RSSI and Transmit Rate to the test form.

d. If there is a waveform loss situation or the RSSI or the Transmit Rate is lower than specified:
   - Observe the length of the waveform loss and, if possible, potential cause of it, for example roaming or out of range situations.

- Take a snapshot of the refreshed WLAN Diagnostics screen, for example, by printing it to a file.

3. Move the roll cart to the following test point along the walking path and repeat the step 2 at each test point until you have completed the test plan. While moving the roll cart from one test point to another, at all times, verify that there are no losses in the ECG waveforms.
   NOTE: A momentary, up to 5 seconds waveform loss is normal during roaming. If longer, or repeating waveform losses occur between test points, make this an extra test point and report it the same way as observations in step 2.

Summary and Reporting

Include the following documents to the test results:

1. Print the full disclosure reports from the CIC about the observed waveform loss situations.
2. Print the snapshots of the WLAN diagnostics screens that you saved into the service PC.
3. Mark to the printouts the id of the test point.

Review and evaluate the test results together with GE personnel and the hospital IT specialists. Summarize, if additional testing is needed and/or if the WLAN infrastructure needs to be changed.

Test Form

Observations

Test point #	Time (hh:mm:ss)	RSSI (dBm)	Transmit rate (Mbps)	Observations

Test summary and recommended actions

Date & time of testing **Signature**

GE Healthcare Finland Oy
Kuortaneenkatu 2
FI-00510 Helsinki
FINLAND
Tel: +358 10 39411
Fax: +358 9 1463310
www.gehealthcare.com

Headquarters

GE Medical Systems
Information Technologies, Inc.
8200 West Tower Avenue
Milwaukee, WI 53223 USA
Tel: + 1 414 355 5000
1 800 558 5120 (US only)
Fax: + 1 414 355 3790

Asia Headquarters

GE Medical Systems
Information Technologies Asia; GE (China) Co., Ltd.
No1 Huatuo Road,
Zhangjiang Hi-tech Park Pudong
Shanghai, P.R.China 201203
Tel: + 86 21 5257 4650
Fax: + 86 21 5208 2008

www.gehealthcare.com

Other ManualsLib Projects

 www.manualslib.com

 www.manualslib.de

 www.manualslib.es

 www.manualslib.fr

 www.manualslib.nl

 www.manualslib.mx

 www.manualslib.tech 30+ Languages