CARESCAPE B450

Service Manual

CARESCAPE Software version 3 (3.2.758)
Version MBA323

CARESCAPE B450
English
2nd edition
5817395-03

Due to continuing product innovation, specifications in this manual are subject to change without notice.

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.

Contents

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About this manual

Intended use of this manual

The list below indicates the compatible products (brands, models and descriptions as applicable) with which this manual is to be used. Supported products are covered by the manuals that were delivered with those products.

- CARESCAPE B450, version MBA323
- CARESCAPE Software version 3 (3.2.758)

This manual contains instructions necessary to install, maintain and service the device. It gives an overview of the CARESCAPE B450 patient monitoring system, and contains information needed for system installation. Information for the planned and corrective maintenance of the CARESCAPE B450 main unit is also provided.

Use the manual as a guide for installation, maintenance and repairs considered field repairable. Where necessary the manual identifies additional sources of relevant information and technical assistance.

See the module's service manual for the planned and corrective maintenance of the acquisition module.

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

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

Intended audience of this manual

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

Manual conventions

This manual uses the following styles to emphasize text or indicate an action. Also note the terminology conventions.

Item	Description
bold	Indicates hardware keys and connectors.
bold italic	Indicates menu options, software keys and messages.
italic	Indicates terms for emphasis.
>	Indicates menu options to select consecutively.

Item	Description
select	The word select means choosing and confirming.
acquisition device	A generic term when referring to both the acquisition modules (PDM, E-modules) and the acquisition platform (CARESCAPE ONE).
supplemental information	In this manual, the phrase supplemental information refers to information that appears in the Supplemental Information Manual or supplements provided.
NOTE	Note statements provide application tips or other useful information.

Monitor naming conventions

In this manual, the CARESCAPE B450 is referred to as the monitor. It may also be referred to as B450.

Acquisition module naming conventions

In this manual, the following naming conventions are used to refer to different modules and module categories:

- PDM: Patient Data Module
- E-modules: All modules with the prefix E-.
- E-COP, E-COPSv
- E-PiCCO
- Pressure E-modules: E-PP, E-PT
- CARESCAPE respiratory modules: E-sCO, E-sCOV, E-sCOVX, E-sCAiO, E-sCAiOV, E-sCAiOVX, E-sCAiOE, E-sCAiOVE
- E-miniC
- Specialty E-modules: E-NMT, E-EEGX, E-BIS, E-ENTROPY
- SpO_2 E-modules: E-NSATX, E-MASIMO
- CARESCAPE Parameter interface module: E-musb

Other naming conventions

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.

In this manual, CARESCAPE Network is used to refer to both the IX Network and MC Network except where they need to be differentiated. Then they are referred to as IX Network and MC Network.

In this manual, the CARESCAPE Service interface may also be referred to as service interface.

In this manual, acquisition platform refers to the CARESCAPE ONE acquisition platform. CS ONE may also be used to refer to the CARESCAPE ONE acquisition platform.

In this manual, CARESCAPE Parameters is used as a generic term when referring to all of the following products:

Graphic on the CARESCAPE Parameter	Explanation
CARESCAPE ECG	CARESCAPE Parameter for measuring ECG. Note that in the manual, the following name is used instead of the graphic: CARESCAPE ECG.
CARESCAPE PRES	CARESCAPE Parameter for measuring invasive pressures. Note that in the manual, the following name is used instead of the graphic: CARESCAPE Pressure.
CARESCAPE rSO_2 - INVOS	CARESCAPE Parameter for measuring regional oxygen saturation of blood (rSO_2) in cerebral and somatic tissues with INVOS technology. Note that in the manual, the following name is used instead of the graphic: CARESCAPE rSO_2.
CARESCAPE TEMP	CARESCAPE Parameter for measuring temperature. Note that in the manual, the following name is used instead of the graphic: CARESCAPE Temperature.
CARESCAPE CO_2 -LoFlo	CARESCAPE Parameter for measuring CO_2 with Respironics LoFlo technology. Note that in the manual, the following name is used instead of the graphic: CARESCAPE CO_2 — LoFlo.
CARESCAPE CO_2 - Microstream	CARESCAPE Parameter for measuring end-tidal carbon dioxide ($EtCO_2$), $FiCO_2$, and respiration rate with Microstream technology. Note that in the manual, the following name is used instead of the graphic: CARESCAPE CO_2 — Microstream.
CARESCAPE SpO_2	CARESCAPE Parameter for measuring SpO_2 with GE TruSignal technology. Note that in the manual, the following name is used instead of the graphic: CARESCAPE SpO_2.
CARESCAPE SpO_2 - Masimo	CARESCAPE Parameter for measuring SpO_2 with Masimo rainbow SET technology. Note that in the manual, the following name is used instead of the graphic: CARESCAPE SpO_2 — Masimo.
CARESCAPE SpO_2 - Nellcor	CARESCAPE Parameter for measuring SpO_2 with Nellcor™ sensors with OxiMax™ technology. Note that in the manual, the following name is used instead of the graphic: CARESCAPE SpO_2 — Nellcor.

In this manual, the following product names are used as generic terms:

- D-lite when referring to D-lite, D-lite+, and D-lite++
- Pedi-lite when referring Pedi-lite and Pedi-lite+
- D-fend Pro when referring to D-fend Pro and D-fend Pro+

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.

Related documents

- CARESCAPE B850, B650, B450 User Manual
- CARESCAPE B850, B650, B450 Privacy and Security Manual

- CARESCAPE B850, B650, B450 Supplemental Information Manual
- CARESCAPE ONE Service Manual
- Service manuals for acquisition modules
- CARESCAPE Network Configuration Guide
- CARESCAPE Wireless Network Configuration Guide
- Patient Monitoring Network Configuration Guide
- CARESCAPE Modular Monitors Mounting Solutions
- CARESCAPE RAD Service Manual
- CARESCAPE Citrix Guide
- Service documentation for displays
- Unity Network Interface Device (ID) Service Manual
- iCollect user's manual
- Service documentation for laser printers
- Cleaning and Disinfecting Supplement
- Supplies and Accessories Supplement
- Instructions for use for CARESCAPE rSO_2— INVOS, REF: PMC71V-GE
- Instructions for use for CARESCAPE CO2 — Microstream, REF: PMC40M-GE

For a list of third-party or open-source software included in the device, please contact your GE service representative.

Revision history

Revision	Description
1st edition	Initial release.
2nd edition	Updated for CARESCAPE Software version 3 (3.2.758) release. Introduced new EAP methods (TLS, TTLS-MSCHAPV2, and PEAP-GTC) for IEEE 802.1X port-based authentication to control access to MC and IX networks.

Accessing manuals online

To obtain the latest version of the manual:

1. Go to: https://www.healthcare.com/documentationlibrary.
2. Enter the Customer Documentation Portal.
3. Select ***Modality*** > ***Monitoring Solutions (MS)***.
4. Select ***Products*** > the products you want to search.

   You may also select the ***Document Type*** and ***Language*** to narrow down the search.
5. Launch the search.
6. Identify and download the manual.

The manuals are in pdf format. Make sure that your viewing device (e.g., computer) has software to open the pdf files (for instance, Adobe® Acrobat® Reader).

Security related documents can be downloaded from https://securityupdate.gehealthcare.com.

Product availability

NOTE Due to continual product innovation, design and specifications for these products are subject to change without notice.

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

Trademarks

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

MUSE, Trim Knob, UNITY NETWORK, D-lite, D-fend, and Entropy are trademarks of General Electric Company or one of its subsidiaries.

Third party trademarks

Masimo SET is a trademark of Masimo Corporation.

Covidien, BISx, BIS, INVOS, and Microstream are trademarks of a Medtronic company.

PiCCO is a trademark of Pulsion Medical Systems SE.

Multi-Link is a trademark of CareFusion Corporation or one of its affiliates.

WMM, WPA and WPA2 are trademarks of Wi-Fi Alliance.

Manufacturer responsibility

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 service manuals.

WARNING SAFETY HAZARD. To avoid risks to personnel and patient, or damage to the equipment, only perform maintenance procedures described in this manual. Unauthorized modifications can lead to safety hazards.

2

Safety

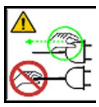
Safety message signal words

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.

Safety symbols

Symbol	Explanation
	General warning sign. ISO 7010. This symbol is identified by a yellow background, black triangular band, and a black symbol. In this manual this symbol is used only in connection with those warning statements that the labels on the equipment refer to.
	Caution. ISO 7000. This symbol is identified by a white background, black triangular band, and a black symbol.
	Follow instructions for use. ISO 7010. This symbol indicates mandatory action and it is identified by a blue background and a white symbol.
	Consult operating instructions. / Operating instructions.
	WARNING — Electric shock hazard. This equipment must be serviced by qualified service personnel only. ISO 7010. This symbol is identified by a yellow background, black triangular band, and a black symbol.

Symbol	Explanation
	MR Unsafe. Indicates that the device is not intended for use in an MR environment. This symbol is identified by a white background, red or black circular band, and a black symbol.
	Electrostatic sensitive device.
	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.

System safety

For a complete list of system safety messages that apply to the entire system, refer to the user manual. For safety messages specific to parts of the system or to a certain installation or service task, refer to the relevant sections.

Reporting of serious incidents

Any serious incident related to the use of this device should be reported to both the manufacturer and the health authority/competent authority where the device is installed.

To report to GE, contact your local service representative or report to In-box.complaints@ge.com.

Please provide the following information:

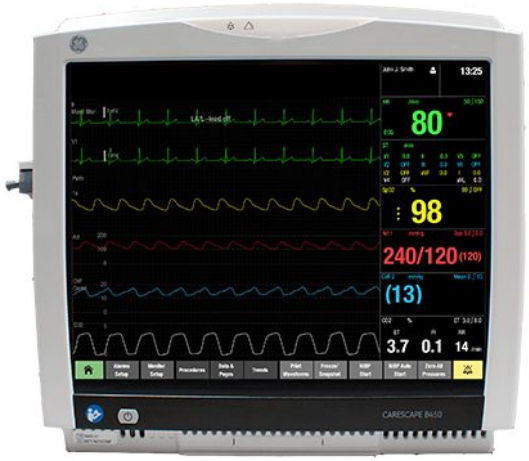
- The catalogue number or the model designation of the device as stated on its identification plate affixed on the device
- The System ID/serial number/lot number of the device
- Date of incident
- Description of incident, including any patient or user impact/injury

- Your contact information (facility, address, contact name, title, and telephone number)

3

System overview

Short description of the equipment



The CARESCAPE B450 is a portable and modular multi-parameter patient monitor. The monitor can be used with most patient populations within a professional healthcare facility, but acquisition modules may have limitations for use based on the patient's age, weight, or clinical condition, or on the type of the care unit (for example, OR or ICU only). There are several types of acquisition modules to choose from based on care requirements and patient needs.

The monitor supports a multi-parameter hemodynamic CARESCAPE ONE acquisition platform or a Patient Data Module (PDM). You can extend the monitoring capability to gas measurement, brain monitoring or relaxation measurement by connecting one single-width, E-series module. The optional integrated recorder enables local printing to a thermal paper.

The modular system design is inherent in electronics and algorithms: some processing of the measurement signals is done by the acquisition modules and further processing happens on the monitor.

The CPU subsystem processes the user input and acquisition data and displays the information on the screen. It controls the monitor operation and communication with the other subsystems and external interfaces. The main software and all platform and clinical settings are stored in a flash memory in the CPU module. The monitor has two CPU assembly options with or without wireless network support.

The monitor has a 12" LCD display with integrated LED backlights and a resistive touchscreen sensor. It also supports one additional display, either a clone or, with a dual video license, an independent secondary display.

The touch screen is the main method for user input. The monitor also supports various USB input devices, including a mouse, an alphanumeric keyboard, a barcode reader, and a remote controller. The monitor frame has an integrated handle and GCX mounting. The alarm system includes a speaker for audible alarms and a separate alarm light for visual alarms. The thermal recorder is also available as a field upgrade.

The monitor can be mains voltage or battery powered. It has an integrated AC/DC power supply unit and it supports up to two detachable lithium-ion batteries. The DC/DC board provides the supply voltages for the electronics of the device, and takes care of the power path logic and battery management.

The monitor is compatible with the wired and optional wireless MC Network and with the wired IX Network infrastructures. MC (Mission Critical) Network is used for transferring real-time or near real-time patient information between network devices, including numerics, waveforms, alarms, trends and patient information. IX (Exchange) Network provides access for example to MUSE reports, Citrix applications, IX printers, and service tools.

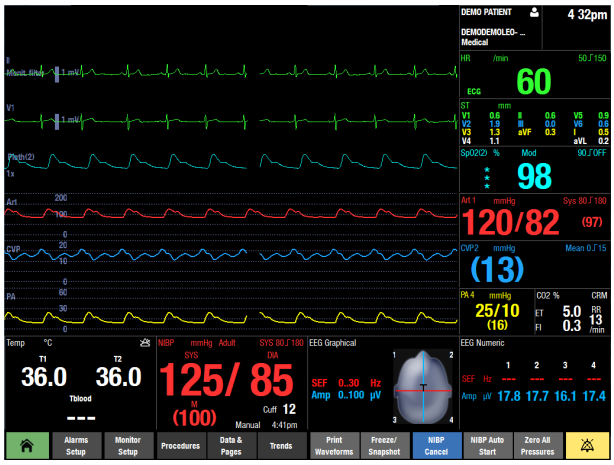
For all physical and performance specifications, refer to the supplemental information provided. For more detailed information on the intended use of the device, refer to the user manual.

Software

The 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.



Displays

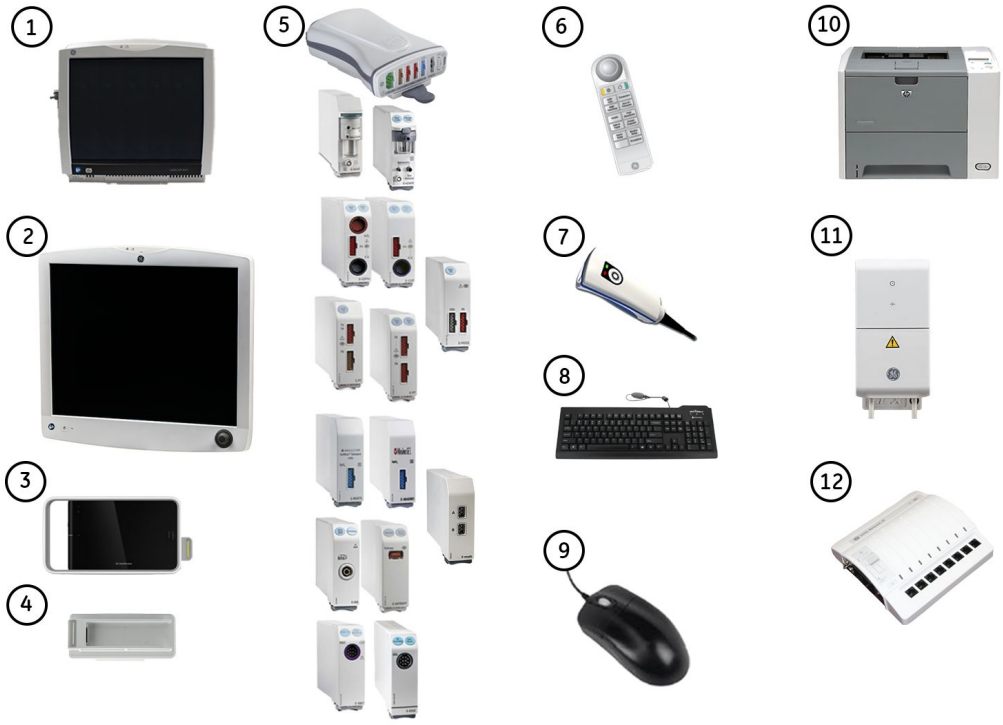
The monitor supports one secondary display, that can be either a clone or with an optional Dual video license an independent display. Screen contents are user-configurable.

The CARESCAPE D19KT VER01 display provides a Trim Knob and touchscreen control and indicates a power failure alarm with a continuous beep. The display integrates audible and visual alarms and provides USB connectivity.

B450 system components

All components listed below can be used within the patient environment as long as an additional transformer providing at least basic isolation is used with non-medical grade secondary displays and printers.

Your system may not include all these components. Consult your local representative for the available components.



1. CARESCAPE B450
2. 19-inch display D19KT VER01: Touchscreen display that provides Trim Knob control. If a non-medical grade display is used as a secondary display within the patient environment it must always be powered from an additional transformer providing at least basic isolation.
3. CARESCAPE ONE acquisition platform (used with CARESCAPE Parameters). For details, refer to its own manuals.
4. CARESCAPE Dock F0 for CARESCAPE ONE.
5. Acquisition modules: Two types of acquisition modules can be used: PDM and E-modules.
6. Remote control: Used to provide all patient monitor controls on a portable component with a Trim Knob control.
7. Barcode reader: Used to scan patient information from barcodes when admitting patients.
8. Keyboard: Allows data entry without using the on-screen keyboard or a touchscreen display.
9. Mouse: Allows on-screen user selections and data entry.
10. Laser printer: This device may be connected to the monitor, network, or to a central station on the network. The laser printer can print waveforms, alarm waveforms, numeric trends, and reports. If it is used within the patient environment it must always be powered from an additional transformer providing at least basic isolation.
11. CARESCAPE RAD (remote alarm device): Used to notify a remote location of patient alarms and system alarms.

12. Unity Network Interface Device (ID): Used with the monitor to communicate with other manufacturers' peripheral bedside devices, such as ventilators and gas delivery systems, to centralize patient data on one device.

CARESCAPE ONE

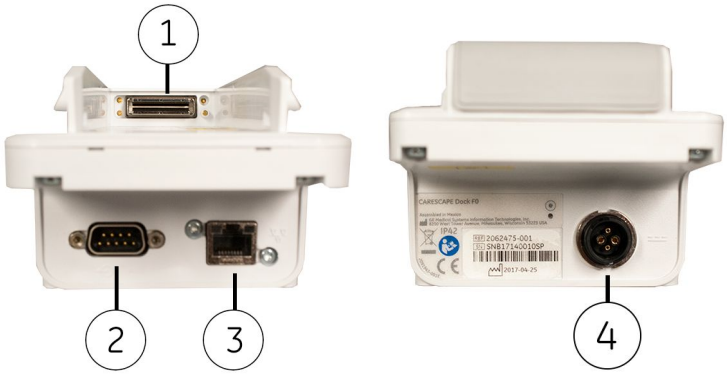
For more information on CARESCAPE ONE, refer to its own manuals.

1. CARESCAPE Parameter connectors
2. Tab for removing the acquisition platform from the docking mount
3. Analog out/Defibrillator synchronization connector
4. NIBP hose connector

CARESCAPE ONE is used with CARESCAPE Parameters:

- CARESCAPE ECG
- CARESCAPE Pressure
- CARESCAPE Temperature
- CARESCAPE CO_2 — LoFlo
- CARESCAPE CO_2 — Microstream
- CARESCAPE rSO_2
- CARESCAPE SpO_2
- CARESCAPE SpO_2 —Masimo
- CARESCAPE SpO_2 — Nellcor

CARESCAPE Dock F0 side views



1	Docking interface connector to the CARESCAPE ONE.
2	ePort connector to the host monitor.

3	RJ–45 connector. The service port is configured for direct connection to a service PC only. Do not connect the service port to a network.
4	Power receptacle for the AC mains to DC power supply.

CARESCAPE Dock F0 provides an interface between a CARESCAPE monitor and the CARESCAPE ONE.

Acquisition modules

You can use different types of acquisition modules with the monitor. They provide connection to the patient, process patient data signals, and send patient data signals to the monitor. For a complete list of compatible devices, see the supplemental information provided.

PDM front view

1. ECG (imp.resp.)
2. T1 to T2/C.O.
3. P1/P3 and P2/P4
4. SpO_2
5. NIBP
6. Communication indicator. Illuminates yellow during boot-up and turns green after boot-up; flashes yellow if communication fails; is not illuminated when no power is applied to the PDM.
7. Power indicator. Illuminates yellow during boot-up and turns green after boot-up; illuminates green when the PDM module is powered by the monitor, or when the PDM battery is installed and power is applied to the PDM by pressing the Power On button; is not illuminated when no power is applied to the PDM.
8. Dual function Power On and Zero All button
9. Defib/Sync
10. Tab for removing the module

Modules and parameters

PDM parameters

Parameter	PDM (Masimo)**	PDM (Nellcor)**
ECG	up to 12 leads	up to 12 leads
Imp.respiration	x	x
Invasive pressures	4*	4*
NIBP	x	x
Temperature	2* (or C.O.)	2* (or C.O.)
C.O.	x (or 2 temp.)	x (or 2 temp.)
SpO_2 Masimo	x	-

Parameter	PDM (Masimo)**	PDM (Nellcor)**
SpO_2 Nellcor	-	x
* A dual adapter cable is required to monitor two invasive pressure or temperature measurements on a single connector.		
** Different SpO_2 cables are required for each type of SpO_2 processing. The cable connectors are not interchangeable.		

CARESCAPE Parameters

Parameter	CARESCAPE Parameter
ECG	CARESCAPE ECG up to 12 leads
Impedance respiration	CARESCAPE ECG
Invasive pressures	CARESCAPE Pressure 4
NIBP	No CARESCAPE Parameter required, measurement is available with NIBP hose connected directly to CARESCAPE ONE
Temperature	CARESCAPE Temperature 2
SpO_2 TruSignal	CARESCAPE SpO_2
SpO_2 Masimo	CARESCAPE SpO_2 — Masimo
SpO_2 Nellcor	CARESCAPE SpO_2 — Nellcor
CO_2	CARESCAPE CO_2 — LoFlo CARESCAPE CO_2 — Microstream (also available with the E-musb module)
Surgical Pleth Index (SPI)	CARESCAPE SpO_2
Regional oxygen saturation (rSO_2)	CARESCAPE rSO_2 (also available with the E-musb module)

E-COP, E-COPSv, and E-PiCCO parameters

Parameter	E-COP	E-COPSv	E-PiCCO
Invasive pressures	1	1	1
SvO_2	-	x	-
$ScvO_2$	-	x *	-
C.O.	x (also REF)	x (also REF)	x
CCO	-	-	x
* E-COPSv-01 only			

E-PP and E-PT parameters

Parameter	E-PP	E-PT
Invasive pressures	2	1
Temperature	-	2*
* A dual adapter cable is required to monitor two temperature measurements on a single connector.		

E-module gas parameters

Module	CO_2	N_2O	O_2	Anesthetic agents	Agent ID
E-miniC	x	-	-	-	-
E-sCO	x	*	x	-	-
E-sCOV	x	*	x	-	-
E-sCOVX	x	*	x	-	-
E-sCAiO	x	x	x	x	x
E-sCAiOE	x	x	x	x	x
E-sCAiOV	x	x	x	x	x
E-sCAiOVX	x	x	x	x	x
E-sCAiOVE	x	x	x	x	x

* The E-sCO, E-sCOV, and E-sCOVX modules automatically compensate for N_2O in realtime although N_2O values are not displayed on screen.

The E-miniC requires manual selection from the monitor menu to compensate for N_2O and for O_2.

Module	Spirometry	Gas exchange	Aisys CS^2 end-tidal control
E-miniC	-	-	-
E-sCO	-	-	-
E-sCOV	x	-	-
E-sCOVX	x	x	-
E-sCAiO	-	-	-
E-sCAiOE	-	-	x
E-sCAiOV	x	-	-
E-sCAiOVX	x	x	-
E-sCAiOVE	x	-	x

For more information on the use of the end-tidal control, refer to the Aisys CS^2 user documentation.

E-MASIMO and E-NSATX parameters

Parameter	E-NSATX*	E-MASIMO*
SpO_2 Masimo	-	x
SpO_2 Nellcor	x	-

* Different SpO_2 cables are required for each type of SpO_2 processing. The cable connectors are not interchangeable.

Specialty E-module parameters

Parameter	E-NMT	E-EEGX	E-ENTROPY	E-BIS
Level of relaxation	x	-	-	-
Nerve stimulation	x	-	-	-
EEG	-	x	-	-

Parameter	E-NMT	E-EEGX	E-ENTROPY	E-BIS
AEP	-	X	-	-
Entropy	-	-	X	-
BIS	-	-	-	X

E-musb parameters

E-musb is an interface module for connecting the following compatible CARESCAPE Parameters to the monitor:

- CARESCAPE rSO_2 for measuring regional oxygen saturation of blood (rSO_2) in cerebral and somatic tissues with INVOS technology
- CARESCAPE CO_2 — Microstream for measuring end-tidal carbon dioxide ($EtCO_2$), $FiCO_2$, and respiration rate with Microstream technology

E-musb can host up to two compatible CARESCAPE Parameters: either one CARESCAPE CO2 - Microstream and one CARESCAPE rSO2, or two CARESCAPE rSO2.

CARESCAPE Network

The monitor is compatible with the CARESCAPE Network.

The MC (Mission Critical) Network services include transferring real-time or near real-time patient information between network devices. The information includes numerics, waveforms, alarms, trends, and patient information.

The IX (Information Exchange) Network provides access to the following services:

- MUSE server for viewing MUSE/12SL reports on the monitor screen (a licensed feature)
- Citrix server for viewing other applications on the monitor screen (a licensed feature)
- Printing to IX printers connected to IX Network
- InSite RSvP remote service platform
- Service personnel have centralized access to service interfaces of several monitors from within the hospital

Other system components

For more information, refer to the devices' own instructions.

Input devices	Description
	Barcode reader The barcode reader can be used to scan Patient Information from barcodes when admitting patients. By default, the barcode reader has been configured to US English at the factory. The correct language must be configured to the barcode reader itself before configuring the barcode settings to the monitor. See the instructions provided with the barcode reader.
	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 on-screen keyboard or a touchscreen display.

Input devices	Description
	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.

Recorders and laser printers	Description
	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 manual for more information about printing. The patient monitor supports printing: • to a laser printer that is connected to IX Network • to a laser printer that is connected directly to the monitor • to a laser printer that is connected to a CARESCAPE Central Station Refer to the printer's service manual for printer installation instructions.

Central stations	Description
	CARESCAPE Central Station The MC Network establishes communication and allows patient data to be sent to an optional CARESCAPE Central Station. See the CARESCAPE Central Station User's Manual for operating instructions.

Other devices	Description
	Unity Network Interface Device (ID) The monitor can interface with peripheral medical devices, such as ventilators and gas delivery systems, to centralize patient data on one device. A Unity Network Interface Device (ID) is used with the monitor to communicate with peripheral devices. See the Unity Network Interface Device (ID) Service Manual for installation instructions.
	CARESCAPE RAD The CARESCAPE RAD provides alarm notification at a location remote from the monitor. The remote alarm device interfaces to the monitor via a USB port. Its functionality is enabled or disabled during configuration. See the CARESCAPE RAD Service Manual for instructions.

Access to external applications

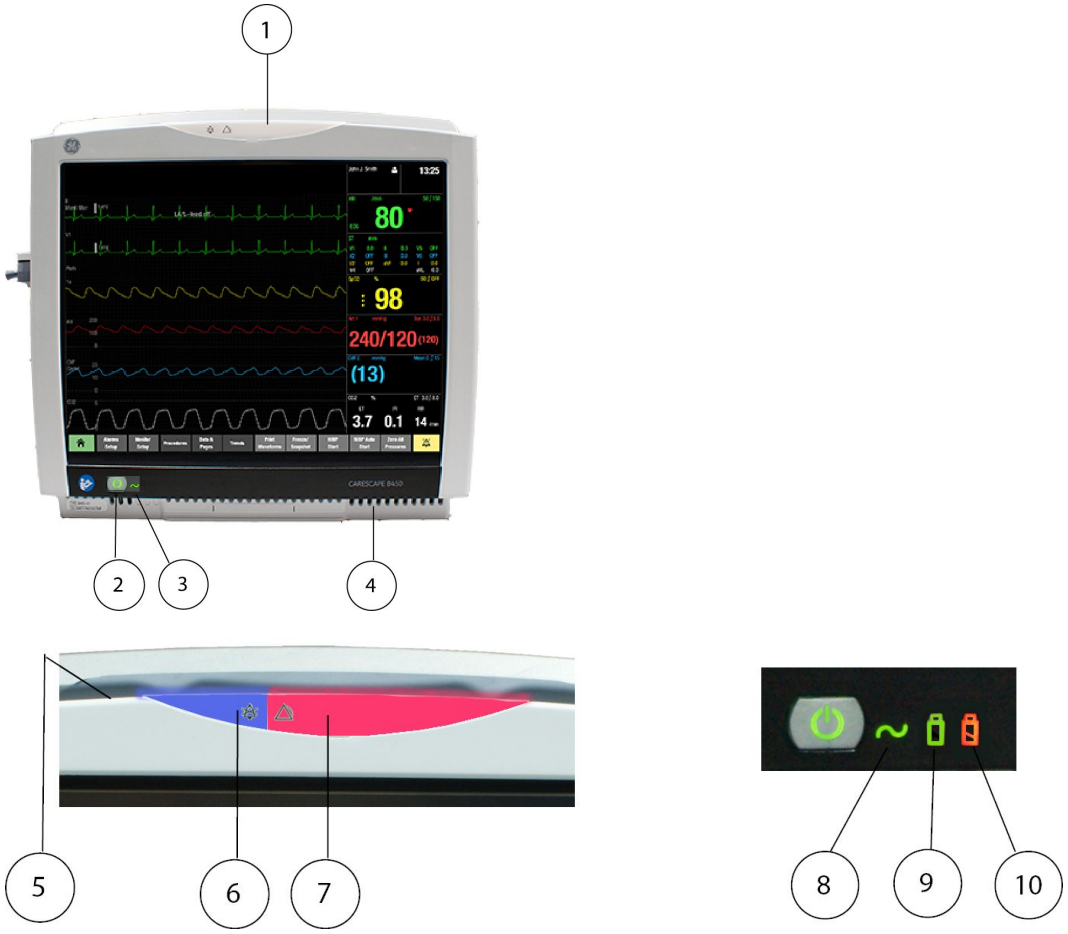
The Citrix application, viewable from one of the monitor's displays, gives access to desktops created by the hospital IT. These desktops provide patient information from other systems that may be installed at the hospital [e.g., Centricity Clinical Information View (Centricity CIV), MUSE Web, and Picture Archiving Communications System (PACS)]. Desktops can be created with customer defined resolutions using the hospital-wide login and identification process. The access is provided through a Citrix thin client on the monitor so no additional equipment is required at the bedside.

Citrix application is accessible through ***Data & Pages*** > .

See the supplemental information provided for default settings related to this application.

Controls and connectors

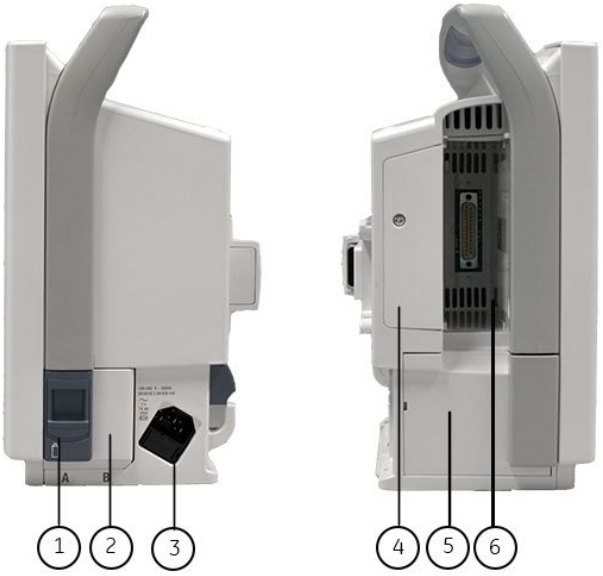
B450 front panel



1. Alarm light
2. Power on/standby button
3. Battery power/mains power indicators

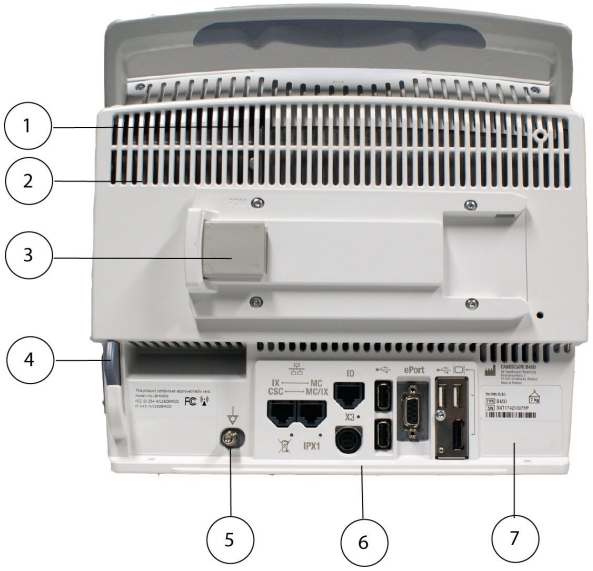
4. Ventilation holes
5. Ambient light detector lens
6. Audio alarm paused/off area (blue)
7. Alarm light area (blue, yellow, or red)
8. Mains voltage indicator - the green LED is lit when the patient monitor is connected to AC mains.
9. Battery use indicator - the green LED is lit when the patient monitor is operating on battery power.
10. Battery charging/failure indicator - the orange LED is lit when the patient monitor battery is charging and flashing in case of battery failure or missing battery.

B450 side views



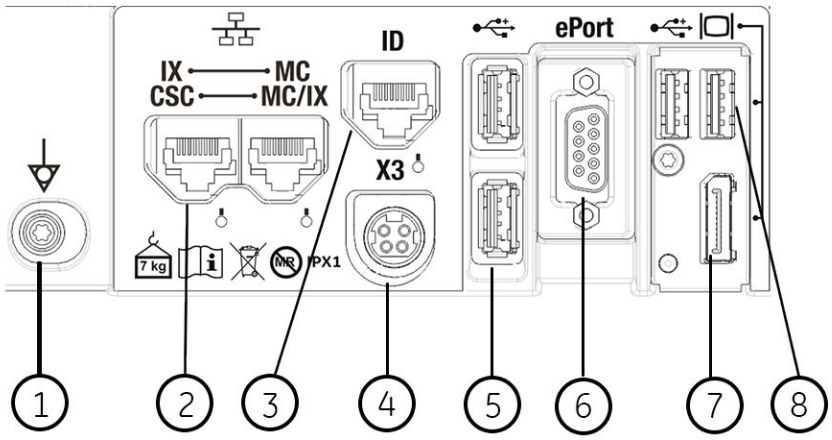
1. Release latch for battery door
2. Battery slot
3. Receptacle for power cord
4. Service cover
5. Cover plate or optional recorder
6. Module slot for one single-width module

B450 back panel



1. Power LEDs for troubleshooting
2. Ventilation holes
3. Slide mount connector for PDM
4. Cable clamp for power cord
5. Equipotential connector
6. Connectors for input/ output devices and networking
7. Device label

B450 rear unit connectors



1. Equipotential connector. For measurements in or near the heart we recommend connecting the monitor to the potential equalization system (IEC 60601–1) to ensure equal potential levels between the devices in the system.
2. Network connectors for connecting to the CARESCAPE Network.
   Monitors can be configured to the MC and IX networks either using two network interfaces (dual wire configuration) or one network interface (single wire

configuration). When connected via single wire, the monitor sends MC and IX traffic onto the MC network. The CARESCAPE Router is responsible for passing IX traffic from the MC network onto the IX network. The connection to these CARESCAPE Networks depends on how the network infrastructure at the customer site is configured.

With dual wire configuration:

- MC: Connects the monitor to the MC Network.
- IX: Connects the monitor to the optional IX Network.

With single wire configuration:

- MC/IX: Connects the monitor to the MC Network and IX Network.
- CSC: This connector is not in use.

3. ID connector: For connecting the monitor to Unity Network Interface Device (ID).
4. X3: Remote-on connector.
5. USB ports (2 pcs USB 2.0 type A connectors).
6. ePort connector for CARESCAPE Dock F0 with CARESCAPE ONE, or for the PDM cable.
7. DisplayPort connector for secondary display.
8. USB ports (2 pcs USB 2.0 type A connectors). If the secondary display is in use, the rightmost USB port is reserved for it.

IEC 60601-1

- Type of protection against electrical shock: Class I.
- Degree of protection against electrical shock: applied parts are marked with a symbol indicating degree of protection.
- Degree of safety of application in the presence of flammable anesthetic mixture with air or with oxygen or nitrous oxide: Not suitable.

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

- Degree of protection against harmful ingress of water: IPX1.
- Mode of operation: Continuous.
- Method(s) of sterilization or disinfection recommended by the manufacturer: see the user manual.

IEC 60601-1-2

The system complies with IEC 60601–1–2:2014–02.

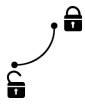
Compliance with the standard IEC 60601-1-2:2014-02 applies only to those products that are currently being manufactured and shipped. It may not apply to older devices or devices that have their software upgraded. For standards compliance information, refer to the supplemental information provided with the device.

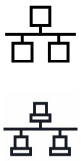
According to parameter-specific IEC 60601-2-xx and IEC 80601-2-xx series standard requirements for ESU (electrosurgical unit) tests, the equipment is protected against malfunction caused by electrosurgery.

IEC 60529

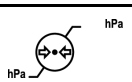
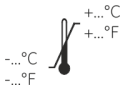
- Degree of protection against harmful ingress of water: Components not marked with an IPXn code are rated as Ordinary (no protection against fluid ingress). All other IPXn rated components have the degree of protection per the 'n' rating.
- B450: IPX1.

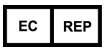
Equipment markings

The following markings 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.
	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). Located on the battery slot cover.
	Battery (monitor): The battery slot cover is open/closed.
	Battery (monitor): Test button on the battery to check the battery charge level.
	Battery.
	Communication indicator.
 (black or red)	Power indicator.
	On/standby button.

The following markings appear on one or more of the devices.	
	Standby or power indicator.
	USB connectors.
	Ethernet connectors.
	Graphical recorder.
	ePort connector.
	DVI connector. Video output connector for digital or analog source.
	Color video input. Video input connector for digital or analog source.
	Gas inlet.
	Gas outlet.
	Zero all.
IPX1	Degree of ingress protection. Degree of protection against harmful ingress of water: Components not marked with an IPX n code are rated as Ordinary (no protection against fluid ingress). All other IPXn rated components have the degree of protection per the 'n' rating. IPX1: This equipment is protected against harmful effects of dripping water per IEC 60529.
	Do not reuse.
	Use by.
	Latex-free.

The following markings appear on one or more of the devices.	
	D-fend Pro/Mini D-fend: Add date.
	Home. Return to the main display.
	Alternating current. Green symbol on the monitor front panel: the monitor is being used on mains power.
	Direct current.
	Equipotentiality. Connect device to a potential equalization conductor.
	Protective earth ground. Connectors grounded to the AC power source.
	Defibrillator synchronization connector (monitor). Not in use.
	Stacking limit by number (number varies).
 2008-06-13	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 the last two digits identify the day.
 GE Healthcare Finland Oy Kuortaneenkatu 2 FI-00510 Helsinki, Finland 2016-01-31	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.
	Manufacturer name and address.
LOT	Batch or lot number.
lbl p/n	Abbreviation for label part number.
P/N	Abbreviation for product number.
TYPE	Identifies the device type.
REF	Catalogue or orderable part number.
SN	Device serial number.
VER	Device model or type.

The following markings appear on one or more of the devices.	
UDI	Every device has a unique marking for identification. The UDI marking appears on the device label.
MD	Indicates that the product is a medical device.
CARESCAPE ECG	CARESCAPE Parameter for measuring ECG
CARESCAPE PRES	CARESCAPE Parameter for measuring invasive pressures
CARESCAPE TEMP	CARESCAPE Parameter for measuring temperature
CARESCAPE CO_2 -LoFlo	CARESCAPE Parameter for measuring CO_2 with Respironics LoFlo technology
CARESCAPE CO_2 - Microstream	CARESCAPE Parameter for measuring end-tidal carbon dioxide ($EtCO_2$), $FiCO_2$, and respiration rate with Microstream technology
CARESCAPE SpO_2	CARESCAPE Parameter for measuring SpO_2 with GE TruSignal technology
CARESCAPE SpO_2 - Masimo	CARESCAPE Parameter for measuring SpO_2 with Masimo rainbow SET technology
CARESCAPE SpO_2 - Nellcor	CARESCAPE Parameter for measuring SpO_2 with Nellcor Oximax technology
CARESCAPE rSO_2 - INVOS	CARESCAPE Parameter for measuring regional oxygen saturation of blood (rSO_2) in cerebral and somatic tissues with INVOS technology
	Mass of typical portable RGM (respiratory gas monitor) configuration. The indicated mass (12 kg in this example) varies per RGM configuration.
	Locked.
	Unlocked.
	No heavy load.
	Maximum total load.
	Atmospheric pressure limitations.
	Temperature limitations.

The following markings appear on one or more of the devices.	
	Humidity limitations.
	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.
	European authorized representative.
	Swiss authorized representative.
	European Union Conformity Mark
 	Conformity mark. Indicates that the product is certified for both the U.S. and Canadian markets, to the applicable U.S. and Canadian standards. Either of these two symbols can appear on the device.
	UK Conformity Assessed marking.
	Conformity mark. TÜV Rheinland product certification mark.
SDPPI	Indonesia only. Ministry of Telecommunication and Informatics certificate number and registrant identification.

The following markings appear on one or more of the devices.	
	Hong Kong only. Approved under Office of the TelecommunicationsAuthority (OFTA) requirements.
	FCC. USA only. Complies with applicable US government (Federal Communications Commission) radio-frequency interference regulations.
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 certified. Accredited laboratory's marking with accreditation reference replaces the OCP marking.
	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 GB/T 26572. Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the 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 markings appear on one or more of the devices.	
	This symbol indicates that this electronic information product does not contain any hazardous substance or elements above the maximum concentration value established by the Chinese standard GB/T 26572, 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.
	China only. Chinese Compulsory Certification as required by AQSIQ. Safety & EMC compliance.
	India only. Indian Conformity Assessment Certification granted by the Bureau of Indian Standards.
CMIIT ID	China only. China Ministry of Industry and Information Technology identification number for Radio Transmission Equipment Type Approval.
	Australia and New Zealand only. RCM compliance. Indicates compliance with electrical safety, EMC, electromagnetic energy, and telecommunications requirements applicable to each product.
	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. The PSE mark (Product Safety Electric Appliance and Materials) is a mandatory mark required on Electrical Appliances in Japan as authorized by the Electrical Appliance and Material Safety Law (DENAN). This mark signifies that a product complies with the law according to a set of standards for electric devices.
	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.
	Ukraine only. Mark of conformity with the Technical Regulations. This product meets the requirements of the Technical Regulations on medical devices, approved by Resolution No. 753 of the Cabinet of Ministers of Ukraine on October 2nd 2013

The following markings appear on one or more of the devices.	
	Vietnam only. MIC Vietnam/MOST Vietnam conformity mark.
	Malaysia only. Malaysian Communication and Multimedia Commission (MCMC) certification mark.
	Taiwan only. Taiwan Regulator National Communications Commission (NCC) approval mark.
	United Arab Emirates only. United Arab Emirates Telecommunications Regulatory Authority (TRA) conformity mark.
TRA RTTE	United Arab Emirates only. United Arab Emirates Telecommunications Regulatory Authority (TRA) product registration number.
Dealer ID	United Arab Emirates only. United Arab Emirates dealer number.
CNC ID	Argentina only. Argentinian Comisión Nacional de Comunicaciones (CNC) identification number.
ictQATAR	Qatar only. Supreme Council of Information and Communication Technology.
Type Approval Reg. No.	Qatar only. Supreme Council of Information and Communication Technology type approval registration number.
Importer No.	Qatar only. Importer identification number.
R-NZ	New Zealand only. Radio label for radio products not harmonized with Australia.
IFETEL	Mexico only. Instituto Federal de Telecomunicaciones or the Mexican Federal Telecommunications Institute.
IMDA	Singapore only. Info-communications Media Development Authority

Unique Device Identifier (UDI)

UDI 	Unique Device Identifier. (UDI) Every medical device has a unique marking for identification. For the UDI marking of the device, see the device labeling. For the UDI marking of the software, select ***Monitor Setup*** > ***Defaults & Service*** > ***Service***. The information is displayed on the screen. Note that this is only an example of a UDI marking. The device may have a linear barcode as in this example, or a DataMatrix code, or only alphanumeric identifiers with no barcode. Also the identifiers vary per product.

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.
- SJN14241237HA = Serial number.
- (11) = GS1 application identifier for the manufacturing date of the device.
- 150628= 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:

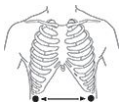
- (10) = For the device: GS1 application identifier for the batch or lot number, followed by the batch or lot number. For the software: GS1 Application identifier for the batch or lot number followed by the software version or build.
- (17) = GS1 application identifier for the expiration date of the device, followed by the expiration date.

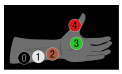
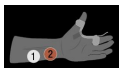
User interface indicators

The following indicators appear in the software user interface.	
	Alarm off indicator. The indicator may not display 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 indicator. Adjust the minimum alarm tone volume.
	Alarm volume adjustment for high and medium priority.
	Alarm volume adjustment for low priority.
	Audio alarms off indicator. The indicator will include a text indication of the silenced alarms: ***ECG*** (***ECG Audio Off***), ***APN*** (***Apnea Audio Off***), ***APN ECG*** (***Apnea & ECG Audio Off***), or ***ALL*** (***All Alarms Audio Off***). Also displays in the screen saver when ***Pause Monitor*** (sleep mode) or ***Pause Monitor & Central*** has been selected.

The following indicators appear in the software user interface.	
	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.
	Alarm pause indicator - Indicates that all alarms are paused. Displays in the CARESCAPE Network bed-to-bed window when no alarms are received from the remote monitor.
	Alarms audio pause indicator. Displays in the upper left corner of the alarm message and indicates that the alarm audio pause has been activated.
	Acknowledge alarms indicator. Displays in the upper right corner of the alarm message and indicates that this alarm can be acknowledged by touching the alarm message or with the pause audio key. In case there are latched alarms, they will all be acknowledged. In 12SL menu: delete.
	Low priority audio off alarm indicator. Indicates that audio indicators have been turned off for low priority alarms (visual indicators are still active).
	General warning sign. Displays when the priority setting deviates from the recommendation of international alarm safety standards.
	Information point sign. Identifies a place where information may be found.
	Reminder volume indicator. Adjust the volume of the tone that sounds every two minutes when audio alarms are turned off.
	Citrix. Access external applications.
	Touch indicator.
	Home indicator. Close all menus/applications displayed on the monitor.
	Patient indicator.
	Patient discharge indicator.
	Other patients indicator. Indicates entry to the ***Other Patients*** menu.
	Locking indicator.
	Network connection indicator. Indicates the monitor is connected to a live wired MC Network.

The following indicators appear in the software user interface.	
	Network connection and signal strength indicator. Indicates the monitor is connected to the Wireless Local Area Network (WLAN). When the icon is gray, it indicates connection to an access point. White icon and strength bars indicate connection to the MC network. The number of segments corresponds to the signal strength: the more segments, the stronger the signal. • 4 white beams: RSSI ≥ –50 dBm • 3 white beams, 1 gray beam: –71 dBm ≤ RSSI ≤ –50 dBm • 2 white beams, 2 gray beams: –80 dBm ≤ RSSI ≤ –71 dBm • 1 white beam, 3 gray beams: RSSI ≤ –80 dBm
	Monitor battery is full indicator.
	Monitor battery indicator (green). The higher the charge, the bigger the green bar within the indicator. Numbers indicate the remaining run time.
	Monitor battery (yellow). This indicator indicates the need to replace the battery.
	Monitor battery indicator (yellow). This indicator and a message indicating low battery charge appear when there is less than 20 minutes of run time left.
	Monitor battery indicator (red). This indicator and a message indicating empty battery appear when there is less than 5 minutes of run time left.
	Monitor battery is charging indicator. There is a white running bar inside the indicator.
	Monitory battery failure indicator. Indicates a missing battery or a battery failure.
	CARESCAPE ONE battery charging indicator. Indicates the battery is charging.
	CARESCAPE ONE battery gauge indicator. Indicates the charge level of the battery.
	CARESCAPE ONE battery failure indicator. Indicates the battery is not available for use.
	PDM battery charging indicator. Indicates the battery is charging.

The following indicators appear in the software user interface.	
	PDM battery gauge indicator. Indicates the charge level of the battery.
	PDM battery failure indicator. Indicates the battery is not available for use.
	CARESCAPE ONE available. Appears in the ***Continue*** or ***Select Patient and Data*** menu.
	CARESCAPE ONE not available. Appears in the ***Continue*** or ***Select Patient and Data*** menu.
	Monitor available. Appears in the ***Continue*** or ***Select Patient and Data*** menu.
	Monitor not available. Appears in the ***Continue*** or ***Select Patient and Data*** menu.
	PDM available. Appears in the ***Continue*** or ***Select Patient and Data*** menu.
	PDM not available. Appears in the ***Continue*** or ***Select Patient and Data*** menu.
	Snapshot indicator. Indicates the event has an associated snapshot.
	Red indicator (blinking) or white indicator (in the ECG Setup menu): beat source indicator.
	Respiration indicator. Indicates a breath is detected by the impedance respiration algorithm.
	Impedance respiration lead I selection indicator.
	Impedance respiration lead II selection indicator.
	Impedance respiration lead RL-LL selection indicator.
	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, Entropy, and NMT sensor impedance check passed indicator. Indicates the specified sensor passed the impedance check.

The following indicators appear in the software user interface.	
	NMT measurement error indicator. Indicates the measurement with the specified electrode has failed.
	NMT indicator: Indicates that the NMT module is connected but no sensor is connected to the NMT sensor cable.
	NMT indicator: Indicates that the ElectroSensor is connected to the NMT sensor cable.
	NMT indicator: Indicates that the MechanoSensor is connected to the NMT sensor cable.
	Post tetanic count indicator.
	Volume indicator. Adjust the volume of the tone that sounds.
	Sound volume adjustment indicator. Increasing bars indicate increase in sound volume level.
	Manual NIBP indicator. Start a manual NIBP measurement.
	NIBP Auto cycling indicator.
	Nellcor™ OxiMax™ SatSeconds™ alarm management 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 normal signal.
	NMT Stimulus beep volume indicator. Adjust the volume of the tone that sounds when a stimulus pulse is generated.
	Progress bar indicator. Indicates the amount of time remaining until the next automatic measurement.
	Refresh view indicator.
*	Required input indicator.
	12SL print indicator.

The following indicators appear in the software user interface.	
	12SL PDF Viewer: Go back one page.
	12SL PDF Viewer: Go back ten pages.
	12SL PDF Viewer: Go to the last page.
	12SL PDF Viewer: Go forward one page.
	12SL PDF Viewer: Go forward ten pages.
	12SL PDF Viewer: Go to the first page.
	12SL PDF Viewer: Fit to screen.
	12SL PDF Viewer: Zoom in.
	12SL PDF Viewer: Zoom out.

Service requirements

Follow the service requirements listed below.

- Refer servicing of the equipment to qualified service personnel only. Service personnel servicing this product must have an appropriate technical qualification, or equivalent work experience, and be familiar with the service requirements described in this manual and in any related service documentation. Service training for the product is recommended.
- 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.

WARNING PATIENT SAFETY. Do not perform any service activities on the monitor in the patient vicinity while a patient is connected to the monitor. Otherwise there is a risk of compromised patient safety.

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.

Product security

This manual contains instructions how to perform the configurations related to product security. For more information about the privacy and security considerations of the use of CARESCAPE B450, CARESCAPE B650 and CARESCAPE B850 monitors with software version 3.2, see Privacy and Security Manual.

4

Using the service applications

Introduction to the service applications

This chapter introduces the following service applications:

- CARESCAPE First Use Wizard
- CARESCAPE Service Interface
- CARESCAPE Multi Monitor Manager
- Service calibrations
- Remote service (InSite RSvP)

CARESCAPE First Use Wizard

CARESCAPE First Use Wizard opens when you turn on the patient monitor for the first time. The wizard provides you two options to set the passwords for all user accounts:

- You can activate a settings file that contains the passwords.
- You can enter the passwords manually.

The monitor will proceed to the normal monitoring screen only after the initial password setup is completed successfully.

For information about the user accounts, user privileges and password management see the Password Management section in this manual and the CARESCAPE B850, B650, B450 Privacy and Security Manual.

You can access the CARESCAPE First Use Wizard either locally at the monitor or with a service PC.

- To access CARESCAPE First Use Wizard locally, connect a USB keyboard and a USB mouse to the monitor.
- For more information on accessing CARESCAPE First Use Wizard with a service PC, see the Accessing the service applications with a service PC section.

Activating a settings file containing the passwords

Use only a settings file that has been downloaded from a monitor with CARESCAPE Software version 3.2.

Using a settings file that has been downloaded from a monitor with older monitor software will fail and the CARESCAPE First Use Wizard will open again.

1. Select ***Choose File*** under the ***Settings activation***.

2. According to your access method:
   a. If you are accessing First Use Wizard using a service PC, you can upload the settings file from any storage device connected to the service PC. Search the settings file from the destination drive and folder according to the instructions provided by the web browser. The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   b. If you are accessing First Use Wizard using the local monitor screen, you can upload the settings file from a USB flash drive:
      i. Connect the USB flash drive to one of the monitor's USB ports.
      ii. The service interface automatically detects the connected USB flash drive, searches the directory structure for files with .7z file extension, and requests the user to select the correct file.
      iii. Choose the settings file you want to activate.

      NOTE Do not disconnect the USB flash drive until the uploading is complete.
3. Enter the password that was used for encrypting the settings file.
4. Select ***Activate & Restart***.

The initial passwords setup is completed and the monitor will restart to the normal monitoring mode.

Entering passwords manually

1. Select ***Passwords*** under the ***Set passwords manually***.
2. Enter and confirm passwords for all user accounts.
3. Select ***Save & Restart***.

The initial passwords setup is completed and the monitor will restart to the normal monitoring mode.

CARESCAPE Service interface

With the CARESCAPE Service interface you can perform all the commonly needed service tasks to a single patient monitor at a time:

- Configure the platform settings of the monitor.
- Transfer settings from one monitor to another.
- Install software and software licenses.
- Retrieve system information for maintenance and troubleshooting, and access service log files.

You can access the service interface either locally at the monitor or with a service PC.

For more information on CARESCAPE B450 platform configuration, software and license management, and settings transfer, see the Configuration chapter. For information on accessing system and configuration information, troubleshooting tools, and service log files, see the Troubleshooting chapter.

For more information on the use of CARESCAPE ONE service interface, see CARESCAPE ONE Service Manual.

CARESCAPE Multi Monitor Manager

With the CARESCAPE Multi Monitor Manager you can install software and to transfer settings to multiple patient monitors at a time, over the IX Network.

For more information, see the Multi Monitor Manager appendix.

Service calibrations

With service calibrations, you can perform touchscreen, analog output, and parameter calibration. You can access these applications only locally at the monitor.

This manual only describes how to calibrate the touchscreen. For information on performing parameter and analog output calibrations, refer to the related CARESCAPE ONE, PDM or E-Module service manuals.

InSite RSvP

InSite RSvP is the GE remote service platform that provides a set of software applications to manage, diagnose and track systems at customer sites by using the Internet for secure communications between the customer's and GE's firewalls.

InSite RSvP consists of an enterprise server that resides at GE's support center, and a remote service agent that is installed to the monitor. The remote service agent can be configured and enabled using the service interface. Contact GE for more information about the InSite RSvP remote service platform.

User accounts and passwords for service applications

The patient monitor does not have any default passwords. The initial password setup must be completed using the CARESCAPE First Use Wizard when the patient monitor is turned on for the first time. Any future password changes are completed using CARESCAPE Service Interface.

You can access all the following service applications with the same *biomed* and *service* user account and password:

- CARESCAPE Service interface
- CARESCAPE Multi Monitor Manager
- Service calibrations

For an overview about the user accounts, user privileges and password management see the Password Management chapter in this manual and the CARESCAPE B850, B650 and B450 Privacy and Security Manual.

Accessing the service interface locally from the monitor

You can access the CARESCAPE B450 service interface locally from the monitor's user interface.

NOTE No local access to connected CS ONE service interface.

Tools needed:

- A USB keyboard
- A USB mouse

1. Connect the USB keyboard and the USB mouse to the monitor.
2. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Service***.
3. Type your username and password, and select ***Log in***.

   The service interface opens and defaults to the ***Information*** tab.

Accessing the service applications with a service PC

Checking the network settings of the target monitor

Check the network settings of the target CARESCAPE B450:

1. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Service***.
2. Write down the following information displayed on the login screen:
   - ***Service IP Address***
   - ***Service IP Netmask***
   - ***Network type*** (***Dual wire*** or ***Single wire***)

NOTE By factory default, the ***Network type*** is ***Dual wire***.

NOTE

- In the dual wire configuration, ***Service IP Address /Netmask*** is equal to ***IX IP Address /Netmask***.
- In the single wire configuration, ***Service IP Address /Netmask*** is equal to ***MC IP Address /Netmask***.

Configuring the network settings of the service PC

Configure your service PC to communicate with the CARESCAPE B450.

NOTE To avoid IP conflicts, ensure that no other device in the same subnet uses the same static IP address.

1. Configure the service PC to operate in the same subnet with the CARESCAPE B450 monitor's ***Service IP Address / Netmask***.

2. If you are connecting the service PC to CARESCAPE Network via a IEEE 802.1X protected network port, either enable IEEE 802.1X authentication on your service PC or utilize MAC Authentication Bypass (MAB). For more information, see CARESCAPE B850, B650, B450 Privacy and Security Manual.

Supported web browsers in service PC

The service applications have been verified to operate correctly with the following web browsers:

- Microsoft Internet Explorer version 11
- Google Chrome version 84
- Mozilla Firefox version 78

Secure access with service PC

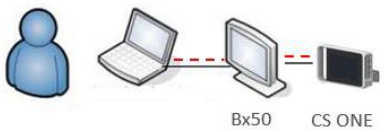
The service applications use the https protocol for secure communications between the monitor and the service PC. If a certificate recognized by the web browser running in the service PC is not installed into the monitor (web server), the web browser in the service PC will report about a certificate error and/or insecure network connection. The message shown depends on the web browser being used. The web browsers typically allow you to ignore the certificate errors and continue accessing the monitor.

By factory default, the monitor has a self-signed certificate installed by GE. To improve access security, GE recommends the responsible organization to install a valid security certificate issued by a trusted certificate authority to all the monitors. For more information, see the Certificate management section and the CARESCAPE B850, B650, B450 Privacy and Security Manual.

Accessing the service applications locally with a service PC

You can access the following service applications of either CARESCAPE B450 or CARESCAPE ONE locally with a direct cable connection from a service PC to the CARESCAPE B450:

- CARESCAPE First Use Wizard
- CARESCAPE Service Interface



NOTE This connection method is not available in dual wire configuration, if IX Network is configured to obtain IP address from a DHCP server.

Tools needed:

- a service PC
- an Ethernet crossover cable

1. Connect the service PC to the CARESCAPE B450 according to the network configuration and the selected ***Network Type***:
   - For dual wire configuration, connect the Ethernet cable to the IX connector of the monitor.
   - For single wire configuration, connect the Ethernet cable to the MC/IX connector of the monitor.
2. Configure the service PC to operate in the same subnetwork with the CARESCAPE B450. (***Service IP Address/ Netmask***).
3. Launch a web browser on the service PC.
   a. To access the CARESCAPE First Use Wizard:
      i. Type one of the following addresses in the address field of the browser according to your needs:
         - CARESCAPE 450: **https://[IP address]**
         - CARESCAPE ONE: **https://[IP address]:8081**

      NOTE **[IP address]** is the service IP address of the CARESCAPE B450. For instructions on checking this information, see the Checking the network settings of target monitor section. Port information, **:8081**, is needed as a suffix to access CARESCAPE ONE that is connected to the CARESCAPE B450.

      i. Press ***Enter***.

   b. To access the CARESCAPE Service interface, type **https://[IP address]** in the address field of the web browser and press ***Enter***:

      NOTE ***[IP address]*** is the Service IP address of the CARESCAPE B450. For instructions on checking this information, see the Checking the monitor network settings of the target monitor section.

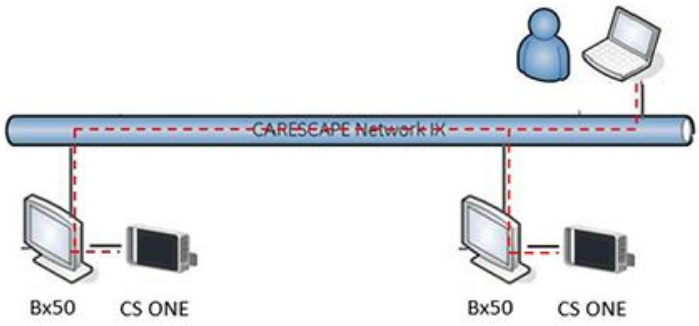
      i. To access the CARESCAPE B450 monitor's service interface: type your username and password, and select ***Log in***.

      ii. To access the CARESCAPE ONE service interface login screen, select ***Open*** on the CARESCAPE Service interface login screen. When the CARESCAPE ONE service interface login screen opens, use the username and password of the CARESCAPE ONE service interface.
      For more information about the CARESCAPE ONE service interface refer to the CARESCAPE ONE Service Manual.

Accessing the service applications over IX network with a service PC

You can access the following service applications of a CARESCAPE B450, or a connected CARESCAPE ONE, over the IX Network:

- CARESCAPE First Use Wizard
- CARESCAPE Service Interface
- CARESCAPE Multi Monitor Manager



Tools needed:

- a service PC
- Ethernet patch cable

1. Connect a service PC either to the IX wall connector (dual wire), or to the MC/IX wall connector (single wire) with an Ethernet patch cable.
2. Configure the service PC to operate in the same subnetwork with the CARESCAPE B450. (***Service IP Address*/ *Netmask***).
3. Launch a web browser on the service PC
   a. To access the CARESCAPE First Use Wizard:
      i. Type one of the following addresses in the address field of the browser according to your needs:
         - CARESCAPE 450: **https://[IP address]**
         - CARESCAPE ONE: **https://[IP address]:8081**

      NOTE **[IP address]** is the service IP address of the CARESCAPE B450. For instructions on checking this information, see the Checking the network settings of target monitor section. Port information, **:8081**, is needed as a suffix to access CARESCAPE ONE that is connected to the CARESCAPE B450.

      i. Press ***Enter***.

   b. To access the CARESCAPE Service interface, type **https://[IP address]** in the address field of the web browser and press ***Enter***:

      NOTE ***[IP address]*** is the Service IP address of the CARESCAPE B450. For instructions on checking this information, see the Checking the monitor network settings of the target monitor section.

      i. To access the CARESCAPE B450 monitor's service interface: type your username and password, and select ***Log in***.

      ii. To access the CARESCAPE ONE service interface login screen, select ***Open*** on the CARESCAPE Service interface login screen. When the CARESCAPE ONE service interface login screen opens, use the username and password of the CARESCAPE ONE service interface.
      For more information about the CARESCAPE ONE service interface refer to the CARESCAPE ONE Service Manual.

   c. For the instructions on how to access CARESCAPE Multi Monitor Manager, refer to the CARESCAPE Multi Monitor Manager appendix.

Accessing service calibrations

You can access the following service calibrations from the CARESCAPE B450 user interface:

- touchscreen calibration for B450 displays
- analog output calibration for a connected CARESCAPE ONE or a CARESCAPE PDM
- parameter calibrations for connected E-Modules, CARESCAPE PDM or CARESCAPE Parameters

1. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Service /Calibrations***.
2. Enter your username and password, and then select ***Enter***.

   The service calibrations menu opens on the monitor.

5

Pre-installation requirements

Unpacking

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 and connecting it to the power line.

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

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 distributor.

Pre-installation checklist

Before you start installing a monitor ensure the following:

- All the system components are compatible.
- The wired and wireless network infrastructure is properly installed, configured and tested.
- CARESCAPE Dock F0, CARESCAPE ONE and CARESCAPE Parameters are properly installed, configured and tested.
- Mounting solutions are properly installed.
- The Unity Network Interface Device (ID) is properly installed, configured and tested.
- The installation site meets power and environmental requirements.

System compatibility

WARNING BEFORE INSTALLATION. Compatibility is critical to safe and effective use of this device. Verify the compatibility of all system components and device interfaces, including hardware and software versions, prior to installation and use.

WARNING PATIENT SAFETY. When using any supply or accessory, make sure that you are familiar with their use to avoid any risk to the patient. For detailed instructions and information regarding supplies and accessories, always refer to their own instructions for use.

Check the compatibility of all the system components before installing the monitor.

Pay special attention before installing a new monitor to an existing CARESCAPE installation. The compatibility may vary between different hardware and software versions.

Refer to the monitor's supplemental information manual for a list of compatible devices, including acquisition modules, input-output devices, network devices, mounts and Unity Network Interface Device (ID). Refer to Unity Network Interface Device (ID) Operator's Manual to see the compatible peripheral devices that can be interfaced to the monitor via Unity Network Interface Device.

For a list of the compatible supplies and accessories, see Supplies and Accessories Supplement.

Important security information

Failure to appropriately implement Network Access Controls on the network and enable them on the monitors, and all security protections (as outlined in the CARESCAPE Network Configuration Guide, CARESCAPE Wireless Network Configuration Guide, Patient Monitoring Network Configuration Guide, and this manual) may result in risks to the functionality and performance of the monitors. As disclosed in the warning statements of these documents, this can impact patient monitoring data and functionality (for example, loss of monitoring), which could contribute to a delay in treatment or missed patient events, potentially leading to serious injury.

Checking the configuration of the wired CARESCAPE Network infrastructure

Before you connect any monitor to a wired network, ensure that the network infrastructure is properly installed, configured and tested. Refer to the CARESCAPE Network Configuration Guide, or Patient Monitoring Network Configuration Guide for details.

Contact the hospital IT for the information you need to properly connect and configure the monitor to the network, or optionally familiarize yourself with the network infrastructure design documents:

1. Check the configuration of the network infrastructure:
    a. Find out how the network infrastructure is configured at the installation site. Monitors can be configured to the MC and IX Networks either using two network interfaces (dual wire configuration) or one network interface (single wire configuration).
        - In the dual wire configuration, separate Ethernet cables connect the monitor to the MC Network and IX Network.
        - In the single wire configuration, the monitor sends MC and IX traffic onto the MC network interface. The CARESCAPE Router is responsible for passing IX traffic from the MC network onto the IX network.

b. Find out if the IEEE 802.1X port based authentication is enabled to the monitor's MC and IX network ports at the installation site. For the information needed to configure the monitor to authenticate to the network, see Configuring the wired CARESCAPE Network.

c. Refer to the following chapters in this service manual to find out the information you will need to connect and configure a monitor to operate correctly in the MC and IX Networks:

- Connecting to the CARESCAPE Network
- Configuring the wired CARESCAPE network
- Setting unit and bed name

d. Ensure that the correct wall jacks and network patch cables are in place for the required network connections.

2. Identify the needed IX Network services and the correct settings for each service:

- Certificates
- IX printing
- Citrix
- MUSE/12SL
- InSite RSvP remote service

Refer to the related configuration chapters in this manual for details of information needed.

About the monitor's MAC addresses

You can check the MAC addresses of the monitor's network interfaces on the service interface login screen:

- The ***MC MAC address*** field shows the MAC address for the ***MC/ MC/IX*** network interface. This is also the MAC address for the wireless MC network interface.
- The ***IX MAC address*** field shows the MAC address for the ***IX/ CSC*** network interface.

Checking the configuration of the wireless MC Network infrastructure

Before you connect any monitor to a wireless MC Network, ensure that the wireless network infrastructure is properly installed, configured and tested. Refer to the CARESCAPE Wireless Network Configuration Guide for details.

NOTE The IX Network is only wired.

1. Ensure that the wireless coverage area is adequate for the installation.
2. Collect the required information ready for network configurations, for details, refer to the following sections:

a. Configuring wired CARESCAPE Network.

b. Configuring wireless CARESCAPE Network.

CARESCAPE ONE installation

The CARESCAPE Dock F0, CARESCAPE ONE and CARESCAPE Parameters shall be properly mounted, installed, configured and tested as a standalone monitor according to the CARESCAPE ONE Service Manual before you connect it as an acquisition module to a monitor.

Mounting solutions

WARNING PATIENT SAFETY. Use only manufacturer specified mounts to avoid the risk of any part of the equipment falling on the patient.

GE devices provide reliable mounting attachments to the mounts listed in the supplemental information provided. Follow mount manufacturer instructions for installation and loading.

Before installing the following system components, ensure that all the needed mounting hardware is properly installed:

- CARESCAPE B450.
- CARESCAPE D19KT secondary display.
- CARESCAPE PDM.
- CARESCAPE ONE and CARESCAPE Dock F0.
- CARESCAPE RAD
- Unity Network ID connectivity device.

Unity Network Interface Device (ID)

The Unity Network Interface Device (ID) shall be properly installed, configured and tested according to the Unity Network ID Connectivity Device Service Manual before connecting it to the monitor.

Power and environmental requirements

Refer to the supplemental information manual for power and environmental requirements.

Power requirements

Ensure that the electrical installation of the relevant room complies with the requirements of the appropriate regulations.

The installation site shall have hospital-grade grounded power outlets and power cords for all system components.

Environmental requirements

WARNING INACCURATE RESULTS. Do not use or store the equipment outside the specified temperature, humidity, or altitude ranges, or outside the specified performance range. Using or storing the equipment outside the specified operating environment or outside the specified performance range may cause inaccurate results.

WARNING ERRONEOUS READINGS. Many factors may cause inaccurate readings and alarms, decreased perfusion, and or low signal strength:

- Environmental conditions:
  - Electromagnetic interference
  - Excessive ambient light
  - Electrical interference
  - Electrosurgery
  - Defibrillation - May cause inaccurate reading for a short amount of time.
  - Excessive patient/sensor motion. Artifact can simulate an SpO_2 reading, so that the device fails to sound an alarm. In order to ensure reliable patient monitoring, the proper application of the probe and the signal quality must be checked at regular intervals.

Install the monitor to a location that meets the specified environmental requirements of operating temperature, humidity and atmospheric pressure.

Place each device in a location with sufficient ventilation. Observe the ventilation openings of a device and make sure not to obstruct them.

Electromagnetic compatibility safety precautions

WARNING EQUIPMENT DAMAGE AND PATIENT SAFETY. Do not use the device in high electromagnetic fields (for example, during magnetic resonance imaging).

WARNING EMC INTERFERENCE. 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 PATIENT SAFETY. Other equipment may interfere with the system, even if that other equipment complies with CISPR emission requirements. This may lead to compromised patient safety.

WARNING 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.

WARNING DEGRADED PERFORMANCE. Do not use portable RF communications equipment (including peripherals such as antenna cables and external antennas) closer than 30 cm (12 inches) to any part of this device/system, including cables specified by the manufacturer. Otherwise, the performance of this device/system may degrade.

NOTE Electromagnetic disturbance may cause, for example, temporary loss of measurement or changes in the values or the appearance of the waveforms (such as excessive noise or a sine wave) on the CARESCAPE monitor.

Ensure that the monitor is isolated from sources of strong electromagnetic and radio frequency interference. Refer to the supplemental information manual for more information.

6

Hardware installation

Hardware installation

WARNING PERSONAL INJURY. To avoid personal injury to users or any other persons moving in the vicinity of the cables or tubing, route all cables and tubing in such a way that they do not present a tripping hazard.

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

WARNING PATIENT SAFETY. After transferring or reinstalling the device, always check that it is properly connected and all parts are securely attached. Otherwise, there may be a risk of something falling on the patient and causing injury.

WARNING PATIENT SAFETY. If the monitor or a module is dropped, have them checked by qualified service personnel before taking them back into use.

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, frames, or battery slot.

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

Installing batteries

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. The warranty can be voided if non-recommended batteries are used.

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

The batteries are shipped separately and must be installed and fully charged prior to taking into use.

This chapter includes the installation of the monitor and PDM batteries.

Refer to CARESCAPE ONE Service Manual for information about CARESCAPE ONE battery installation and maintenance.

Inserting and removing the B450 monitor battery

1. Open the battery cover by pressing the battery cover release latch down and pulling the battery door open:

The yellow warning symbol inside the battery slot door:

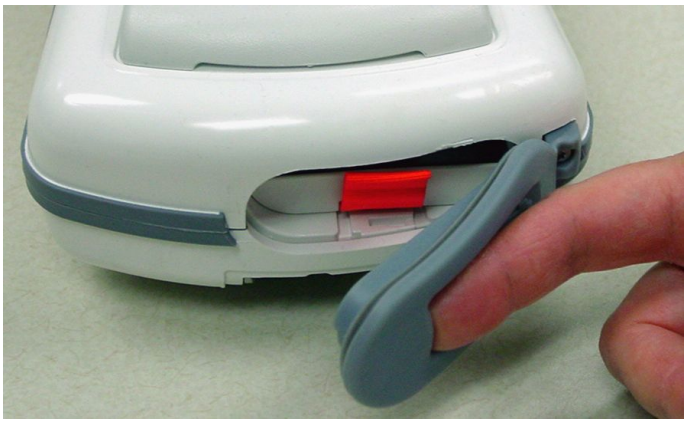
WARNING LOSS OF MONITORING. The B450 must always be used with a battery inserted. This will ensure the functioning of the monitor during possible supply mains interruptions.

2. Insert the batteries, one at a time, with the test indicator facing front and the connector end first all the way into the battery slot.
3. Close the battery door carefully.
4. To remove a battery, open the battery cover and pull the battery out from the cord.

Installing the PDM battery

NOTE: Refer to the CARESCAPE PDM Service Manual for information about PDM battery maintenance.

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 and remove the battery from the battery tray.
3. Insert the new 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.

Installing and mounting the monitor

WARNING PHYSICAL INJURY. Do not install the monitor 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 PATIENT SAFETY. Use only manufacturer specified mounts to avoid the risk of any part of the equipment falling on the patient.

WARNING EQUIPMENT DAMAGE. To prevent liquids from entering the monitor, do not tilt the monitor more than +/- 15 degrees. If the monitor is used as a stationary bedside monitor with CARESCAPE respiratory modules or PDM, do not tilt it at all. Any liquids entering these devices may damage them.

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

The monitor has an integrated GCX mounting plate to facilitate all mounting options, including mounting to the Carestation machines. Refer to the CARESCAPE Modular Monitors Mounting Solutions to identify compatible mounting hardware for the monitor. You can also place the monitor on a table or a shelf.

1. Install the monitor to the mounting hardware according to the installation instructions delivered with the mount.

Connecting a secondary display

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

WARNING PATIENT SAFETY. Use only manufacturer specified mounts to avoid the risk of any part of the equipment falling on the patient.

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.

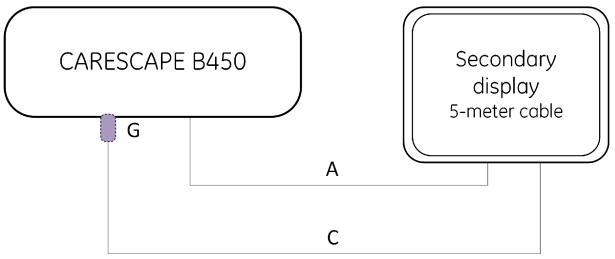
NOTE The maximum supported cable length of the USB and the display cable is 5 meters. Video signal splitters are not supported.

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

The monitor supports one secondary display, that can be either a clone or an independent, user-configurable display. The independent secondary display requires a Dual Video license.

For instructions on how to calibrate the touchscreen, see the configuration chapter.

For detailed instructions on how to adjust the display, refer to the display's user manual.



Connecting a secondary display with 1 to 5 meter cables

Cables needed:

Interface	Equip-ment ID	Equipment type	GE Part number
USB	A	USB-A to USB-B cable, length: 1, 3, or 5 meters	For a list of compatible display cables and USB cables, see Supplies and Accessories Supplement.
Video	C	DVI-D to DVI-D cable, length: 1.0, 1.8, 3.0, or 5.0 meters	
	G	DisplayPort to DVI-D Adapter, shielded, 0,2 m	2093022-001

Note the following:

- To ensure the proper operation of the touchscreen, alarm light and Trim Knob, always connect the secondary display to the dedicated USB connector marked on the rear panel.

1. To connect the secondary display:
   a. Connect a DisplayPort to DVI-D adapter (G) to the DisplayPort connector on the rear panel of the monitor.
   b. Connect a DVI-D to DVI-D cable (C) to the DisplayPort to DVI-D adapter (G) and fasten the thumb screws.
   c. Connect the DVI-D to DVI-D cable (C) to the DVI connector on display and fasten the thumb screws.
   d. Connect a USB-A to USB-B cable (A) to the marked USB connector on the monitor and to the USB Type B connector on the display.

Connecting CARESCAPE Dock F0 to an ePort connector

Ensure that the CARESCAPE Dock F0, CARESCAPE ONE and CARESCAPE Parameters are properly mounted, installed, configured and tested as a stand-alone monitor according to the CARESCAPE ONE Service Manual before connecting it as an acquisition module to the monitor.

WARNING PATIENT SAFETY. Do not use identical acquisition 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 reconnect the new module after five seconds. In some cases, using identical modules may lead to misinterpretations and therefore compromise the patient safety.

WARNING PATIENT SAFETY. Do not use the E-musb and CARESCAPE ONE simultaneously in the same monitoring system. If you are using the E-musb module, disconnect any connected CARESCAPE Parameters from the E-musb module before connecting CARESCAPE ONE to the monitor and connect them to CARESCAPE ONE instead. If E-musb and CARESCAPE ONE are both connected to the monitor, the measurement with E-musb stops. This may compromise patient safety.

CARESCAPE ONE and PDM are considered identical and should not be used simultaneously in the same monitoring system.

CARESCAPE ONE and E-musb cannot not be used simultaneously in the same monitoring system.

There are two options to connect the CARESCAPE Dock F0 to the monitor. The connection method depends on the distance between the monitor and CARESCAPE Dock F0.

Connecting CARESCAPE Dock F0 with a 1.5- or 4.5-meter cable

If a 1.5- or 4.5-meter cable is used, the host monitor provides power for the CARESCAPE ONE and charges the CARESCAPE ONE battery.

Cables needed:

- Cable assembly, ePort CARESCAPE ONE to host, 1.5 m (5 ft) or 4.5 m (15 ft)

1. Connect one end of the ePort cable to the ePort connector in the rear panel of the monitor.
2. Connect the other end of the ePort cable to the ePort connector in the CARESCAPE Dock F0.
3. Tighten the thumbscrews with a screwdriver in both ends of the cable to secure the connection.

Connecting CARESCAPE Dock F0 with a 30-meter cable

If a 30-meter cable is used, the CARESCAPE Dock F0 shall be powered by its external power supply.

NOTE With the 30-meter cable the host monitor does not provide power to the CARESCAPE ONE, or charge the CARESCAPE ONE battery. The CARESCAPE Dock F0 shall always be powered by the external power supply.

Cables needed:

- Cable assembly, ePort Ethernet CARESCAPE ONE to host, 30 m (98.5 ft)

1. Ensure the F0 frame is powered by an external power supply unit.
2. Connect the cable to the ePort connector in the CARESCAPE Dock F0.
3. Connect the other end of the cable to the ePort connector in the host monitor.
4. Tighten the cable locking screws in both ends to secure the connection.

Installing acquisition modules

WARNING PATIENT SAFETY. Do not use identical acquisition 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 reconnect the new module after five seconds. In some cases, using identical modules may lead to misinterpretations and therefore compromise the patient safety.

WARNING ERRONEOUS READINGS. Ensure that the CARESCAPE respiratory modules are in vertical position when used. Tilting them may result in erroneous readings.

- Ensure the compatibility of the acquisition modules. Refer to the supplemental information manual for a list of compatible modules.

- Ensure that there are no identical modules. Refer to the user manual to identify the acquisition modules with identical measurements.

Connecting a PDM to the B450

1. Connect a module by aligning it with the insertion guides of the docking station on the back of the monitor.
2. Push the module into the docking station until it clicks and stops.

NOTE The PDM module requires additional time to power up when used without the PDM battery. Do not interrupt the startup sequence by unplugging the PDM module.

Connecting a PDM to an ePort connector

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.

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.

WARNING PHYSICAL INJURY. For safety reasons, all connectors for patient cables and sensor leads are designed to prevent inadvertent disconnection, should someone pull on the leads. Do not route cables in a way that they may present a stumbling hazard.

WARNING EQUIPMENT DAMAGE. To avoid accidental ingress of liquids, do not tilt the PDM in any direction or mount the PDM in a vertical position with the patient cables facing up or down.

Mounting options include mounting to a bed headboard or footboard, an IV pole, or a roll stand using one of the docking stations. Mounting kits include all necessary hardware and installation instructions. Ensure that the selected PDM mount is properly installed according to the installation instruction.

Cables needed:

- Cable assembly ePort pod to host cable

For a list of compatible cables, see Supplies and Accessories Supplement.

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

Connecting E-modules to the B450

WARNING ERRONEOUS READINGS. Ensure that the CARESCAPE respiratory modules are in vertical position when used. Tilting them may result in erroneous readings.

WARNING PATIENT SAFETY. Do not use the E-musb and CARESCAPE ONE simultaneously in the same monitoring system. If you are using the E-musb module, disconnect any connected CARESCAPE Parameters from the E-musb module before connecting CARESCAPE ONE to the monitor and connect them to CARESCAPE ONE instead. If E-musb and CARESCAPE ONE are both connected to the monitor, the measurement with E-musb stops. This may compromise patient safety.

1. With the module properly oriented (module release latch facing down), align the insertion guide slot in the module with the insertion guide in the module frame.
2. Push the module into the module frame until it clicks.

Connecting to the mains power

WARNING ELECTRIC SHOCK. To avoid the risk of electric shock, use only AC power cords recommended or manufactured by GE.

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.

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 must be complied with.

WARNING ELECTRIC SHOCK. To avoid the risk of electric shock, 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 - Always connect the device power cable to a properly installed power outlet with protective earth contacts before connecting any network cables (MC and IX networks). If the integrity of the protective earth conductor is in doubt or there is no protective earth available, do not connect the monitor to the power line, but use it with the battery power instead. When using the device with battery power, do not connect the network cables. 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. The manufacturer is not responsible for damage to the device caused by an improper or a faulty power.

1. Connect the power cords to the mains power supply inlet and to a wall outlet on all system components that require AC mains power input, including:
   - the monitor
   - the optional secondary display
   - the optional Unity Network ID connectivity device
   - the optional local printer

2. Secure all power cords by routing through the retaining clips or cable clamps, as applicable.

Connecting to the CARESCAPE Network

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

Connect the monitor to the CARESCAPE Network depending on the configuration of the network infrastructure at the installation site. The following questions can help you to find the right configuration at the installation site:

- Do the Ethernet ports support dual wire or single wire connection?
- Is IEEE 802.1X port based authentication enabled or disabled?

1. Connect the cables according to the network configuration and the selected ***Network type***:
   - For dual wire configuration, connect MC Ethernet patch cable to the MC connector, and the IX Ethernet patch cable to the IX connector in the rear panel of the monitor.
   - For single wire configuration, connect MC/IX Ethernet patch cable to the MC/IX connector in the rear panel of the monitor.

Connecting a Unity Network ID connectivity device to the monitor

Install, configure and test the Unity Network ID connectivity device according to the Unity Network ID Service Manual after completing the monitor installation.

WARNING BEFORE INSTALLATION. Compatibility is critical to safe and effective use of this device. Verify the compatibility of all system components and device interfaces, including hardware and software versions, prior to installation and use.

1. Connect a Unity Network ID connectivity device to the Ethernet connector labelled “ID” in the rear panel of the monitor.

Connecting USB input devices

WARNING EQUIPMENT DAMAGE. Use only washable keyboard with at least IPX1 protection against ingress of water. Other types of keyboards may get damaged by water during cleaning.

NOTE To ensure the proper operation of the touchscreen, alarm light and Trim Knob, always connect the secondary display to the dedicated USB connector marked on the rear panel of the monitor.

NOTE The maximum output voltage and the current of the USB port that is reserved mainly for the secondary display is limited to 5 V / 100 mA. Therefore, this USB port may not provide enough power for some USB devices. All the other USB ports provide 5 V / 500 mA.

1. Connect the following devices to the USB ports in the rear panel of the monitor or at the bottom of a secondary display:
   - keyboard
   - mouse
   - remote control
   - barcode reader

Connecting iCollect and other data acquisition systems

You can connect iCollect and other data acquisition systems to one of the USB connectors of the monitor.

Cables needed:

- 1 or 2 USB to serial converter
- PC serial interface cable, 881167

1. Connect a USB to serial Converter to one of the USB connectors of the monitor.
2. Connect the converter to the PC serial interface cable.
3. Connect the other end of the PC serial cable to the PC. Use another USB to serial converter, if needed.

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

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

Connecting a local printer

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.

WARNING EXCESSIVE LEAKAGE CURRENT. Laser printers are not IEC 60601-1 certified equipment and 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 clause 16 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. Consult your local service representative before installing a laser printer.

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.

Cables needed:

- Ethernet crossover cable

You can connect a local laser printer directly to the monitor's IX connector with a crossover cable if the selected ***Network type*** is ***Dual wire*** and the monitor is not connected to the IX Network. The monitor considers a local printer to be an IX printer.

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

Connecting to CARESCAPE RAD

Cables needed:

- USB-A to USB-B cable

For a list of compatible cables, see Supplies and Accessories Supplement.

1. Connect the USB cable of the CARESCAPE RAD to one of the USB connectors in the rear panel of the monitor.

Install, configure, and test the CARESCAPE RAD according to the CARESCAPE RAD Service Manual after completing the monitor installation.

Connecting a remote-on cable

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

NOTE Remote-on connection is possible only if the anesthesia workstation supports this feature. Refer to the anesthesia workstation documentation for details.

Cables needed:

- remote-on cable

1. Connect the remote-on cable to the remote-on connector in the rear panel of the monitor.
2. Connect the other end of the remote-on cable to the related connector on the anesthesia workstation.

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

7

Configuration

Platform configuration

The configuration of a monitor consists of platform configuration and clinical configuration.

This chapter describes:

- The platform configuration needed before taking the monitor into use for the first time.
- The configuration tasks needed for administration and maintenance.

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

Adjusting display

Setting up the displays

With the Dual video license enabled, the user can select the screen where menus, alarms and Citrix applications are shown, and the size of the Citrix application.

1. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup***.
2. Enter your user name and password, and select ***Enter***.
3. Select ***Care Unit Settings*** > ***Screens***.

Refer to the monitor's user manual for detailed information on how to set up the screens.

Adjusting the display brightness automatically

With the automatic adjustment, the brightness of the primary display is automatically set according to the ambient light.

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Brightness***.
2. Select the radio button for ***Automatic*** adjustment.

Adjusting the display brightness manually

With the manual adjustment, you can set the brightness level of the primary display according to your needs.

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Brightness***.
2. Select the radio button for ***Manual*** adjustment.
3. Select ***Display %*** and adjust the display brightness in the range of 30% to 100%.

Adjusting the alarm light brightness

You can set the brightness of the alarm light on the monitor according to your needs.

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Brightness***.
2. Select ***Alarm Light %*** and adjust the brightness.

Adjusting the secondary display

If needed, adjust the display's brightness and picture using the display's OSD menu. For more information, refer to the display's user documentation.

Calibrating touchscreen

The touchscreen of the integrated primary display has been calibrated in the factory. Re-calibration may be needed after replacing the CPU assembly or the touchscreen sensor.

The calibration data of the connected secondary display is saved in the monitor CPU assembly. Calibration may be needed when changing the connected display or after replacing the monitor CPU assembly.

If needed, calibrate a touchscreen as follows:

NOTE Touchscreen calibration is only available if the monitor is in a patient discharged/case end state.

1. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Service /Calibrations***.
2. Enter the username and password, and then select ***Enter***.
3. In the ***Service /Calibrations*** menu, select the touchscreen to calibrate:
   a. To calibrate the touchscreen of the primary display, select ***Touch Screen***.
   b. To calibrate the touchscreen of the optional secondary display, select ***Secondary Touch Screen***.

   The Touch calibration screen opens.
4. Touch the cross hairs (+) on the screen one by one until you have touched all three cross-hairs.

   The calibration is now completed, and the touchscreen calibration window will close. The touchscreen calibration data for the display will be saved to the permanent memory of the monitor.

Configuring wired CARESCAPE network

Configuring the hostname

The hostname is a unique identifier of a monitor in the network. The factory default value for the hostname is the Serial Number of the monitor.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Network*** > ***Configuration***.
3. Enter the ***Hostname*** following these rules:
   - Use alphanumeric characters A-Z, a-z, 0-9.
   - You may also use characters "-" and "_", but not in the beginning or in end of the hostname.
   - The hostname must be 4 to 32 characters long.
4. Select ***Save***.

The change will take effect immediately.

Wired LAN Certificate Management

The IEEE802.1X port based authentication supports the use of a CA certificate to control access to wired MC and/or IX Networks. If CA certificate is in use, you must first upload it to the monitor before you can select it. Certificate can be in PEM or DER format.

Uploading certificates

1. Log in to the service interface.
2. Select ***Configuration*** > ***Network***.
3. Select ***Certificate Management***.
4. In ***Upload Certificate***, select the CA certificate and select ***Upload***.
5. According to your service interface access:
   a. If you are using a service PC, you can upload the certificate from any storage device connected to the service PC:
      i. Search the Certificate file from the destination drive and folder according to the instructions provided by the web browser.
      The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   b. If you are using the local, integrated service interface, you can upload the certificate from a USB flash drive that is connected to one of the monitor's USB ports.
      i. The service interface automatically detects a connected USB flash drive and requests the user to select the correct file.
      ii. Choose the Certificate file you want to upload.

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

The configuration changes take effect immediately.

Deleting certificates

Note that you cannot delete a certificate or a key, if it is currently in use.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Network***.

3. Select ***Certificate Management***.
4. In ***Delete Certificate***, select the CA certificate and select ***Delete***.

The selected certificate is permanently deleted.

Wired CARESCAPE Network configuration

The configuration of the wired CARESCAPE Network depends on how the network infrastructure has been configured at the installation site:

- In the dual wire configuration, MC and IX network traffic flows through two separate network interfaces, the **MC** and **IX** ports. Therefore, you need to configure two network interfaces, **MC** port for the MC Network and **IX** port for IX Network.
- In the single wire configuration, MC and IX network traffic flows through a single physical network interface, the **MC/IX** port. Therefore, you need to configure only the **MC/IX** network interface to support both the MC and IX Network communication.

Contact the hospital IT for the information you need to properly connect and configure the monitor to the network, or optionally familiarize yourself with the network infrastructure design documents.

NOTE The following IP addresses are reserved and not valid: 127.0.0.0/8, 172.16.254.254/32, 172.16.255.255/32, 172.18.254.254/32, 172.18.255.255/32, 192.168.249.0/24, 192.168.250.0/24, 192.168.252.0/24, 192.168.253.0/24.

Selecting the network type

1. Log in to the service interface.
2. Select ***Configuration*** > ***Network*** > ***Configuration***.
3. According to the network configuration used at the installation site, select ***Network Type***: ***Dual wire*** or ***Single wire***.

Configuring the dual wire network

1. To configure the MC Network, configure the following settings in the ***MC Network*** area below ***Network***:
   a. Enter a ***Static IP*** address.
   b. Enter a valid ***Netmask***.
   c. If IEEE 802.1X port based authentication is in use for accessing the MC Network, continue as instructed in the Configuring IEEE 802.1X port based authentication section. Otherwise, proceed to the next step.

2. To configure the (optional) IX Network, configure the following settings in the ***IX Network*** area below ***Network***:
   a. Select ***DHCP*** (if dynamic IP address is used) or ***Manual Configuration*** (if static IP address is used).

      If you select ***DHCP***, the following are obtained automatically from the DHCP server: ***Static IP*** address, ***Netmask***, and ***Default Gateway***.

      If you select ***Manual Configuration***:

      i. Enter a ***Static IP*** address.

      ii. Enter a valid ***Netmask***.

      iii. Optional: Enter the IP address of the ***Default Gateway*** between the IX Network and the hospital network.

   b. Enter the IP address for the ***DNS Server 1***. You can also leave the ***DNS Server 1*** field empty, if DNS servers are not in use or if DNS server addresses are provided by the DHCP server.

   c. To configure additional DNS servers, select ***Add DNS server*** and enter the IP address for the DNS Server.

      You can configure up to 3 DNS servers manually.

   d. If IEEE 802.1X port based authentication is in use for accessing the IX Network, continue as instructed in the Configuring IEEE 802.1X port based authentication section. Otherwise, proceed to the next step.
3. Select ***Save***.

The change will take effect after the next monitor restart.

Configuring the single wire network

1. Configure the following settings in the ***MC Network*** area below ***Network***:
   a. Enter a ***Static IP*** address.

   b. Enter a valid ***Netmask***.

   c. Optional: Enter the IP address of the ***Default Gateway*** between the IX Network and the hospital network.

   d. Enter the IP address for the ***DNS Server 1***.

      You can configure up to 3 DNS servers manually. You can also leave the ***DNS Server 1*** field empty, if DNS servers are not in use.

   e. To configure additional DNS servers, select ***Add DNS Server*** and enter the IP address for the DNS Server.
2. If IEEE 802.1X port based authentication is in use for accessing the MC and IX Network, continue as instructed in the Configuring IEEE 802.1X port based authentication section. Otherwise, proceed to the next step.
3. Select ***Save***.

The change will take effect after the next monitor restart.

Configuring the IEEE 802.1X port based authentication

If IEEE 802.1X port based authentication is in use for accessing the network, configure the following settings.

1. Select the ***802.1X Authentication*** radio button.
2. For the ***EAP Method***, select one of the following:
   - ***TLS***
   - ***TTLS-MSCHAPV2***
   - ***PEAP-MSCHAPV2***
   - ***PEAP-GTC***

   The following table shows which additional settings you must configure, depending on the selected ***EAP Method***:

Setting	TLS	TTLS-MSCHAPV2	PEAP-MSCHAPV2	PEAP-GTC
CA Certificate	Recommended	Recommended	Recommended	Recommended
Client Certificate	Yes, if not included in the Private Key	No	No	No
Private Key	Yes	No	No	No
Private Key Password	Optional	No	No	No
Identity	Optional	Yes	Yes	Yes
Password	No	Yes	Yes	Yes
Anonymous Identity	No	Optional	Optional	Optional

3. Select which ***CA Certificate*** is used.

   Before selecting the CA certificate, you must upload it to the monitor in ***Configuration*** > ***Network*** > ***Certificate Management***. Using CA certificate is highly recommended for improved security.

4. Select which ***Client Certificate*** is used.

   Before selecting the client certificate, you must upload it to the monitor in ***Configuration*** > ***Network*** > ***Certificate Management***. The client certificate is only required if the selected EAP method is TLS and it is not included in the private key.

5. Select which ***Private Key*** is used.

   Before selecting the private key, you must upload it to the monitor in ***Configuration*** > ***Network*** > ***Certificate Management***. The private key is required if the selected EAP method is TLS. If a p12 package is used as a private key, it contains both the private key and the client certificate, and you can leave the client certificate selection empty.

6. Enter the ***Private Key Password***.

   A valid private key password must contain from 0 to 255 visible (printable) ASCII characters. Select ***Help*** to see the complete list of allowed characters.

7. Enter the ***Identity***.

   A valid identity string must contain:

   - With ***TLS*** as ***EAP Method***: from 0 to 255 visible ASCII characters
   - With any other supported ***EAP Method***: from 1 to 255 visible ASCII characters
   - Select ***Help*** to see the complete list of allowed characters.

8. Enter the ***Password***.

   A valid password must contain from 1 to 255 visible ASCII characters. The password is required by all other supported EAP methods except TLS. Select ***Help*** to see the complete list of allowed characters.

9. Enter the ***Anonymous Identity***.

   The anonymous identity is used as the unencrypted identity with EAP types that support a different tunneled identity. A valid anonymous identity string must contain from 0 to 255 visible ASCII characters, it is optional, and it is supported by all other EAP Methods except TLS. Select ***Help*** to see the complete list of allowed characters.

10. For dual wire configuration: perform steps 2-9 for the MC Network and (if used) the IX Network.

11. Select ***Save***.

The change will take effect after the next monitor restart.

Wireless CARESCAPE network configuration

Before you connect a monitor to a wireless MC Network, ensure that the wireless network infrastructure is properly installed, configured, and tested. Refer to the CARESCAPE Wireless Network Configuration Guide for details. Contact the hospital IT for the information you need to properly configure the monitor for the wireless network.

NOTE The monitor supports wireless communication for MC Network services only. The IX Network services require wired network connection.

Introduction to WLAN configuration

The monitor runs wireless supplicant software, wpa_supplicant, to handle the authentication process for a secure network, take care of data encryption, and manage roaming between access points.

To configure the wpa_supplicant, you can enter the different parameters manually or upload a wpa_supplicant custom configuration file. To access the WLAN settings of the monitor, log into the service interface and select ***Configuration*** > ***WLAN***. The following menus are shown:

- ***Basic Configuration*** This is the main menu for the wireless configuration. It allows you to configure most of the parameters you need to set up the monitor as a wireless client. The configuration steps depend on the selected ***Configuration Type*** (***Standard*** or ***Custom File***) and the ***Security Mode*** (WPA-Personal or WPA-Enterprise) used in the wireless network:
  - Configuring WLAN settings manually using WPA-Personal (88): Follow these instructions if the monitor operates in a wireless network that does not require the use of an authentication server.
  - Configuring WLAN settings manually using WPA-Enterprise (90): Follow these instructions if the monitor operates in a wireless enterprise network that requires the use of an authentication server. The supported EAP methods are TLS, TTLS-MSCHAPV2, PEAP-MSCHAPV2, and PEAP-GTC.

  - Configuring WLAN settings by uploading a custom configuration file (92): This alternative configuration method provides you a more customized way to configure the wpa_supplicant, allowing the use of additional configuration parameters.

- ***Channel Selection***: The monitor supports IEEE 802.11d specifications. By factory default, all possible wireless channels are enabled. This means that the monitor can use any of the wireless channels that are allowed in your country and supported by the selected ***Frequency Band*** (2.4 and/or 5.1 GHz). Use this submenu only if you need to restrict the wireless channels that are allowed. GE Healthcare recommends that you use the default channel selection unless otherwise specified in the wireless network design.
- ***Certificate Management***: Use this submenu to upload certificates and/or private keys required by the supported EAP methods, or to remove unused certificates and/or private keys. You must upload the required certificates and private keys before you configure the WPA-Enterprise manually or upload the wpa_supplicant custom configuration file.
- ***Advanced Settings***: Use this submenu to change the ***RTS*** and ***Fragmentation Thresholds*** and configure the ***Quality of Service DSCP Settings***. GE Healthcare recommends that you use the factory default values for all these settings unless otherwise specified in the wireless network design.

Configuring WLAN settings manually using WPA-Personal

WPA-Personal (also called WPA-PSK) security method is intended for wireless networks that do not require the use of an authentication server.

1. Log in to the service interface.
2. Select ***Configuration*** > ***WLAN***.
3. Select ***Basic Configuration***.
4. Select ***Configuration Type***: ***Standard***.
5. Select ***WLAN Radio***: ***Enabled***.

   You must set the WLAN module to ***Enabled*** to access the WLAN configuration and enable wireless communication.
6. Select which ***Frequency Band*** is used.

Frequency Band	Related standard
2.4 GHz	IEEE 802.11b
	IEEE 802.11g
5.1 GHz	IEEE 802.11a
All Band 2.4 & 5.1 GHz (default)	IEEE 802.11n

7. Select which ***Roaming Tendency*** is used.

   This setting is also known as roaming aggressiveness or roaming sensitivity. Roaming tendency specifies how much better the signal quality provided by another access point must be to cause the monitor to roam to it.

Roaming Tendency	Threshold and background scanning frequency
Off	Roaming is disabled.
Low	If RSSI > -65 dBm: scan once every 5 seconds If RSSI < -65 dBm: scan once every 2 seconds
Medium	If RSSI > -55 dBm: scan once every 5 seconds If RSSI < -55 dBm: scan once every 2 seconds
High (default)	If RSSI > -45 dBm: scan once every 5 seconds If RSSI < -45 dBm: scan once every 2 seconds

   Configure the roaming settings according to the WLAN infrastructure. Incorrect configuration may cause non-optimal roaming. For more information, refer to the wireless network infrastructure design documentation, and the CARESCAPE Wireless Network Configuration Guide.

8. Enter the ***SSID*** (Service Set Identifier).

   A valid SSID must contain from 1 to 32 printable and case-sensitive 7-bit ASCII characters. Special characters or international characters are not accepted. Select ***Help*** to see the complete list of allowed characters.

9. Select which ***Security Mode*** is used.
   - ***WPA-Personal***: WPA represents an older security protocol that replaced WEP.
   - ***WPA2-Personal***: WPA2 (IEEE 802.11i) is the security protocol that is typically used in wireless networks.

10. Select which ***Encryption*** method is used.
    - ***TKIP***: TKIP is typically used as the encryption protocol with WPA.
    - ***CCMP***: CCMP, also known as AES-CCMP, is a stronger encryption protocol that is typically used with WPA2.

11. Enter the ***Pre-Shared Key***.

    A valid pre-shared key must contain from 8 to 63 printable and case-sensitive 7-bit ASCII characters or, alternatively, 64 hexadecimal digits:
    - The ASCII characters must not include special characters or international characters. Select ***Help*** for a complete list of allowed characters.
    - The hexadecimal characters can only include numbers 0-9 and letters A-F.

12. According to the WLAN infrastructure, enable (recommended, default) or disable ***802.11r fast transition***

    IEEE 802.11r or fast BSS transition (FT), also called fast roaming, permits continuous connectivity of wireless mobile devices. It provides fast and secure handoffs from one access point to another.
    - If the network infrastructure does not support fast BSS transition, it must be disabled.

13. Select ***Save***.

The configuration changes take effect immediately.

Configuring WLAN settings manually using WPA-Enterprise

WPA-Enterprise (also called WPA 802.1X mode) security method is intended for wireless enterprise networks and requires the use of an authentication server.

1. Log in to the service interface.
2. Select ***Configuration*** > ***WLAN***.
3. Select ***Basic Configuration***.
4. Select ***Configuration Type***: ***Standard***.
5. Select ***WLAN Radio***: ***Enabled***.

   You must set the WLAN radio to ***Enabled*** to access the WLAN configuration and to enable wireless communication.
6. Select which ***Frequency Band*** is used.

Frequency Band	Related standard
2.4 GHz	IEEE 802.11b
	IEEE 802.11g
5.1 GHz	IEEE 802.11a
All Band 2.4 & 5.1 GHz (default)	IEEE 802.11n

7. Select which ***Roaming Tendency*** is used.

   This setting is also known as roaming aggressiveness or roaming sensitivity. Roaming tendency specifies how much better the signal quality provided by another access point must be to cause the monitor to roam to it.

Roaming Tendency	Threshold and background scanning frequency
Off	Roaming is disabled.
Low	If RSSI > -65 dBm: scan once every 5 seconds If RSSI < -65 dBm: scan once every 2 seconds
Medium	If RSSI > -55 dBm: scan once every 5 seconds If RSSI < -55 dBm: scan once every 2 seconds
High (default)	If RSSI > -45 dBm: scan once every 5 seconds If RSSI < -45 dBm: scan once every 2 seconds

   Configure the roaming settings according to the WLAN infrastructure. Incorrect configuration may cause non-optimal roaming. For more information, refer to the wireless network infrastructure design documentation, and the CARESCAPE Wireless Network Configuration Guide.
8. Enter the ***SSID*** (Service Set Identifier).

   A valid SSID must contain from 1 to 32 printable and case-sensitive 7-bit ASCII characters. Special characters or international characters are not accepted. Select ***Help*** to see the complete list of allowed characters.

9. Select which ***Security Mode*** is used.
   - ***WPA-Enterprise***: WPA represents an older security protocol that replaced WEP.
   - ***WPA2-Enterprise***: WPA2 (IEEE 802.11i) is the security protocol that is typically used in wireless networks.
10. Select which ***Encryption*** method is used.
    - ***TKIP***: TKIP is typically used as the encryption protocol with WPA.
    - ***CCMP***: CCMP, also known as AES-CCMP, is a stronger encryption protocol that is typically used with WPA2.
11. Select which ***EAP Method*** is used.

    The following EAP methods are supported:
    - ***TLS***
    - ***TTLS-MSCHAPV2***
    - ***PEAP-MSCHAPV2***
    - ***PEAP-GTC***

    The following table shows which additional WLAN settings you must configure, depending on the selected ***EAP Method***:

Setting	TLS	TTLS-MSCHAPV2	PEAP-MSCHAPV2	PEAP-GTC
CA Certificate	Recommended	Recommended	Recommended	Recommended
Client Certificate	Yes, if not included in the Private Key	No	No	No
Private Key	Yes	No	No	No
Private Key Password	Optional	No	No	No
Identity	Optional	Yes	Yes	Yes
Password	No	Yes	Yes	Yes
Anonymous Identity	No	Optional	Optional	Optional

12. Select which ***CA Certificate*** is used.

    Before selecting the CA certificate, you must upload it to the monitor in ***Configuration*** > ***WLAN*** > ***Certificate Management***. Using CA certificate is highly recommended for improved security.
13. Select which ***Client Certificate*** is used.

    Before selecting the client certificate, you must upload it to the monitor in ***Configuration*** > ***WLAN*** > ***Certificate Management***. The client certificate is only required if the selected EAP method is TLS and it is not included in the private key.
14. Select which ***Private Key*** is used.

    Before selecting the private key, you must upload it to the monitor in ***Configuration*** > ***WLAN*** > ***Certificate Management***. The private key is required if the selected EAP method is TLS. If a p12 package is used as a private key, it contains both the private key and the client certificate, and you can leave the client certificate selection empty.

15. Enter the ***Private Key Password***.

    A valid private key password must contain from 0 to 255 visible (printable) ASCII characters. Select ***Help*** to see the complete list of allowed characters.

16. Enter the ***Identity***.

    A valid identity string must contain:

    - With ***TLS*** as ***EAP Method***: from 0 to 255 visible ASCII characters
    - With any other supported ***EAP Method***: from 1 to 255 visible ASCII characters
    - Select ***Help*** to see the complete list of allowed characters.

17. Enter the ***Password***.

    A valid password must contain from 1 to 255 visible ASCII characters. The password is required by all other supported EAP methods except TLS. Select ***Help*** to see the complete list of allowed characters.

18. Enter the ***Anonymous Identity***.

    The anonymous identity is used as the unencrypted identity with EAP types that support a different tunneled identity. A valid anonymous identity string must contain from 0 to 255 visible ASCII characters, it is optional, and it is supported by all other EAP Methods except TLS. Select ***Help*** to see the complete list of allowed characters.

19. Enable (recommended, default) or disable ***802.11r fast transition***.

    IEEE 802.11r or fast BSS transition (FT), also called fast roaming, permits continuous connectivity of wireless mobile devices. It provides fast and secure handoffs from one access point to another.

20. Enable or disable ***Fast reauthentication***.

    Fast reauthentication is an optional feature that is based on keys derived upon a previous full authentication exchange. The monitor caches the keys from previous authentication and uses those when authenticating with a new AP.

21. Select ***Save***.

The configuration changes take effect immediately.

Configuring WLAN settings by uploading a custom configuration file

You can also configure the wpa_supplicant in a more customizable way with additional configuration parameters. If you select ***Custom*** as the ***Configuration Type***, you need a wpa_supplicant custom configuration file. Test the wpa_supplicant custom configuration file first in a Linux system to verify that the file is functional and to troubleshoot possible problems. The monitor does not support extensive logging for debugging output from the wpa_supplicant file.

For a list of possible parameters, refer to the wpa_supplicant configuration file at https://w1.fi/cgit/hostap/plain/wpa_supplicant/wpa_supplicant.conf.

- You must install the certificates and private keys required by the selected EAP method in ***Configuration*** > ***WLAN*** > ***Certificate Management***.
- Certificate and private key file paths are adjusted automatically to match filenames in configuration file.

The following is an example config file for using EAP-TLS:

```
network={
   ssid="EAP-TLS"
   key_mgmt=WPA-EAP
   eap=TLS
   identity="b450"
   ca_cert="ca.pem"
   client_cert="client.pem"
   private_key="client.key"
   private_key_passwd="B450"
   proto=WPA2
   pairwise=CCMP

   group=CCMP
   scan_ssid=1
}
```

To upload a wpa_supplicant custom configuration file:

1. Log in to the service interface.
2. Select ***Configuration*** > ***WLAN***.
3. Select ***Basic Configuration***.
4. Select ***Configuration Type***: ***Custom***.
5. Select ***WLAN Radio***: ***Enabled***.

   You must set the WLAN module to ***Enabled*** to access the WLAN configuration and enable wireless communication.
6. If the selected EAP method needs certificates/keys, upload the certificates in ***Configuration*** > ***WLAN*** > ***Certificate Management***.
7. In ***Custom Configuration***, select the file that you want to upload.

   According to your service interface access:

   - If you are using a service PC, you can upload the wpa_supplicant file from any storage device connected to the service PC.
     i. Search for the file from the destination drive and folder according to the instructions provided by the web browser.
     The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   - If you are using the local, integrated service interface: you can upload the wpa_supplicant file from a USB flash drive that is connected to one of the monitor's USB ports.
     i. The service interface automatically detects a connected USB flash drive, searches the .conf files, and requests the user to select the correct file.
     ii. Choose the file you want to upload.

     NOTE Do not disconnect the USB storage device until uploading is complete.
8. Select ***Save***.

The configuration changes take effect immediately.

NOTE To configure ***Roaming Tendency***, select ***Configuration*** > ***WLAN*** > ***Advanced Settings*** menu.

Configuring channel selection

The monitor supports IEEE 802.11d specification. By factory default, all possible wireless channels are enabled. This means that the monitor can use any of the wireless channels allowed in your country and supported by the selected ***Frequency Band*** (2.4 and/or 5.1 GHz).

NOTE The range of 802.11b/g and 802.11a channels allowed for use in a given country are limited by 802.11d. If 802.11d is not in use, the monitor will be in World Mode.

You can disable the use of individual WLAN channels. This may improve roaming performance and prevents monitor from scanning disabled channels.

To change the default channel selections:

1. Log in to the service interface.
2. Select ***Configuration*** > ***WLAN***.
3. Select ***Channel Selection***.
4. For each individual WLAN channel, select or deselect the ***Enabled*** check box.

   You can also select ***Enable All*** or ***Disable All***.
5. Select ***Save***.

The configuration changes take effect immediately.

NOTE If the ***Channel information unavailable*** text appears, the WLAN DIP switches are in the OFF position. To access Channel Selection, set the WLAN DIP switches on the CPU carrier board to the ON position.

WLAN certificate management

In the ***Certificate Management*** menu, you can upload and delete the following:

- CA certificate
- client certificate
- private key

The required certificates and/or private keys depend on the selected EAP method. You must upload the certificates and/or private key before you configure the WLAN settings manually with the WPA-Enterprise security method or upload the wpa_supplicant custom configuration file.

Private keys can be either encrypted or unencrypted. Private keys and certificates can be in PEM or DER format, or you can combine private key and certificate in a p12 package.

Uploading certificates and private keys

1. Log in to the service interface.
2. Select ***Configuration*** > ***WLAN***.

3. Select ***Certificate Management***.
4. In ***Upload Certificate***, select the CA certificate, client certificate or private key file that you want to upload and select ***Upload***.

   According to your service interface access:

   - If you are using a service PC, you can upload the certificate or the key file from any storage device connected to the service PC.
     i. Search for the file from the destination drive and folder according to the instructions provided by the web browser.
     The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   - If you are using the local, integrated service interface: you can upload the certificate or the key file from a USB flash drive that is connected to one of the monitor's USB ports.
     i. The service interface automatically detects a connected USB flash drive and requests the user to select the correct file.
     ii. Choose the file you want to upload.

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

The configuration changes take effect immediately.

Deleting certificates and private keys

You cannot delete a certificate or a key that is currently in use.

1. Log in to the service interface.
2. Select ***Configuration*** > ***WLAN***.
3. Select ***Certificate Management***.
4. In ***Delete Certificate***, select the CA certificate, client certificate or private key file that you want to delete and select ***Delete***.

The selected certificate or private key is permanently deleted.

Configuring advanced WLAN settings

In the ***Advanced Settings*** menu, you can change the RTS and Fragmentation Threshold and configure the Quality of Service DSCP (Differentiated Services Code Point) settings:

- Changing the default RTS and Fragmentation Threshold values may resolve issues with unreliable wireless network.
- DSCP settings provide Quality of Service (QoS) features by prioritizing network traffic by traffic type. Traffic classification is carried out by placing each data packet into a limited number of traffic classes.

GE Healthcare recommends that you use the factory default values for all these settings unless otherwise specified in the wireless network design.

NOTE If the selected ***Configuration Type*** is ***Custom***, ***Roaming Tendency*** is configured in this menu.

To change the default values:

1. Log in to the service interface.
2. Select ***Configuration*** > ***WLAN***.
3. Select ***Advanced Settings***.
4. Enter the ***RTS Threshold*** value to be used.

   RTS Threshold specifies the maximum number of bytes a packet can contain before the request to send/clear to send (RTS/CTS) is enabled. A valid RTS Threshold is a numeric value within the range of 0 to 2347. Use the default RTS Threshold value (2347) unless otherwise specified in the wireless network design.
5. Enter the ***Fragmentation Threshold*** value to be used.

   Fragmentation Threshold specifies the maximum size of a packet that a wireless device can send 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 (2346) unless otherwise specified in the wireless network design.
6. Check the ***Quality of Service DSCP Settings*** for different types of network traffic and change them only if needed.

   The default values are:

   - ***Real Time Clinical Traffic*** (for example, waveforms and parameters): 48
     The valid DSCP range is 48-63.
   - ***Non-Real Time Clinical Traffic*** (for example, trends, full disclosure, and printing): 0
     The valid DSCP range is 0-7.
   - ***Non-Real Time Non-Clinical Traffic*** (for example, InSite RSvP, and service traffic): 8
     The valid DSCP range is 8-23.
7. Select which ***Roaming Tendency*** is used.

   This setting is also known as roaming aggressiveness or roaming sensitivity. Roaming tendency specifies how much better the signal quality provided by another access point must be to cause the monitor to roam to it.

Roaming Tendency	Threshold and background scanning frequency
Off	Roaming is disabled.
Low	If RSSI > -65 dBm: scan once every 5 seconds If RSSI < -65 dBm: scan once every 2 seconds
Medium	If RSSI > -55 dBm: scan once every 5 seconds If RSSI < -55 dBm: scan once every 2 seconds
High (default)	If RSSI > -45 dBm: scan once every 5 seconds If RSSI < -45 dBm: scan once every 2 seconds

   Configure the roaming settings according to the WLAN infrastructure. Incorrect configuration may cause non-optimal roaming. For more information, refer to the wireless network infrastructure design documentation, and the CARESCAPE Wireless Network Configuration Guide.
8. Select ***Save***.

The configuration changes take effect immediately.

Configuring date and time

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 the service interface.
2. Select ***Configuration*** > ***Time***.

   The ***Time Configuration*** window displays.
3. ***Clock type***, select the type from the drop-down list:
   a. Select either ***12 Hours*** or ***24 Hours***.
   b. Select ***Save***.
4. ***Configure Date and Time***, enter the local date and time:
   a. To automatically fill in the current date and time, select the ***Fill with current monitor time*** button.

      The current date and time will be filled into the data fields.
   b. To manually enter the date and the time, enter the following information:
      - ***Date***: use **YYYY-MM-DD** date format.
      - ***Time***: use **HH:MM:SS** time format.
      - ***AM/PM***: This applies when the clock type is set to ***12 Hours***.
   c. Select ***Save***.
5. ***Configure UTC Offset***: Select the Coordinated Universal Time (UTC).

   NOTE
   - The UTC Offset configuration applies only to the communication with a Citrix server. It does not affect the date and time of the monitor's real-time clock.

   a. Select the local UTC Offset setting from the drop-down list.
   b. Select ***Save***.

The manual time configuration takes effect immediately.

Setting unit and bed name

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

NOTE All the monitors and central stations that are connected to the same care unit in the MC Network must have the same unit name. Bed name must be unique to each monitor in the same care unit.

NOTE The clinical user may have a need to change the initially set unit and/or bed name via clinical user interface if the monitor is moved, or roved, to a new location in the CARESCAPE Network. To allow this, configure the related settings through ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup*** > ***Care Unit Settings*** > ***Roving***. Refer to user manual for more information about the roving feature.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Unit and Bed Name***.
3. Enter the ***Unit Name***.
4. Enter the ***Bed Name***.

   NOTE Use only capital letters A to Z, numbers from 0 to 9, dash (-), and space ( ). The unit name may be up to seven characters long and bed name up to five characters long. Names may not be identical.

5. Select ***Save***.

The change will take effect immediately.

Configuring printers

You can configure the monitor to print to up to 12 laser printers connected on the IX Network, or to a local printer that is connected to the IX Network connector in the rear panel of the monitor.

Printer installation consists of the following main steps:

1. Installation and configuration of the printer to IX Network according to the printer documentation:
   - Refer to the supplemental information manual for the list of compatible laser printers.
   - Refer to the printer's service manual for printer installation instructions.
   - Ensure that you have the host names or IP addresses for all connected IX printers available for monitor configuration.
   - Notice that the printer driver is part of the monitor software.
2. Configuration of the monitor to print to the installed IX printers:
   - Use monitor's service interface to add a new printer, and to print a test page.
   - Use monitor's clinical user interface to configure which monitor printouts are directed to which printer. See monitor's user manual for more information about the printing and different printouts.

NOTE If a laser printer is installed directly on a CARESCAPE central station, see the central station service manual for more information.

Adding a printer

1. Log in to the service interface.
2. Select ***Configuration*** > ***Printers***.

3. Select ***Add Printer***.
4. Enter the following information:
   a. Enter either the ***Hostname*** or ***IP Address*** of the printer.
   b. Provide a user-assigned name for the printer in the ***Printer name*** field.
   c. Select ***Print test page***.

      A successfully printed test page ensures that the printer and the monitor configuration is completed correctly, and there are no incompatibility issues.
5. Select ***Add Printer***.

The change will take effect immediately.

Selecting printout types and print locations

1. From the monitor main menu, select ***Monitor Setup*** > ***Main Setup*** >***Printing***.
2. Select ***Devices*** tab.
3. Select ***Setup***.
4. Select the printout type from the ***Printout*** list.

   For example, select ***Waveforms*** or ***Numeric Trends***.
5. From the printout ***Location*** options, select the ***Network*** radio button.
6. From the ***Network Device*** list, select the correct printer.

The change will take effect immediately.

Printing a test page

1. Log in to the service interface.
2. Select ***Configuration*** > ***Printers***.
3. From the list of the installed IX printers, select the printer that you want to test.
4. Select ***Print test page***

If the printing fails, check that the printer is compatible and correctly configured.

Deleting a printer

NOTE Before deleting a laser printer, check ***Monitor Setup*** > ***Main 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 the service interface.
2. Select ***Configuration*** > ***Printers***.
3. From the list of installed printers, select the printer that you want to delete.
4. Select ***Delete***.

The change will take effect immediately.

Configuring Citrix

The CARESCAPE monitor contains a built-in Citrix Client that provides the ability to show external Windows applications or desktops running on the XenApp server as if the applications were executing locally on the monitor.

For more information refer to:

- CARESCAPE Citrix Guide about Citrix implementation, installation and configuration
- Supplemental information manual about the supported Citrix XenApp versions.
- Citrix product documentation at www.citrix.com about Citrix.

Contact the hospital's IT Administrator or biomedical department to get the needed information for the built-in Citrix client configuration.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Citrix***.
3. Select ***Enabled*** to enable Citrix configuration.
4. Enter the values to the following fields:

Item	Description
Server Address 1 to 4	Enter the IP address or DNS name of the XenApp server hosting the published application or hosted desktop. You can enter up to four server addresses. The ***Server Address 1*** is always mandatory. To add an other server, select ***Add a server***, and enter the information of the additional server. The Server address consists of IP address or a host name, followed by an optional port number, which is separated by a colon. The maximum length of a host name is 255 characters. An example of an IP address with the optional port number is 3.187.230.30:8080.
Initial Program	The name of the application or desktop resource as published in the XenApp. For example #MUSE. This field is mandatory. The maximum length is 128 characters.
Session Timeout	This client side timeout affects only a normal sized application window when it is hidden behind a menu. A full screen application is never hidden behind a menu and this timeout does not affect it. Keeping the session alive allows users to quickly return to their last session, but locks a Citrix license. Valid values are between 0-99 in minutes. Selecting “0” disables the timeout.

Item	Description
Username ***Password***	• To enable device specific Citrix credentials configuration, configure the Windows user account and password. Give the username in the form “domain\username”. • To enable user specific Citrix credentials configuration, leave the username and password fields empty. The user will be prompted to login when Citrix session is initiated (the button is pressed). NOTE: The user name and password shall be in valid Windows format and the maximum length is 128 characters. For more information about user and device specific Citrix credentials, refer to the CARESCAPE Citrix Guide.
Encryption Level	Select the encryption level: • Basic • RC5 – 128 bit - Login Only • RC5 – 40 bit • RC5 – 56 bit • RC5 – 128 bit
Load balancing:	Select either ***Enabled*** or ***Disabled***: If the Load Balancing is disabled, Citrix will connect directly to the first server address. If it is enabled, Citrix client will query the first available server which tells the client where to connect to.

5. Select ***Save***.

The change will take effect immediately.

NOTE To disable Citrix client, select ***Disabled***. All configuration values will be cleared.

MUSE/12SL configuration

All communication between the patient monitor and the MUSE server, both sending and receiving the 12SL ECG reports, takes place over the IX Network and is encrypted. The supported server version is MUSE NX R1 SP1 or higher.

The communication uses HTTPS protocol and the traffic is encrypted with TLS 1.2 protocol using X.509 certificates. MUSE certificate bundle must be installed into the monitor to facilitate server authentication and encryption key exchange.

Sending 12SL reports to MUSE server requires that a 12SL diagnostics ECG license, either P12D or P12S, is installed into the monitor.

Receiving 12SL PDF reports from the MUSE server requires that the MuseView License, AMSE, is installed into the monitor.

Configuring MUSE/12SL Settings

1. Log in to the service interface.
2. Select ***Configuration*** > ***MUSE/12SL*** > ***MUSE/12SL Settings***.
3. Enter the following data:

Settings	Description
Location ID	Identifies the location ID number (within the range 0 to 999) 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.
Web Username	Username used to authenticate with the MUSE Web Server.
Web Password	Password used to authenticate with the MUSE Web Server.
Web URL	Enter the URL of the MUSE Web Server, for example, 'https://muse.example.net'.

4. Select ***Save***.

The change will take effect immediately.

NOTE To reset the settings back to factory defaults, select ***Reset settings***.

Installing MUSE/12SL certificate

The CA certificate bundle from the MUSE Web Server must be installed into the monitor in order to make authenticated connection between the monitor and the MUSE server.

Exporting the CA certificate from the MUSE Web Server

Follow the instructions in MUSE NX service documentation to export the CA root certificate file from the MUSE Web Server.

Points to note:

1. Certification Path: In the ***Certificate*** view, ensure that you have selected the top-level certificate, the CA root certificate.
2. Certificate encoding and format: In the ***Certificate Export*** wizard, select ***se-64 encoded X.509 (.CER)*** file format. This creates a .cer ASCII file in PEM format that contains the complete certificate chain in a single certificate bundle.

NOTE The steps for exporting a certificate are web browser specific.

Importing the CA certificate into the monitor

Follow the below instructions to import the exported CA certificate into the monitor.

Points to note:

- The certificate installation is only supported when you access the service interface with a service PC.

- The certificate must be in a PEM-encoded file format, which is readable as ASCII text.

1. Log in to the service interface
2. Select ***Configuration*** > ***MUSE/12SL***> ***Certificate Management***.
3. Install the certificate using one of the following methods:
   a. Paste the certificate from a PEM file that contains the certificate.
      i. Open the PEM file with a text editor.
      ii. Copy the certificate information.
      iii. In the service interface, paste the information into the box under the ***Certificate*** title.
   b. Upload the PEM file that contains the certificate.
      i. Select ***load from file*** next to the ***Certificate*** title.
      ii. Search the drive and folder where the file is located and choose the file to upload. Follow the instruction of the web browser used.
      The whole file content populates into the box under the ***Certificate*** title.
4. Select ***Upload***.

The change will take effect immediately.

Admit settings

Configuring patient ID prefix

The monitor will automatically generate a temporary, unique patient ID when a patient with unknown ID is admitted to the patient monitor. The 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 the service interface.
2. Select ***Configuration*** > ***Admit Settings*** > ***Patient ID Prefix***.
3. Enter a 2 character prefix.

   Valid values are uppercase letters and numbers.
4. Select ***Save***.

The change will take effect immediately.

Barcode parser configuration

Barcode reader can be used to scan information to a single text field or to several text fields at a time:

- You do not need to configure the parser if you use a barcode reader to scan a simple barcode with only one piece of information to a single field in the monitor's user interface.

- You need to configure the parser if you use a barcode reader to scan complex barcodes with several data items to multiple fields in the ***Admit/Discharge*** menu. The correct parser configuration ensures that the data items in the barcode string are correctly populated to the related fields in the ***Admit/Discharge*** menu.

Before you start configuring the parser:

1. Acquire detailed specifications of the character-delimited or length-delimited barcode string that the hospital uses.
2. Acquire sample barcodes, if possible, to verify that you have completed the parser configuration correctly. For more information, see the Testing the barcode reader section in the Checkout procedures chapter.

Refer to the monitor's supplemental information manual for a list of compatible barcode readers.

NOTE The barcode reader has an internal, configurable setting for keyboard locale. The factory default value for this setting is US English. Configure first the keyboard locale setting of the barcode reader to be the same as the keyboard locale setting in the monitor's service interface. Follow the instructions provided with the barcode reader.

The supported barcode symbologies and characters are listed in the table below:

Symbology	Supported characters
Aztec Code	All 8-bit values can be encoded. The default interpretation should be: 1. For values 0 - 127, ANSI X3.4 (ASCII) 2. For values 128 - 255, ISO 8859-1 Latin alphabet number 1 See the IEC 24778 standard.
Code 128	Encodes the full ASCII set 0 - 127. See the IEC 15417 standard.
Code 39 (Extended)	Code 39 is restricted to 44 characters, symbols 0-9, A-Z, '-', '.', '$', '/', '+', '%' and space. The Code39 Extended encodes the full ASCII set 0 - 127. Extended characters are encoded by a pair of normal Code 39 characters. See the IEC 16388 standard.
Data Matrix	Encodes all 8-bit values. The maximum length is 1556 ASCII (8 bit), 2335 alphanumerical or 3116 numeric characters. See the IEC 16022 standard.
Interleaved Code 2 Of 5	Restricted to symbols 0-9. See the IEC 16390 standard.
Pdf417	Encodes all-8 bit values. The maximum length is 1108 ASCII (8 bit), 1850 alphanumerical, 2725 numeric characters. See the IEC 24728 standard.

Selecting and configuring the barcode parser

1. Log in to the service interface.

2. Select the ***Configuration*** tab.
3. If needed, select ***Admit Settings*** > ***Barcode Settings***.
4. In ***Barcode Settings***, select the parser type:

Parser type	Use with this type of barcode
None	Simple barcode that contains one piece of information, but no data control. There is no need for a parser.
Char-Delimited	Barcode that specifies a special character that separates each data item in the barcode string.
Length-Delimited	Barcode that specifies the beginning position and length of each data item in the barcode string.

5. Depending on your selection:
   a. If the selected parser is ***None***, select ***Save*** to complete the parser configuration.
   b. If the selected parser is ***Length-Delimited***:
      i. Enter the starting ***Position*** and ***Length*** of each data item included in the barcode string.
      See the General notes about parser configuration and Data item specific notes sections for more information to complete the parser configuration.
      ii. Select ***Save***.
   c. If the selected parser is ***Char-Delimited***:
      i. Enter the ***Field Delimiter*** character that separates the data items in the barcode string.
      The field delimiter can be any ASCII character between 33-126.

      If the character selected as a field delimiter exists within a data item in the barcode string, it will be misinterpreted as a field delimiter.
      ii. Enter the sequence number of each data item included in the barcode string into the ***Position*** column.
      See the General notes about parser configuration and Data item specific notes sections for more information to complete the parser configuration.
      iii. Select ***Save***.

General notes about parser configuration

Follow these general instructions when configuring the barcode parser:

- You can configure the barcode parser to populate the following data items from a barcode string into the related fields in the ***Admit/Discharge*** menu:
  - ***MRN***
  - ***First Name***
  - ***Last Name***
  - ***Day of Birth***
  - ***Month of Birth***
  - ***Year of Birth***
  - ***Age***
  - ***Age Unit***

- ***Gender***
- ***Height***
- ***Height Unit***
- ***Weight***
- ***Weight Unit***
- ***Visit Number***
- ***Primary Physician***
- ***Referring Physician***

- The maximum length of the barcode string is 300 characters. The maximum length of a single data item within the barcode string is 99, except for the following data items that have a fixed length, if included:

Data item	Number of characters
Day of Birth	2
Month of Birth	2
Year of Birth	4
Gender	1

- The ***Day of Birth*** and ***Month of Birth*** fields have a fixed length of 2 characters. '0' and space are accepted as padding characters. For example, "01", " 1" and "1 " are all accepted and will be interpreted as 1, whereas "1" is not accepted because it has only one character.
- If the data item in the barcode is longer than the space reserved for it in the related field, the rest of the characters are truncated.
- The barcode string can contain data items that have no related field in the ***Admit/Discharge*** menu. Omit these data items when configuring the parser.
  - In the length-delimited parser configuration: leave the starting ***Position*** and ***Length*** fields empty for all data items that are not included in the barcode string.
  - In the character-delimited parser configuration: leave the sequence number in the ***Position*** field empty for all data items that are not included in the barcode string.
- The data items can be located anywhere within the barcode. They do not have to be in the same consecutive order as they appear in the parser configuration menu or in the ***Admit/Discharge*** menu.
- If decimal numbers are allowed for a data item, both period (.) and comma (,) are accepted as the decimal symbol.

Data item specific notes

Data item / field name	Maximum number of characters		Valid values in barcode string	Comments
	Admit/Discharge*	Barcode string		
MRN	13	99	Both letters and numbers	—
First Name	10	99		
Last Name	16	99		

Data item / field name	Maximum number of characters		Valid values in barcode string	Comments
	Ad-mit/Dis-charge*	Barcode string		
Day of Birth	2	2	1-31	If you configure ***Day of Birth***, configure also: • ***Month of Birth*** • ***Year of Birth***
Month of Birth	2	2	1-12	If you configure ***Month of Birth***, configure also: • ***Day of Birth*** • ***Year of Birth***
Year of Birth	4	4	1880 to current year	If you configure ***Year of Birth***, configure also: • ***Day of Birth*** • ***Month of Birth***
Age	Depends on the selected ***Age Unit***	99	Numeric (decimal numbers are not allowed)	If you configure ***Age***, configure also ***Age Unit***.
Age Unit		99	For Custom configuration: • A, Y, YR, YRS (years) • MO, MOS (months) • WK, WKS (weeks) • D, DAY, DYS (days)	If ***Age Unit*** is included in the barcode, select ***Custom*** and enter the starting position and length for the data item. If ***Age Unit*** is not included in the barcode, select one of the following: • ***Years*** • ***Months*** • ***Days*** • ***Weeks***
Gender	1	1	For Custom configuration, the allowed characters are between ASCII 32 and ASCII 127	If you configure ***Gender***, you must specify the codes (character) that identify ***Male*** and ***Female***. • If you select ***Custom***: specify which 1-digit characters represent male and female in the barcode. • If you select ***Fixed***: ***M*** or ***1*** in the barcode is automatically identified as a male, and all other characters as female.
Height	Depends on the selected ***Height Unit***	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol. If you configure ***Height***, configure also ***Height Unit***.

Data item / field name	Maximum number of characters		Valid values in barcode string	Comments
	Ad-mit/Dis-charge*	Barcode string		
Height Unit		99	For Custom configuration: • FT (feet) • IN (inches) • M (meters) • CM (centimeters) • MM (millimeters)	If ***Height Unit*** is included in the barcode, select ***Custom*** and enter the starting position and length for the data item. If ***Height Unit*** is not included in the barcode, select one of the following: • ***Feet*** • ***Inches*** • ***Meters*** • ***Centimeters*** • ***Millimeters***
Weight	Depends on the selected ***Weight Unit***	99	Numeric 9999.9999	Either a period or comma is accepted as a decimal symbol. If you configure ***Weight***, configure also ***Weight Unit***.
Weight Unit		99	For Custom configuration: • KG, KGS (kilograms) • G, GM, GMS (grams) • MCG (micrograms) • OZ, OZS (ounces) • LB, LBS (pounds)	If ***Weight Unit*** is included in the barcode, select ***Custom*** and enter the starting position and length for the data item. If ***Weight Unit*** is not included in the barcode, select one of the following: • ***Kilograms*** • ***Grams*** • ***Micrograms*** • ***Pounds*** • ***Ounces***
Visit Number	20	99	Both letters and numbers	—
Primary Physician	16	99		
Referring Physician	16	99		
* When the monitor is connected to the CARESCAPE network.				

Setting power frequency

WARNING ERRONEOUS PATIENT DATA. Incorrect power line frequency setting could adversely affect ECG, EEG, and rSO_2 processing.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Power Frequency***.
3. Select the applicable power line frequency.

4. Select ***Save***.

The change will take effect immediately.

Selecting language and locale

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

1. Log in to the service interface.
2. Select the ***Configuration*** tab.
3. Select ***Language Settings***.
4. To select the monitor language and keyboard language:
   a. Select the monitor language from the drop-down list and select ***Save***.

      The change takes effect after the monitor is restarted.

   b. Select the keyboard locale from the drop-down list and select ***Save***.

      The change will take effect immediately.

Configuring modules

You can configure some acquisition module settings via the service interface. These settings are saved to the permanent memory of the connected acquisition module and the settings travel with the module from one monitor to another.

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

Refer to the CARESCAPE PDM Service Manual and E-PT & E-PP Service Manual for detailed information on how to change these settings.

Setting	Module	Description
ECG Filter Configuration	PDM	This setting allows you to temporarily disable the ECG filter of the PDM.
Licensing	PDM	This setting allows you to manage the PDM invasive pressure licenses.
Assets Settings	PDM	This is an optional, user-assigned unique identifier for the CARESCAPE PDM. You can it for example for asset management purposes.
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.

NOTE The platform configuration for CARESCAPE ONE and CARESCAPE Parameters cannot be completed via the monitor's service interface. See CARESCAPE ONE Service Manual for more information.

Configuring module asset number

This configuration applies only to the PDM. The user-assigned asset number can be up to 32 alphanumeric characters.

The ***Serial Number*** field is view only. The serial number must be edited when the PDM main board is replaced. Contact GE service personnel for more information.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Modules*** and scroll down to the ***Asset Settings***.
3. Enter the user-assigned asset number for the device in the ***Change value to*** field.
4. Select ***Save***.

The change will take effect immediately.

Configuring host asset settings

Configuring host asset number

The asset number is an optional, user-assigned unique identifier for the monitor. This identifier can be up to 32 ASCII characters long.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Host Asset Settings***.

   The current value for the asset number, if available, is shown below the ***Current value***.
3. Enter the new value into the ***Change value to*** field.
4. Select ***Save***.

The change will take effect immediately.

Configuring serial number

A serial number is a unique, manufacturer-assigned identifier for the monitor. The serial number is printed to the device label and/or UDI label of the monitor. The monitor serial number is also shown in the service interface and stored to the CPU assembly.

If CPU assembly is replaced, the original serial number will be lost, and it needs to be re-entered manually to ensure correct operation of the monitor. The serial number of the spare part CPU assembly is set to factory default "SED08349999GP".

There are two options to re-enter the serial number:

1. If the current value of the serial number is set to factory default, you can enter the new serial number without a serial number reset key and save it.
2. If the current value of the serial number is set to something other than the factory default, you need to contact your local GE representative and request a serial number reset key. When requesting for the serial number reset key, provide the original printed serial number from the device label, the MC MAC address that is displayed on the service interface login screen, and the reason for the request. The serial number reset key you will receive back consists of a ***Password*** and an ***Expiration date***.

   NOTE The created serial number reset key is monitor specific, and it is valid for 5 days.

1. Log in to the service interface.

2. Select ***Configuration*** > ***Host Asset Settings***.

   The ***Current value*** for the serial number is shown in the ***Serial Number*** area.

3. Enter a new value into the ***Change value to*** field. Check the correct serial number of the monitor from the device label.
4. If needed, enter the ***Expiration date*** you received for the serial number reset.
5. If needed, enter the ***Password*** you received for the serial number reset.
6. Select ***Save***.

The change will take effect immediately.

Password management

The initial password setup must be completed using the CARESCAPE First Use Wizard when the patient monitor is turned on for the first time. Any future password changes, password length and password reuse configurations are completed using CARESCAPE Service Interface.

For the initial password setup, see chapter 4 Service Applications - CARESCAPE First Use Wizard.

For an overview about the concepts and aspects related to access control, user authentication and password management see the CARESCAPE B850, B650 and B450 Privacy and Security Manual.

User accounts and passwords

The patient monitor supports role-based access control for accessing password protected service applications and clinical configurations. The following table lists the supported user accounts for accessing the clinical configuration and the different service applications:

NOTE The patient monitor does not have any default passwords.

User name	Access rights	Password change
service	This user account is intended for GEHC service to access CARESCAPE Service Interface, CARESCAPE Multi Monitor Manager, service calibrations, and password protected clinical configurations: • ***Monitor Setup*** > ***Defaults & Service*** > ***Service*** • ***Monitor Setup*** > ***Defaults & Service*** > ***Service Calibrations*** • ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup***	Only the ***service*** user can change the password for the ***service*** user account. This is done via the CARESCAPE Service Interface: • ***Configuration*** > ***Passwords*** > ***Change Passwords*** If the valid password for the ***service*** user account is forgotten, contact your GEHC service representative and request for a password reset key for the ***service*** user.
biomed	This user account is intended for end customer to access CARESCAPE Service Interface, CARESCAPE Multi Monitor Manager, service calibrations, and password protected clinical configurations:	The ***service*** and ***biomed*** users can change the password for the ***biomed*** user account. This is done via the CARESCAPE Service Interface: • ***Configuration*** > ***Passwords*** > ***Change Passwords***

User name	Access rights	Password change
	• ***Monitor Setup*** > ***Defaults & Service*** > ***Service*** • ***Monitor Setup*** > ***Defaults & Service*** > ***Service Calibrations*** • ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup***	If the valid password for the ***biomed*** user account is forgotten, either ask a local ***service*** user to change the password, or contact your GEHC service representative and request for a password reset key for the ***biomed*** user.
clinical	This user account is intended for clinical users and GEHC support personnel to access password protected clinical configurations: • ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup*** See monitor's user manual and supplemental information manual for more information.	The ***service*** and ***biomed*** users can change the password for the ***clinical*** user account in the CARESCAPE Service Interface: • ***Configuration*** > ***Passwords*** > ***Change Passwords***
demomode	This user account is intended for entering the DEMO mode. See the user manual and supplemental information manual for more information.	Only the ***service*** user can change the password for the ***demomode*** user account. This is done via the CARESCAPE Service Interface: • ***Configuration*** > ***Passwords*** > ***Change Passwords***

Password policy

Password policy can be configured:

- The minimum and maximum password length can be changed.
- The reuse of previously used passwords can be prohibited.

The monitor utilizes also password blacklisting. User assigned passwords are checked against a list of commonly used and compromised passwords, and if the prospective password appears in the list, the use is prohibited.

Changing the minimum and the maximum password length

To change the minimum and/or maximum password length:

1. Login to service interface.
2. Select ***Configuration*** > ***Passwords*** > ***Policy***.
3. Enter the ***minimum length*** of the password to be between 6 to 14 characters.
4. Enter the ***maximum length*** of the password.

   The ***maximum length*** can be between 8 to 64 characters, but it cannot be less than the selected ***minimum length***.
5. Select ***Save***

Preventing the reuse of old passwords

To prevent the reuse of old passwords:

1. Login to service interface.

2. Select ***Configuration*** > ***Passwords*** > ***Policy***.
3. Enter the number of previous passwords you want to prevent from being reused as a new password to the ***Prohibit use of previous*** field.

   The allowed values are 0 and 2 - 10. By default passwords can be reused, so the default value is 0. The maximum number is 10, which means that the previous 10 passwords cannot be reused.
4. Select ***Save***.

Changing passwords

WARNING PATIENT SAFETY. Use strong passwords. Do not store the passwords in insecure manner or share them with unauthorized persons. Failure to do so may compromise patient safety, privacy and security and/or system performance.

NOTE The username and password are case sensitive. Use only letters A to Z, or a to z, numbers from 0 to 9, and space.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Passwords*** > ***Change Passwords***.

   The user accounts for which you can change the password are shown on the screen.
3. Depending on the password you want to change:
   a. If you are logged in as a ***service*** user:
      - To change the ***service*** password:
        i. In the ***Change Password for service*** area, re-enter the ***service*** password in the ***Current Password*** field.
        ii. In the ***New Password*** field, provide a new password for the ***service*** user account.
        iii. In the ***Confirm password*** field, re-enter the new password.
        iv. Select ***Save***.
      - To change the ***biomed*** password:
        i. In the ***Change Password for biomed*** area, re-enter the ***service*** password in the ***Your Password*** field.
        ii. In the ***New Password*** field, provide a new password for the ***biomed*** user account.
        iii. In the ***Confirm password*** field, re-enter the new password.
        iv. Select ***Save***.
      - To change the ***clinical*** password:
        i. In the ***Change Password for clinical*** area, re-enter the ***service*** password in the ***Your Password*** field.
        ii. In the ***New Password*** field, provide a new password for the ***clinical*** user account.
        iii. In the ***Confirm password*** field, re-enter the new password.
        iv. Select ***Save***.

- To change the ***demomode*** password:
  i. In the ***Change Password for demomode*** area, re-enter the ***service*** password in the ***Your Password*** field.
  ii. In the ***New Password*** field, provide a new password for the ***demomode*** user account.
  iii. In the ***Confirm password*** field, re-enter the new password.
  iv. Select ***Save***.

  The change will take effect immediately.

b. If you are logged in as a ***biomed*** user:

- To change the ***biomed*** password:
  i. In the ***Change Password*** area, re-enter the ***biomed*** password in the ***Current Password*** field.
  ii. In the ***New Password*** field, provide a new password for the ***biomed*** user account.
  iii. In the ***Confirm password*** field, re-enter the new password.
  iv. Select ***Save***.
- To change the ***clinical*** password:
  i. In the ***Change Password for clinical*** area, re-enter the ***biomed*** password in the ***Your Password*** field.
  ii. In the ***New Password*** field, provide a new password for the ***clinical*** user account.
  iii. In the ***Confirm password*** field, re-enter the new password.
  iv. Select ***Save***.

  The change will take effect immediately.

Resetting passwords

If the valid password for the ***service*** or ***biomed*** user account is forgotten, you can reset the password. Contact your local GE representative to request a password reset key.

Provide the following information when requesting a password reset key:

- Serial Number of the monitor.
- The user account for which the password reset key is needed for.

NOTE The created reset key will be monitor and user account specific, and valid for 90 days. If you need password reset keys for several monitors and/or user accounts, provide the requested information for all affected monitors / user accounts.

Once you have received the password reset key:

1. Go to the service interface login screen.
2. Select ***Forgot password?***.
3. Enter the ***Username*** for the user account the password reset key was requested.
4. Enter a new password to the ***New Password*** field.
5. Confirm the new password to the ***Confirm Password*** field.

6. Enter the received ***Activation Code*** to the ***Reset Key*** field.
7. Enter the received ***Expiration Date*** for the reset key in format YYYY-MM-DD.
8. Select ***Reset Password***.

The new password for the user account is now valid. Try to log into the account with the new password.

Configuring CS ONE authentication

CARESCAPE Bx50 can be configured to support only authenticated connections with CARESCAPE ONEs.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Device Authentication***.
3. Depending on you need:
   - Select ***Allow all connections***, if the host monitor needs to be compatible also with CARESCAPE ONEs with software version 3.0. In this case, the connection is not authenticated. This is the factory default.
   - Select ***Allow only authenticated connections***, if the host monitor needs to be compatible only with CARESCAPE ONEs with software version 3.2. In this case, the connection is authenticated.

The setting takes effect immediately. It will affect any new CS ONE connections.

NOTE The host monitor will show a ***CS ONE not authenticated*** message on the screen, if you have selected ***Allow only authenticated connections*** and connected a CARESCAPE ONE with software version 3.0.

Configuring connectivity

Select the serial port speed for the communication with iCollect or other serial interface solutions.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Connectivity***.
3. Select the serial port speed: either ***19200 bits/s*** or ***115200 bits/s***.
4. Select ***Save***.

The change will take effect after next monitor restart.

Configuring remote alarm device

This configuration is related to CARESCAPE RAD. For more information see CARESCAPE RAD Service Manual.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Remote Alarm Device***.

3. Select the appropriate ***Remote alarm device operation*** radio button:
   - If you select ***Enabled***, the CARESCAPE monitor can send alarms to the connected remote alarm device.
   - If you select ***Disabled***, the CARESCAPE monitor cannot send alarms to the connected remote alarm device. The remote alarm device is powered but not operating properly.
4. Select the appropriate ***Remote alarm device power failure detection*** radio button.

   This setting determines whether the remote alarm device triggers an alarm condition in the remote alarm system in power loss situations (for example, if a USB cable is disconnected or the monitor shuts down):
   - If you select ***Enabled***, the remote alarm device triggers an alarm condition in the remote alarm system if power is lost.
   - If you select ***Disabled***, the remote alarm device does not trigger an alarm condition in the remote alarm system if power is lost.
5. Select ***Save***.

The settings take effect immediately.

Restarting the monitor

You can use the Restart function in the service interface to restart the monitor after making configuration changes that require a manual restart before the changed setting 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 monitor is in a discharged state. Before restarting the monitor, verify that the patient is discharged from the monitor.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Restart***.
3. Select the ***Restart*** button.

The monitor will shut down and restart automatically.

Setting up the remote service

Enabling or disabling the remote service connection

You can enable and disable the operation of the remote service agent and connectivity to the GE back office server.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Remote Service***.

   You can see the ***Current status*** of the InSite RSvP agent: ***Enabled*** or ***Disabled***.
3. In ***New status***, select the appropriate radio button: ***Enable*** or ***Disable***.
4. Select ***Save***.

The change will take effect immediately.

Configuring remote service

1. Log in to the service interface.
2. Select ***Configuration*** > ***Remote Service***.

   The ***Enterprise URL*** is the GE InSite RSvP back office server web address. It is pre-configured at factory. Do not change this web address unless explicit instructions are given to do so.
3. If a proxy server is in use for accessing Internet:
   a. Select ***Use proxy server***.
   b. Enter the IP address and Port number of the proxy server.
4. If a proxy server requires user authentication for accessing Internet:
   a. Select ***Use authentication***.
   b. Enter the ***Username*** and the ***Password*** to access the proxy server.
5. Select ***Save***.

The change will take effect immediately.

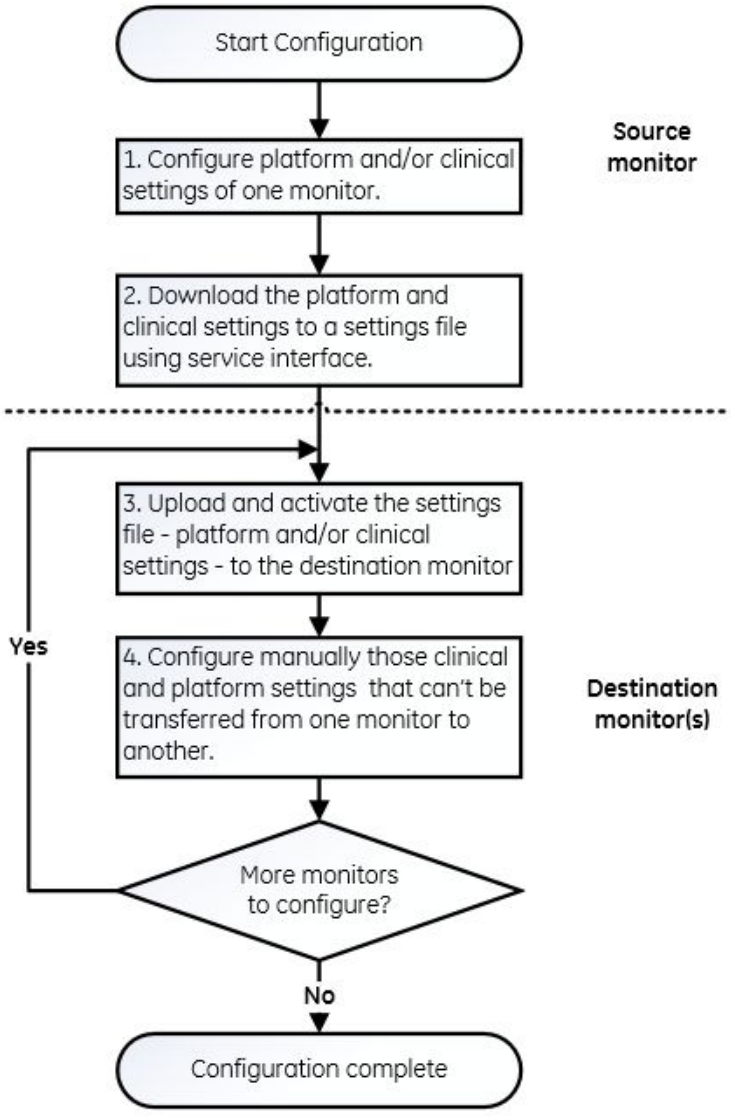
Settings management

This section explains how to:

- Transfer the clinical and/or platform settings configured for one monitor to other similar monitors.
- Reset the clinical and/or platform settings configured for one monitor back to factory defaults.

Settings transfer process

To simplify the installation process for several monitors, you can configure the clinical and/or platform settings manually for one monitor (source monitor) and then transfer the monitor settings to other similar monitors (destination monitors). This figure provides an overview of the settings transfer process.



1. Use the clinical and service interfaces to complete the platform and/or clinical configuration for one source monitor. Note that:
   - Clinical settings cover both care unit settings and profile settings.
   - Many of the clinical settings are either software package and/or profile specific.
   - Some of the platform and clinical settings are monitor type and software version specific.

   Ensure that you have completed the clinical configuration for all applicable software packages and profiles in the source monitor and saved the settings to the profiles before proceeding.
2. Use the service interface to download the platform and clinical settings of the source monitor to a settings file.
   - The downloaded settings file will be encrypted using 7-Zip open-source file archiver (http://7-zip.org/) and have a file extension `.7z`. The file name contains the source monitor serial number followed by the date and time of the download. For example: `SNR16410010HP_20170731_115745.7z`.

3. Use the service interface to upload and activate the platform and/or clinical settings in the destination monitor.
4. Configure manually those clinical and/or platform settings that cannot be transferred from one monitor to another.
   - The following platform settings are unique to each monitor and must be configured manually:
     - software licenses
     - host asset settings
     - network hostname
     - settings for wired network
     - unit and bed name
5. Repeat steps 3 and 4 for each monitor that you wish to configure.

Settings transfer between different monitor types or software versions

It is also possible to transfer clinical settings between different CARESCAPE monitor types (for example, from a CARESCAPE B450 to a CARESCAPE B850 or vice versa), and between similar monitors with different CARESCAPE software versions (for example, from software version 2.0.7 to 3.1).

However, the clinical settings may differ between CARESCAPE software versions. A newer software version may have some new or changed software features that affect some clinical settings. These new or changed clinical settings remain in the factory defaults in the destination monitor after the settings have been transferred from the source monitor with an older software version. Refer to the monitor's Software Settings Transfer Guide for more information about differences in clinical settings in different CARESCAPE software versions.

Do not transfer platform settings between different monitor types or software versions.

Downloading clinical and platform settings

Download the platform and clinical settings of the source monitor to a settings file.

NOTE For security reasons, the contents of the settings file are encrypted with a user-selectable password. Store the password in a secure way. You will need the password for uploading the settings file to the destination monitors.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Settings*** > ***Download***.
3. Provide a password for encrypting the settings file.

4. According to your service interface access:
   a. If you are using a service PC, you can save the settings file to any storage device connected to the service PC:
      i. Select ***Download***.
      ii. Save the settings file according to the instructions provided by the web browser.

      The steps to download the settings file to a service PC depend on the web browser used. The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   b. If you are using the local, integrated service interface, you can save the settings file to a USB flash drive that is connected to one of the monitor's USB ports:
      i. Select ***Save to USB storage*** to save the settings file to the USB flash drive.

      The settings file is saved always to the root directory of the USB flash drive.

      NOTE Do not disconnect the USB flash drive until downloading is complete.

The downloaded settings file is now ready to be uploaded and activated into the destination monitors. The settings file contains both the platform and clinical settings of the source monitor.

Activating settings

You can upload and activate the previously downloaded settings file to the destination monitor(s).

NOTE Some platform settings cannot be transferred from one monitor to another. They need to be configured manually in the destination monitor after the activation is completed.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Settings*** > ***Activate***.
3. According to your service interface access:
   a. If you are using a service PC, you can upload the settings file from any storage device connected to the service PC. Search for the settings file from the destination drive and folder according to the instructions provided by the web browser.

      The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   b. If you are using the local, integrated service interface, you can upload the settings file from a USB flash drive that is connected to one of the monitor's USB ports. The service interface automatically detects a connected USB flash drive, searches the directory structure for files with .7z file extension, and requests the user to select the correct file.
      i. Choose the settings file you want to activate.

      NOTE Do not disconnect the USB flash drive until uploading is complete.
4. Enter the password that was used for encrypting the settings file.

5. Below ***Settings that are to be Activated***, select the settings you want to activate.

   Choices are:

   - ***All (clinical and platform) settings***: Activates both the clinical and platform settings.
   - ***Clinical settings***: Activates clinical settings only.
   - ***Platform settings***: Activates platform settings only.

   NOTE Do not activate platform settings that have been downloaded from a monitor with CARESCAPE software version 3.1 or earlier.

6. Below ***Schedule***, select when you want the setting activation to occur.

   Choices are:

   - ***Immediately***: The settings upload and activation starts immediately.
   - ***After discharge***: The settings activation starts after the next patient discharge/case end.

   NOTE ***Immediately*** option is only available if the monitor is in a patient discharged/case end state.

7. Select the ***Activate*** button.

   NOTE If you selected the settings activation to take place after the next patient discharge/case end, you can cancel the activation while it is pending. To cancel the activation, select ***Configuration*** > ***Settings*** > ***Activate*** > ***Cancel activation***.

   a. If the settings activate immediately, do the following:
      - Wait until the settings activation is completed and the monitor has performed an automatic restart.
      - Check that the settings activation was successful and the monitor is using the activated settings.
      - Configure manually those clinical and platform settings that cannot be transferred from the source monitor to the destination monitor.

   b. If the settings are activated after the patient is discharged, do the following:
      - The monitor shows a ***Setting activation after next discharge / Setting activation after next case end*** message until the clinical user performs a patient discharge/case end. The patient monitoring can continue normally until then.
      - Settings activation will start automatically after the next patient discharge/case end. Wait until the settings activation is completed and the monitor has performed an automatic restart.
      - Check that the settings activation was successful and the monitor is using the activated settings.
      - Configure manually those clinical and platform settings that cannot be transferred from the source monitor to the destination monitor.

The settings activation will fail if the settings file is invalid, the password is incorrect or the settings file is not found.

Resetting to factory settings

You can reset the platform and/or clinical settings of a monitor to factory defaults.

NOTE Resetting to factory defaults does not affect the following platform settings:

- licenses
- host asset settings
- passwords

1. Log in to the service interface.
2. Select ***Configuration*** > ***Settings*** > ***Reset***.
3. In ***Settings Type*** area, select the settings you want to reset.

   Choices are:

   - ***Clinical and platform settings***: Resets both the clinical and platform settings.
   - ***Clinical settings***: Resets the clinical settings only.
4. In ***Defaults*** area, select the defaults to be used for clinical settings.

   Choices are:

   - ***Factory defaults***: Resets the clinical settings to the global factory defaults
   - ***US defaults***: Resets the clinical settings to the US factory defaults.

   Refer to the supplemental information manual for a list of the global or US-specific factory default values for clinical settings.
5. In ***Schedule*** area, select when you want the reset to occur.

   Choices are:

   - ***Immediately***: The reset starts immediately.
   - ***After discharge***: The reset starts after the next patient discharge/case end.

   NOTE ***Immediately*** option is only available if the monitor is in a patient discharged/case end state.
6. Select the ***Reset*** button.

   NOTE If a patient is admitted or a case is ongoing in the target monitor, the reset takes place after the patient is discharged or the case is ended. You can cancel the reset while it is pending. To cancel the reset, select ***Configuration*** > ***Settings*** > ***Reset*** > ***Cancel reset***.

   a. If the reset starts immediately, do the following:

      - Wait until the settings reset is completed and the monitor has performed an automatic restart.
      - Check that the settings reset was successful and the selected settings have been reset to factory defaults.

   b. If the reset starts after the patient is discharged, do the following:

      - The monitor shows a ***Setting activation after next discharge / Setting activation after next case end*** message until the clinical user performs a

patient discharge/case end. The patient monitoring can continue normally until then.

- Settings reset will start automatically after the next patient discharge/case end. Wait until the settings reset is completed and the monitor has performed an automatic restart.
- Check that the settings reset was successful and the selected settings have been reset to factory defaults.

License management

CARESCAPE monitors support three type of licensed features:

1. Care area specific *software packages* (ED, ICU, NICU, OR and PACU) allow you to customize a monitor to meet care area specific monitoring needs.
2. *Host licenses* are used to enable optional, licensed clinical features, for example, for anesthetic agent measurement or using the auto view on alarm - features.
3. A *base license* may be required when you upgrade a monitor from one host software version to another. For more information about software upgrades and base licenses, see Activating the host software section.

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

NOTE The activation codes are monitor specific. Check that the license file and/or printed activation codes are intended for the monitor in use.

Contact GE to acquire activation codes for licenses.

Activating host licenses

Some software features require a specific host license to be enabled. Host licenses are typically valid for all software packages, but there are some exceptions to the rule. Host licenses are available either as permanent or as trial licenses. Activation codes for trial licenses are valid for 45 days. See user manual and supplemental information manual for more information about the host licenses.

To enable a host license manually:

1. Log in to the service interface.
2. Select ***Configuration*** > ***Licenses*** > ***Host License***.

   The supported host licenses are listed under ***Host License***. The enabled licenses have an activation code next to it. The host licenses are either STANDARD (always enabled) or OPTIONAL (separately purchasable). Trial licenses are marked with a suffix "-TRIAL".
3. For each ***Host License*** that you want to enable:
   a. Select ***ENABLED*** from the ***Status*** drop-down list.
   b. For trial licenses only: enter the ***Expiration date***.
   c. Enter a valid ***Activation code*** for the software package.
4. Select ***Save***.

The changes take effect after the next patient monitor restart.

NOTE You can also disable a host license. If you do so, the activation code will be cleared.

Software packages

You can customize CARESCAPE software to meet the needs of different care areas with software package licenses. The supported software packages are: ED, ICU, NICU, OR and PACU.

Many of the monitor's clinical settings are separately configurable for different software packages (care unit settings) and different profiles (profile settings). See supplemental information manual for more information about the configuration and factory defaults for care unit settings and profile settings.

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

Enabling software packages

To enable software packages manually:

1. Log in to the service interface.
2. Select ***Configuration*** > ***Licenses*** > ***Software Package***.
3. For each ***Software Package*** you want to enable:
   a. Select ***ENABLED*** from the ***Status*** drop-down list.
   b. Enter a valid ***Activation Code*** for the software package.
4. Select ***Save***.

All license changes take effect after the next monitor restart.

NOTE You can also disable a software package. If you do so, the activation code will be cleared.

Changing the active software package

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

The factory default value for the software package is ICU.

NOTE The operation is not allowed while a patient is admitted.

To change the active software package:

1. Log in to the service interface.
2. Select ***Configuration*** > ***Licenses*** > ***Software Package***.
   The currently active software package is shown under ***Active Software Package***.
3. Select the new software package from the drop-down list.
4. Select ***Save***.

The changes take effect after the next monitor restart.

Uploading license file

NOTE Contact GE to get the correct license file for your monitor. The license file is a text file that is named according to the monitor's serial number. The activation codes are monitor specific. Check that the license file is intended for the monitor in use.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Licenses*** > ***Upload License***.
3. According to your service interface access:
   a. If you are using a service PC, you can upload the license file from any storage device connected to the service PC. Search for the license file from the destination drive and folder according to the instructions provided by the web browser.

      The web browser may also notify you about security issues. Refer to the web browser documentation for details.

   b. If you are using the local, integrated service interface, you can upload the settings file from a USB flash drive that is connected to one of the monitor's USB ports. The service interface automatically detects a connected USB flash drive, searches the .txt files, and requests the user to select the correct file.

      - Choose the license file you want to activate.

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

4. Check that the information populated in the ***Host License*** and ***Software Package*** screens is accurate.

These changes take effect after the next monitor restart.

Backup and restore

Take a backup of the platform and clinical settings of each monitor after the initial installation is completed, and every time the platform settings have been changed.

The availability of a valid backup file can save your time if you ever need to replace the CPU assembly, and you need to restore the original settings.

The backup file contains a complete image of the monitor platform and clinical settings, including monitor specific licenses, serial number, IP addresses and other unique settings. The created backup file can be restored only to the same monitor.

NOTE For security reasons, the contents of the backup file are encrypted with a user-selectable password. Store the password in a secure way, separately from the monitor's backup file. You will need the password later if you have to restore the backup file to the monitor.

Taking a backup

The default file name contains the serial number of the monitor, followed by the date and the time the backup file was created.

NOTE For security reasons, the contents of the backup file is encrypted with a user-selectable password. Store the password in a secure way. It will be needed for restoring the backup file to the monitor.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Backup*** > ***Download***.
3. Provide a password for encrypting the backup file. This password is user-selectable.
4. According to your service interface access:
   a. If you are using a service PC, you can save the backup file to any storage device connected to the service PC.
      i. Select ***Download***.
      ii. Save the backup file according to the instructions provided by the web browser.

      The steps to download the backup file to a service PC depend on the web browser used. The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   b. If you are using the local, integrated service interface, you can save the backup file to a USB flash drive that is connected to one of the monitor's USB ports.
      i. Select ***Save to USB storage*** to save the backup file to the USB flash drive.

      The backup file is saved always to the root directory of the USB flash drive.

      NOTE Do not disconnect the USB flash drive until downloading is complete.
5. Store the backup file and the password to a secure location.

Restoring a backup

Note that the backup file is monitor specific, and can be restored only to the original monitor with the same serial number. Before restoring the backup file, ensure that the backup file is for the intended monitor, and that you have the password to decrypt the backup file. If restore is done after CPU replacement, first enter the original serial number manually, before restoring the backup file.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Backup*** > ***Restore***.
3. According to your service interface access:
   a. If you are using a service PC, you can upload the backup file from any storage device connected to the service PC. Search for the backup file from the destination drive and folder according to the instructions provided by the web browser.

      The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   b. If you are using the local, integrated service interface, you can upload the backup file from a USB flash drive that is connected to one of the monitor's USB ports. The service interface automatically detects a connected USB flash

drive, searches the directory structure for files with .7z file extension, and requests the user to select the correct file.

i. Choose the backup file you want to upload.

NOTE Do not disconnect the USB flash drive until uploading is complete.

4. To decrypt the contents of the backup file, enter the password that was used to encrypt the backup file.
5. Select ***Restore***.

Certificate management

HTTPS protocol is used for secure communication between the CARESCAPE monitor (web server) and the service PC (web client).

The CARESCAPE monitor allows you to use an X.509 certificate to authenticate it to the service web client. The monitor's service interface provides tools to create a certificate signing request, and to install the signed certificate to the monitor.

By factory default, each monitor has a unique self-signed certificate issued by GE. To improve access security, you can send a certificate signing request (CSR) to a publicly trusted certificate authority (CA). The CA validates the information in the CSR and creates a signed certificate, which you can install on the monitor later. The web browsers used to access the service interface recognize and trust the signed certificate. The users who access the monitors via the service interface will know that their peer is actually the monitor which possesses the private key of such certificate. For example, this prevents spoofing or man-in-the-middle attacks which can be mounted in attempt to steal the passwords of monitor users.

Creating a certificate signing request (CSR)

Creating the certificate signing request is only supported when you access the service interface with a service PC.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Certificates*** > ***Certificate Signing Request***.
3. Enter the following information:
   - ***Common Name***: Enter the name of the host device. This is the only mandatory field, the rest of the fields are optional.
   - ***Organization Name***: Enter the name of the hospital requesting the signed certificate.
   - ***Organizational Unit Name***: Enter the unit name (for example, hospital department).
   - ***City***: Enter the name of the city.
   - ***State or Province***: Enter the state or province information.
   - ***Country Code***: Enter the 2-letter country code.
   - ***Email Address***: Enter the email address of the hospital requesting the signed certificate.

4. Select ***Create***.

   The monitor creates a certificate signing request (CSR) file. It also creates a new device-specific private key which will be taken into use when the signed certificate is later uploaded to the monitor.

5. Save the CSR file according to the instructions provided by the web browser.

   The steps to save the CSR file to a service PC depend on the web browser used. The web browser may also notify you about security issues. Refer to the web browser documentation for details.

6. Send the CSR to a publicly trusted certificate authority (CA). The CA validates the information in the CSR and creates a signed certificate to be installed on the monitor later.

Installing the certificate

The certificate installation is only supported when you access the service interface with a service PC.

Note that the certificate must be in a PEM-encoded file format, which is readable as ASCII text.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Certificates***> ***Upload Certificate***.
3. Install the certificate using one of the following methods:
   a. Paste the certificate from a PEM file that contains the certificate.
      i. Open the PEM file with a text editor.
      ii. Copy the certificate information.
      iii. In the service interface, paste the information into the box under the ***Certificate*** title.
   b. Upload the PEM file that contains the certificate.
      i. Select ***load from file*** next to the ***Certificate*** title.
      ii. Search the drive and folder where the file is located and choose the file to upload. Follow the instruction of the web browser used.
      The whole file content populates into the box under the ***Certificate*** title.
4. Select ***Upload***.

The change will take effect immediately.

Note that the service interface may become unresponsive after the new certificate has been uploaded. In this case, reload the page or restart the browser.

Viewing the current certificate

1. Log in to the service interface.
2. Select ***Configuration*** > ***Certificates*** > ***Upload Certificate***.

3. Under Current Certificate, you can see an overview of the current certificate:
   - the issuer of the certificate
   - the subject of the certificate (issued to)
   - the validity period of the certificate
   - the SHA-1, SHA-256 and SHA-512 fingerprints
4. To see more information about the current certificate, open the certificate view / security report from the address bar of the web browser in the service PC.

   Note that this functionality depends on the web browser you use. For example, in Internet Explorer, select the lock symbol or certificate error next to the address bar of the browser to view a detailed certificate view / security report.

Software management

Software installation consist of two main steps:

1. Software upload
2. Software activation

Software installation is supported for the following system components.

Software image	Image type	Target device
CARESCAPE Software package	Host Software	CARESCAPE software for the monitor including: • PUIC software for the DC/DC board • EMBC software for the CPU carrier board NOTE: PUIC and EMBC software are included in the CARESCAPE software image. In case a ***Service Monitor Error Code 0xHOST1005*** or a ***Service Monitor Error Code 0xHOST1007*** message is shown because of a software incompatibility, PUIC or EMBC software may become available for activation also separately in ***Configuration*** > ***Software Management*** > ***Devices***.
E-PiCCO Software Package	Devices	Module software for E-PiCCO module.
PDM Software Package	Devices	Module software for CARESCAPE PDM.
sGAS Software Package	Devices	Module software for CARESCAPE respiratory modules, E-sCAiOVX.

Software signing

Software code for CARESCAPE Software v3.2 (host software) is signed with a digital signature by GE Healthcare. The purpose of code signing is to confirm the software author and to ensure that the software code has not been altered or corrupted since it was signed.

There are two software files for each software build:

1. If you are updating the monitor software from one v3.2 software build to another, upload the software file that is named as "CSP_3.2.X.cas.csmon".

2. If you are upgrading the monitor software from v3.1 to v3.2, or if you are reloading host software to the monitor after CPU replacement, upload the software file that is named as "CSP_3.2.X.cas-unsigned.csmon".

Software upload

Software upload loads a software file from a service PC to a target monitor, but does not activate / install it.

Contact your local GE distributor for any inquiries for software files. Software is delivered using a physical media or electronically.

Software upload is supported only when you access the service interface from a service PC.

Software activation

NOTE Software activation is prevented if the monitor is in battery use. Connect the monitor to AC mains to enable software activation, and keep the monitor connected to AC mains for the whole duration of the software activation.

Software activation installs the uploaded software images to the target devices.

- Software activation for CARESCAPE software is done in ***Configuration*** > ***Software Management*** > ***Host Software***. The host software activation takes place either immediately or after the next discharge. If a patient is not admitted or a case is not started in the target monitor, the activation takes place immediately. If a patient is admitted or a case is started in a target monitor, the activation takes place after the patient is discharged or case is ended. If the activation takes place after the next case end/discharge, the user can cancel pending software activation at any time before the activation starts.
- Software activation for any other software is done in ***Configuration*** > ***Software Management*** > ***Devices***. It is possible only when the monitor is in a patient discharged/case reset state.

A successful software activation will automatically erase the previous version of the installed software from the target monitor or connected device.

Software activation is supported with all access methods to service interface.

Uploading software

NOTE Software upload is supported only when accessing service interface from a service PC.

NOTE Software is delivered as an ISO image file, either using a physical media or electronically. To have access to the software file the ISO image must be mounted first as a logical drive. If software is delivered using a physical media, mounting typically takes place automatically when you attach the USB flash drive to your computer. If software is delivered electronically, you will have to enable the mounting manually by double-clicking the ISO image file.

1. Log in to the service interface.

2. Select ***Configuration*** > ***Software Management*** > ***Upload***.

   The currently uploaded software image(s) that are ready to be activated are shown in the ***Uploaded Software Image*** area. If the monitor does not have any software images uploaded, a message ***No uploaded image*** is shown.

   To see the currently active, running software version of the monitor and any connected devices:

   - Select ***Information*** > ***Host Information*** to see the currently active CARESCAPE software (host software and PUIC software).
   - Select ***Information*** > ***Acquisition Information – Acquisition Module*** to see the currently active CARESCAPE PDM software.
   - Select ***Information*** > ***Acquisition Information – E Module*** to see the currently active software in the connected CARESCAPE respiratory module and/or E-PiCCO module.
   - Select ***Information*** > ***Acquisition Information – E Module Frame*** to see the currently active EMBC software in the CPU carrier board.
   - Select ***Information*** > ***Acquisition Information – USB Port Information*** to see the currently active UIC software in the connected CARESCAPE D19KT displays and USB Remote Controller.

   NOTE The menu options in steps 3 and 4 depend on the web browser.

3. In the ***Upload New Software Image*** area, select ***Browse*** or ***Choose File***.

   An Open / Choose File to Upload -dialog box will open.

4. Browse the drive and folder to find the software file. Select the software file by double-clicking it or by selecting ***Open***.

   a. Select the software file that is named as "CSP_3.2.X.cas.csmon", if you are updating the monitor software from one v3.2 software to another.

   b. Select the software file that is named as "CSP_3.2.X.cas-unsigned.csmon", if you are upgrading the monitor software from v3.1 to v3.2, or if you are reloading host software to the monitor after CPU replacement.

5. Select ***Upload image***.

   The software upload will start. The status of the software upload is shown using a progress bar. Do not leave the menu page until the software image is completely uploaded. You can cancel the software upload any time by selecting ***Cancel upload***, or by leaving the ***Upload*** page. Once the upload of the software file is completed, the software images are shown under the title ***Uploaded Software Image***.

The uploaded software images are now ready to be activated to the target monitor or connected devices.

NOTE To delete a previously uploaded software images, select ***Delete image.***

Activating the host software

WARNING BEFORE INSTALLATION- Compatibility is critical to safe and effective use of this device. Verify the compatibility of all system components and device interfaces, including hardware and software versions, prior to installation and use.

Before you start activating new host software:

- Note the difference between a software activation in case of a software upgrade and in case of a software update:
  - Software upgrade requires a base license activation code. The activation code is tied to the serial number of the monitor and to the software version to be activated. Software activation is not possible if the activation code is not entered or is invalid. In case of a software upgrade, contact GE Healthcare sales team to order the correct software upgrade kit with the base license activation codes.
  - Software update does not require a base license.
- Verify the compatibility of the new software to be activated with the current monitor hardware, and with all the connected bedside and network devices. Refer to the latest version of the supplemental information manual for a list of compatible network and bedside devices.
- Contact GE to get the latest version of the user and service documentation.
- Ensure the monitor is connected to AC mains for the duration of the entire software activation.
- Change passwords for all user accounts after a monitor software upgrade. You can change the passwords either manually or by transferring platform settings from a monitor with CARESCAPE Software v3.2.

NOTE LOSS OF MONITORING. Software is activated only when the 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 monitor are saved and are not affected by the activation of the new host software version. However, any new or changed clinical and platform settings in the activated monitor software version are set to their factory default values, and may require manual configuration. For more information, refer to the latest version of the supplemental information manual.

NOTE Do not shut down the monitor until the software activation is successfully completed.

1. Log in to the service interface.
2. Select ***Configuration*** > ***Software Management*** > ***Host Software***.
   - ***Current version*** shows the currently active CARESCAPE software version.
   - ***Uploaded version*** shows the new CARESCAPE software version to be activated.

3. To start the host software activation:

   a. In case of a software upgrade: Enter the base license activation code and select ***Activate***.

   b. In case of a software update: Select ***Activate***.

   The software activation takes place in either of the following ways:

   - immediately if no patient case is currently ongoing (a patient is not admitted / no case started)
   - after the next discharge, if there is currently an ongoing patient case (a patient is admitted, or case is started)

Activating the host software immediately

If the host software activation occurs immediately, the monitor shows the following screen saver:

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.

1. Wait until the software activation completes and the monitor restarts automatically.
2. Verify that the software activation is successful and the monitor runs the activated software.

Activating host software after next case end / discharge

The monitor informs the clinical users about pending software activation with the following message: ***Software activation after next case end / Software activation after next discharge***. The monitoring can continue normally.

NOTE To cancel the pending software activation, select ***Cancel activation***.

The software activation starts automatically after the patient is discharged, or patient case is ended. The patient monitor displays 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.

1. Wait until the software activation is complete and the monitor restarts automatically.

If the monitor starts up normally and no error messages appear on the display, the activation is successful.

Activating software to acquisition modules, DC/DC board and CPU carrier board

WARNING BEFORE INSTALLATION- Compatibility is critical to safe and effective use of this device. Verify the compatibility of all system components and device interfaces, including hardware and software versions, prior to installation and use.

CAUTION EQUIPMENT DAMAGE. Do not disconnect the power during software update. The software update may fail and the connected device may become unresponsive.

Points to note before you start activating software to connected devices:

- Verify the compatibility of the new software to be activated with the current monitor hardware, and with all the connected bedside and network devices. Refer to the latest version of the supplemental information manual for a list of compatible network and bedside devices.
- Contact GE to get the latest version of the user and service documentation.
- Ensure the following:
  - The monitor is in a patient discharged/case reset state
  - Keep the target devices connected to the monitor.
  - Keep the monitor connected to AC mains during the entire software activation cycle.

NOTE LOSS OF MONITORING - Software is activated only when the 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 20 minutes.

NOTE Do not disconnect the connected devices, or shut down the monitor, until the software activation is successfully completed.

To activate the software:

1. Log in to the service interface.
2. Select ***Configuration*** > ***Software Management*** > ***Devices***.

   The screen will show a list of devices for which there is a new software version available. For each device, you can see the currently active software version and the uploaded new software version that is waiting for activation.

   To update the list shown (for example, after connecting or disconnecting a device), select ***Update list***.

3. Select ***Update*** next to the device for which to start activating new software. The software activation starts. The service interface will show a message ***Update is in progress***.

   a. Wait until the software activation is complete and the following message is shown: ***Update done***.

   Depending on the target device, the monitor performs the software activation as follows:

   - PDM/E-PiCCO/sGAS software: The message ***PDM module removed***, ***Gas measurements removed,*** or ***CO measurement removed*** is shown on the monitor screen when the software activation starts. This message remains until the module software activation is completed and the acquisition module has restarted.
   - EMBC software: Software activation takes place in the background without monitor restart. The message ***Service Monitor Error Code 0xHOST1005*** disappears after the EMBC software activation is completed successfully.
   - PUIC software: Software activation will restart the monitor automatically. The message ***Service Monitor Error Code 0xHOST1007*** disappears after the PUIC software activation is completed successfully.

   If the software activation was successful, the information of the new activated software version is updated to the ***Current version*** column. If needed, refresh the web browser to update the information shown on the screen.

   If there are any problems in the software activation, the following message is shown: ***Update failed, Try again***. If needed, refresh the web browser to update the information shown on the screen.

8

Checkout procedures

About the checkout procedures

This chapter describes the checkout procedures for the CARESCAPE B450 monitor.

The installation check covers the CARESCAPE B450 monitoring system including the following devices:

- CARESCAPE B450
- Displays
- E-modules
- E-musb with CARESCAPE rSO_2 and CARESCAPE CO_2 – Microsteam
- CARESCAPE PDM

The planned and corrective maintenance checks cover CARESCAPE B450 monitor.

The relevant planned and corrective maintenance checks and service procedures for the following connected devices are located in their own service manuals:

- E-modules
- E-musb with CARESCAPE rSO_2 and CARESCAPE CO_2 – Microsteam
- CARESCAPE PDM
- CARESCAPE ONE
- CARESCAPE RAD
- Unity Network ID connectivity device

For cleaning and disinfection information that applies to devices, device components, supplies, and accessories manufactured by GE, see the Cleaning and Disinfecting Supplement.

For cleaning, disinfection, and care information for devices, device components, supplies, and accessories made by manufacturers other than GE, see the applicable instructions for use provided by the manufacturer.

To help ensure the equipment remains in proper operational and functional order and maintains its essential performance and basic safety, follow the corrective and planned maintenance recommendations. The tests that are related to the essential performance and basic safety are marked with an asterisk *.

Record the results of the check procedures to the eCheckforms delivered on the electronic media.

Required checkout procedures

Perform the following tests during installation, planned maintenance and corrective maintenance:

Checkout procedure		Required checks		
		Visual inspections	**Electrical safety test***	**Functional check**
Installation check		Yes	No, if there is less than 12 months since the monitor was manufactured. Check the date of manufacture of the device from the device plate.	Yes
Planned maintenance check		Yes	Yes	Yes
Corrective maintenance check	After detaching, replacing or upgrading: • Recorder unit (FRU / Upgrade)	Yes	No	Check that the monitor starts normally and that you can print something to the recorder.
	After detaching or replacing: • Module rail unit (FRU)	Yes	No	Check that the monitor starts normally and that the connected PDM functions correctly.
	After detaching or replacing: • CPU battery (FRU) • Mains fuses (FRU) • Battery door (FRU) • Monitor battery (FRU)	Yes	No	Check that the monitor starts normally.
	After detaching or replacing any other part inside the monitor.	Yes	Yes, all steps except the patient leakage current tests.	Perform a complete functional check.

Installation check

The purpose of the installation check is to ensure that the patient monitoring system, including the connected devices, is properly installed and configured for use.

Perform the installation check after the hardware installation and platform configuration is completed before taking the monitor into clinical use.

The manufacturer has performed the electrical safety test for the monitor and acquisition modules during final inspection. You do not have to perform the electrical safety tests during the installation checkout, if there is less than 12 months since the monitor was manufactured. Check the date of manufacture of the device from the device plate.

Planned maintenance check

The purpose of the planned maintenance check is to periodically check that the product remains safe to use and maintains its performance characteristics.

Perform the planned maintenance check every two years after installation.

WARNING SAFETY HAZARD. To avoid risks to personnel and patient, or damage to the equipment, only perform maintenance procedures described in this manual. Unauthorized modifications can lead to safety hazards.

WARNING PATIENT SAFETY. Planned maintenance must be carried out at the specified interval. Failure to implement the 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 The planned maintenance check must be performed to the whole patient monitoring system, including all the connected devices. This service manual covers the planned maintenance procedure for the CARESCAPE B450 monitor. See the related service manuals for information about the planned maintenance checks for the connected devices.

Corrective maintenance check

The purpose of the corrective maintenance check is to ensure that the product was repaired correctly, and to check that the product is safe to use and maintains its performance characteristics. Perform the corrective maintenance check after any corrective maintenance, before taking the monitor back into clinical use.

Checking the user and service manuals

Start the installation check by checking the manuals:

1. Check that the customer has all user and service manuals for the CARESCAPE monitoring system with SW v3.2 and the customer knows how to use them.

After having confirmed that the customer has the correct manuals, proceed to the visual check.

Performing visual inspection

Perform the following visual inspection to the installed monitoring system:

1. Check that all product labeling, markings and symbols are intact and readable.
2. Check that the monitor and the connected devices do not have any visible damage.
3. Check that the monitor and the connected devices are properly mounted with specified mounting solutions.
4. Check that the cables between the monitor and the connected devices are intact, properly connected and secured to the right connectors.
5. Check that the acquisition modules are properly connected and locked.

Performing 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.

WARNING EXCESSIVE LEAKAGE CURRENT. Do not use a multiple socket outlet or extension cord in an ME system.

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.

WARNING EXCESSIVE LEAKAGE CURRENT. Laser printers are not IEC 60601-1 certified equipment and 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 clause 16 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. Consult your local service representative before installing a laser printer.

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 must be complied with.

Test setup

The electrical safety test procedure described in this service manual is intended for the following system components in the CARESCAPE B450 monitoring system:

- CARESCAPE B450
- D19KT display
- E-modules
- E-musb with CARESCAPE $rSO_2$and CARESCAPE CO_2Microsteam
- CARESCAPE PDM
- CARESCAPE ONE, only if connected to the CARESCAPE B450 with a 1.5 m (5 ft) or 4.5 m (15 ft) ePort cable.

NOTE If CARESCAPE ONE is connected to the CARESCAPE B450 with a 30 m (98.5 ft) Ethernet cable, or used as a stand-alone monitor, perform the electrical safety test for the CARESCAPE ONE according to the CARESCAPE ONE Service Manual.

Perform the electrical safety tests for the Unity Network Interface Device (ID) according to the product's own service manual.

All system components must be properly connected to the monitor during the electrical safety tests.

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	Perform the electrical safety tests using an electrical safety analyzer according to IEC 60601-1; 3.1 edition, AAMI ES60601-1 + C1 + A1 + A2, EN 60601-1 or CSA CAN/CSA-C22.2 NO. 60601-1:14. The schematics in this section show the principle of the test equipment. The actual configuration of the test equipment may vary. Refer to the instructions delivered with the safety analyzer to perform each test.
Safety Test Body Kit	P/N: M1155870 for E-Modules and CARESCAPE PDM P/N: 2101836-001 for CARESCAPE Parameters Instead of the test bodies in the safety test body kit, you may use other applicable test bodies with all pins connected together.

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.

Verifying power outlets

1. 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.

Verifying power cords and plugs

1. Verify that the power cords being used with the monitoring system are undamaged:
   a. Inspect each power cord for wear or damage. If damage is suspected, test for continuity through each conductor of the power cord connector.
   b. Replace the power cord, as necessary, with a regulatory-approved cord for the country of use.

WARNING ELECTRIC SHOCK. To avoid the risk of electric shock, use only AC power cords recommended or manufactured by GE.

Ground integrity check

There are two alternative methods for checking the ground integrity:

- Testing ground continuity
- Checking the impedance of protective earth connection

These tests determine whether the device's exposed metal and power inlet's ground connection has a power ground fault condition.

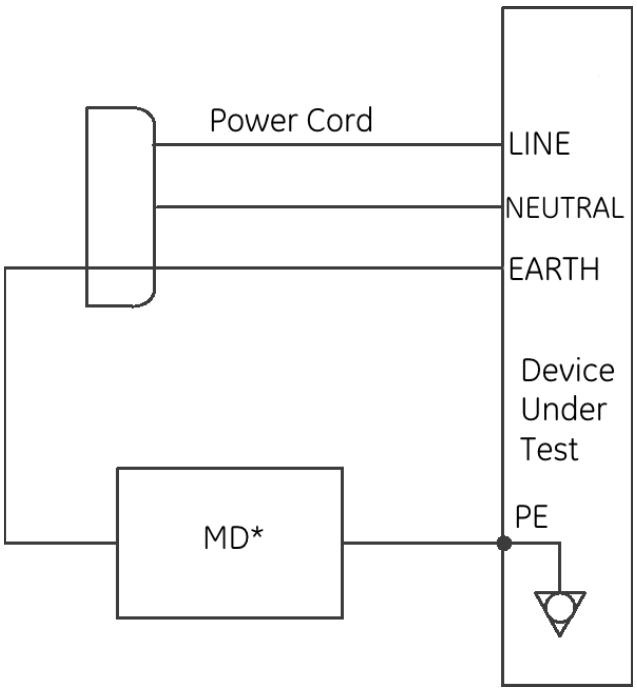
Perform this test separately for the monitor and for the secondary display according to the following instruction.

Perform the test in accordance to your local regulations.

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

Testing ground continuity

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 ground terminal and any accessible metal part which is protectively grounded shall not exceed 0.1 ohms.
- For equipment with a power supply cord, the impedance between the protective ground pin in the mains plug and any accessible metal part which is protectively grounded shall not exceed 0.2 ohms.

Checking impedance of protective ground 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.

Preferably use a safety analyzer and test the equipment with the power supply cord.

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

Testing earth leakage current

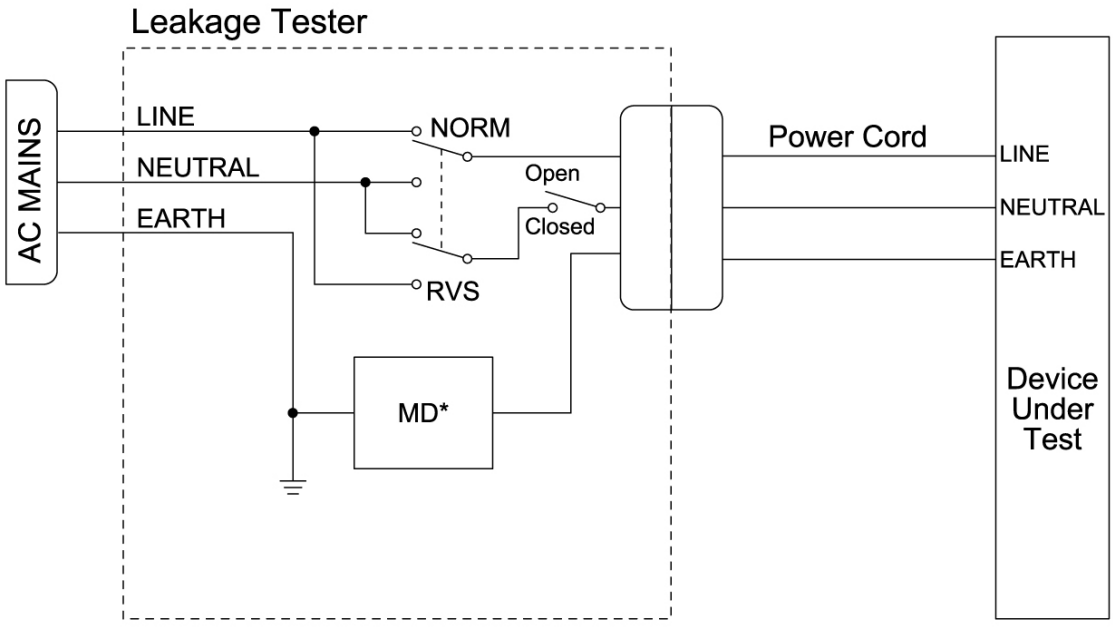
This test measures the current leakage flowing from the mains part through or across the insulation into the protective earth conductor of the device under test.

Perform this test separately for the monitor and for the secondary display according to the following instruction.

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

The test sequence described below is for reference only. You can also perform the subtests in a different order.

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



In the diagram:

* 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 5 mA for installations that require compliance to 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 10 mA.

Testing touch current

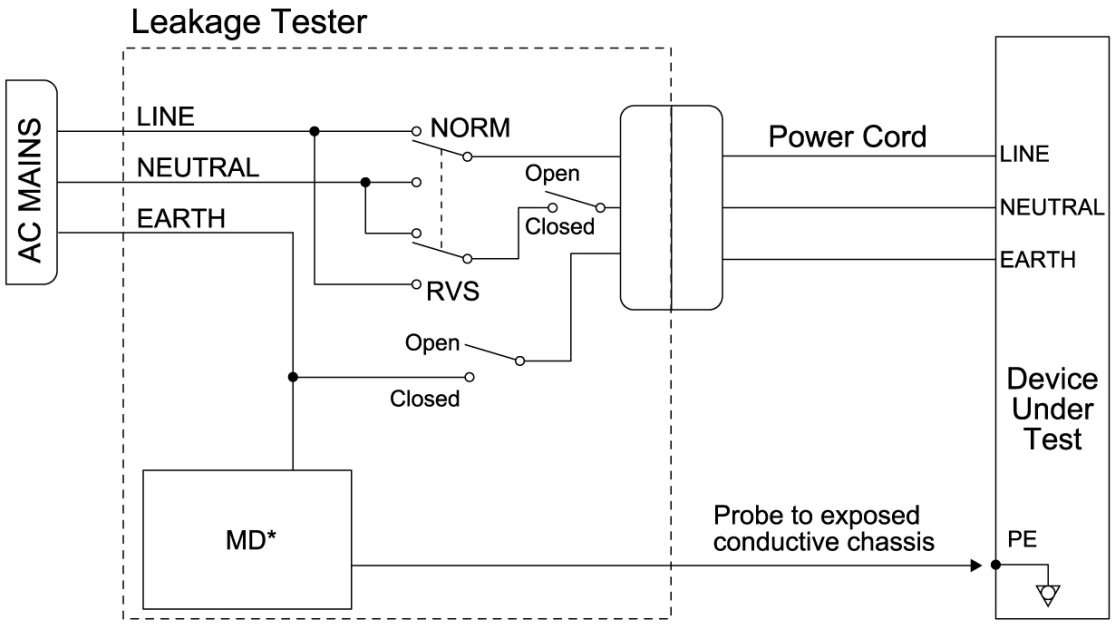
This test measures current leakage through the exposed conductive parts on the device under test.

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.

The test sequence described below is for reference only. You can also perform the subtests in a different order.

- The monitor: You don't have to perform the tests in Normal Condition (NC), because the accessible connectors are connected to the protective earth.
- Displays: Perform all the conditions. Measure the touch current from one of the screws in the mounting plate in the back of the display.
- CARESCAPE ONE: Perform all the conditions. Measure the touch current from one of the ePort screws, or the RJ-45 connector.

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



In the diagram:

* 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.

Patient leakage current tests

Patient leakage current tests consist of patient (source) leakage current tests and patient (sink) leakage current tests. Perform these patient leakage current tests for all the E-modules, PDM and CARESCAPE Parameters connected to the monitor.

Patient leakage current tests for acquisition modules

The following table specifies the applied part connections to be tested with each connected E-module and PDM.

Use the safety test body kit, P/N M1155870 (or equivalent), to perform patient leakage current tests. This safety test body kit contains various test connectors where all pins are shorted out together. For information on which test connector 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, connect the test connector directly to the specified connector in the module.

Applied part connections to be tested with each connected E-module and PDM	
Module	**Patient connector**
E-PT	P3/P7
E-PP	P5
E-COP, E-COPSv	P4/P8
E-PiCCO	P8
E-NSATX	SpO2

Applied part connections to be tested with each connected E-module and PDM	
Module	**Patient connector**
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. 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-EEGX	1. Disconnect the N-EEGX headbox from the E-EEGX module. 2. Connect the test body directly to the E-EEGX module.
PDM	ECG & SpO2

Patient leakage current tests for E-musb with CARESCAPE rSO_2

Use the safety test body kit, P/N 5851468 (or equivalent), to perform patient leakage current tests. The safety test body kit contains various test connectors where all pins are shorted out together.

Applied part connection to be tested	
Module	**Patient connector**
E-musb	Connect the test body to one of the INVOS sensor cable connectors.

Patient leakage current tests for CARESCAPE ONE with CARESCAPE Parameters

Perform the patient leakage current tests for each CARESCAPE Parameter connected to the CARESCAPE ONE, including:

- CARESCAPE ECG
- CARESCAPE Pressure
- CARESCAPE Temperature
- CARESCAPE SpO_2
- CARESCAPE SpO_2 Masimo
- CARESCAPE SpO_2 Nellcor
- CARESCAPE CO_2– LoFlo
- CARESCAPE rSO_2

Use the safety test body kit, P/N 2101836-001 (or equivalent). The safety test body kit contains a test connector for each available CARESCAPE Parameter. All pins in a test connector are shorted out together.

Testing patient (source) leakage current

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

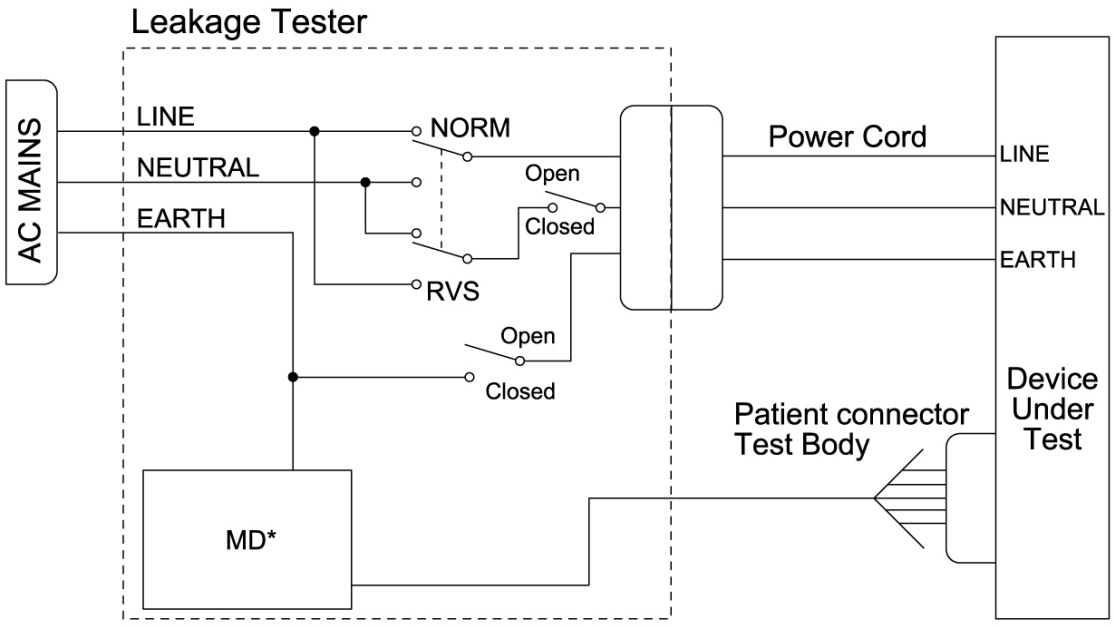
Perform this test for all the E-modules, PDM and CARESCAPE Parameters connected to the monitor.

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.

The test sequence described below is for reference only. You can also perform the subtests in a different order.

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



In the diagram:

* 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.
15. Repeat this test for all the connected acquisition modules and patient connectors specified in table Patient connectors to be tested with each module.

Acceptance criteria in Normal Condition (NC):

- All readings shall be less than or equal to 10 µA (d.c.).

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 (d.c.).

Testing patient (sink) leakage current

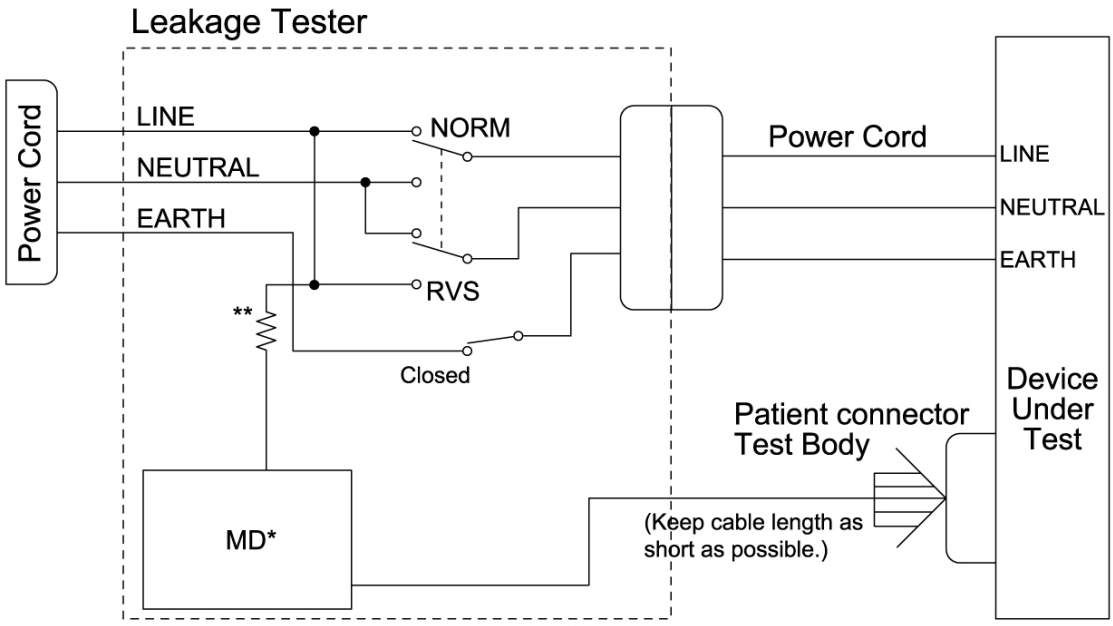
This procedure measures the leakage current from an applied part connector of the device to ground when the applied part connector is connected to 250 V.

Perform this test for all the E-modules, PDM and CARESCAPE Parameters connected to the monitor.

Perform the test in Normal Condition (NC) with normal and reverse polarity.

The test sequence described below is for reference only. You can also perform the subtests in a different order.

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



In the diagram:

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

** 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.

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 acquisition modules and patient connectors specified in table Patient connectors to be tested with each module

Acceptance criteria:

- All readings shall be less than or equal to 50 µA (d.c.).

Completing electrical safety tests

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.

Performing functional check

Preparing for the functional check

1. Turn off the monitor. Press the on/standby button on the monitor front panel. When a message prompts you, press the power button a second time.
2. Detach the monitor battery and disconnect the power cord from the wall outlet for a moment, and then connect them back. This ensures the monitor is turned off, not to standby.
3. If installed, turn off the secondary display by pressing the on/off switch located on the back of the display to the 0 (off) position.

   The monitor and display are now turned off.

Checking the startup

1. Turn on the monitor and check that the 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 system error messages on the screen.
   - The language of the clinical user interface is correct
2. If the optional secondary display is connected, press the power on/off switch located on the back of the secondary display to the I (on) position and check the following from the display:
   - The power indicator is lit.
   - The blue, yellow, and red alarm lights illuminate momentarily.
   - The blue pause audio alarm indicator illuminates momentarily.
3. Check that the monitor starts charging the monitor battery, if it is not yet fully charged:
   - Either the monitor battery is full or the monitor battery is charging indicator is in the upper right corner of the screen.
4. Check that the monitor date and time are correct.

The battery must be fully charged before taking the monitor into use for the first time. Keep the monitor connected to the AC mains until the battery is fully charged.

Checking displays

Perform these tests for both the integrated main display and for the optional secondary display.

Checking picture quality

1. Check that all text is readable and all images are clear.
2. Check that the display brightness is adequate in the use environment. Adjust if necessary.

Testing touchscreen control

1. To check the touchscreen operation, touch a corner of an active parameter window.

   Check that the related menu is opened.
2. Recalibrate the touchscreen, if needed.
3. Select  to return to the normal screen.

Testing Trim Knob on the secondary display

Perform this test only for the secondary display.

1. Rotate the ***Trim Knob*** control in either direction to move from option to option on the display.
2. Press the ***Trim Knob*** control once to select the highlighted option.
3. Check that the selected menu is opened on the screen or the selected activity is started.

Checking the status of connected devices

Check that the following devices are properly identified and configured. Skip the steps that are not applicable for the installed monitoring system.

1. Log in to the service interface.

2. Select ***Information***:
   a. Select ***Host Information***: Check that ***Host Serial Number*** and ***Active Software Version*** are correct.
   b. Select ***Host License Information***: Check that all the ordered licenses are enabled.
   c. Select ***Acquisition Information- Acquisition Module***: Check that the connected PDM or the connected CARESCAPE ONE is correctly identified.
   d. Select ***Acquisition Information- E-Module***: Check that all the connected E-Modules are correctly identified.
   e. Select ***Acquisition Information- CARESCAPE Parameters***: Check that the CARESCAPE parameters connected to the CARESCAPE ONE or to the E-musb module are correctly identified.
   f. Select ***PDM License Information***: Check that the connected PDM has the ordered licenses enabled.
   g. Select ***UnityID Information***: Check that the connected CARESCAPE Network ID interface device is identified.
   h. Select ***Admit Settings***: Check that the ***Patient ID Prefix*** is correct.
   i. Select ***Power Line Frequency***: Check that the power line frequency is correctly configured according to the line frequency used in your country.
   j. Select ***MUSE/12SL***: Check that the MUSE/12SL is correctly configured.
3. Stay connected to the service interface.

Testing printing to IX printers

Perform the following test only if the 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. Select ***Configuration*** > ***Printers***.

   A list of all the installed IX printers is shown.
2. Select the printer you want to test and select ***Print test page***.
3. Verify that the test page is printed to the selected printer.
4. Repeat steps 2 to 3 for all connected IX printers.
5. Log out from the service interface.

Testing InSite RSvP connectivity

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

1. Contact the local GE online support center to confirm that they can view the monitor.

Testing the USB remote control

Perform this test only if a USB remote control is connected to the monitor.

1. Press any hard key on the remote control.

   Verify that the selected menu opens on the screen, or the related activity starts.

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.
3. Press the ***Trim Knob*** control once to select the highlighted option.

   Verify that the selected menu opens on the screen, or the related activity starts.
4. Select  to return to the normal screen.

Testing the mouse

Perform this test only if a mouse is connected to the 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. Verify that a correct window or a menu opens.
3. Select  to return to the normal screen.

Testing the keyboard

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

1. Select ***Data & Pages*** > ***Admit/ Discharge*** (or ***Start/ End Case).***
2. Select ***Patient*** tab > ***Edit Name & MRN***.
3. Enter some data into the ***Medical Record Number*** field using the keyboard. Include characters that are specific to the chosen keyboard locale.
4. Check that the keyboard language configuration is correct.
5. Select  to return to the normal screen.

Testing the barcode reader

Perform this test only if a barcode reader is connected to the 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:
   a. Length delimited or Character delimited parser:
      i. Select ***Scan from Barcode***.
      ii. 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.
      iii. Verify that the data content in the barcode is correctly populated to the related fields in the ***Patient*** and the ***Administr. Information*** tabs.
   b. No parser:
      i. Select ***Edit Name & MRN*** and press ***Enter*** to highlight the ***Medical Record Number*** field.
      ii. Scan a sample barcode that only contains one piece of information (for example, a Serial Number barcode from a module's device label).
      iii. Verify that the data is correctly populated into the ***Medical Record Number*** field.
4. Select  to return to the normal screen.

Testing wired MC Network communication

Perform the following test only if the monitor is connected to a wired MC Network.

1. Make sure that at least one other monitor is on the network. The other monitor must be in an admitted state and have an active ECG measurement with a simulator signal.
2. Check that a network symbol  is displayed in the upper right corner of the screen.
3. Select ***Data & Pages*** > ***Other Patients*** > ***View Patients***.
4. Select a care unit from the ***Unit*** list.
5. From the ***Show*** list, select ***All Patients***
6. Select a patient bed from the list and select ***View***
7. Check that a window with parameters from the other monitor displays on the left side of the screen.
8. Select ***Close View*** to close the window.

Testing wireless LAN

Perform the following test only if the monitor supports WLAN communication.

Wireless LAN functional check consists of two tests:

1. The first test is for all wireless monitors. The purpose of this test is to ensure that each wireless monitor is correctly configured. The monitor is stationary during the test.
2. The second test is for the wireless MC Network infrastructure. This test is recommended if the wireless monitors will be used during patient transfers. You may skip the test if the wireless monitors will only be used as stationary

monitors at the bedside. Perform this test only during the installation, or when troubleshooting wireless connectivity issues.

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

Testing the monitor's wireless LAN configuration

Check each wireless monitor according to the following procedure.

1. Make sure that there is at least one other monitor on the MC Network. The other monitor must be in an admitted state and have an active ECG measurement with a simulator signal.
2. Disconnect the monitor under test from the wired MC Network, if connected.
3. Check that the wireless network connection and signal strength indicator appears on the screen.
4. Select ***Data & Pages*** > ***Other Patients*** > ***View Patients***.
5. Select a care unit from the ***Unit*** list.
6. From the ***Show*** list, select ***All Patients***.
7. Select a patient bed from the list and select ***View***.
8. Check that:
   a. A window with parameters from the other monitor displays on the left side of the screen.
   b. The waveforms are continuous and there is no data loss.
9. Select ***Close View*** to close the window.
10. Reconnect the monitor back to the wired MC Network, if applicable.

Checking performance of wireless MC Network infrastructure

1. Perform the test according to the guidelines described in Appendix A.

Testing Citrix connection

Perform the following test only if Citrix is configured and in use.

1. Select ***Data & Pages*** > .
2. Verify that the initial program (configured in the service interface) is launched correctly on the screen.
3. Select to exit the Citrix thin client.

Completing the functional check

1. Select ***Discharge Patient*** or ***Reset Case*** to discard any changes made to the monitor configuration during the functional check.
2. Disconnect the test setup.

9

Battery maintenance

Maintaining the battery

WARNING LOSS OF MONITORING. The B450 must always be used with a battery inserted. This will ensure the functioning of the monitor during possible supply mains interruptions.

This chapter contains information for the CARESCAPE host monitor battery maintenance. Refer to the CARESCAPE ONE and CARESCAPE PDM Service Manuals for information about their battery maintenance procedures.

CARESCAPE B450 supports up to two rechargeable and user replaceable lithium-ion batteries. They are located in the battery compartment. One battery must be installed at all times, the second one is optional.

About the lithium-ion battery

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 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 self-discharge rate of lithium-ion cells double for every 10°C (18°F) rise in temperature.
- 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 rated/nominal 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.

Improving battery performance

Follow these guidelines to improve the battery performance:

1. Position the equipment in a location that does not artificially increase the operating temperature of the battery.
2. GE recommends using an approved GE external battery charger to charge the battery whenever possible. The external battery charger maintains a lower battery cell temperature during the charge cycle.

   This reduction in temperature can extend the life of the battery.
3. Condition the battery when the monitor shows the message ***Condition Battery A/B***, or when the battery quality status indicates ***Condition***. (See ***Monitor Setup*** > ***Main Setup*** > ***Battery Status*** > ***Monitor*** > ***Batteries***.)

   Battery conditioning re-calibrates the electronic fuel gauge. GE recommends using an approved GE external battery charger to condition the battery.

Battery 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) if the device will not be used for a long period of time.

Testing the battery charge

Before installing a battery, verify the battery's state of charge. Each battery must be fully charged before use.

1. Press the **TEST** button on the battery and check the green charging level indicators to see how much charge is left:
   - Four LEDs illuminated: 75% to 100% of full-charge capacity.
   - Three LEDs illuminated: 50% to 74.9% of full-charge capacity.
   - Two LEDs illuminated: 25% to 49.9% of full-charge capacity.
   - One LED illuminated: 11% to 24.9% of full-charge capacity.
   - One LED flashing: < 11% of full-charge capacity.

Charging a battery inside the monitor

The battery is charged whenever the monitor is connected to an AC power source. The battery charges when the monitor is either turned on or in the standby mode.

Battery is charging as long as the orange battery charging LED indicator is lit.

There are some special conditions when battery charging is temporarily denied, for example, when the battery temperature is too high.

Charging and conditioning a battery using an external battery charger

Follow the external battery charger instructions for charging and conditioning the battery.

Checking the battery status with monitor software

You can check the monitor battery status using the monitor software:

1. Select the battery status area in the upper right corner of the screen, or select ***Monitor Setup*** > ***Main Setup*** > ***Battery Status***.
2. Check the ***Monitor*** battery status that appears.

   If the B450 has two batteries inserted, there are two columns, ***A*** and ***B***, that show information for each battery.
3. If you wish to see more detailed battery information, select the ***Advanced*** tab.

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.

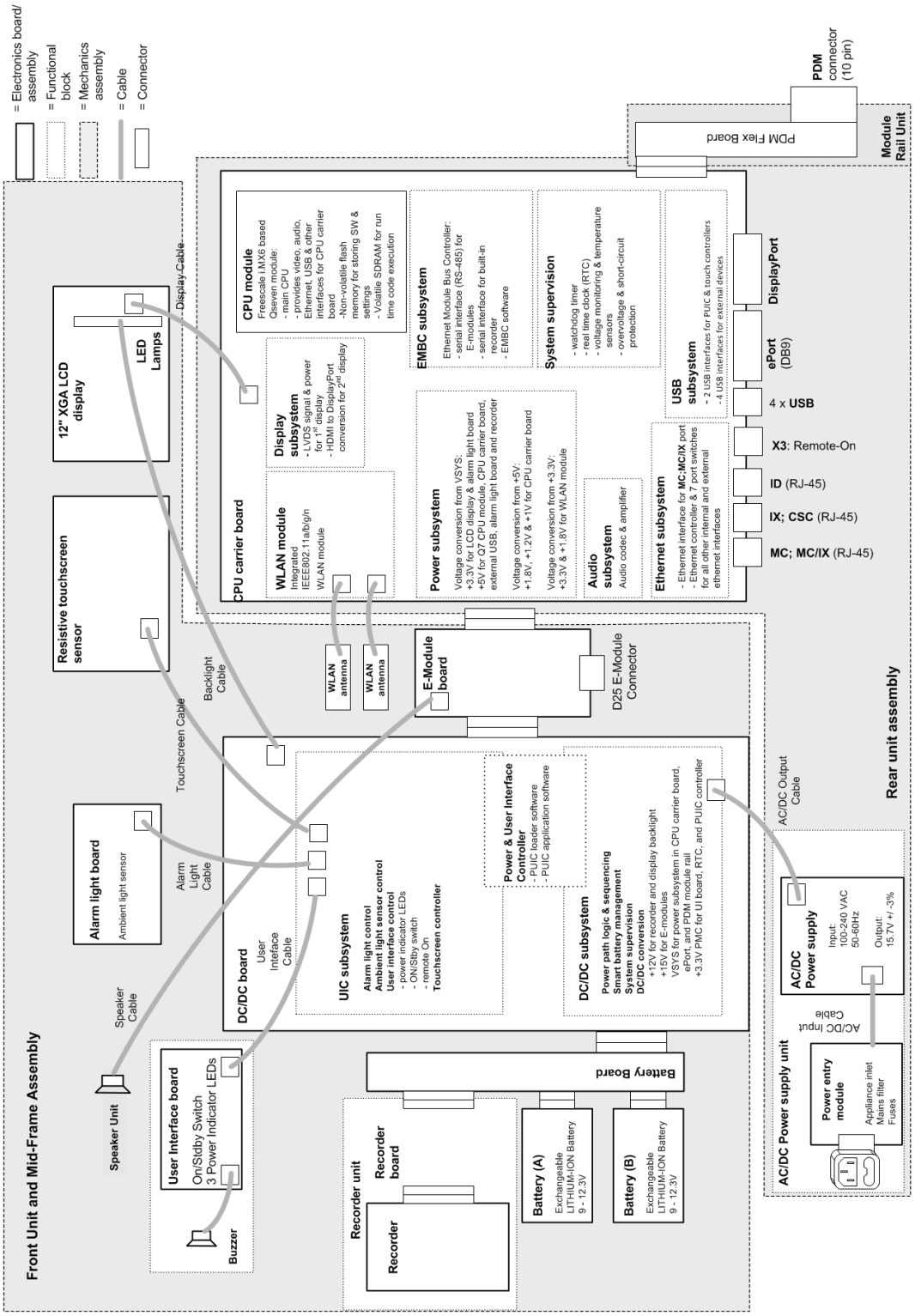
- USA: You may follow the battery manufacturers instructions on the battery to recycle it. Alternatively, you may return GE product batteries to GE for recycling. For information about returning batteries to GE, contact your authorized GE Service representative or contact GE Equipment Services at 1-800-437-1171.
- 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.

10

Theory of operation

CARESCAPE B450 System block diagram

The system block diagram shows the functional units of the CARESCAPE B450. The following sections describe the operation and interaction of the different subsystems.


= Electronics board/ assembly
= Functional block
= Mechanics assembly
= Cable
= Connector
Front Unit and Mid-Frame Assembly
Speaker Unit
Speaker Cable
User Interface board
On/Stdby Switch
3 Power Indicator LEDs
Buzzer
Alarm light board
Ambient light sensor
Alarm Light Cable
Touchscreen Cable
Backlight Cable
Display Cable
Resistive touchscreen sensor
12" XGA LCD display
LED Lamps
DC/DC board
User Inteface Cable
UIC subsystem
Alarm light control
Ambient light sensor control
User interface control
- power indicator LEDs
- ON/Stby switch
- remote On
Touchscreen controller
Power & User Interface Controller
- PUIC loader software
- PUIC application software
DC/DC subsystem
Power path logic & sequencing
Smart battery management
System supervision
DC/DC conversion
+12V for recorder and display backlight
+15V for E-modules
VSYS for power subsystem in CPU carrier board, ePort, and PDM module rail
+3.3V PMC for UI board, RTC, and PUIC controller
Battery Board
Recorder unit
Recorder board
Recorder
Battery (A)
Exchangeable
LITHIUM-ION Battery
9 - 12.3V
Battery (B)
Exchangeable
LITHIUM-ION Battery
9 - 12.3V
WLAN antenna
WLAN antenna
E-Module board
D25 E-Module Connector
CPU carrier board
WLAN module
Integrated IEEE802.11a/b/g/n WLAN module
Display subsystem
- LVDS signal & power for 1st display
- HDMI to DisplayPort conversion for 2nd display
CPU module
Freescale i.MX6 based Qseven module:
- main CPU
- provides video, audio, Ethernet, USB & other interfaces for CPU carrier board
-Non-volatile flash memory for storing SW & settings
- Volatile SDRAM for run time code execution
EMBC subsystem
Ethernet Module Bus Controller:
- serial interface (RS-485) for E-modules
- serial interface for built-in recorder
- EMBC software
System supervision
- watchdog timer
- real time clock (RTC)
- voltage monitoring & temperature sensors
- overvoltage & short-circuit protection
Power subsystem
Voltage conversion from VSYS:
+3.3V for LCD display & alarm light board
+5V for Q7 CPU module, CPU carrier board, external USB, alarm light board and recorder
Voltage conversion from +5V:
+1.8V, +1.2V & +1V for CPU carrier board
Voltage conversion from +3.3V:
+3.3V & +1.8V for WLAN module
Audio subsystem
Audio codec & amplifier
Ethernet subsystem
- Ethernet interface for MC;MC/IX port
- Ethernet controller & 7 port switches for all other internal and external ethernet interfaces
USB subsystem
- 2 USB interfaces for PUIC & touch controllers
- 4 USB interfaces for external devices
DisplayPort
ePort (DB9)
4 x USB
X3: Remote-On
ID (RJ-45)
IX; CSC (RJ-45)
MC; MC/IX (RJ-45)
PDM Flex Board
PDM connector (10 pin)
Module Rail Unit
Rear unit assembly
AC/DC Output Cable
AC/DC Power supply
Input: 100-240 VAC 50-60Hz
Output: 15.7V +/ -3%
AC/DC Input Cable
AC/DC Power supply unit
Power entry module
Appliance inlet
Mains filter
Fuses

AC/DC Power Supply

Power Entry Module

The power entry module consists of an appliance inlet and mains filter. The fuses in the appliance inlet provide the input protection. AC/DC input cable provides the AC voltage to AC/DC power supply and protective earth connection to the device chassis.

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 provides 15.7 Vdc ± 3% and 65 W continuous output power for the DC/DC board.

The AC/DC power supply unit has overload and overvoltage protections.

AC/DC Output cable

The AC/DC output cable provides the 15.7 Vdc to the DC/DC board.

Batteries

The monitor supports two rechargeable and user-replaceable (9-12.3V, 3800 mAh) lithium-ion batteries. They are located in the battery compartment. One battery must be installed at all times, the second one is optional.

The batteries support Smart Battery Data and they communicate with the DC/DC board using the System Management Bus (SMBus).

Batteries can be charged inside the monitor or by using an external battery charger. Battery conditioning, if needed, should be done using the external battery charger.

Cooling

The 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 and the CPU assembly have integrated heat sinks to enhance the cooling of the monitor.

DC/DC board

PUIC controller and software

The Power Management and User Interface Controller (PUIC) software controls the hardware related functions of the DC/DC and user interface controller subsystems.

The PUIC software is part of the host software package and it can be updated through the service interface, if needed..

DC/DC subsystem

The DC/DC subsystem takes care of:

- Power path control and sequencing.

- DC/DC conversions.
- Smart battery management.
- System supervision.

Power path control and sequencing

The DC/DC subsystem takes care of controlling 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 PUIC controller controls the sequencing of the power supplies.

DC/DC conversions

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

- + 12V is generated by using buck-boost converter. It is supplied to the thermal recorder and the LED backlight unit in the LCD display.
- + 15V is generated by using a buck-boost converter. It is supplied to the E-modules through +15VMOD circuit breaker.
- VSYS voltage level depends on the selected power source. In battery use, the VSYS is between 8.7-12.3V and in AC/DC use the VSYS is between 14.9-16.1V. The VSYS voltage is used to generate 5 V and 3.3 V voltages in the CPU carrier board. It is also used to create supply voltages for a CARESCAPE ONE or CARESCAPE PDM that is connected to an ePort connector, or for a CARESCAPE PDM that is connected to the PDM module rail.
- +3.3 V PMC voltage is generated by using a buck converter. The +3.3V PMC is supplied to the user interface board, for the real-time clock (RTC) in the CPU carrier board, and for the DC/DC board power management electronics. This voltage is always present when the monitor is connected to AC mains, or is battery powered, even when the monitor is in Standby.

All supply voltages have over-voltage and short-circuit protection.

Smart battery management

The PUIC controller acts as a SMBus host device and takes care of the battery management and charging.

The smart battery charger acts as a SMBus slave device that responds to charging current and charging voltage requests received via SMBus. The PUIC controller may reduce or stop charging current if needed from the system point of view, for example, if the system power consumption or temperature gets too high. The smart battery is responsible for the charging algorithm and capacity calculation.

System supervision

The PUIC controller monitors the internal supply voltages, temperatures and power consumption of the monitor.

The voltages and temperatures are measured by the voltage monitors and temperature sensors in the DC/DC board and CPU Carrier Board. System current is measured from the DC/DC board and used to calculate the system power consumption.

The communication between the PUIC controller and the voltage monitors and temperature sensors on CPU Carrier board takes place via the I2C bus (Inter-Integrated Circuit).

User Interface Controller (UIC) subsystem

The User Interface Controller (UIC) subsystem manages the following user interface related functions.

Alarm light control

- PUIC controller controls the alarm light LEDs according to the information received from the CPU assembly.
- The DC/DC board passes the +3.3V and +5 V supply voltages to the alarm light board.

Ambient light sensor

- The PUIC controller digitizes the information received from the ambient light sensor and passes it to the CPU assembly.
- CPU assembly adjusts the brightness of the display according to the ambient light information received from the PUIC controller.

User interface board

- The UIC subsystem has the LED drives for three power indicator LEDs and ON/Stdby button LED in the keypad.
- The PUIC controller reads the On/Stdby button press and remote-on signals.

Touchscreen controller

- The touchscreen controller digitizes the user input received from the touchscreen sensor and passes the coordinate information to the CPU assembly using USB communication.

CPU assembly

The CPU assembly consists of a CPU module and a CPU carrier board. The CPU assembly is attached to a heat sink to enhance cooling. There are two versions of the CPU assembly: with or without the WLAN module.

CPU module

The CPU module is an off-the-shelf, highly integrated QSeven computer-on-module (COM) that is based on a dual-core Freescale i.MX6 processor. The main processor of the CPU module manages data processing.

The CPU module has non-volatile flash memory for storing software and settings and volatile SDRAM memory for run time code execution. It also provides video, audio, Ethernet, USB, and other interfaces to the CPU carrier board.

CPU carrier board

Power subsystem

The power subsystem in the CPU carrier board receives VSYS voltage (8.7...16.1 V) as input from the DC/DC board and is responsible for the following voltage conversions:

- The power subsystem first converts the VSYS voltage to +5V and +3.3 V supply voltages. The +5V and +3.3 V voltages are used for the following purposes:
  - +5V is used to supply power for the CPU carrier board electronics, external USB connectors, and the Q7 CPU module. It is also directed back to DC/DC board

to provide supply voltage for the touch screen controller, for the alarm light board, and for the optional recorder.

  - +3.3V is used to convert +1.8V, +1.2 V and +1V voltages for the internal electronics in the CPU carrier board.
    If the WLAN option is installed, the +3.3V is used to provide +3.3 V and +1.8 V for the integrated WLAN module. The +3.3 V is also used to supply power for the integrated LCD display and directed back to DC/DC board to provide supply voltage for the alarm light board.

- The CPU carrier board passes the VSYS supply voltage to the ePort connector in the rear panel and to the PDM connector in the module rail unit. Only one of these interfaces is powered at a time.

System supervision

The CPU module and the CPU carrier board have internal watchdog timers to control the operation of the monitor. They may restart the monitor in case of a malfunction.

The CPU module has a real-time clock to store the system date and time. The real-time clock is powered normally by the +3.3 V PMC voltage and backed up by a BR2032 battery.

All critical supply voltages have over-voltage and short-circuit protection.

The CPU carrier board has A/D-converters (voltage monitors) and temperature sensors to measure the critical supply voltages and board temperatures. Many of them are shown in the service interface (***Diagnostics*** > ***Hardware Statistics***).

EMBC subsystem

The Ethernet Module Bus Controller (EMBC) subsystem is responsible for the RS-485 serial module bus communication for the E-modules, and serial communication for the optional built-in recorder.

The EMBC subsystem in the CPU carrier board has its own micro controller. It has serial flash memory for the EMBC bootloader software, NAND flash for the EMBC application software and the Linux kernel, and SDRAM for run-time EMBC code execution and temporary data storage. The EMBC subsystem has its own reset and watchdog circuitry.

The EMBC application software controls the EMBC section. The EMBC software is part of the host software package, and it can be updated through the service interface, if needed.

The host communication with the CPU module is implemented with an internal 10/100 Ethernet interface.

Display subsystem

The display controller is integrated into the CPU module. It provides a LVDS (Low Voltage Differential Signaling) interface for the integrated 12.1" LCD display, and HDMI (High Definition Media Interface) video output to the CPU carrier board.

The CPU carrier board takes care of the following functions:

- It passes the LVDS signal lines and the +3.3 V supply voltage to the integrated 12.1" LCD display via the display cable.
- It controls the backlight enable and brightness signals. The backlight cable is connected to the DC/DC board.

- It converts the HDMI video output from the CPU module to a DisplayPort interface provided for the secondary display.

Audio subsystem and speaker unit

The monitor has a speaker that provides audible alarms.

The audio interface originates from the digital I2S interface in the CPU module. The CPU carrier board has an audio codec to convert the digital audio signal to an analog audio signal, and an amplifier to amplify the audio signal for the speaker. The speaker cable is connected to the E-module board.

The monitor has an audio feedback circuitry that monitors the operation of the audio subsystem.

USB interfaces

The monitor provides four external USB interfaces and two internal USB interfaces.

- The two internal USB interfaces originate from the CPU module's USB On-The-Go port used in the host mode. A USB hub in the CPU carrier board expands this single USB interface into two: for communication with the PUIC controller and the touch screen controller in the DC/DC board.
- The four external USB interfaces in the rear panel of the monitor originate from the CPU module's standard USB ports. These external high-speed USB connections are intended for the USB input devices, for the secondary display, and for exporting monitoring data to external systems using the DRI protocol.
  The maximum output voltage and current of the USB port that is reserved mainly for the secondary display is limited to 5 V/100 mA. All the other external USB ports provide 5 V/500 mA.

Ethernet subsystem

Ethernet system consists of external Ethernet ports and in-system Ethernet communication channels.

The external MC; MC/IX network interface (RJ-45) is provided by a 10/100/1000 BASE-T Ethernet controller in the CPU module. This port has a unique MAC address.

The CPU carrier board has a PCI-E Ethernet controller and an internal 7-port Ethernet switch. All the external and internal interfaces provided by the Ethernet switch share the same MAC address. The Ethernet switch provides the following external interfaces:

- Network interface for the IX; CSC port (RJ-45) in the rear panel (10/100 BASE-T).
- PDM interface (10-pin) for the connector in the module rail unit (10/100 BASE-T).
- ePort interface (DB9) for the connector for the PDM and CARESCAPE ONE in the rear panel (10/100 BASE-T).
- Unity ID interface (RJ-45) for the connector in the rear panel (10/100 BASE-T).

The Ethernet switch also provides an internal interface for communication between the EMBC subsystem and the CPU module.

All external Ethernet interfaces are electrically isolated per IEC60601-1. Each external Ethernet interface (RJ-45) has a one dual-purpose LED to indicate link and activity states.

The MC; MC/IX, and IX; CSC network interfaces are configurable through the service interface. The monitor can be configured to use either two physical network interfaces

(dual wire configuration) or one physical network interface (single wire configuration) to connect to the MC and IX Networks.

WLAN subsystem

The monitor has an optional IEEE 802.11a/b/g/n WLAN module that enables a wireless network connection to the MC Network. The monitor can be ordered either with or without the WLAN option:

- If the WLAN option is ordered, the monitor includes a CPU assembly with a powered* WLAN module, WLAN antennas, and a WLAN license.
- If the WLAN option is not ordered, the monitor includes a CPU assembly without a WLAN module. The WLAN antennas and WLAN license are not installed.

* The WLAN DIP switches on the CPU carrier board control the power to the WLAN module.

The CPU carrier board with the WLAN module has connectors for the two WLAN antennas that are attached to the inner roof of the rear unit.

The WLAN module has the same MAC address as the MC; MC/IX port.

The monitor connects automatically to the wireless MC Network if the monitor is disconnected from the wired MC Network.

External interfaces

The CPU carrier board provides the following external interfaces in the rear panel of the monitor:

- Four high-speed USB connections for the USB input devices, for the secondary display, and for exporting monitoring data to external systems using the DRI protocol.
  - The USB interface that is dedicated for the secondary display controls the touch screen, Trim Knob, audible alarm, and alarm light operations in the secondary display. The maximum output voltage and current of this USB port is limited to 5 V/100 mA, whereas all the other USB ports provide 5 V/500 mA. Therefore, this USB port may not provide enough power for some USB devices.
- One DisplayPort connector for a secondary display. Connection to a CARESCAPE D19KT VER01 requires the use of a DisplayPort to DVI-D Adapter.
- Three Ethernet (RJ-45) connectors.
  - With dual wire configuration:
    - MC: Connects the monitor to the MC Network.
    - IX: Connects the monitor to the optional IX Network.
  - With single wire configuration:
    - MC/IX: Connects the monitor to the MC Network and IX Network.
    - CSC: This connector is not in use.
  - ID: Connects the monitor to the Unity Network Interface Device (ID).
- One ePort (DB9) connector that provides an interface either to CARESCAPE Dock F0 with CARESCAPE ONE or for CARESCAPE PDM. The ePort connector is not powered if there is a PDM is connected to the module rail unit.
- One Remote-on connector. A remote-on cable enables a GE anesthesia workstation to turn the monitor to On/Standby mode. The remote-on functionality is disabled when the monitor is battery powered.

All the external connectors have ESD protection. Additionally, RJ-45 connectors are electrically isolated with Ethernet isolation transformers.

Other subsystems

Display subsystem

Display

The monitor has an integrated 12.1" active matrix color TFT LCD panel with a LED backlight unit. It provides wide viewing angle and supports XGA (1024 * 768 pixels) resolution.

The video controller is integrated into the CPU module and it provides LVDS output to the LCD panel through the display cable. The display cable also supplies the +3.3 V supply voltage to the LCD panel.

LCD backlight unit

The LCD panel has an integrated, long-life LED backlight unit that is used to illuminate the LCD display. The LED backlight unit receives the +12 V input voltage from the DC/DC board via backlight cable. The backlight enable signal and brightness control is received from the CPU carrier board.

Touchscreen sensor

The 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 through the touchscreen cable to the touchscreen controller on the DC/DC board.

E-module board

The E-module board is a simple connector board. It interfaces the CPU Carrier Board to the DC/DC Board and provides a D25 male connector for one single-width E-module.

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 LED backlight of the LCD panel to the different ambient light conditions.

The alarm light board is connected to the DC/DC board with the alarm light cable.

Speaker

The speaker unit provides audible alarms. The audio signal for the speaker is generated in the CPU carrier board using an audio codec and an audio amplifier. Audio feedback controls the operation of the speaker.

The speaker cable is connected to the E-module board.

Keypad & Buzzer

The monitor has a user interface board with an on/standby button and three power indicator LEDs: mains voltage indicator, battery use indicator and battery charging/failure indicator. The user interface board is connected to the DC/DC board with a user interface cable.

The buzzer that is connected to the user interface board functions as a back-up speaker in case the main speaker fails.

Recorder unit

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

The recorder board interfaces the recorder to the DC/DC board through the battery 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 a LC-filter for the +12 V.
- It passes +5 V to the recorder.

The serial communication and recorder buffers are in the EMBC section of the CPU carrier board.

Battery board

The battery board is a connector board. It interfaces the two lithium-ion batteries and the optional thermal recorder to the DC/DC board.

Module rail unit

The module rail unit has a 10-pin connector for the CARESCAPE PDM. The module rail unit connects to the CPU carrier board.

11

Troubleshooting

Troubleshooting guidelines

This chapter focuses on troubleshooting technical problems. Refer to the user manual for troubleshooting monitoring problems and clinical configuration issues.

If a problem remains, contact technical support for service. To ensure accurate problem solving, please be prepared to provide the following information:

- Product name and serial number or UDI
- Hardware and software versions
- Detailed problem description
- Error messages, if any
- Configuration information (or settings file)
- Service Logs
- The troubleshooting you have done so far

Perform the specified corrective maintenance check after any corrective maintenance to the product.

Performing basic troubleshooting

Before beginning any detailed troubleshooting, complete the following steps:

1. Check if there are any error messages shown in the message field. For a list of possible causes and solutions, see Messages related to various technical issues.
2. Perform visual inspection to be sure that:
   - There is no physical damage.
   - All peripheral devices are connected properly.
   - The monitor and the connected peripheral devices are properly powered.
3. Verify the compatibility of all system components.

   For a list of the compatible devices, see the supplemental information manual.

   For a list of compatible supplies and accessories, see Supplies and Accessories Supplement.
4. Verify that the platform and clinical configurations are correct.

   For the clinical configuration see user's manual and for the platform configuration see Configuration chapter.

5. If you suspect loose parts or cable connections inside the monitor, disassemble the monitor to a level needed to perform an internal visual check. Check that:
   a. All screws are tightened properly.
   b. All cables are connected properly.
   c. There are no loose objects inside the monitor.

   Perform the electrical safety test and the checkout procedure every time you have disassembled the patient monitor.

Viewing configuration and device information

To view current platform configuration, hardware and software information of the monitor and the connected peripheral devices:

1. Log in to the service interface.
2. Select ***Information***.
3. Select the menu option on the left side of the screen, or scroll down the page to view the information.

Information

Item	Description
Host Information	Active software part number and version, uploaded software part number and version, Host serial number, Host asset number, MC Network IP address, IX Network IP address, MAC address, CPU hardware version, PUIC hardware version, and PUIC software version.
Network	For dual wire configuration: • Active MC Network configuration: IP address and Netmask • Active IX Network configuration: DHCP, IP address, Netmask, and Default Gateway For single wire configuration: • Active MC Network configuration: IP address, Netmask, and Default Gateway • IX Network configuration shown as disabled
Active Software Package	Current active 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.
Acquisition Information - Acquisition Module	Shows current information related to a connected acquisition device. • For PDM: Active software version, Main board revision, DAS board revision, Serial number, Asset number, MAC address, IP address, Power frequency, ECG filter. • For CS ONE: Active software version, CPU HW version, Serial number and Asset number.
Acquisition Information - E-Module	Label, Software version, Control number, and Serial number.

Item	Description
Acquisition Information - E-Module Frame	Shows information related to the internal EMBC subsystem: EMBC Serial number, EMBC Software number, EMBC Software version, and EMBC IP address.
Acquisition Information - CARESCAPE Parameters	Shows current information related to the CARESCAPE Parameters: Cable type, Serial number, and Software version.
Installed IX Printers	Printer name, hostname or IP address.
Printer Location Information	Printout type (Alarm Waveforms, Numeric Trends, Reports, Telemetry Waveforms, and Waveforms) and Printer location.
PDM License Information	PDM license option, status, and number of licenses.
UnityID Information	Product ID, Unity Network ID software number and version, Date, Time, Device name and software version of each device connected.
Admit Settings	Patient ID Prefix.
Citrix	Server address, initial program, session timeout in minutes, username and encryption level.
Unit and Bed Name	Unit name and Bed name for CARESCAPE Network.
Remote Service	Status, Enterprise URL, Proxy Address, Proxy port, Proxy username.
Language	Clinical user interface language.
Power Line Frequency	Current power line frequency setting in use.
MUSE/12SL	Location ID, Site number, MUSE web username, and MUSE web URL
Remote Alarm Device Settings	Operation status and power failure detection status.
Remote Alarm Devices	Remote alarm devices currently connected to the monitor.
USB Port Information	Product name, Manufacturer, Vendor code, Product ID, and Serial number.
WLAN	WLAN radio status, configuration type and configuration details.

Viewing hardware statistics

You can view internal voltages, temperatures and power consumption in the ***Hardware Statistics*** menu.

Note that if there is a hardware failure in the power subsystem of the DC/DC board or the CPU carrier board the monitor may not start up and you cannot access hardware statistics. In this case, see sections Power management LEDs and Problems and solutions for troubleshooting instructions.

Points to note:

- Too low or high temperature may also trigger a ***Service Monitor Error Code 0xHOST1001*** message. If the internal temperatures get too high, the monitor may shut down.
- Too low or high internal supply voltages may also trigger a ***Service Monitor Error Code 0xHOST1002*** or a ***Module voltage low*** message.
- For more information about the monitor battery statuses, see ***Monitor Setup*** > ***Battery Status*** > ***Monitor*** > ***Batteries*** > ***Advanced***.

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.

1. Log in to the service interface.
2. Select ***Diagnostics*** > ***Hardware Statistics***.
3. Scroll down the page to view the information.

   The controlled parameters are measured with voltage monitors and temperature sensors in the specified subsystem.

Hardware statistics

Measurement	Description
+12Vsync CPU Voltage (mV) -12Vsync CPU Voltage (mV)	Not in use.
AC/DC voltage (mV)	The AC/DC voltage is the +15.7V DC voltage generated by the AC/DC power supply unit from the mains voltage, 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" when the monitor is in battery use (not connected to the AC mains).
DC/DC VSYS voltage (mV) DC/DC +15V voltage (mV) DC/DC +12V voltage (mV) CPU carrier board 3.3V PMC	These voltages are generated by the voltage converters in the DC/DC board. They are used for the following purposes: • DC/DC VSYS voltage is used to generate the CPU carrier board 5V and CPU carrier board 3.3V voltages. The VSYS CPU carrier board voltage is also derived from the DC/DC VSYS voltage. • DC/DC +12V voltage is supplied for the display backlight and for the optional recorder. • DC/DC +15V voltage is supplied for a connected E-module. • CPU carrier board 3.3V PMC is supplied to the user interface board, for the real-time clock, and for the DC/DC board power management electronics. This voltage is always on present when the monitor is connected to AC mains or is battery powered, even when the monitor is in Standby. The above voltages are measured by a voltage monitor in the DC/DC board, except the 3.3V PMC voltage, which is measured by a voltage monitor in the CPU carrier board.
DC/DC +15V MOD voltage (mV)	This voltage is derived from the DC/DC +15V voltage. It is supplied for a connected E-module. The voltage is measured by a voltage monitor in the CPU carrier board.
DC/DC +5V voltage (mV) DC/DC +3.3V voltage (mV)	These voltages are generated by the step-down converters in the CPU carrier board. • DC/DC +5V voltage is supplied for the touchscreen controller in the DC/DC board, for the alarm light board, and for the optional recorder. • DC/DC +3.3V voltage is supplied for the alarm light board. These voltages are measured by a voltage monitor in the DC/DC board.

Measurement	Description
VSYS CPU carrier board voltage (mV)	This voltage is derived from the DC/DC VSYS voltage provided by the DC/DC board. The voltage is measured from the CPU carrier board. It is used for the following purposes: • to generate the CPU carrier board 3.3V and CPU carrier board 5V voltages. • to create the VSYS ePort 10Pin (PDM) and VSYS ePort voltages when needed.
VSYS ePort 10Pin (PDM) voltage (mV)	VSYS ePort 10Pin (PDM) voltage provides supply voltage for a CARESCAPE PDM that is connected to the PDM module rail connector. The voltage is measured by a voltage monitor in the CPU carrier board. The value is shown as "0" if a CARESCAPE PDM is not connected to the PDM module rail. NOTE: VSYS ePort 10Pin (PDM) voltage and VSYS ePort voltage cannot be enabled simultaneously.
VSYS ePort voltage (mV)	VSYS ePort voltage provides supply voltage for a CARESCAPE PDM or a CARESCAPE Dock F0 that is connected to the ePort (DB9) connector. The voltage is measured by a voltage monitor in the CPU carrier board. The value is shown as "0" if a CARESCAPE PDM or a CARESCAPE Dock F0 is not connected to the ePort connector. NOTE: VSYS ePort voltage and VSYS ePort 10Pin (PDM) voltage cannot be enabled simultaneously.
CPU carrier board 1.0V (mV) CPU carrier board 1.2V (mV) CPU carrier board 1.8V (mV) CPU carrier board 3.3V (mV) CPU carrier board 5V (mV)	These voltages are generated by the step-down converters or load switches in the CPU carrier board. They are used for the following purposes: • CPU carrier board 5V is converted from the VSYS CPU carrier board voltage. It is used to supply power for the CPU carrier board electronics, external USB connectors, and Q7 CPU module. It is also directed back to DC/DC board (DC/DC +5V voltage) to provide supply voltage for the touch screen controller, for the alarm light board, and for the optional recorder. • CPU carrier board 3.3V is converted from the VSYS CPU carrier board voltage. It is used to convert the lower CPU carrier board voltages, to provide supply voltage for the LCD display, and to create the supply voltages required by the optional WLAN module. It is also directed back to DC/DC board (DC/DC +3.3V voltage) to provide supply voltage for the alarm light board. • The CPU carrier board 1.0V, CPU carrier board 1.2V and CPU carrier board 1.8V are converted from the CPU carrier board 3.3V. These voltages are used as supply voltages for the internal electronics in the CPU carrier board.
CPU carrier board 1.8V WLAN (mV) CPU carrier board 3.3V WLAN (mV)	These voltages are the supply voltages for the WLAN module in the CPU carrier board. NOTE: The voltages are "0" if the WLAN DIP switches in the CPU carrier board are in the OFF position or if the CPU assembly does not support the WLAN option.
System power (mW) Module power (mW)	Power consumption is indicated as follows: • System power is the total power consumption of the monitor. • Module power describes the total power consumption of the connected acquisition modules.

Measurement	Description
CPU carrier board temperature (U29) (°C) CPU carrier board temperature (U49) (°C) CPU core temperature (°C) DC/DC temperature (°C)	The monitor measures the internal temperatures with temperature sensors from the following subsystems: • CPU carrier board • CPU module • DC/DC board
Ambient air pressure (mmHg)	Ambient air pressure (in mmHg).
Battery A voltage (mV) Battery B voltage (mV)	Shows the battery voltages. In battery use, the battery voltage is supplied as an input voltage to the DC/DC board. The battery voltage shows "-" if the battery is not connected to the monitor.
Battery A current (mA) Battery B current (mA)	Shows the battery charging/discharging currents. The battery current is positive when the monitor is charging the battery and negative when the monitor is in battery use and discharging the battery. The battery current shows "-" if the battery is not connected to the monitor.
Battery A temperature (°C) Battery B temperature (°C)	Shows the battery temperatures. Battery charging may be interrupted if the battery temperature gets too high, and the monitor may show a ***Battery A temperature high*** or ***Battery B temperature high*** message on the screen. The battery temperature shows "-" if the battery is not connected to the monitor.

Pinging a TCP/IP network device

You can verify connectivity with a network device on the MC Network and IX Network using ***Ping***.

1. Log in to the service interface.
2. Select ***Diagnostics*** >***Ping***.
3. In the ***Address to Ping*** field enter the IP address of a known device on the network and select ping.

If you receive a reply, the monitor is able to connect to the network device.

If you do not receive a reply, make sure that the monitor is connected to an active network.

NOTE The monitor withstands a maximum packet loss of 5 packets per 1 million and maximum latency of 250 ms without performance degradation.

Viewing WLAN diagnostics

To troubleshoot WLAN problems, you can view information about WLAN driver, WLAN status and the detected access points.

1. Log in to the service interface.
2. Select ***Diagnostics*** > ***WLAN***.

3. Scroll down the page to view the information.
   - Select ***Refresh*** to manually refresh the information on the screen.
   - Select ***Auto-refresh On/Off*** to enable/disable automatic refresh of the screen

WLAN diagnostics

Log	Description
WLAN Driver	• Kernel Version • Firmware Version • PHY Firmware Version • MAC Address
WLAN status	• WLAN Radio (Enabled/Disabled) • IP Address of the monitor • Antenna Diversity mode (2.4 GHz, 5.1 GHz, Both) • Region: 2-letter country code • Center Frequency of the operating channel • Operating Channel number • RTS Threshold • Fragmentation Threshold • SSID (Service Set Identifier/ network name) • Security (WPA-Personal, WPA2-Personal, WPA-Enterprise, WPA2-Enterprise) • Encryption (TKIP, CCMP) • Fast Transition (Enabled/Disabled) • Association status: ▪ Disconnected: The WLAN client radio is not authenticated or associated to any network infrastructure. ▪ Authenticating: The network infrastructure is authenticating the WLAN client radio. ▪ Authenticated: The WLAN client radio is authenticated but not yet associated to the network infrastructure. ▪ Associating: The WLAN client radio is in the process of associating to the network infrastructure. ▪ Connected: The WLAN client radio is connected to the network infrastructure and data is now being transmitted. • Associated AP (BSSID): MAC address of the associated access point • EAP State: Enterprise Authentication status • RF readings from the WLAN radio: ▪ Transmit Rate in Mbps ▪ Transmit Power in dBm & mW ▪ Signal Level (RSSI) in terms of dBm ▪ Noise Floor in dBm

Log	Description
	▪ Signal to Noise Ratio (SNR) in dB • WLAN Radio transmission information: ▪ Packets Received ▪ Packets Transmitted ▪ Bytes Received ▪ Bytes Transmitted ▪ Receiving Errors ▪ Transmission Errors • DSCP settings: ▪ DSCP for Realtime Clinical Traffic ▪ DSCP for Non-Realtime Clinical Traffic ▪ DSCP for Non-Realtime Non-Clinical Traffic
Available access points	The following information is displayed for a maximum of 8 detected Access Points on the same network (same SSID): • Signal Level (RSSI) in terms of dBm. • Operating channel number • MAC address NOTE: If the monitor has associated with an Access Point, information on only that Access Point is displayed.

Viewing log files

1. Log in to the service interface.
2. Select ***Diagnostics*** > ***View Logs***.
3. Select the log you want to view. The contents of the selected log file are shown on the screen.

Downloading log files

For security reasons, the contents of the log file(s) will be encrypted with a user-selectable password before the download. Provide the password in a secure way only for the authorized receiver of the log file. Use 7-Zip open-source file archiver (http://7-zip.org/) and the password to decrypt the downloaded log file.

1. Log in to the service interface.
2. Select ***Diagnostics*** > ***Download Logs***.
3. Select the log(s) you want to download.
4. Provide a password to encrypt the contents of the log file. This password is user-selectable.

5. Depending on your access to the service interface:
   a. If you are using a service PC, you can save the log file to any storage device connected to the service PC.
      i. Select ***Download***.
      ii. Save the log file according to the instructions provided by the web browser.

      The steps to download the log file to a service PC depend on the web browser used. The web browser may also notify you about security issues. Refer to the web browser documentation for details.
   b. If you are using the local, integrated service interface, you can save the log file to a USB flash drive that is connected to one of the monitor's USB ports:
      i. Select ***Save to USB storage*** to save the log file to the USB flash drive.

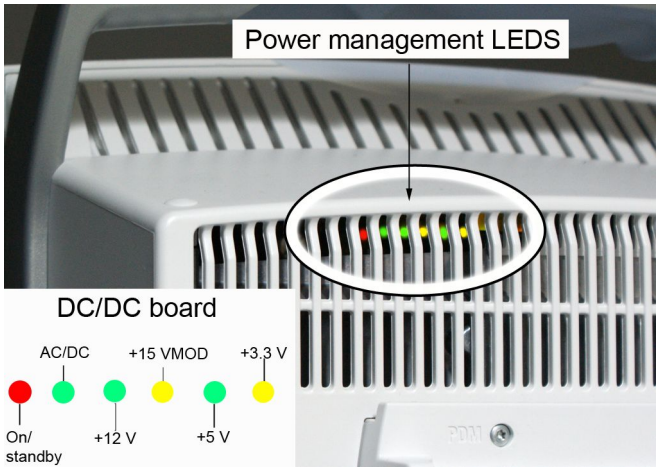
      The log file is saved always to the root directory of the USB flash drive.

      NOTE Do not disconnect the USB flash drive until downloading is complete.
6. Send the log file and the password in a secure way to GE Service for further investigation.

Power management LEDs

The DC/DC board contains power management LEDs to help troubleshooting start-up problems in the monitor.

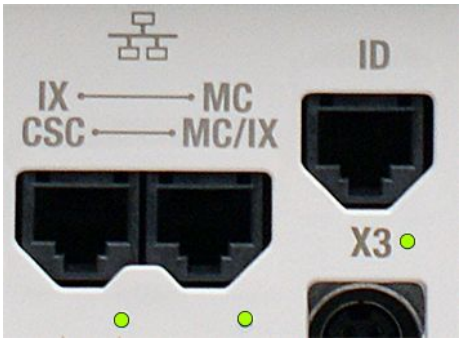
The LEDs in the DC/DC board are visible through the ventilation holes in the rear of the monitor.



LED	Description
On/standby (red, H6)	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 monitor On/Off. If the On/standby LED is not lit when the on/standby button is pressed, check the monitor for any of the following problems: • Faulty user interface board. • User interface cable is not connected to DC/DC board. • Faulty DC/DC board.
ACDC (green, H7)	The green ACDC LED should be lit when the monitor is connected to the AC mains, even if the monitor is in standby mode. A lit LED indicates that the DC/DC board receives the 15.2-16.2 VDC from the AC/DC power supply unit. If the ACDC LED is not lit when the monitor is connected to live AC mains, check the monitor for one of the problems: • Main fuses are blown. • AC/DC cable is disconnected from DC/DC board. • Faulty AC/DC power supply unit (especially, if the monitor operates normally when it is battery powered. • Faulty DC/DC board (especially if the monitor does not operate neither on AC mains nor battery).
+ 12 V (green, H3) + 15 VMOD (yellow, H5)	These secondary voltages are created by the DC/DC board and they should be lit when the monitor is turned On and operates normally. If one of the secondary voltages is not present (LED not lit) when the monitor is turned On, the DC/DC board is most likely faulty. If +15VMOD LED is not lit it may be because DC/DC board has not got a request from CPU via communication to enable +15VMOD circuit breaker as such.
+ 5 V (green, H4) + 3.3 V (yellow, H2)	These secondary voltages are created by the CPU carrier board and routed to the DC/DC board. They should be lit when the monitor is turned On and operates normally. If one of the secondary voltages is not present (LED not lit) when the monitor is turned On, the CPU carrier board is most likely faulty

Network status LEDs

The network status LEDs help in troubleshooting network connectivity and communication problems. The LEDs are located next to each network connector in the rear of the monitor.



There is one dual purpose indicator LED for each network connector:

- The LED is lit to indicate a link. This means that the monitor is physically connected to a network.
- The LED is flashing to indicate activity. This means that the monitor is either transmitting or receiving data packets over the network.

Checking battery status information

You can check the monitor battery status using the monitor software. Refer to the CARESCAPE PDM Service Manual for information about PDM battery and the CARESCAPE ONE Service Manual for information about CARESCAPE ONE battery.

1. Select the battery status area in the upper right corner of the screen, or select ***Monitor Setup*** > ***Main Setup*** > ***Battery Status*** > ***Monitor***.

   If the B450 has two batteries inserted, there are two columns, ***A*** and ***B***, that show information for each battery.

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 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 monitor.
Slot status	"No battery"	Battery is not connected to the monitor.
	"No communication"	Battery is connected to the monitor, but battery communication failure error condition is on.
	"Failure"	Battery error condition is on.
	"Discharging"	Monitor is operating on battery power.
	"Charging"	Monitor is connected to AC mains and charging the battery.

Field	Status	Description
	"Full"	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 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 monitor.
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 monitor.

2. If you wish to see more detailed battery information, select the ***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.

Messages related to various technical issues

The following table lists messages that are not directly related to any parameter or measurement. They are mostly technical messages related to hardware, configuration, network, and similar issues.

To see parameter and measurement related messages, refer to the module's service manual. To see a complete list of the messages, refer to the user manual.

For information regarding alarm priorities and escalation times, see the supplemental information provided.

Make sure you are familiar with the generic layout of the screen. This will help you identify where on screen the following messages appear. The message location is indicated with the following abbreviations:

- al. area = alarm area
- param. = parameter window
- wavef. = waveform area

Message	Location	Possible causes	Suggested actions
• ***All monitors disconnected***	• al. area	The monitor is disconnected from the network.	• Re-establish connection. • If the problem persists, check the following: 1. The network cable connection and condition. 2. The monitor's network configuration 3. The network infrastructure hardware and configuration.
• ***Analog output malfunction***	• al. area	CARESCAPE ONE analog output voltage failure.	• Service CARESCAPE ONE: replace its main board and reinstall the software.
• ***Application error: Citrix***	• al. area	Connection to Citrix application was lost.	• Re-establish the connection. • If the problem persists, contact hospital IT administration to check the Citrix setup and configuration and possible network problems.
• ***Application error: pdf***	• al. area	PDF viewer closes unexpectedly.	• Try to open the MUSE 12SL report again. • If the problem persists, contact GE.
• ***Application error: Service***	• al. area	The local built-in service interface was terminated abnormally.	• Select audio pause to acknowledge the message. • If the problem persists, contact GE.
• ***Barcode scanned***	• al. area	All data has been successfully stored to the monitor.	• No action required.
• ***Barcode too long***	• al. area	The maximum length of the barcode has been exceeded.	• The maximum length of a barcode string is limited to 300 characters. See the Barcode parser configuration section for more information.

Message	Location	Possible causes	Suggested actions
• ***Battery A failure*** • ***Battery B failure***	• al. area	The monitor battery is faulty.	• Remove the faulty battery from use, and replace it with a new one.
• ***Battery A temperature high*** • ***Battery B temperature high***	• al. area	Battery temperature error due to faulty battery or battery management error.	• Replace the battery. • If the problem persists, replace the DC/DC board.
• ***<Bed> Monitor disconnected***	• al. area	The monitor with open bed-to-bed view, or with alarm notification enabled, is disconnected from the network.	• Re-establish the connection. • If the problem persists, check the following: 1. The network cable connection and condition. 2. The monitor's network configuration 3. The network infrastructure hardware and configuration.
• ***Busy Network***	• al. area	Printing job cannot be processed immediately.	• Wait. The printing will resume automatically.
• ***Call Service: Text(s) missing***	• al. area	The software text is missing in this language; the text file may be corrupted.	• Reinstall the software and check if the message disappears. Contact GE service representative for support.
• ***Call service: Check wired MC/IX certificate.***	• al. area	• The Wired MC/IX certificate for 802.1X authentication will expire in 15 days or less. • Incorrect system time.	• Contact hospital IT to update the Wired MC/IX certificate for in the monitor. • Fix the time and date configuration.
• ***Call service: Check WLAN certificate.***	• al. area	• The WLAN certificate used with WPA-Enterprise will expire in 15 days or less. • Incorrect system time.	• Contact hospital IT to update the WLAN certificate in the monitor. • Fix the time and date configuration.
• ***Call service: Wired MC/IX certificate expired.***	• al. area	• The Wired MC/IX certificate for 802.1X authentication has expired. Authentication to wired network may fail. • Incorrect system time.	• Contact hospital IT to update the Wired MC/IX certificate for in the monitor. • Fix the time and date configuration.
• ***Call service: WLAN certificate expired.***	• al. area	• The WLAN certificate used with WPA-Enterprise has expired. Authentication to wireless network may fail. • Incorrect system time.	• Contact hospital IT to update the WLAN certificate in the monitor. • Fix the time and date configuration.

Message	Location	Possible causes	Suggested actions
• ***Case ended***	• al. area	OR and PACU software packages: There is no active patient case.	• No action required.
• ***Case started***	• al. area	OR and PACU software packages: A new case has just been started.	• No action required.
• ***Check CS ONE battery***	• al. area	• There is no battery in the indicated device. • The indicated device battery is not working properly.	• Install the missing battery. • Select ***Monitor Setup*** > ***Main Setup*** > ***Battery Status*** > ***CS ONE*** and check ***Slot status***. For more information, see the battery diagnostics in the CARESCAPE ONE Service Manual.
• ***Check PDM battery***	• al. area	• There is no battery in the indicated device. • The indicated device battery is not working properly.	• Install the missing battery. • Select ***Monitor Setup*** > ***Main Setup*** > ***Battery Status*** > ***PDM*** and check ***Slot Status***. For more information, see the battery diagnostics in the CARESCAPE PDM Service Manual.
• ***Condition battery A*** • ***Condition battery B***	• al. area	Battery requires conditioning.	• Remove the battery from use. Condition the battery with the external battery charger.
• ***Configuration change(s)***	• al. area	The loaded configuration has changed from the previous one.	• No action required. The monitor configuration has changed after monitor restart. See ***Configuration changes. Restart required.***
• ***Configuration changes. Restart required.***	• al. area	Pending configuration changes to platform settings that require monitor restart.	• Restart the monitor. • NOTE: You can acknowledge the message, but it will reappear every 6 hours until the monitor is restarted.
• ***Configuration error(s)***	• al. area	One or more errors have been detected in the configuration.	1. Acknowledge the message. 2. If the message reappears, try the following: a. Restart the monitor and check if the message disappears. b. Reset the settings to factory defaults, and restore the original monitor settings from a backup file. c. Reload the software, and then reconfigure the monitor.

Message	Location	Possible causes	Suggested actions
• ***Connecting Measurement***	• al. area	An acquisition module has been connected.	• No action required.
• ***CS Gateway communication failure***	• al. area	An error occurred when trying to search for patient on the CARESCAPE Gateway server.	• Check the network connectivity. • Retry loading from the network. • Check the gateway configuration.
• ***CS ONE battery low***	• al. area	CARESCAPE ONE battery charge level is low.	• Allow CARESCAPE ONE battery to charge. • If message persists, change battery. • Select ***Monitor Setup*** > ***Main Setup*** > ***Battery Status*** > ***CS ONE*** and check if the battery is being charged. • NOTE: The monitor charges the CS ONE battery unless the CS ONE is connected to the monitor with a 30-meter cable. With a 30–meter cable, the CS ONE receives power from the battery or the Dock F0 power supply.
• ***CS ONE battery temp high***	• al. area	CS ONE battery temperature error due to a faulty battery or battery management error. Battery charging stops.	• For information about the CS ONE battery temperature, select ***Monitor Setup*** > ***Main Setup*** > ***Battery Status*** > ***CS ONE***. • Change battery.
• ***CS ONE charging is denied***	• al. area	The CARESCAPE ONE battery cannot be charged because the internal temperatures of the monitor or the monitor battery are too high.	• Find the root cause for the high temperature of the monitor or the monitor battery.
• ***CS ONE Faulty Device Connected***	• al. area	One of the connected CARESCAPE Parameters has a communication failure.	• Identify and replace the CARESCAPE Parameter causing the communication failure.
• ***CS ONE faulty device in port #X***	• al. area	CARESCAPE ONE USB port 1 to 8 is reporting an overcurrent. CARESCAPE ONE main board failure.	• Refer to CARESCAPE ONE Service Manual for more troubleshooting instructions.

Message	Location	Possible causes	Suggested actions
• ***CS ONE not authenticated: Call service***	• al. area	CARESCAPE ONE authentication required. CARESCAPE ONE version 3.0 or an unauthenticated acquisition device connected.	• To allow connection, select ***Configuration*** > ***Device Authentication*** >***Allow all connections***. • Remove the unauthorized device from the monitor.
• ***CS ONE unknown device in port #X***	• al. area	An unauthorized device is connected to one of the eight CARESCAPE ONE USB ports is detected.	• Disconnect the unauthorized device.
• ***CS ONE removed***	• al. area	CARESCAPE ONE has been removed.	• Reconnect the CARESCAPE ONE if you want to restart measurements.
• ***DEMO MODE Not for clinical use!***	• al. area	***DEMO mode*** has been enabled.	• To start monitoring a patient, restart the monitor, or select ***Monitor Setup*** > ***Main Setup*** > ***Exit DEMO*** > ***Confirm***.
• ***E-musb disabled. Connect parameters to CS ONE.***	• al. area	It is not possible to use the E-musb module if CARESCAPE ONE is connected to the monitor. The measurement with the connected CARESCAPE Parameter does not start or stops when CARESCAPE ONE is connected to the monitor.	• Disconnect the CARESCAPE Parameter from the E-musb module and connect it to the CARESCAPE ONE instead.
• ***E-musb faulty device in port X*** where X = E-musb port A or B	• al. area	E-musb port is reporting an overcurrent situation. This may be due to a defective CARESCAPE Parameter in the indicated E-musb port or due to a hardware failure in the E-musb module.	• Refer to E-musb Service Manual for more troubleshooting instructions.
• ***E-musb module error***	• al. area	There is a hardware error with the E-musb module.	• Disconnect and reconnect the E-musb module. • Replace the E-musb module. • Refer to E-musb Service Manual for more troubleshooting instructions.
• ***E-musb unknown device in port X*** where X = E-musb port A or B	• al. area	An incompatible CARESCAPE Parameter or an external USB hub device is connected to the indicated E-musb port.	• Replace the incompatible CARESCAPE Parameter with a compatible CARESCAPE Parameter. E-musb module is only compatible with CARESCAPE CO_2 — Microstream and CARESCAPE rSO_2.

Message	Location	Possible causes	Suggested actions
• ***External alarm light disconnect. Check USB connection.***	• al. area	• The USB cable between the monitor and the display is disconnected when a patient is admitted/case is started. • Display is turned to standby when a patient is admitted/case is started. • User interface board communication failure due to a UIC software error. • User interface board communication failure due to a user interface board hardware error in the display.	Depending on the cause: • NOTE: Secure the connected USB cable to the monitor. • Turn on the display. • Update the UIC software to the display. • Contact the GE service representative to have the display repaired.
• ***Identical E-musb modules***	• al. area	There are two or more E-musb modules in the system.	• Remove all but one E-musb module.
• ***Identical IP address noticed***	• al. area	IP address conflict. There are two or more monitors or other devices with the same IP address on the network.	• Disconnect the devices with identical IP addresses from the network, and reconfigure them with a unique IP address(es). • Contact hospital IT administration for more information.
• ***Identical unit & bed name noticed***	• al. area	Two or more monitors have the same unit and bed name on the network.	• Disconnect the duplicate monitor that has the same unit and bed name. • Change the bed name of the duplicate monitor.
• ***Incompatible device: ECG module***	• al. area	The module is not compatible.	• Replace with a compatible ECG module. For a list of compatible devices, refer to the supplemental information provided.
• ***Incompatible device: Gas module***	• al. area	The module is not compatible.	• Replace with a compatible gas module. For a list of compatible devices, refer to the supplemental information provided.
• ***Incompatible Module***	• al. area	The module is not compatible.	• Replace with compatible module. See the supplemental information provided.
• ***Incorrect barcode value***	• al. area	The monitor's barcode parser reports about invalid value in the barcode string that was read.	• Check that the barcode string contains only allowed characters and values. See the Barcode parser configuration section for more information.

Message	Location	Possible causes	Suggested actions
• ***Invalid barcode configuration***	• al. area	The monitor's barcode parser reports about invalid barcode configuration.	• Check that the monitor's barcode parser configuration is correct. Otherwise, the barcode strings cannot be read.
• ***License(s) expired***	• al. area	One or more trial licenses have expired.	• Contact GE to purchase a permanent license. Enable the license in service interface with a new activation code.
• ***Loading failed***	• al. area	Loading a case/patient from an acquisition module or network has been interrupted.	• Check device or network cable connections.
• ***Loading from CS ONE***	• al. area	Patient data is being loaded from CARESCAPE ONE.	• Wait.
• ***Loading from PDM***	• al. area	Patient data is being loaded from an acquisition module.	• Wait.
• ***Module voltage low***	• al. area	Parameters may not be working properly due to a technical fault in the monitor. • One of the supply voltages for the acquisition modules is out of specification.	• If possible, log in to the service interface and select ***Diagnostics*** > ***Hardware Statistics*** to diagnose which internal supply voltage is out of specification. • The power supply unit or CPU assembly may be defective. Replace the defective unit.
• ***Monitor battery empty!***	• al. area	The monitor is used on battery power, and there is less than 5 minutes of charge left.	• Charge the battery by using the monitor on mains power.
• ***Monitor battery low***	• al. area	The monitor is used on battery power, and there is less than 20 minutes of charge left.	• Charge the battery by using the monitor on mains power.
• ***Monitor powering down!***	• al. area	The monitor is used on battery power and there is less than 10 seconds of charge left.	• Charge the battery by using the monitor on mains power.
• ***Monitor restarted. Check patient.***	• al. area	Monitor restart (warm start) has occurred unexpectedly when a patient was admitted/case started.	• Reset the alarm by pressing the silence alarms key twice or by discharging the patient/ending the case. • If the problem persists, troubleshoot the root cause for the problem and fix it. Service logs may provide additional information for the restart.
• ***Multiple Remote Alarm Devices connected***	• al. area	There are two or more remote alarm devices connected to the monitor.	• Disconnect all but one remote alarm device.

Message	Location	Possible causes	Suggested actions
• ***Network down***	• al. area	No other network device observed on the MC Network.	• Verify that the monitor is connected to an active network.
• ***No battery backup in monitor***	• al. area	There is no battery inserted.	• Insert a battery.
• ***No printer selected***	• al. area	There is no printer selected on the monitor.	• Select a printer.
• ***Patient admitted***	• al. area	ICU, NICU, and ED software packages: The current patient has just been admitted.	• No action required.
• ***Patient discharged***	• al. area	ICU, NICU, and ED software packages: There is no admitted patient.	• No action required.
• ***PDM battery low***	• al. area	The PDM battery cannot be charged due to a power fault.	• Allow PDM battery to charge. • If message persists, change battery.
• ***PDM battery temp high***	• al. area	Battery temperature error is caused by a faulty battery or a battery management error. Battery charging stops.	• For information about the PDM battery temperature, select ***Monitor Setup*** > ***Main Setup*** > ***Battery Status*** > ***PDM***. • Change battery.
• ***PDM charging is denied***	• al. area	The PDM battery cannot be charged because the internal temperatures of the monitor or monitor battery is too high.	• Find the root cause for the high temperature of the monitor or the monitor battery.
• ***PDM module removed***	• al. area	Acquisition module has been removed.	• Connect the module if you want to restart the measurements.
• ***Power management failure***	• al. area	Power management failure due to PUIC communication error. NOTE: See also message 'Service Monitor Error Code 0xHOST1007".	• Restart the monitor. • Activate the PMC Software Package from the service interface. Select ***Configuration*** > ***Software Management*** > ***Devices***. NOTE: In case of the PMC communication error, you cannot update the PMC software. • If the problem still persists, the DC/DC board may be defective. Replace the DC/DC board.
• ***Printer error***	• al. area	A printer is not present or the printer needs paper.	• Select ***Monitor Setup*** > ***Main Setup*** > ***Printing*** > ***Devices*** to choose a different printer. • Add paper to the printer.

Message	Location	Possible causes	Suggested actions
• ***Printing Alarm***	• al. area	Recorder: An alarm has triggered printing.	• Wait for the printing to finish.
• ***Printing ready***	• al. area	Your printing request has been forwarded to the printer.	• No action required.
• ***Printing...***	• al. area	Printing is occurring. Recorder: Manual printing is initiated for ***Print Waveforms***, ***ALL ECG***, ***PA Waveform***, or ***Catheter Insertion***.	• Wait for the printing to finish.
• ***Reconnect CS ONE***	• al. area	Monitor does not receive active and latched alarms from the CARESCAPE ONE after connection, or settings transfer failed, or the monitor receives incorrect waveform data.	• Disconnect the CARESCAPE ONE, wait a few seconds, and then reconnect.
• ***Reconnect PDM***	• al. area	Disconnecting and then reconnecting the PDM too quickly may cause a communication error between the module and the monitor, and result in duplicate waveform data.	• Disconnect the PDM, wait a few seconds, and then reconnect.
• ***Recorder input voltage high*** / ***Recorder input voltage low***	• al. area	1. Damaged recorder connector in the battery board. 2. Recorder failure. 3. DC/DC board failure.	1. Remove the recorder unit from the monitor. Check visually that the recorder connector on the battery board is intact without any broken or bent pins. If faulty, replace the battery board. 2. a. Log in to service interface. b. Select ***Diagnostics*** > ***Hardware Statistics***. c. If the ***DC/DC +12 V*** voltage is within the limits, replace the recorder unit. 3. a. Log in to service interface. b. Select ***Diagnostics*** > ***Hardware Statistics***. c. If the ***DC/DC +12 V*** voltage is out of the limits , replace the DC/DC board.
• ***Recorder out of paper***	• al. area	The recorder is out of paper or the recorder cover is open.	• Replace recorder paper. • Close the recorder cover.
• ***Recorder system error***	• al. area	The built-in recorder is not working.	1. Restart the monitor. 2. If the error message repeats, replace the recorder unit.

Message	Location	Possible causes	Suggested actions
• ***Recorder thermal array overheat***	• al. area	Recorder unit failure.	• Try stopping the recording as it may help. 1. Restart the monitor. 2. If the error message repeats, replace the recorder unit.
• ***Remote Alarm Device disconnected***	• al. area	***Remote alarm device operation*** has been enabled during configuration, but the remote alarm device is disconnected.	• Connect the remote alarm device, or disable the ***Remote alarm device operation***.
• ***Remote Alarm Device service life exceeded***	• al. area	The device has reached the end of its expected service life.	• Stop using the device. Dispose of the device, and contact GE to acquire a new one.
• ***Replace battery A*** • ***Replace battery B***	• al. area	The full capacity of the battery is less than or equal to 50% compared to the full capacity of a new battery.	• Replace the battery.
• ***Saving***	• al. area	The recorder is unavailable while printing manual or alarm waveform recording, and the recording is saved for later printing. No recording location has been selected.	• Check the recorder. • Select a recording location.
• ***Service CS ONE*** and specific error indication	• al. area	Technical fault in CARESCAPE ONE.	• See the CARESCAPE ONE service manual for a detailed list of error messages.
• ***Service E-musb faulty port X*** where X = E-musb port A or B	• al. area	E-musb is reporting a fault on the indicated E-musb port. This may be due to an internal E-musb hardware error, dirt on the connectors, or a defective CARESCAPE Parameter.	• Disconnect and reconnect the CARESCAPE Parameter. • Try to connect the CARESCAPE Parameter to the other E-musb port. • Disconnect and reconnect the E-musb module to the module slot. • Refer to E-musb Service Manual for more troubleshooting instructions.
• ***Service gas module*** and specific error indication	• al. area	Technical problem in the CARESCAPE Respiratory Module.	• See the service manual for the CARESCAPE Respiratory Modules for a detailed list of error messages.

Message	Location	Possible causes	Suggested actions
• ***Service Monitor Activation Failed***	• al. area	The initiated software activation has failed due to an error situation. The original software version remains active.	1. Check the compatibility of the uploaded software, and try to reactivate the software. If it still fails, reload and active the software. 2. If the problem still persists, contact the GE service representative.
• ***Service Monitor Error Code 0xHOST1001***	• al. area	One of the internal temperature sensors indicate the inside temperature of the monitor is out of specification. The message stays on screen as long as the error condition is valid.	If the temperature is too high: 1. Turn off the power. 2. Let the monitor cool down. 3. Check that the ventilation holes are not obstructed. 4. Ensure that the monitor is installed to a location that meets the specified environmental requirements of operating temperature. 5. Investigate the monitor thoroughly for potential short circuits and other electrical faults. 6. If possible, log in to service interface and select ***Diagnostics*** > ***Hardware Statistics*** to identify the root cause for the error message. If the temperature is too low (or high) after the monitor has been transported or stored outside the operating temperature, wait for the temperature to stabilize back to the operating temperature range before applying the power.
• ***Service Monitor Error Code 0xHOST1002***	• al. area	• One of the internal supply voltages is out of the specification. The message stays on screen as long as the condition is valid.	• Remove any system component connected to the ePort. If the error message disappears, either the connected device or the ePort may be defective. • Log in to service interface and select ***Diagnostics*** > ***Hardware Statistics*** to identify the supply voltage that is below or above the specification. • The power supply unit or CPU assembly may be defective. Replace the defective unit.

Message	Location	Possible causes	Suggested actions
• ***Service Monitor Error Code 0xHOST1004***	• al. area	Disk usage exceeds 90%.	• Reinstall the host software and restore clinical and platform settings. • If the problem still persists, contact the GE service representative.
• ***Service Monitor Error Code 0xHOST1005***	• al. area	EMBC error. Communication with E-Modules fails due to one of the following reasons: • EMBC software start-up failure. • Incompatible EMBC software version. • EMBC communication error.	• Restart the monitor. • If the problem still persists, activate the EMBC Software Package from the service interface. Select ***Configuration*** > ***Software Management*** > ***Devices***. NOTE: In case of the EMBC communication error, you cannot update the EMBC software. • If EMBC software activation does not help or is not available, replace the CPU Assembly.
• ***Service Monitor Error Code 0xHOST1007***	• al. area	PUIC error due to one of the following reasons: • Incompatible PUIC software version. • PUIC communication error.	• Activate the PUIC Software Package from the service interface. Select ***Configuration*** > ***Software Management*** > ***Devices***. NOTE: In case of the PUIC communication error, you cannot update the PUIC software. • If PUIC software activation does not help or is not available, replace the DC/DC Board.
• ***Service Monitor Error Code 0xHOST1008***	• al. area	• The monitor's IX and/or MC network interface is disabled due to traffic overload. The monitor will periodically (once every 5 minutes) check the amount of network traffic in the IX and/or MC Network. The message will disappear and the IX and/or MC network interfaces will be re-enabled once the network traffic overload is over.	• Find out the root cause for the IX and/or MC Network traffic overload. Consult the hospital IT for troubleshooting support.
• ***Service Monitor Error Code 0xHOST1100***	• al. area	The CPU battery is empty. Time and date may be reset to factory defaults.	1. Replace the CPU battery. 2. Restart the monitor. 3. Adjust the date and time. 4. Restart the monitor again.

Message	Location	Possible causes	Suggested actions
• ***Service Remote Alarm Device***	• al. area	One of the relays inside the remote alarm device has a fault.	• Stop using the device. Dispose of the device, and contact GE to acquire a new one.
• ***Service the PDM*** — and specific error indication	• al. area	Technical fault in the PDM.	• See the CARESCAPE PDM service manual for a detailed list of the PDM error messages.
• ***Service update certificate***	• al. area	• The installed certificate has expired. • Incorrect system time.	• Install a new certificate. • Fix the time and date configuration.
• ***Setting activation after next case end***	• al. area	Service user has initiated delayed settings activation that will automatically take place after next case end.	• No action needed. • If necessary, you can cancel the pending settings activation from the service interface. Select ***Configuration*** > ***Settings*** > ***Activation*** > ***Cancel activation***.
• ***Setting activation after next discharge***	• al. area	Service user has initiated delayed settings activation that will automatically take place after next discharge.	• No action needed. • If necessary, you can cancel the pending settings activation from the service interface. Select ***Configuration*** > ***Settings*** > ***Activation*** > ***Cancel activation***.
• ***Software activation after next case end***	• al. area	Service user has initiated delayed software activation that will automatically take place after next case end.	• No action needed. • If necessary, you can cancel the pending software activation from the service interface. Select ***Configuration*** > ***Software Management*** > ***Host Software*** > ***Cancel activation***.
• ***Software activation after next discharge***	• al. area	Service user has initiated delayed software activation that will automatically take place after next discharge.	• No action needed. • If necessary, you can cancel the pending software activation from the service interface. Select ***Configuration*** > ***Software Management*** > ***Host Software*** > ***Cancel activation***.

Message	Location	Possible causes	Suggested actions
• ***Speaker failure***	• al. area	1. Speaker cable is loose. 2. Speaker failure. 3. CPU tone generator or audio amplifier failure.	1. Connect the speaker cable. 2. Replace the speaker. 3. Replace the CPU.
• ***SW download failed on CS ONE port #X*** where X is the CARESCAPE Parameter port number	• al. area	Software update to a CARESCAPE Parameter failed.	• Disconnect and reconnect the CARESCAPE Parameter cable. If the software update fails again, replace the Parameter cable. Refer to CARESCAPE ONE Service Manual for more troubleshooting instructions.
• ***SW update in progress on CS ONE port #X*** where X is the CARESCAPE Parameter port number	• al. area	Software update in progress. One of the connected CARESCAPE Parameters is updating software from CARESCAPE ONE.	• Wait until the software update to the CARESCAPE Parameter is successfully completed and the message disappears from the monitor screen. This may take up to 1 minute. • Do not disconnect the CARESCAPE Parameter from the CARESCAPE ONE before the software update is completed.
• ***Unable to read licenses***	• al. area	Installed license file is corrupted. The system cannot read the licenses correctly when the monitor starts.	• Re-enter licenses or reload the license file. Contact GE to get the correct license file.
• ***Unknown device alarm***	• al. area	One or more alarms not supported by the monitor are active or latched on CARESCAPE ONE during dual monitoring.	• Disconnect CARESCAPE ONE, check its alarms and resolve as required.

Problems and solutions

Troubleshooting startup failures

- Use the information in this table together with the information provided in the Power management LEDs section.
- Connect a secondary display to the monitor to help troubleshooting problems that are related to the primary display or LED backlight.

Problem	Possible causes	Recommended action
Failure to turn on the monitor, when the following conditions apply: • The monitor is connected to AC mains. • A fully charged battery is installed to the monitor.	The user interface cable between the user interface board and DC/DC 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 DC/DC board: • Reconnect the cable, if loose. • Replace the user interface cable, if the cable is faulty.
	The user interface board is faulty.	Replace the user interface board.
	DC/DC Board failure.	Replace the DC/DC board.
Failure to turn on the monitor, when the following conditions apply: • The monitor is powered from the AC mains. • The mains voltage indicator in the front panel is not lit. • Monitor battery is not installed. NOTE: You may only remove the monitor battery for troubleshooting purposes. During the clinical use, a battery must always be inserted.	Power cord is loose.	Ensure that the power cord is connected properly to the wall outlet and to the 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 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.	• Refer to the supplemental information manual for power requirements. • Check the power outlet being used.
	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.
	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.
Failure to turn on the monitor, when the following conditions apply: • The monitor is powered from battery. • The monitor is not connected to AC mains.	Battery empty Battery failure Missing battery.	Check the battery status. Charge or replace the battery.
	DC/DC board failure.	Replace the DC/DC board.

Problem	Possible causes	Recommended action
The monitor starts (you can hear the start-up beep), but the primary display remains “black”, indicating that the backlight does not illuminate the LCD display.	The backlight cable between the LCD display and the DC/DC board is loose or faulty.	Check that the backlight cable is intact and properly connected to the DC/DC board and the LCD display. • Reconnect the cable, if loose . • Replace the backlight cable, if the cable is faulty.
	The LED backlights in the LCD display are faulty.	Replace the LCD display unit.
The monitor starts, but the primary display remains "white", indicating that the backlight does illuminate the LCD display, but nothing appears on the screen.	The display cable is damaged or loose.	Check that the display cable is intact and properly connected to the LCD display and the CPU carrier board. • Reconnect the cable, if loose. • Replace the cable, if faulty.
	The LCD display is faulty.	Replace the LCD display unit.
	The display controller section of the CPU module is faulty.	Connect a secondary display to the monitor. If there is no picture on the secondary screen either, the display controller section in CPU module is most likely faulty. Replace the CPU assembly.
Startup procedure does not advance. Error messages may appear.	• Unable to read software from the memory. • Software is corrupted.	Replace CPU assembly. Contact your local GE service representative for support.
The monitor starts up with the following text on the screen: Field Replacement Unit, SW version, IP address, and Device MAC address.	The monitor starts up with a special FRU software, because the CPU assembly has been replaced with the CPU assembly FRU. The CARESCAPE software has not been installed after the CPU replacement.	Reinstall the CARESCAPE software and reload the settings. Contact your local GE representative to order the CARESCAPE software. For more information, see the Reloading software and settings section.

User interface issues

Troubleshooting touchscreen issues

Problem	Possible cause	Recommended action
Touchscreen operation is inaccurate.	Touchscreen is not calibrated.	Calibrate the touchscreen.
Touchscreen is inoperative.	Touchscreen cable is loose.	Connect the touchscreen cable to the DC/DC board.
	Faulty touchscreen sensor.	Replace the front unit assembly.

Troubleshooting On/standby button and alarm light

Problem	Possible cause	Recommended action
On/standby and the power indicator LEDs are inoperative.	User interface cable is loose or faulty.	Check the user interface cable and replace it, if necessary
	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 DC/DC board.
	Alarm light board or alarm light cable is faulty.	Replace the alarm light board
Alarm light does not illuminate during power-on self test.	Warm start: there is less than 15 minutes since the last power-up, and the monitor is performing a warm start.	The monitor works correctly. The alarm light illuminates during the power-on self test only during a cold start, when there is more than 15 minutes from the previous power-up.

Troubleshooting USB keyboard and barcode reader

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.
Wrong character is displayed when a barcode is read.	The keyboard locale is not configured correctly.	Configure the keyboard locale correctly.
	The barcode reader's language configuration is incorrect.	Refer to the instructions supplied with the barcode reader.
Barcode reader does not read a multi-field barcode correctly. The information is not populated correctly to the fields in the Admit menu.	The parser configuration is incorrect.	Configure the barcode settings.
	The parser configuration is incompatible: field lengths, field types, delimeters, symbologies etc.	Check the barcode information content and compare it to the current parser configuration.

Troubleshooting audible alarms and speaker

Problem	Possible cause	Recommended action
Audible alarms do not work.	Audible alarms are turned off.	Enable audible alarms: select ***Alarm setup*** > ***Audible & Visual*** > ***Activate All Audible Alarms*** > ***Close***.
	Alarm volume is too low.	Adjust alarm volume: select ***Monitor Setup*** > ***Sound Volumes***.
	USB cable from display is not connected to the monitor.	Connect the USB cable to the monitor.
	Defective speaker.	Replace the speaker unit.
	Speaker cable loose or faulty.	Check that the speaker cable is intact and properly connected.

Problem	Possible cause	Recommended action
	Tone generator or audio amplifier failure	Replace CPU assembly.
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.

Troubleshooting incorrect system time

Problem	Possible cause	Recommended action
System time is incorrect when monitor is not connected to network.	CPU battery is empty.	1. Replace CPU battery. 2. Set date and time. 3. Restart the monitor.
	Time is not configured properly.	Configure date and time.
System time is incorrect when monitor is connected to network.	Network device time synchronization error.	When a new device connects to the CARESCAPE Network, the existing devices on the CARESCAPE Network may synchronize to the new device's time. To prevent potential time synchronization issues, 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.

Troubleshooting license issues

Problem	Possible cause	Recommended action
Unable to activate a new monitor (host) software.	1. You are trying to upgrade the monitor software without a valid activation code. 2. You have entered an invalid activation code.	1. Contact GE Healthcare to get the activation code for the base license. Provide the following information: • serial number of the monitor • current software version • software version to be activated 2. Check that the activation code is correct. The activation code is tied to the serial number of the monitor and to the software version to be activated. Software activation is not possible if the activation code is not entered or is invalid. Contact GE Healthcare for more information.
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.

Problem	Possible cause	Recommended action
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 the service interface. 2. Select ***Configuration*** > ***Licenses*** > ***Software Package***. 3. Select the correct option and select ***Save***.
Unable to upload a license file.	• The license file is corrupted. • The license file is for a monitor with a different serial number.	Log in to the service interface. Select ***Configuration*** > ***Licenses***. • If you have printed license information, select ***Software Package*** and ***Host License***. • If you have a license file, select ***Upload License***.
A wrong software package is in use. (The active software package is displayed on the screen during monitor startup.)	A wrong software package is activated for the device.	1. To view the software package that is currently activated, log in to the service interface. Select ***Configuration*** > ***Licenses*** > ***Host License***. 2. Make sure that the desired software package is displayed in ***Currently Active Software Package***. 3. If you need to activate a different software package, select ***Configuration*** > ***Licenses*** > ***Software Package***. 4. Select the correct option and select ***Save***.

Troubleshooting MC Network issues

Problem	Possible cause	Recommended action
There is no MC network traffic.	Incorrect configuration.	Reconfigure the monitor with correct IP address and Netmask.
	The monitor has detected MC network traffic overload, and has disabled network traffic through the ***MC*** port.	If the ***Service Monitor Error Code 0xHOST1008*** message is displayed on the monitor screen, contact the hospital IT to resolve the MC traffic overload.
	The MC network port at the installation site has IEEE 802.1X port based authentication enabled, but the monitor is incorrectly configured: 1. The authentication has not been enabled on the monitor. 2. Authentication is enabled, but either ***Identity*** and/or ***Password*** are incorrect, or have expired. 3. If ***Call service. Wired MC/IX certificate expired*** message is shown, the CA certificate has expired.	1. Enable 802.1X authentication on the monitor. 2. Enter correct ***Identity*** and ***Password*** 3. Contact hospital IT to update the wired MC/IX certificate in the monitor. For detailed instructions, see Wired network configuration chapter.

Troubleshooting IX Network issues

Problem	Possible cause	Recommended action
There is no IX network traffic.	Incorrect configuration.	Reconfigure the monitor with correct IP address, Netmask, Gateway and/or DNS server.
	The cable connections do not match the selected network type (dual wire or single wire).	Verify the selected network type at the installation site and check the cable connections of the monitor: • In the dual wire configuration, separate Ethernet cables must be connected to the ***MC*** and ***IX*** connectors of the monitor. • In the single wire configuration, one Ethernet cable must be connected to the ***MC/IX*** connector. Connect the cable(s) according to the selected network type or change the network type.
	The monitor has detected IX network traffic overload, and has disabled network traffic through the ***IX*** port.	If the ***Service Monitor Error Code 0xHOST1008*** message is displayed on the monitor screen, contact the hospital IT to resolve the IX traffic overload.
	The IX network port at the installation site has IEEE 802.1X port based authentication enabled, but the monitor is incorrectly configured: 1. The authentication has not been enabled on the monitor. 2. Authentication is enabled, but either ***Identity*** and/or ***Password*** are incorrect, or have expired. 3. If ***Call service. Wired MC/IX certificate expired*** message is shown, the CA certificate has expired.	1. Enable 802.1X authentication on the monitor. 2. Enter correct ***Identity*** and ***Password.*** 3. Contact hospital IT to update the wired MC/IX certificate in the monitor. For detailed instructions, see Wired network configuration chapter.
Unable to retrieve MUSE 12SL reports to the monitor from the MUSE server.	1. Incorrect MUSE server user name or password. 2. Incorrect MUSE server address. 3. MUSE license not installed. 4. MUSE certificate is not installed or valid.	1. Enter correct MUSE user name and password. 2. Enter correct MUSE server address. 3. Install a valid MUSE license. 4. Install a valid MUSE certificate bundle.

Recorder troubleshooting

Problem	Possible cause	Recommended action
Recorder is printing 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.
Recorder does not work.	Printing location is not configured correctly.	Check the configuration: ***Monitor Setup*** > ***Main Setup*** >***Printing*** >***Devices*** >***Setup*** .
	Recorder unit failure.	Replace the recorder unit.
	CPU carrier 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. If the cause is none of the above, the problem is most likely in the CPU carrier board. Replace the CPU assembly.

Troubleshooting acquisition platform

Acquisition platform refers to CARESCAPE ONE, CARESCAPE Dock F0, and CARESCAPE parameters.

To troubleshoot host monitor issues with the acquisition platform, check first if the CARESCAPE ONE works correctly as a standalone monitor, when disconnected from the host monitor:

1. Disconnect the CARESCAPE Dock F0 from the host monitor.
2. Check if the CARESCAPE ONE works normally:

Yes	Continue troubleshooting in step 3.
No	Refer to CARESCAPE ONE Service Manual for more troubleshooting instructions.

3. Check the following possible causes:

Possible cause	Recommended action
PDM and CARESCAPE ONE were connected simultaneously.	Remove PDM and reconnect CARESCAPE Dock F0 after five seconds.
Some CARESCAPE parameters are not shown on the host monitor screen due to configuration issue.	Configure the measured parameters to the host monitor screen with adequate priority.
Loose or defective cable between CARESCAPE Dock	Check that the cable is intact and properly connected. Replace if necessary.

Possible cause	Recommended action
F0 and host monitor CPU unit.	
Defective CARESCAPE Dock F0.	Refer to CARESCAPE ONE Service Manual for troubleshooting instructions. If available, try another CARESCAPE Dock F0 to confirm the case.
Defective CPU assembly in the host monitor.	Check if the acquisition platform works correctly when connected to another host monitor. If it does, and there is no other evident reason for the problem, the problem is most likely in the host monitor CPU assembly.

Troubleshooting PDM when connected to the ePort

PDM does not work correctly when it is connected with an ePort pod to host cable to an ePort connector in the host monitor.

Possible cause	Recommended action
Compatibility issue.	Check the compatibility of the connected module, the software, and the accessories. For a list of the compatible devices, see the supplemental information manual. For a list of the compatible supplies and accessories, see the Supplies and Accessories Supplemental.
Configuration issue.	Check that the measured parameters are configured to the monitor screen with adequate priority.
Missing licenses.	The cardiac output license from the PDM requires a C.O. license installed on the monitor. Invasive pressure measurement from the PDM requires a PDM license (1-4 channels) installed on the PDM module.
The ePort pod to host cable is loose or defective.	Check that the cable is intact and properly connected. Replace the cable, if defective.
Defective PDM or accessories.	Try to connect another, correctly working PDM with its own accessories to the ePort connector. If the other PDM works correctly, the original PDM, or one of its accessories, is likely to be defective. Refer to CARESCAPE PDM Service Manual for further troubleshooting instructions.
Defective DC/DC board.	The VSYS supply voltage for the PDM module is generated in the DC/DC board. Log into the service interface, select ***Diagnostics*** > ***Hardware Statistics***, and check that the following supply voltages are within specifications: • DC/DC VSYS voltage • VSYS ePort voltage If the PDM is connected to the ePort connector, the DC/DC board should identify the PDM and enable the VSYS ePort voltage. If the DC/DC VSYS voltage is not within the specifications, the problem may be in the DC/DC board. Replace the DC/DC board.
CPU assembly failure	CPU carrier board manages the Ethernet communication for the PDM module. • Check PDM log for possible PDM error messages.

Possible cause	Recommended action
	If the cause is none of the above, the problem is most likely in the CPU carrier board. Replace the CPU assembly.

Troubleshooting PDM when connected to the module rail

A PDM module does not work correctly with the monitor when connected to the module rail.

Possible cause	Recommended action
Identical modules connected simultaneously to the ePort connector and module rail unit.	CARESCAPE PDM and CARESCAPE ONE are considered identical modules and should not be used simultaneously. Disconnect the identical modules from the monitor. Then reconnect the PDM module to the module rail unit. NOTE: The monitor can only provide supply voltage either to the ePort connector or the module rail unit connector at a time.
Configuration issue.	Configure the measured parameters to the monitor screen with adequate priority.
Compatibility issue.	Check the compatibility of the connected module and the accessories. For a list of the compatible devices, see the supplemental information manual. For a list of the compatible supplies and accessories, see the Supplies and Accessories Supplemental.
Missing licenses.	The cardiac output license from the PDM requires a C.O. license installed on the monitor. Invasive pressure measurement from the PDM requires a PDM license (1-4 channels) installed on the PDM module.
Defective PDM or accessories.	Try to connect another, correctly working PDM with its own accessories to the module rail connector. If the other PDM works correctly, the original PDM or one of its accessories is likely to be defective. Refer to the CARESCAPE PDM service manual for further troubleshooting instructions.
DC/DC board failure.	The VSYS supply voltage for the PDM module is generated in the DC/DC board. Log into the service interface, select ***Diagnostics*** > ***Hardware Statistics***, and check that the following supply voltages are within specifications: • DC/DC VSYS voltage • VSYS ePort 10Pin (PDM) voltage If the PDM is connected to the module rail unit, the DC/DC board should identify the PDM and enable the ePort 10Pin (PDM) voltage. If this voltage is “0”, check that there is nothing simultaneously connected to the ePort connector. If the DC/DC VSYS voltage is not within specifications, the problem may be in the DC/DC board. Replace the DC/DC board.
CPU assembly failure.	CPU carrier board manages the Ethernet communications for the PDM module. • Check the PDM log for PDM error messages. If the cause is none of the above, the problem is most likely in the CPU carrier board. Replace the CPU assembly.

Troubleshooting E-module issues

An E-module does not work correctly with the monitor.

Possible cause	Recommended action
Configuration issue.	Configure the measured parameters to the monitor screen with adequate priority.
Compatibility issue.	Check the compatibility of the connected module and the accessories. For a list of the compatible devices, see the supplemental information manual. For a list of the compatible supplies and accessories, see the Supplies and Accessories Supplemental.
Defective E-module or accessories.	Try to connect another similar, correctly working E-module with its own accessories to the monitor. If the other module works correctly, the original E-module or its accessories are defective. Refer to the related module's service manual for further troubleshooting instructions.
E-module board failure.	Check that the E-module connector is intact. Replace the E-module board, if needed.
DC/DC board failure.	The +15 V MOD supply voltage for the E-module board is generated in the DC/DC board. Log into the service interface, select ***Diagnostics*** > ***Hardware Statistics***, and check that the supply voltage is within specifications. If the +15 V MOD voltage is not within specifications, the problem may be in the DC/DC board. Replace the DC/DC board.
CPU assembly failure.	The EMBC section of the CPU carrier board manages the RS-485 communications for the E- modules. • Check the EMBC Frame logs for possible EMBC failures. If the cause is none of the above, the problem is most likely in the CPU carrier board. Replace the CPU assembly.

Troubleshooting CARESCAPE Network communication

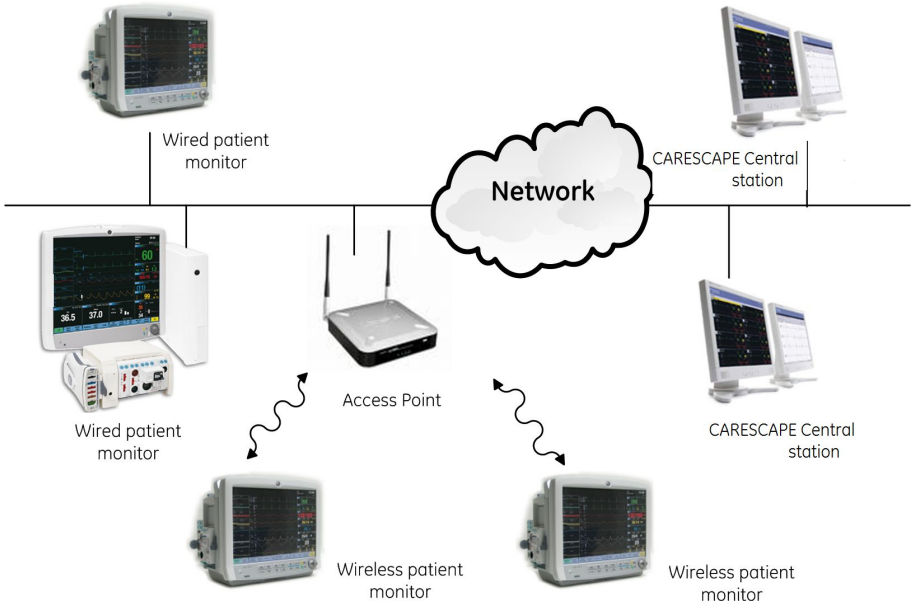
Traffic types

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 monitor sends broadcasts to other network devices.
- Downstream broadcast: The monitor receives broadcasts from other network devices.



Types:

- Broadcasts (discovery, alarms, time)
- Unicasts (waveforms, ping)

Mediums:

- Wired
- Wireless

Flow:

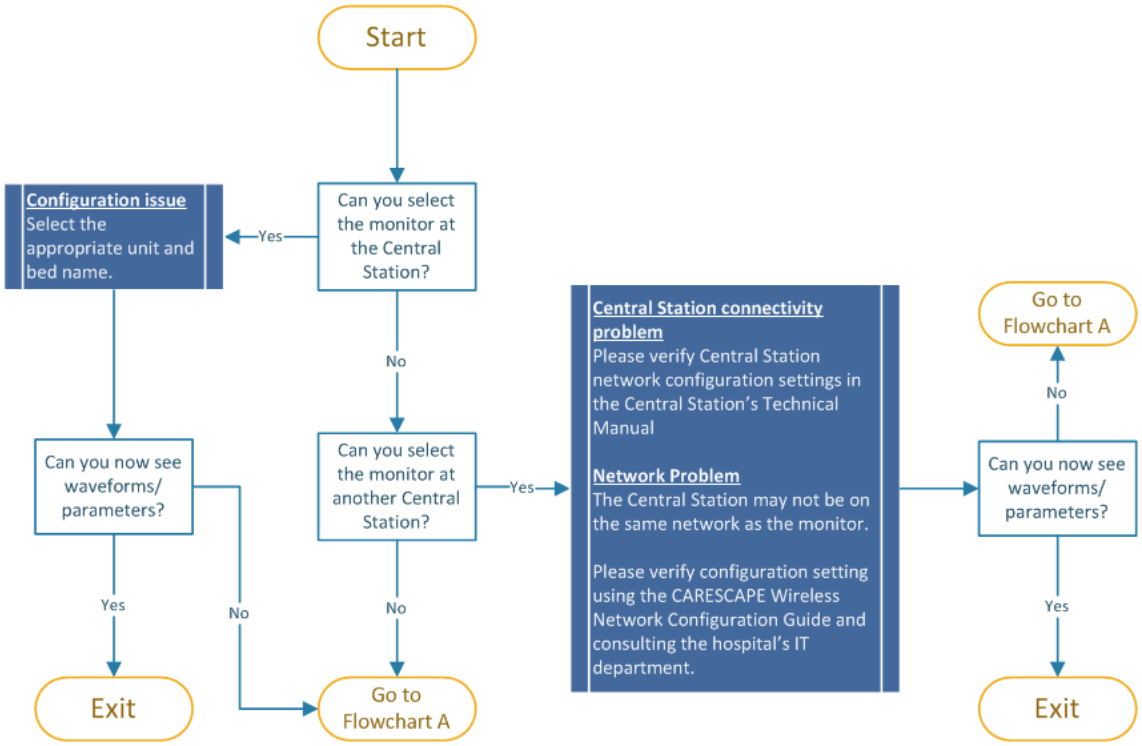
- Upstream Broadcast
- Downstream Broadcast
- Bi-Directional Unicast

Combinations:

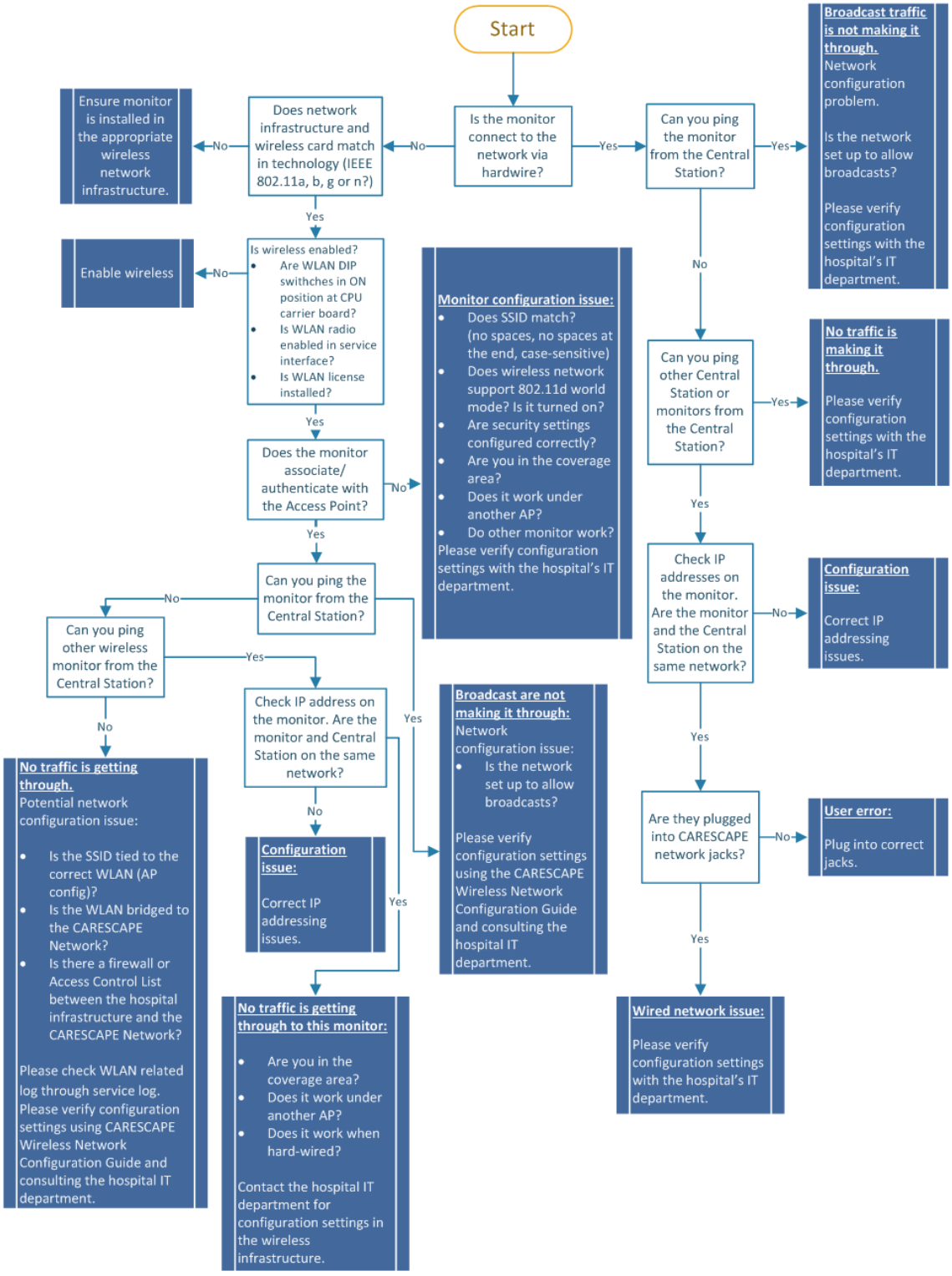
- Wired Broadcast
- Wired Unicast
- Wireless Broadcast
- Wireless Unicast

Waveform or parameter data missing at the CARESCAPE Central Station

Network troubleshooting flowchart



Network troubleshooting flowchart A



12 Disassembly and reassembly

Disassembly guidelines

Field repair of the device is limited to replacing field replaceable units (FRUs).

NOTE Only qualified service personnel should perform field replacement procedures.

NOTE Perform the specified corrective maintenance check after any corrective maintenance to the product.

ESD precautions

All external connectors of the device are designed with protection from ESD damage. However, if the device requires service, exposed components and assemblies inside are susceptible to ESD damage. This includes human hands, non-ESD protected work stations or improperly grounded test equipment. The following guidelines may not guarantee a 100% 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.
- Wear a grounded, antistatic wristband or heel strap 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.
- 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.
- Store the semiconductors and electronic assemblies only in antistatic bags or boxes.
- Handle all PCB assemblies by their edges.
- Do not flex or twist a circuit board.

Reassembly precautions

Pay attention to the following generic precautions when reassembling the monitor:

- Note the positions of any wires, cables or connectors. Mark them if necessary to ensure that they are reassembled correctly.
- Save and set aside all hardware for reassembly.
- GE recommends using the new fasteners (screws, washers, etc.) provided in the FRU kits rather than reusing the old fasteners. Some fasteners are not intended to be re-used.

When you fasten the screws:

- Visually ensure that the screws are properly attached.
- Do not use too much force, as this may damage the existing thread patterns.
- The maximum recommended torque value for each screw and nut is listed in brackets after each disassembly step.
- If you use a battery-operated tool, ensure that it is equipped with torque limiter and the torque is properly adjusted.
- When you attach self-tapping screws to light metal parts without existing threads (new light metal FRU parts), use a higher torque than is recommended for reassembled parts, but still not more than 1.6 Nm.
- Use only new screws for the light metal parts. Before fastening a screw, turn it counterclockwise until it drops into an existing thread pattern.

Required tools

NOTE Use torque wrench and torque screwdriver to comply with the given torques.

- Torx screwdriver, size T10
- a flat blade screwdriver; width 2.5 mm /0.1 in
- small flat blade pliers
- a nut driver or a wrench; size 5 mm
- an antistatic ESD wristband

Preparing for disassembly

WARNING ELECTRIC SHOCK – Always disconnect the device from the power line before you start the disassembly.

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.

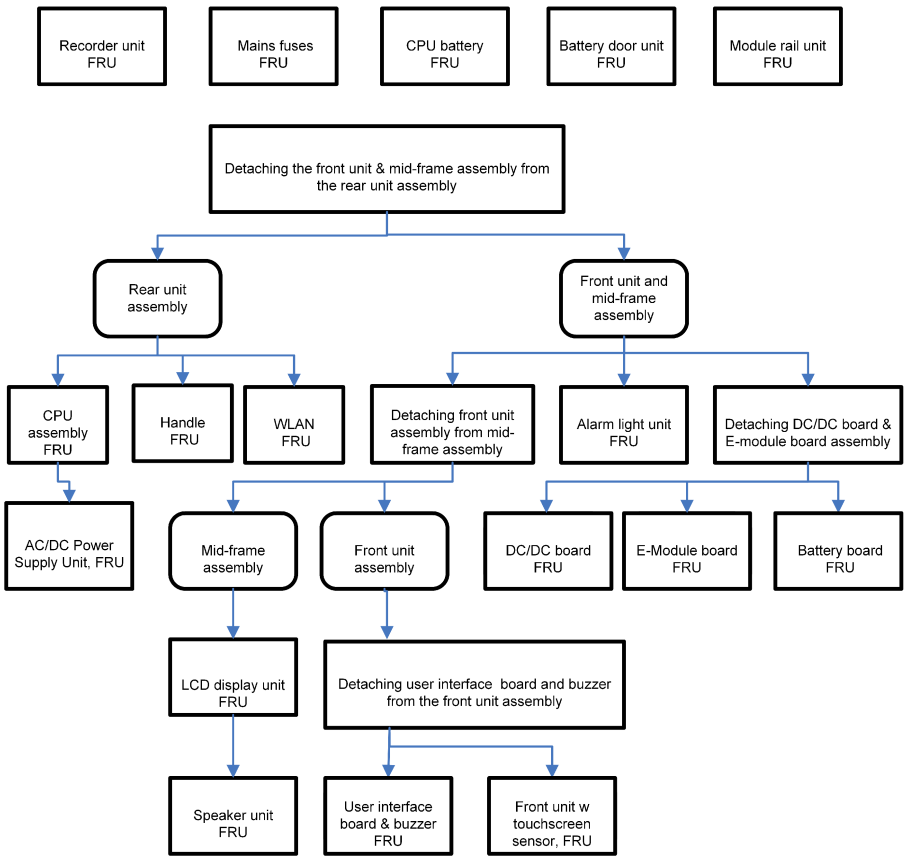
WARNING SAFETY GROUND. Remove power cord from the mains source by grasping the plug. Do not pull on the cable.

WARNING ELECTRIC SHOCK. Always unplug the grounded data cables when not in use. Leaving them connected could result in an electric shock from the ground contact in the other end.

1. Turn off the power by pressing the on/standby button on the monitor front panel. Complete the shutdown procedure by pressing the button a second time when a message prompts you to do so.
2. Remove the monitor batteries.
3. Disconnect all the interface cables from to the monitor.
4. Disconnect the power cable, first from the wall outlet and then from the monitor.
5. Disconnect /Remove all acquisition modules.
6. If a mounting is installed, detach the monitor from it.

Disassembly procedures

Follow the arrows from top to down to identify the required disassembly procedure for each FRU. Perform the steps in the given order.



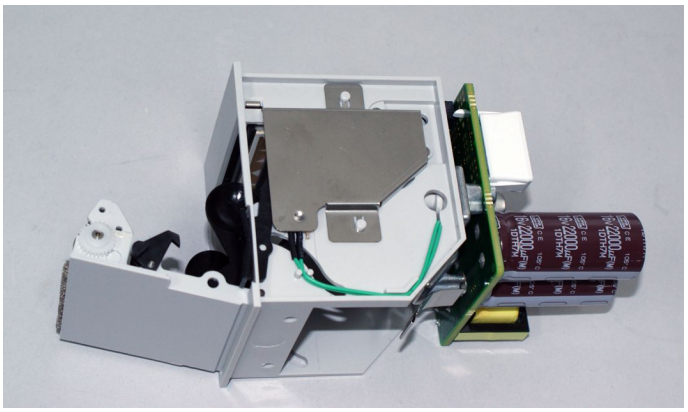
Replacing the recorder unit (FRU)

1. Open the recorder door and remove the paper roll if installed.
2. Release the two snaps on each side of the recorder by pressing with a flat blade screwdriver.

3. Pull the recorder out of the monitor, first a little by pulling from the recorder door, and then all way out by pulling from the recorder body.

NOTE Be careful not to damage the recorder door or the grounding plate when pulling out the recorder.

FRU, Recorder unit, B450:



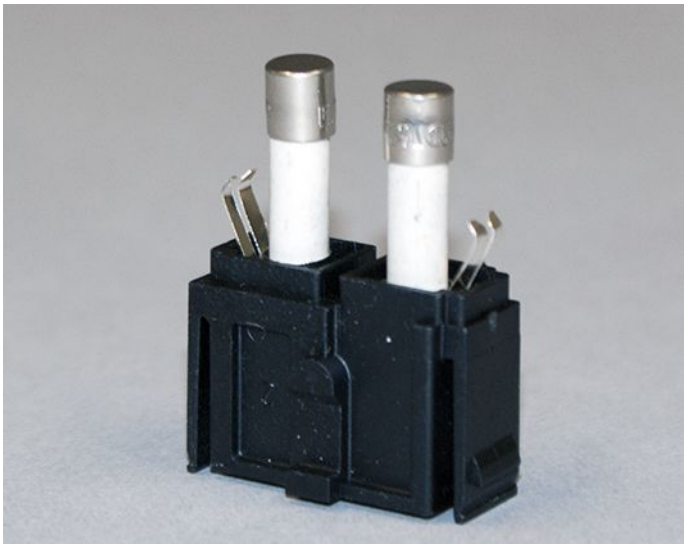
4. Reassemble in reverse order:
   - Push the recorder unit all the way into its slot until it locks.

Replacing the main fuses (FRU)

The mains fuses are located on the side of the monitor, inside the AC inlet.

1. Press the snaps on both sides of the fuse holder with a flat blade screwdriver to release the holder.

2. Pull the fuse holder out of the AC inlet.



3. Replace the fuses with new ones.

   NOTE Use only fuses with the same rating.

4. Reassemble in reverse order. Make sure the following:
   - Push the fuse holder all the way in until it snaps to its place.

Replacing the CPU battery (FRU)

1. Remove the screw (T10) holding the service cover. Torque [0.6 Nm].

2. Release the snap that holds the service cover using a flat blade screwdriver.

3. Pull out the service cover.

4. Detach the CPU battery from the CPU carrier board with a flat blade screwdriver.

NOTE Dispose the battery according to local, state or country laws.

5. Place the new battery into the bracket the positive (+) side facing up.
6. Reassemble in reverse order.

NOTE

When the CPU battery is replaced, the system date and time is reset to the factory default. You must re-configure them before you connect the monitor back to the network. For detailed instructions, see the Configuring date and time section.

Replacing the battery door unit (FRU)

1. Open the battery door.
2. Release the snap that holds the battery door unit to the monitor using a flat blade screwdriver.

3. Pull the battery door unit out of the monitor.

FRU, Battery door unit, B450:

4. Reassemble in reverse order:
   a. Align the battery door plate to its guide rails.
   b. Push the battery door unit all the way into the monitor frame until it snaps to its place.
   c. Close the battery door.

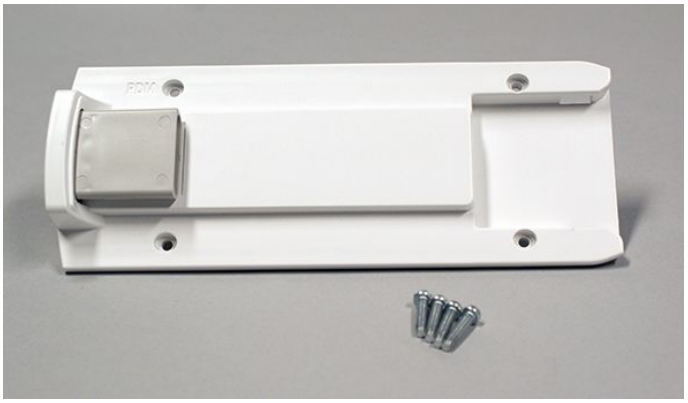
Replacing the module rail unit (FRU)

WARNING EQUIPMENT DAMAGE. To avoid the risk of the monitor getting damaged, use only GE specified screws and torque when replacing the module rail unit.

1. Remove the four screws (T10) that mount the module rail unit to the rear unit assembly.

2. Pull out the module rail unit.

FRU, Module rail unit, B450:



3. Reassemble in reverse order. Make sure the following:
   a. Ensure that the module rail unit connector is correctly aligned to the connector in the CPU carrier board.
   b. Notice the torque during the reassembly:
      - If you replaced the CPU assembly, use 1.2 Nm.
      - If you didn't replace the CPU assembly, use 0.8 Nm.

Detaching the front unit and mid-frame assembly from the rear unit assembly

1. Only for monitors without a recorder unit: Use a flat blade screwdriver to release the snap that fastens the recorder cover plate to the monitor frame. Detach the recorder cover plate.

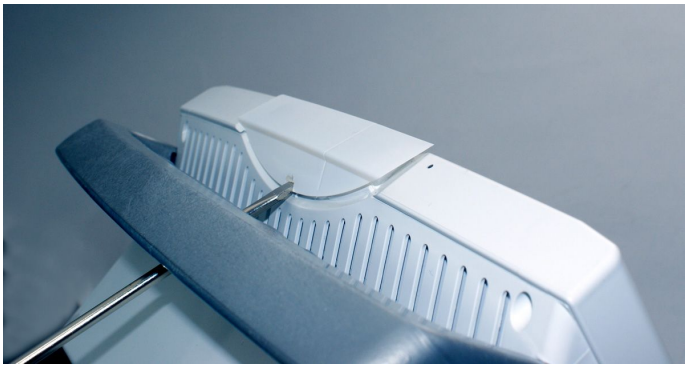
2. Remove the screw (T10) holding the service cover. Torque [0.6 Nm].

3. Release the snap that holds the service cover using a flat blade screwdriver.

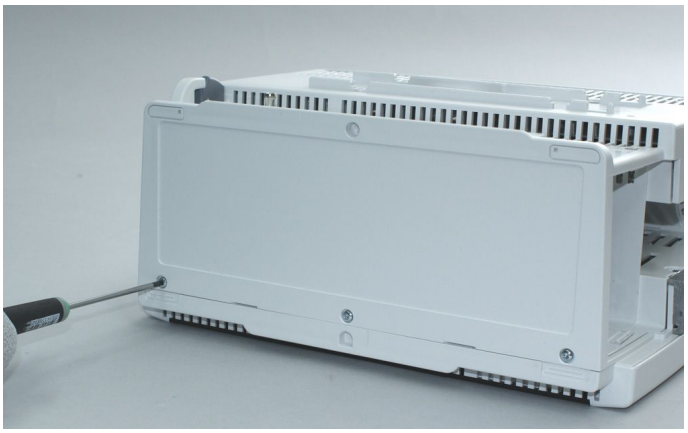
4. Pull out the service cover.

5. Carefully detach the alarm light lens.

   Slide a flat blade screw driver under the alarm light lens to release the snaps that hold the lens and carefully lift the lens up with the screw driver.



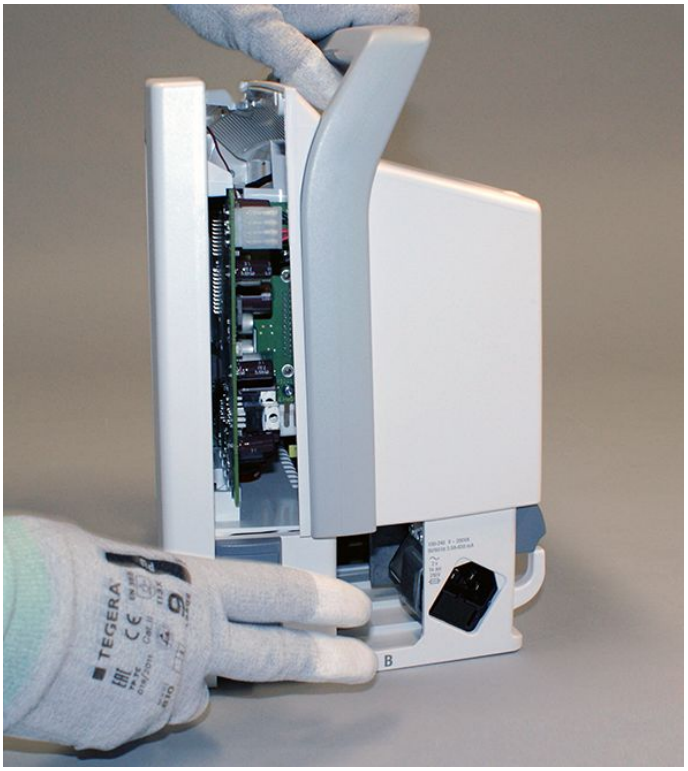
6. Remove the three screws (T10) in the bottom of the monitor. Torque [0.6 Nm].



7. Remove the two screws (T10) in the top of the monitor. Torque [1.2 Nm].

8. Remove the screw (T10) next to the handle. Torque [1.2 Nm].

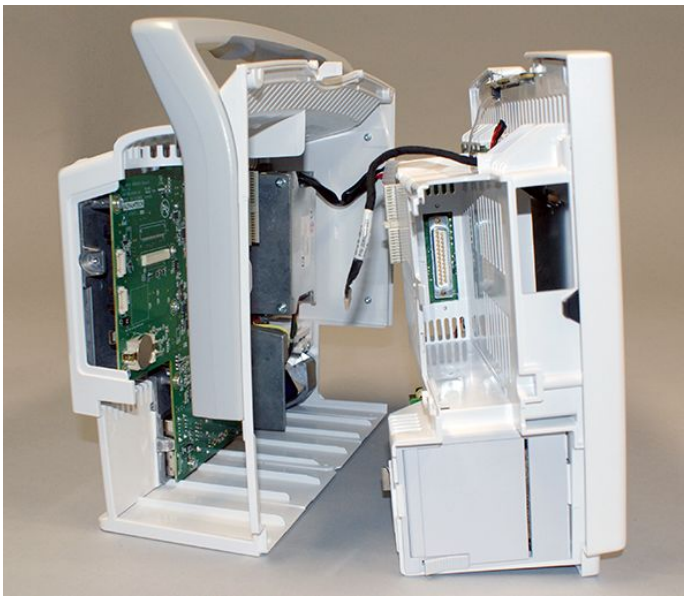
9. Pull out the front unit and mid-frame assembly from the rear unit assembly a little to get access to the AC/DC and display cables.



10. Detach the AC/DC cable from the DC/DC board connector.

11. Detach the display cable from the CPU carrier board.

12. Pull out the front unit and mid-frame assembly all way out from the rear unit assembly.



13. Reassemble in reverse order. Make sure the following:
    a. Ensure that you align the connector in the E-module board properly with the connector in the CPU carrier board.
    b. Remember to reconnect the AC/DC cable and the display cable.

Detaching the CPU assembly (FRU)

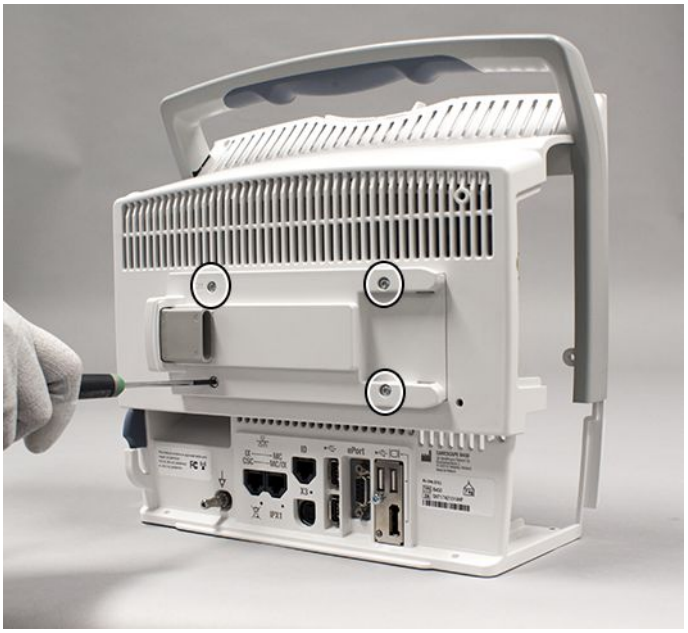
The CPU assembly consists of a CPU carrier board and a CPU module.

Disassemble first:

- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)

Keep the rear unit assembly upright on the table. Support the CPU assembly and the AC/DC power supply unit with your hand, so that they do not drop when you perform the following steps.

1. Remove the four screws (T10) that mount the module rail unit to the rear unit assembly.



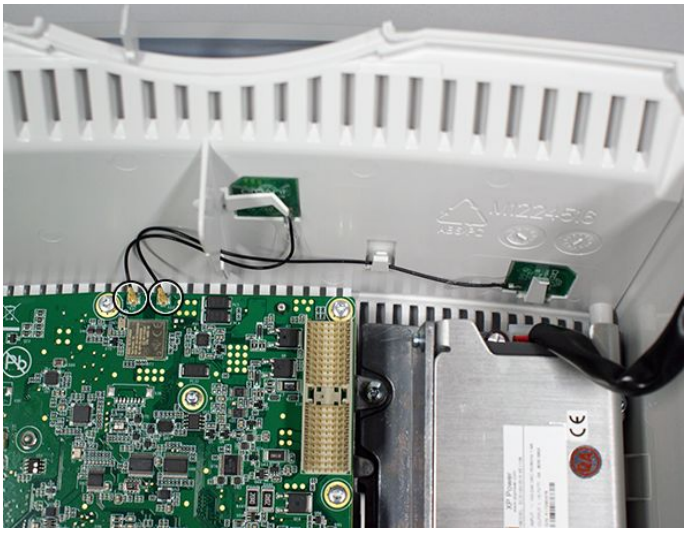
2. Pull out the module rail unit.

3. Remove the screw (T10) holding the small metal plate around the DisplayPort and USB connectors. Torque [0.6 Nm].

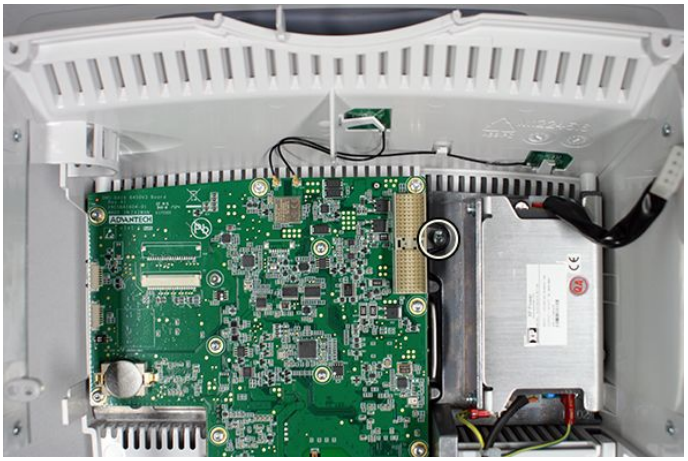
4. Keep the rear unit assembly on the table, the device label side facing down.

5. If the WLAN option installed, detach the WLAN antenna wires from the connectors on the CPU carrier board.

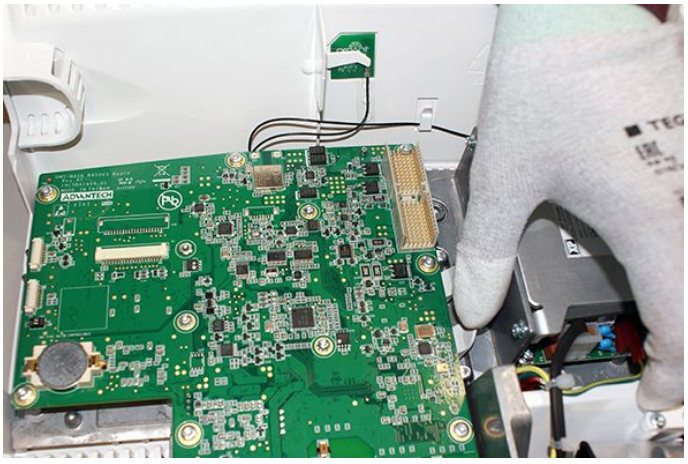
   Be careful not to damage the fragile WLAN antenna boards or antenna wires.



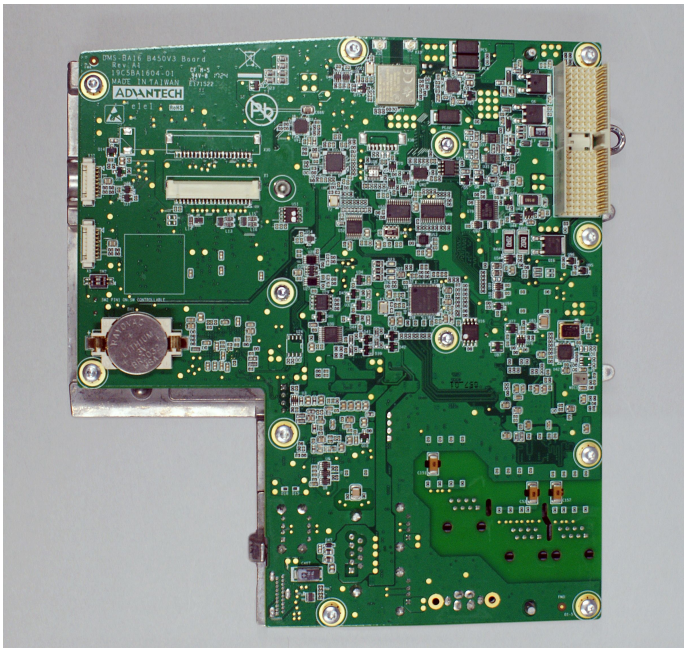
6. Detach the grounding screw (T10) holding the CPU assembly and AC/DC unit together. Torque [1.6 Nm].



7. Release the latch holding the CPU assembly and pull the assembly out from the rear unit.



FRU, CPU assembly, B450:

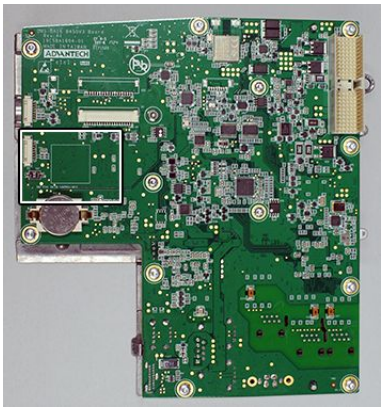


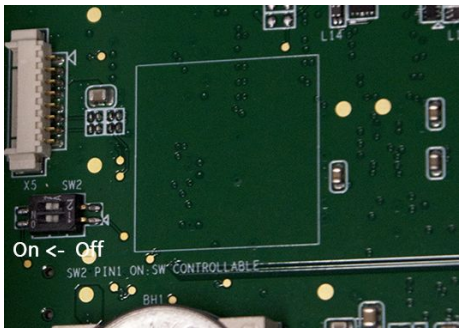
8. Reassemble in reverse order. Note the following:

WARNING EQUIPMENT DAMAGE. To avoid the risk of the monitor getting damaged, use only GE specified screws and torque when replacing the module rail unit.

a. Check the status of the WLAN DIP switches on the CPU carrier board:

- If the monitor has the WLAN option: turn the DIP switches from ***Off*** to ***On*** position to power the WLAN radio module.



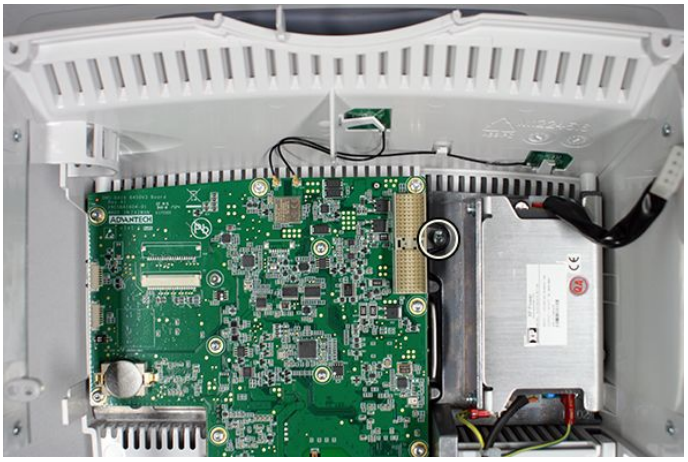


- If the monitor does not have the WLAN option: check that the DIP switches are in ***Off*** position.

b. When you reassemble the CPU assembly, make sure to first place the heat sink under the plastic lip of the rear unit assembly. Then press the other edge of the heat sink under the latch.

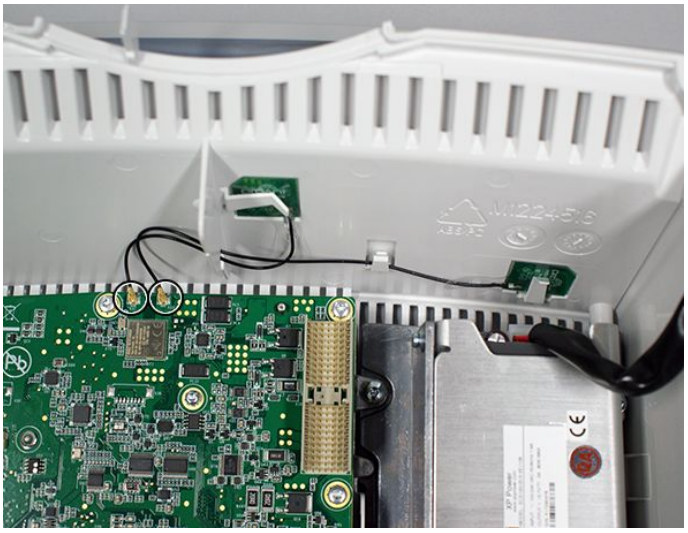
c. Reattach the grounding screw (T10) holding the CPU assembly and AC/DC unit together. Torque [1.6 Nm].

   Make sure to fasten the grounding screw and the start washer properly to ensure that the CPU assembly is properly connected.



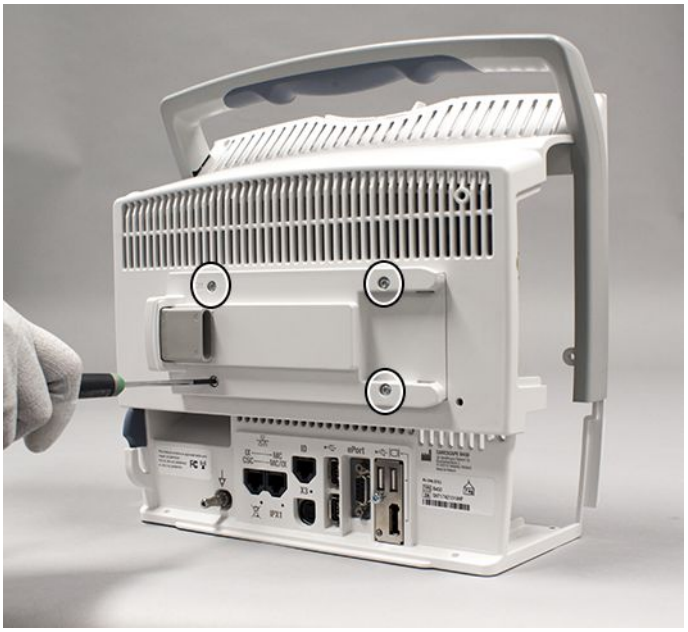
d. If the WLAN option is installed, reattach the WLAN antenna wires back to the correct connectors on the CPU carrier board: the shorter antenna wire to the left-hand side connector on the CPU carrier board and the longer antenna wire to the right-hand side connector.

   Be careful not to damage the fragile WLAN antenna boards or antenna wires.



e. Fasten the small metal plate around the DisplayPort and USB connectors with the screw (T10) . Torque [0.6 Nm].

f. Support the CPU assembly and the AC/DC power supply with your hand, and check the correct position of the CPU assembly and the AC/DC power supply unit before you fasten the four screws (T10) that hold the CPU assembly and the module rail unit to the rear unit assembly.



Notice the torque during the reassembly:

- If you replaced the CPU assembly, use 1.2 Nm.
- If you didn't replace the CPU assembly, use 0.8 Nm.

After the reassembly:

1. Reload the software and the settings. See the Reloading software and settings section.
2. The MAC addresses for the network interfaces are changed when CPU assembly is replaced. To ensure network connectivity is maintained when network access controls are in place, inform the hospital IT/ Biomed of the new MC and IX MAC addresses.

Reloading software and settings

The monitor software and all the settings (including passwords) will be lost when the CPU assembly is replaced with the CPU assembly FRU. The CPU assembly FRU is shipped with a special FRU software pre-installed. Replace this FRU software with the CARESCAPE software, and then reload the original settings.

Contact your local GE representative to order the CARESCAPE software (host software). Provide the original monitor software version and the serial number of the monitor to ensure that you get the correct software.

Perform the following tasks after replacing the CPU assembly with the CPU assembly FRU:

1. Turn on the monitor.

   The monitor starts up with the special FRU software, showing the text ***Field Replacement Unit*** and the FRU software version, IP address, and MC MAC address of the monitor.

2. Log in to the service interface locally with a service PC. Use ***biomed*** user account with ***Change Me*** password. Follow the instructions in the Accessing the service interface locally with a service PC section.

3. Upload the host software. Use the software file that is named as "CSP_3.2.X.cas-unsigned.csmon", where X is the software build you need. Follow the instructions in the Uploading software section.
4. Activate the uploaded host software. Follow the instructions in the Activating the host software section.
5. Enter the original serial number of the monitor. Follow the instructions in the Configuring serial number section.
6. Restore the clinical and the platform settings, including licenses and original passwords:
   - If you have a recent backup file of the settings available for this specific monitor, restore the original clinical and platform settings from the backup file. The backup file includes also the passwords, and all unique platform settings like IP addresses and licenses. For details, see the Restoring a backup section.
   - If you do not have a monitor specific backup file available:
     1. Contact your local GE representative and provide the original serial number of the monitor to get the original license file for the monitor. For instructions on uploading the license file, see the Uploading license file section.
     2. Transfer the other clinical and platform settings from another monitor. For details, see Settings management section. Note that some platform settings are unique to each monitor and need to be configured manually. Ensure that the monitor has correct passwords for all user accounts.
7. Perform a complete checkout procedure for the monitor. Follow the instructions in the Checkout procedures chapter.

Replacing the AC/DC power supply unit (FRU)

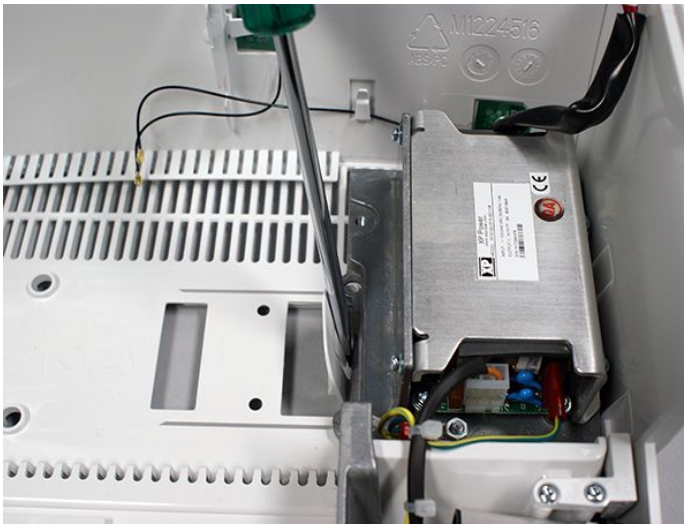
Disassemble first:

- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)
- Detaching the CPU assembly (FRU) (227)

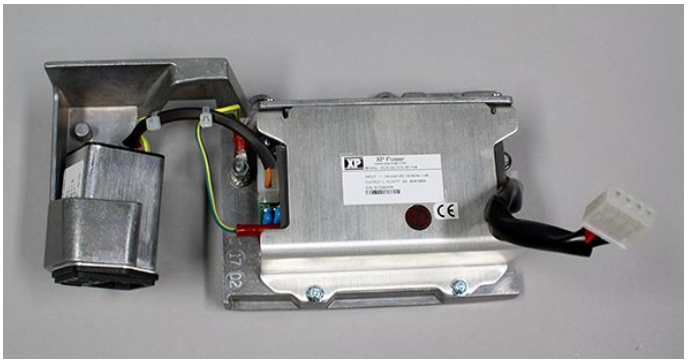
Keep the rear unit assembly on the table, the device label side facing down.

1. Press the latch and pull out the AC/DC power supply unit from the rear unit.

   NOTE Be careful not to damage the fragile WLAN antenna boards or antenna wires.



   FRU, AC/DC power supply unit, B450:



2. Reassemble in reverse order. Make sure the following:
   - Ensure that the AC/DC power supply unit is properly aligned to the rear unit assembly.
   - Make sure that the primary conductors are not squeezed.

Replacing the handle (FRU)

Disassemble first:

- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)

Keep the rear unit assembly on the table, the device label side facing down.

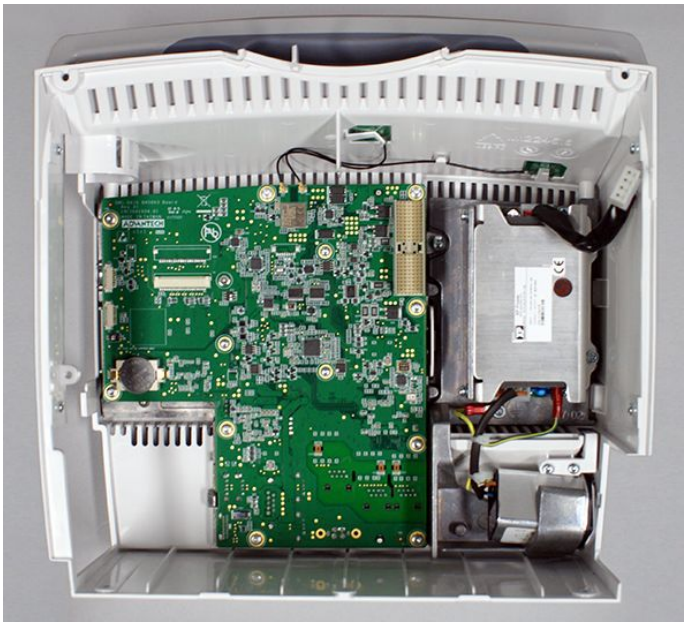
1. Remove the four screws (T10) that mount the handle to the rear unit. Torque [0.6 Nm].
2. Reassemble in reverse order.

Replacing the WLAN antennas (FRU)

Disassemble first:

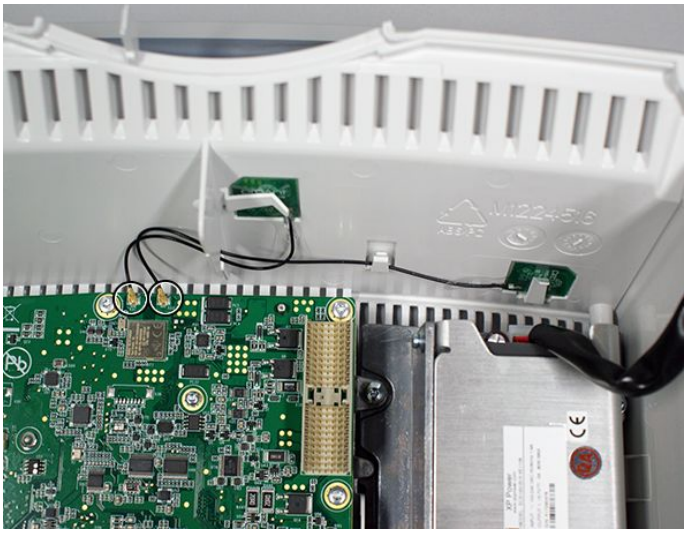
- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)

Keep the rear unit assembly on the table, the device label side facing down.

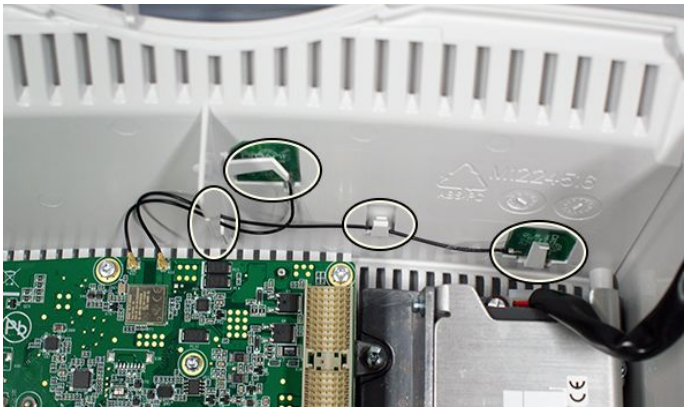


1. Detach the WLAN antenna wires from the connectors on the CPU carrier board.

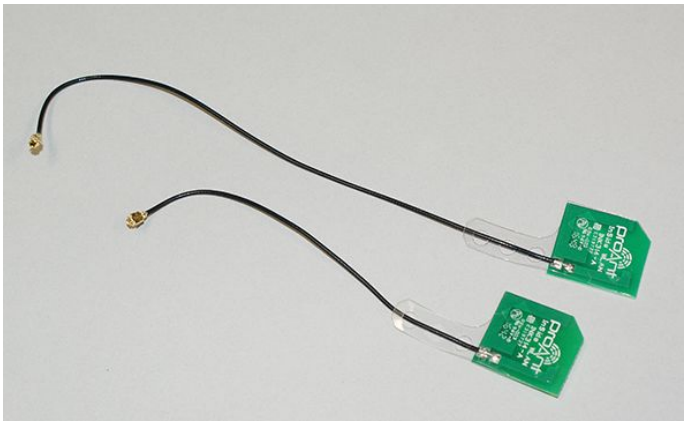
   Be careful not to damage the fragile WLAN antenna boards or antenna wires.



2. Detach the two WLAN antenna boards and antenna wires carefully from their holders on the inner roof of the rear unit.



FRU, WLAN antennas, B450:



3. Reassemble in reverse order. Note the following:
   a. Be careful not to bend the antenna boards or damage the antenna wires.
   b. Ensure that the antenna boards and antenna wires are properly mounted to their holders on the inner roof of the rear unit.
   c. Place the antenna board with the shorter wire to the left-hand side antenna holder and the board with the longer wire to the right-hand side antenna holder.
   d. Connect the shorter antenna wire to the left-hand side connector on the CPU carrier board and the longer antenna wire to the right-hand side connector on the CPU carrier board.

Detaching the front unit assembly from the mid-frame assembly

Disassemble first:

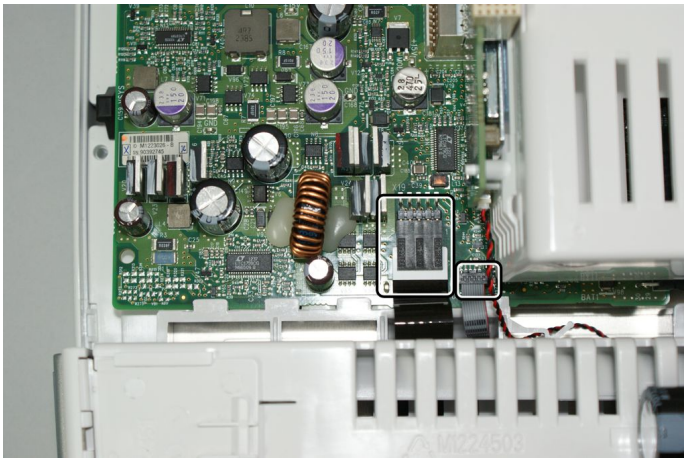
- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)

1. Remove the cover plate at the bottom of the front panel.

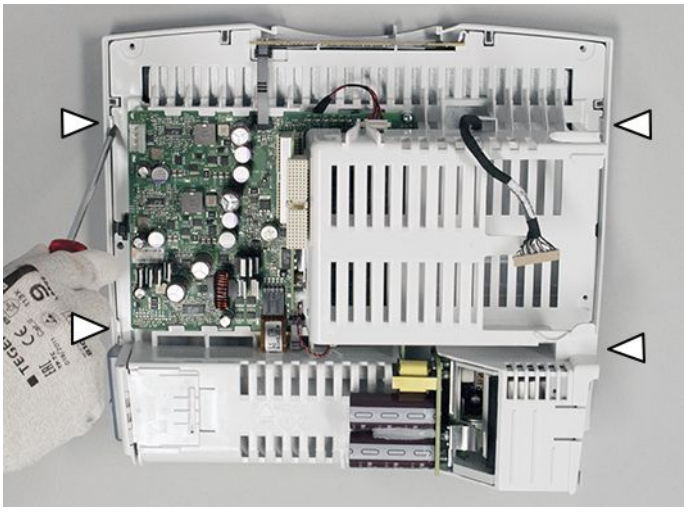
2. Remove the two screws (T10), that hold the front unit assembly to the mid-frame assembly.

3. Keep the front unit and mid-frame assembly on the table the display facing down. Protect the touchscreen sensor from any scratches and dust.

4. Detach user interface and touchscreen cables from the DC/DC board.

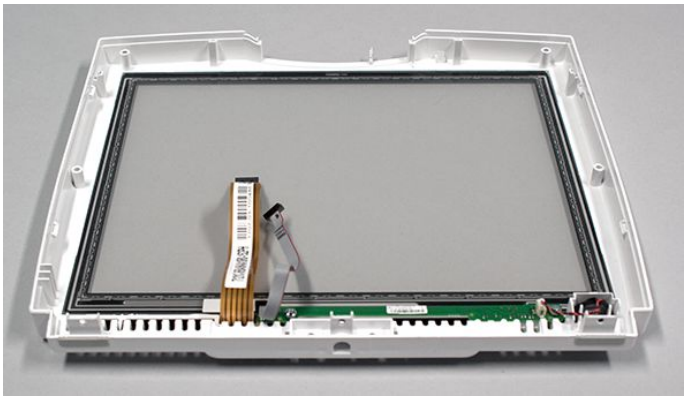


5. Release the four snaps - two on each side - that mount the front unit assembly to the mid-frame assembly.

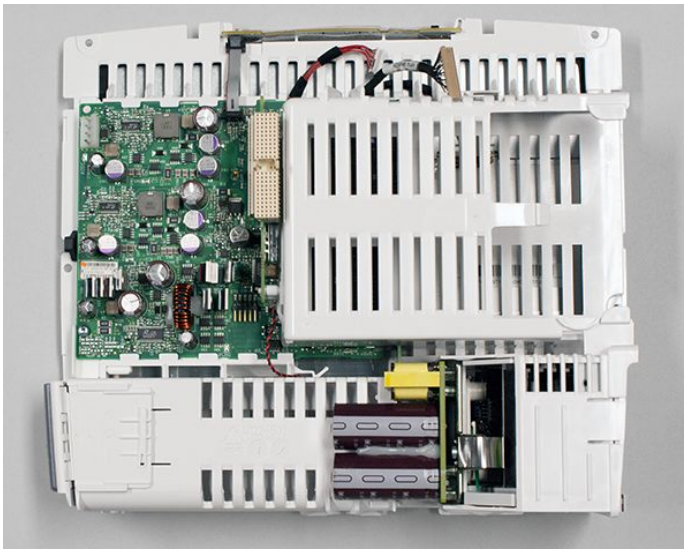


6. Carefully support the LCD display while you lift the mid-frame assembly from the front unit assembly.
   a. Leave the LCD display attached to the display holder of the mid-frame unit with the two rubber fasteners of the display gasket.
   b. Guide the disconnected cables through the openings in the unit.

Front unit assembly:



Mid-frame assembly:



7. Reassemble in reverse order. Make sure the following:
   a. Ensure that the display gasket is correctly aligned and that the four snaps lock properly when attaching the front unit assembly back to the mid-frame assembly.
   b. Guide the touchscreen and user interface cables through the openings in the mid-frame assembly. Connect the cables to the connectors in the DC/DC board.

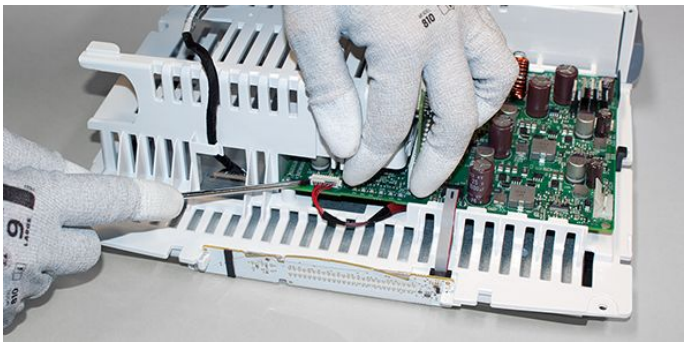
      NOTE: You may find it easier to first connect the user interface cable to the DC/DC board and guide it towards the user interface board through the opening in the mid-frame assembly.

Replacing LCD display unit (FRU)

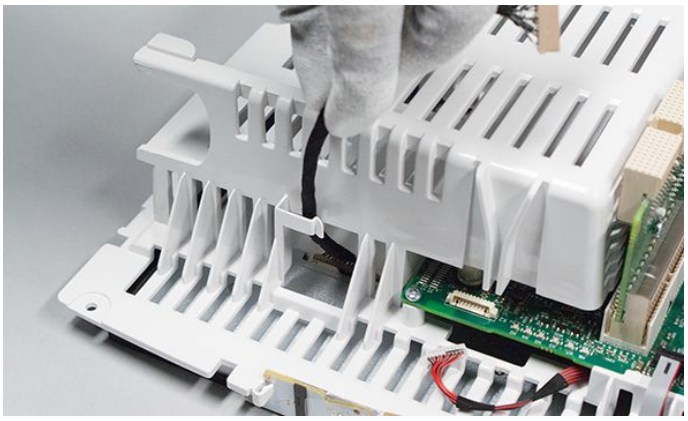
Disassemble first:

- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)
- Detaching the front unit assembly from the mid-frame assembly (239)

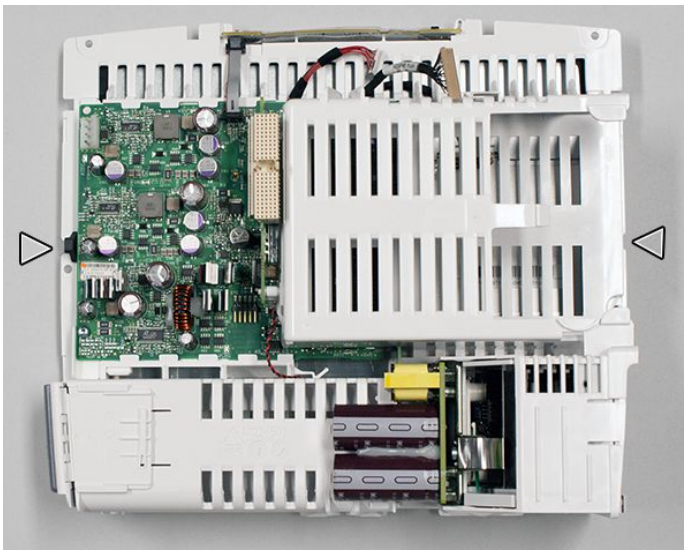
1. Detach the LCD backlight cable from the DC/DC board using a screw driver.



2. Guide the display cable through the openings in the mid-frame unit.



3. Detach the two rubber fasteners that hold the LCD display attached to the plastic display holder of the mid-frame unit.



4. Lift the LCD display with its gasket from the display holder in the mid-frame unit.

FRU, LCD Display unit, B450:

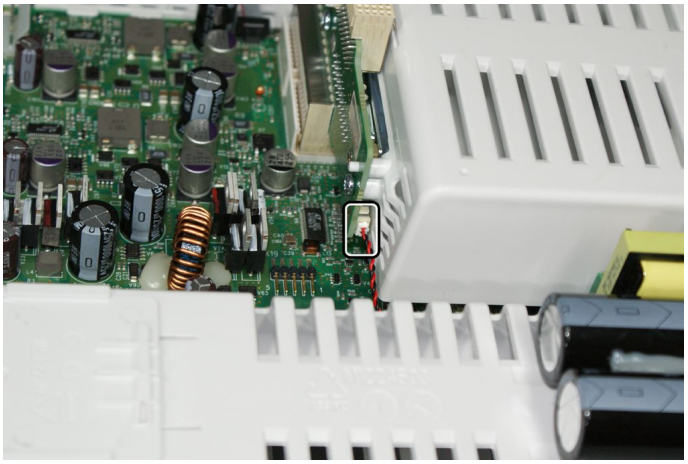
5. Reassemble in reverse order:
   a. Guide the display and LCD backlight cables back through the openings in the mid-frame assembly.
   b. Check that the display gasket is properly aligned around the LCD display. Then carefully align the LCD display with the gasket to the display holder in the mid-frame assembly and lock the two rubber fasteners to the mid-frame.
   c. Connect the LCD backlight cable to the DC/DC board.

Replacing the speaker unit (FRU)

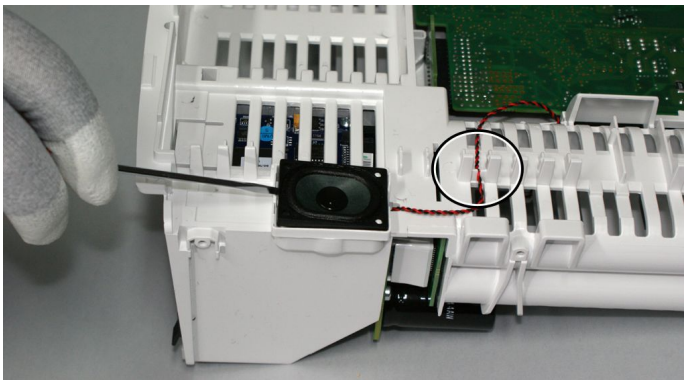
Disassemble first:

1. Detaching the front unit and mid-frame assembly from the rear unit assembly (223)
2. Detaching the front unit assembly from the mid-frame assembly (239)
3. Replacing LCD display unit (FRU) (242)

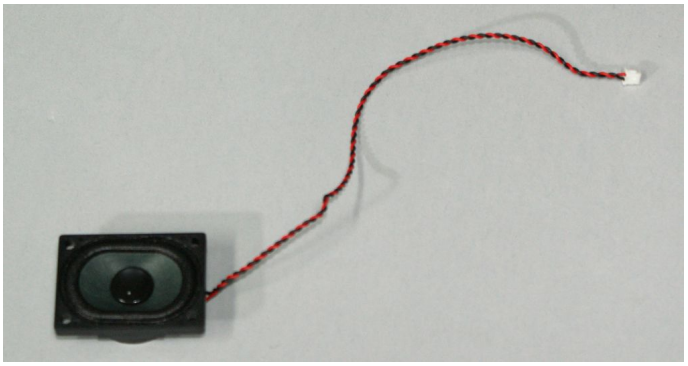
1. Detach the speaker cable from the E-module board and guide it through the openings in the mid-frame unit.



2. Lift the speaker up using a screw driver and detach the speaker.



FRU, Speaker Unit, B450:



3. Reassemble in reverse order. Make sure the following:
   a. Make sure to guide the speaker cable correctly through the cable clamp and the guiding notch.

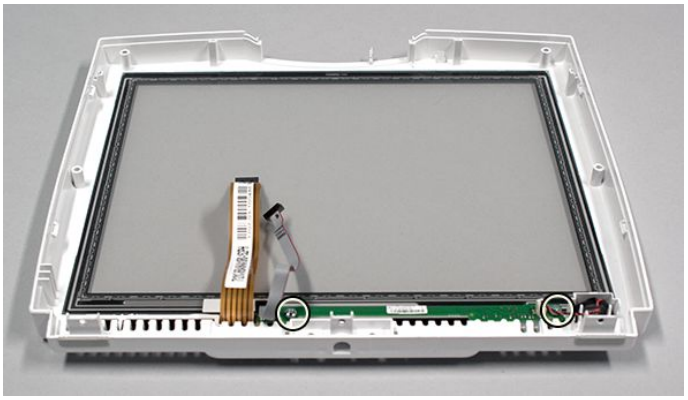
Detaching the user interface board and buzzer from the front unit assembly

Disassemble first:

1. Detaching the front unit and mid-frame assembly from the rear unit assembly (223)
2. Detaching the front unit assembly from the mid-frame assembly (239)

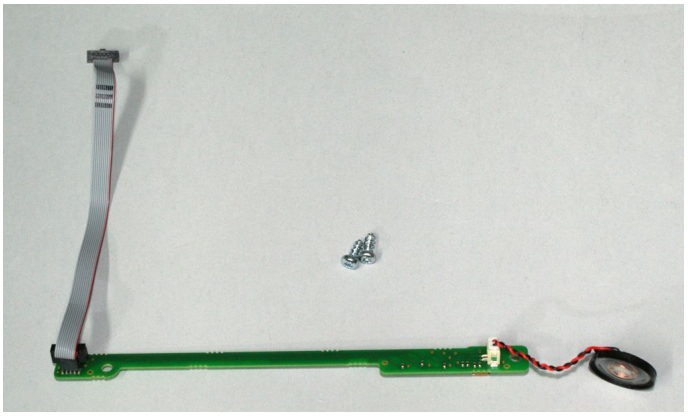
Keep the front unit assembly on the table, the touchscreen sensor facing down. Protect the touchscreen sensor from any scratches and dust.

1. Remove two screws (T10) that mount the user interface board to the front unit. Torque [0.6 Nm].



2. Detach the buzzer cable from the guiding notch.
3. Lift the user interface board and the buzzer up.

FRU, User Interface Board& Buzzer, B450:



FRU, Front unit with touchscreen sensor, B450

4. Reassemble in reverse order. Make sure the following:
   a. Guide the buzzer cable through the guiding notch.

Replacing the alarm light board (FRU)

Disassemble first:

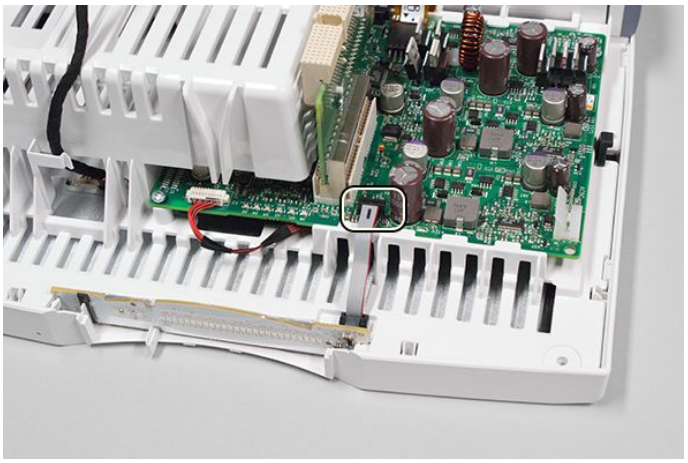
- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)

1. Remove the cover plate at the bottom of the front panel.

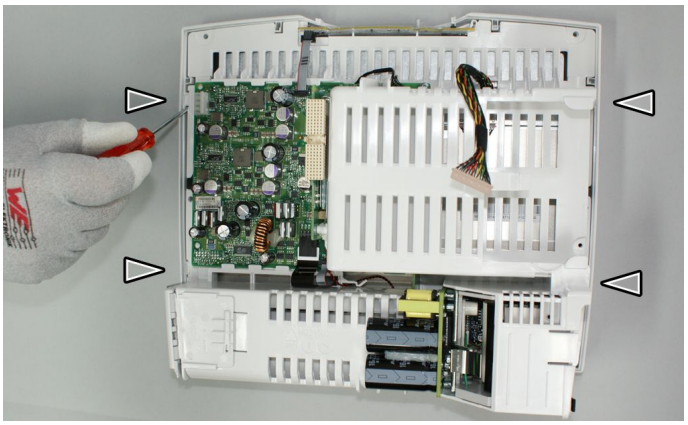
2. Remove the two screws (T10), that hold the front unit assembly to the mid-frame assembly. Torque [0.6 Nm].

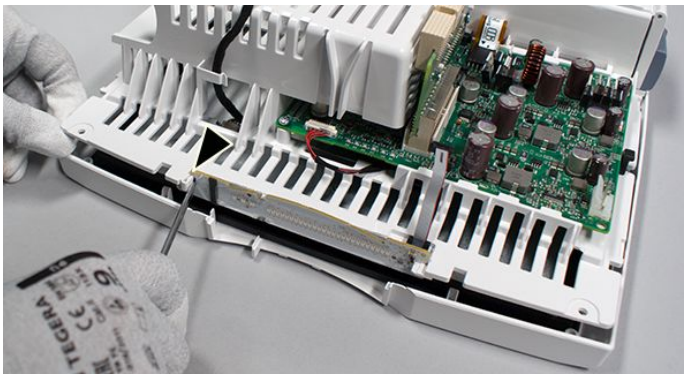
3. Keep the front unit and mid-frame assembly on the table the display facing down. Protect the touchscreen sensor from any scratches and dust.

4. Detach the alarm light board cable from the DC/DC board.

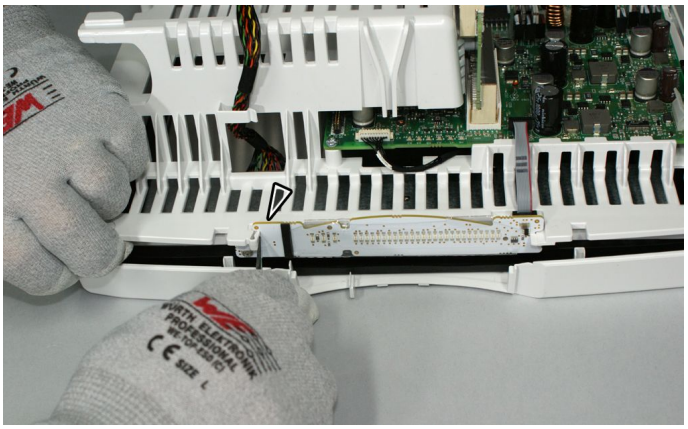


5. Release the four snaps - two on each side - that mount the front unit assembly to the mid-frame assembly to be able to detach the alarm light board.

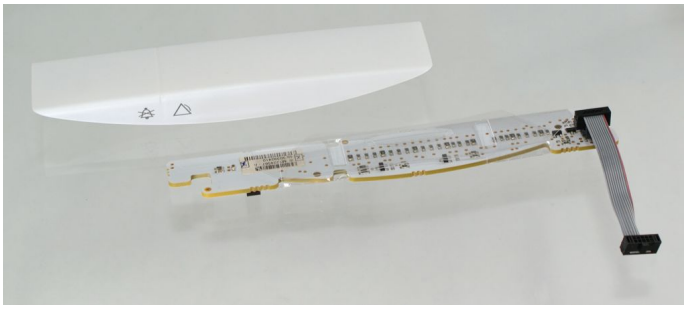




6. Release the snap that holds the alarm light board.



FRU, Alarm light unit, B450:



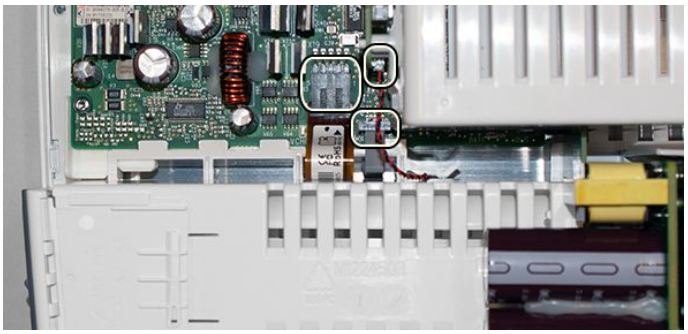
7. Reassemble in reverse order.

Detaching DC/DC and E-module board (FRUs)

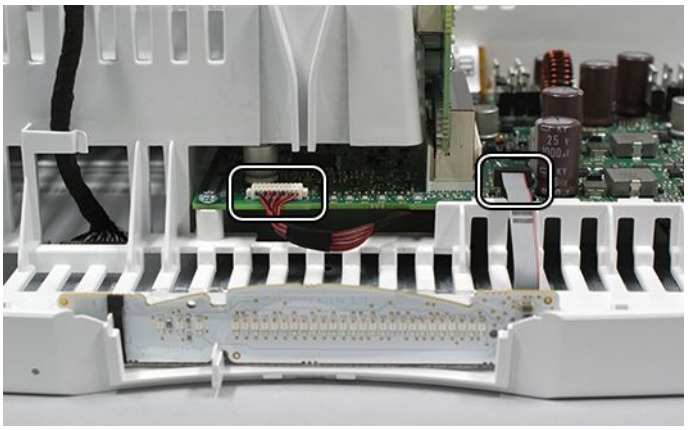
Disassemble first:

- Detaching the front unit and mid-frame assembly from the rear unit assembly (223)

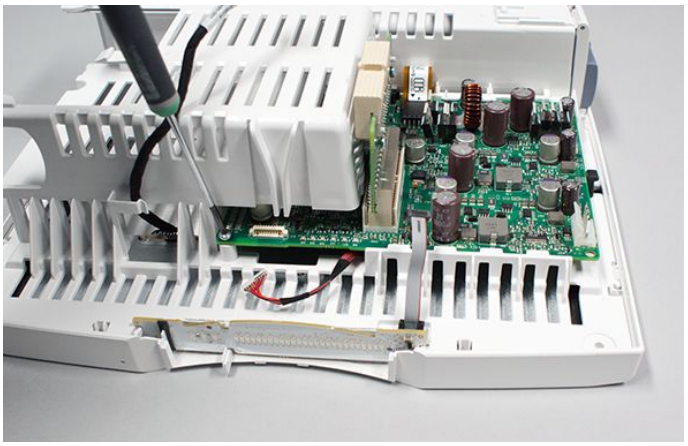
1. Detach the following cables:
   a. The touchscreen cable and the user interface cable from the DC/DC board.
   b. The speaker cable from the E-module board.



2. Detach the following cables from the DC/DC board:
   a. Alarm light board cable
   b. LCD backlight cable



3. Remove the screw (T10) that mounts the DC/DC board to the mid-frame assembly. Torque [0.6 Nm].



4. Remove the two screws (T10) that mount the E-module board to the mid-frame assembly. Torque [0.6 Nm].

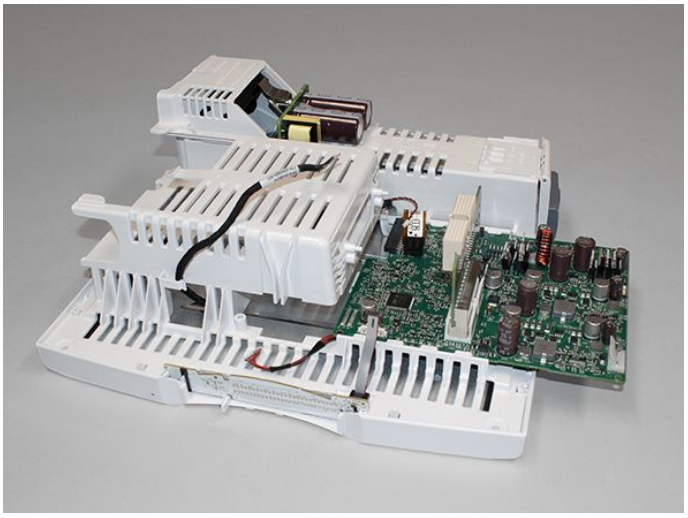
5. Remove the screw (T10) that mounts the DC/DC board support. Torque [0.6 Nm].

6. Detach DC/DC board support from the mid-frame assembly.

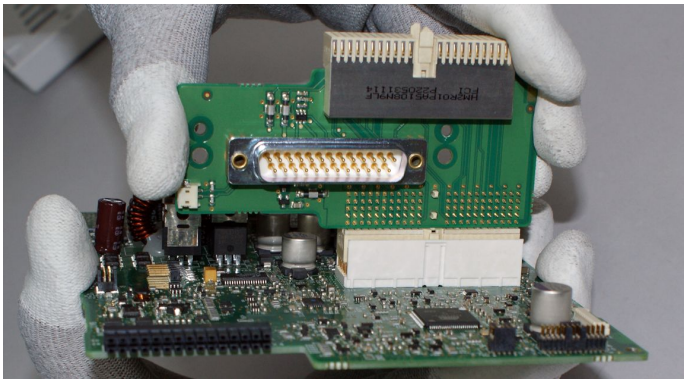
7. Use the flat blade screw driver to release the DC/DC board and the E-module board assembly from the mid-frame assembly.

8. Slide the DC/DC board and E-Module board assembly out from the mid-frame assembly.

NOTE When reassembling, make sure that the connector between the battery board and the DC/DC board is properly connected.

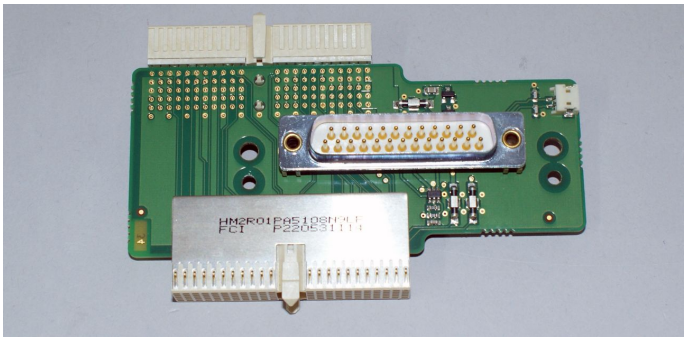


9. Detach the E-module board from the DC/DC board.



FRU, DC/DC Board, B450:

FRU, E-Module Board, B450:



10. Reassemble in reverse order.

NOTE: The monitor will automatically check the PUIC software version in the replaced DC/DC board during the start-up. If the PUIC software requires update, the monitor will show an error message ***Service Monitor - Error Code - 0xHOST1007***. To update the software, log in to the service interface and select ***Configuration > Software Management > Devices***. For more detailed instructions, see Activating software to acquisition modules, DC/DC board and CPU carrier board (134).

Replacing the battery board (FRU)

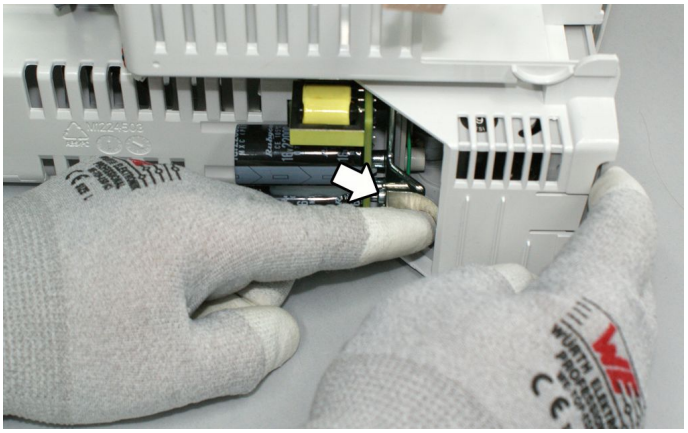
Disassemble first:

1. Detaching the front unit and mid-frame assembly from the rear unit assembly (223)
2. Detaching DC/DC and E-module board (FRUs) (249)

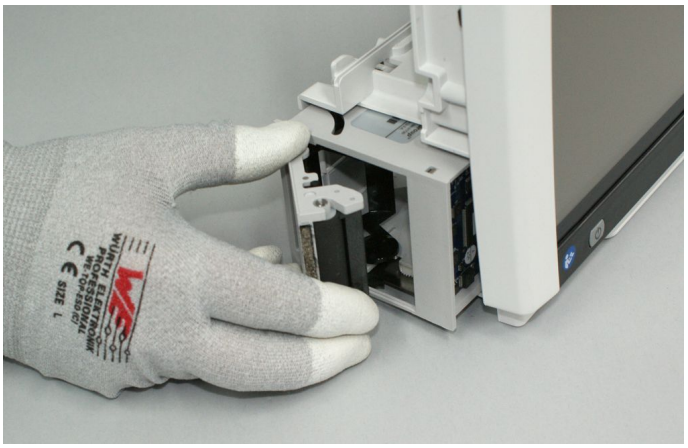
Steps 1. to 3. only for monitors with a recorder. If the monitor is not equipped with a recorder, there is a cover plate, which you do not have to remove.

1. Press the two snaps on each side of the recorder with a flat blade screwdriver.

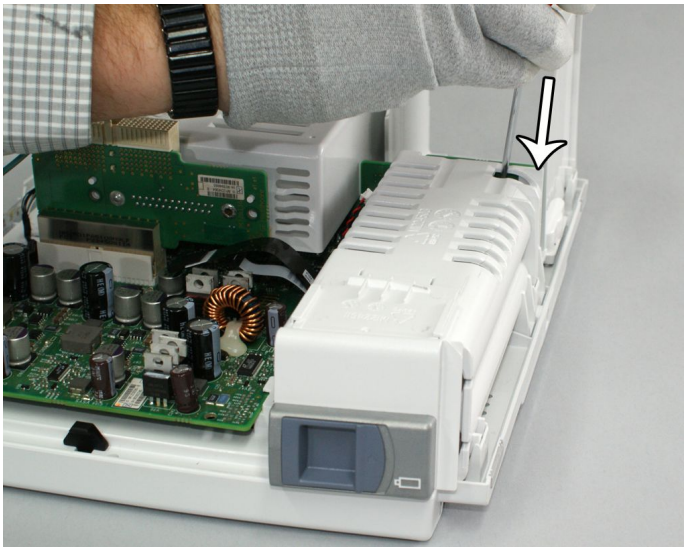
2. Press the grounding plate to release the recorder unit from the mid-frame assembly.



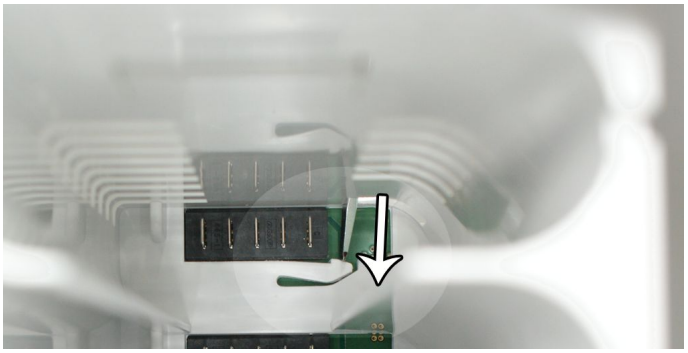
3. Pull the recorder out of the mid-frame assembly.



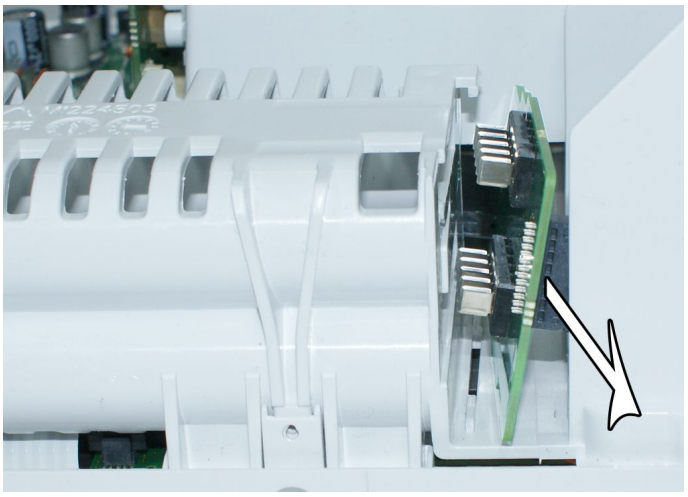
4. Use a flat blade screwdriver to press the snap that holds the battery board to the mid-frame assembly.



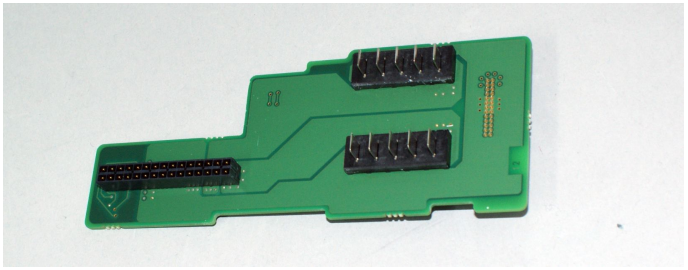
The tip of the screwdriver seen through the open battery slot.



5. Pull the battery board out from the mid-frame unit assembly.



FRU, Battery board, B450:



6. Reassemble in reverse order. Make sure the following:
   a. Ensure that the battery board is correctly aligned to its guide rails.
   b. Ensure that the DC/DC board - battery board connector is properly connected.

13

Service parts

Service parts

Perform the specified corrective maintenance check after any corrective maintenance to the product. For the spare part graphics, see the disassembly procedures.

Ordering parts

To order parts, contact your local GE representative. Contact information is available at www.gehealthcare.com. To make sure you get the correct service part, provide the device type and the serial number information.

List of FRUs

For more information about the FRU contents, see the figures in the Disassembly and reassembly chapter.

Item	Part number	Description
1	M1233483	FRU, Recorder unit, B450: • Thermal printer • Recorder interface board assembly
2	2108451-001	FRU, AC/DC Power supply unit, B450: • AC inlet • Fuses • Heat sink • Cable to DC/DC board
3	M1168221	FRU, Main fuses (10 pcs), B450 & B650 • FUSE, 4A, T, 250V, 5x20mm, high breaking capacity 1500A, IEC, UL/CSA, CCC, 2 pcs
4	2093720-001	FRU, Module rail unit, B450 • A complete PDM module rail unit with the 4 mounting screws.
5	M1233489	FRU, Battery Door Unit, B450 • Complete battery door assembly

Item	Part number	Description
6	2093744-001	FRU, LCD Display Unit, B450: • LCD display with LED backlights • Display cable • LED backlight cable • Gasket around the display
7	2093742-001	FRU, Front unit w. touchscreen sensor, B450 • Complete plastic front bezel subassembly with the touchscreen sensor and cable.
8	M1233492	FRU, User Interface Board & Buzzer, B450: • User interface board • User interface cable • Buzzer • Screws to mount the UI board
9	M1233493	FRU, Speaker Unit, B450 • Main speaker with the cable
10	M1233494	FRU, Alarm Light Unit, B450: • Alarm light board • Alarm light cable • Plastic alarm light lens
11	2108452-001	FRU, DC/DC Board, B450 • DC/DC board with mounting screws (T10) • Plastic DC/DC board support
12	2093743-001	FRU, CPU assembly*, B450: • CPU carrier board • CPU module • CPU battery • Heat sink • Fastening parts NOTE: The monitor software is installed in the CPU module and it will therefore be lost when the CPU assembly is replaced. Contact your local GE representative to order a new monitor software. To ensure you will be get the correct software, you need to provide the original monitor software version and the serial number of the monitor. NOTE: The CPU assembly FRU always includes the WLAN Module.
13	2069650-001	FRU, CPU Battery (5 pcs) • CR2032, Coin battery, Li / MnO2, min capacity 225mA
14	M1233497	FRU, Battery Board, B450

Item	Part number	Description
15	M1233498	FRU, E-Module Board, B450 • E-Module board with mounting screws
16	2093745-001	FRU, WLAN antennas, B450: • Antenna wires • Antenna boards
17	2093746-001	FRU, Plastics kit, B450: • Service cover • Middle frame • Power cable with lock & spring • Recorder cover • Alarm lens. • Screw cover plate for front panel. • Plastic DC/DC board support.
18	2093747-001	FRU, Hardware kit, B450 • A complete set of fastening parts to re-assemble the monitor
19	2108453-001	FRU, Cable Kit, B450: • User interface cable • Alarm light cable • LVDS cable • LCD backlight cable
20	2062895-001	Monitor Battery (1 pc), B450 • Type “FLEX-3S2P”.
21	5830283	FRU, Handle, B450
* The rear panel of the CPU contains the serial number and the UDI labels with unique device identification information. Contact your local GE representative if you need to replace the rear panel.		

A

Test procedure for wireless MC Network infrastructure

Purpose and scope of the test

The purpose of this test is to verify that wireless CARESCAPE monitors operate reliably in customer's wireless network infrastructure. The test focuses on the wireless coverage areas that most likely have poor connectivity.

This test is recommended if the wireless monitors are going to be used in patient transfers within the wireless coverage area. You may skip the test, if the wireless monitors will only be used as stationary monitors at the bedside.

Planning the test

Each wireless installation is unique. It is often impractical and uneconomical to verify the whole wireless coverage area. Therefore, prepare a site-specific test plan that covers the areas where the monitors are most likely to face issues with the wireless communication.

When preparing the test plan, utilize the information provided in the pre-quote questionnaire, existing wireless network design documentation and site survey results. Discuss with the hospital IT specialists and clinical staff to identify the areas that are most likely for poor wireless communication, and prepare a test plan accordingly.

Consider the following aspects when you prepare the test plan:

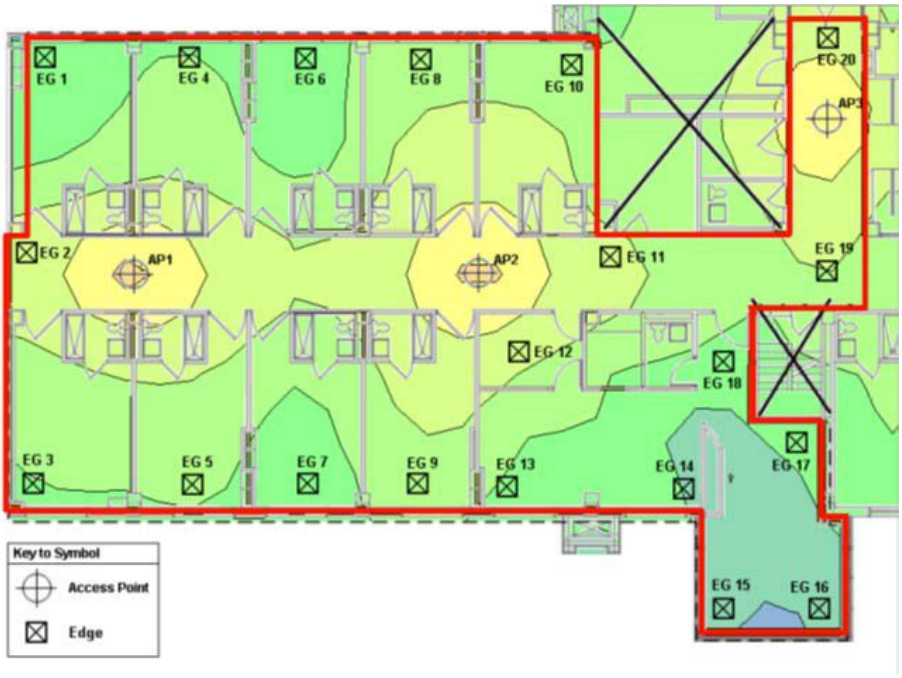
- Identify areas with known or obvious low signal strength.
- Identify areas with known sources of radio frequency interference, causing high noise floor and/or poor signal-to-noise ratio.
- Identify the special characteristics in the building layout (floors, wings patient rooms) and construction material 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 use a 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.

Due to the dynamic nature of a wireless environment this test provides only a snapshot of the wireless network at the time of the test. This is not a comprehensive

test that covers all possible use situations, network traffic situations, radio frequency interferences and possible other changes in the wireless environment.

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.



Overview of the test procedure

The test procedure covers the following:

1. A wired CARESCAPE monitor (stationary monitor) measures ECG and sends the ECG waveform data to the MC Network.
2. A wireless CARESCAPE monitor (transport monitor) shows the ECG waveform from the wired monitor in a bed-to-bed view.
3. A tester moves the wireless monitor along a preplanned route in the wireless coverage area and ensures that the signal strength and transmit rate are adequate, and that the ECG waveform does not have any major gaps or interruptions during the transport between test points.

NOTE If there is a central station with a full disclosure license available, you can extend the scope of the test. In this case you can set up the wireless monitor to also measure ECG and send the information to the central station. The central station will capture any wireless communication issues in the ECG full disclosure data.

Test devices needed

Ensure that you have the following equipment and documentation available.

Central station — optional

- CARESCAPE Central Station / CIC Pro Clinical Information Center with full disclosure license.

A central station is recommended for documentation and reporting purposes. 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.

Hardwired CARESCAPE monitor, the stationary monitor setup

- A patient simulator.
- A CARESCAPE modular monitor with hardwired MC Network connection and one of the following:
  - A PDM with 5-lead ECG trunk cable and 5-leadwire set.
  - CARESCAPE ONE with CARESCAPE ECG and 5-leadwire set.

Wireless CARESCAPE monitor, the transport monitor setup

- A battery operated patient simulator.*
- Service laptop with a crossover Ethernet cable.
- A plastic roll cart for the monitor, service laptop and the simulator. To avoid RF impairment, do not use metal roll carts.
- A CARESCAPE modular monitor with wireless MC Network connection with one of the following:
  - CARESCAPE ONE with CARESCAPE ECG and 5-leadwire set.*
  - A PDM with 5-lead ECG trunk cable and 5-leadwire set.*

NOTE * Needed only if a central station with full disclosure license is available in the MC Network.

Test setup

Install, configure and test the monitors and, if available, the central station to operate in the same MC Network.

Configuring central station

1. Configure the central station to capture full disclosure data from the wireless CARESCAPE monitor. Refer to the central station's operator and service manuals for detailed instructions.

Setting up the hardwired monitor

1. Set up the connections:
   a. Connect a PDM with 5-lead ECG trunk cable and 5-leadwire set, or a CARESCAPE ONE with CARESCAPE ECG and 5-leadwire set to the patient monitor.
   b. Turn on the monitor and the patient simulator.

2. Configure the patient simulator:
   a. Refer to the simulator documentation for details on how to use and configure the simulator.
   b. Configure the patient simulator to output ECG waveform with:
      - ECG rhythm: a normal sinus rhythm
      - Heart rate: 80 bpm
      - Amplitude: 1 mV
3. Configure the monitor:
   a. Select ECG1, ECG2 and ECG3 waveform fields to the screen with adequate priority.
   b. In the ***Paramater Setup*** > ***ECG*** > ***Setup***, select:
      - ***ECG 1 Lead: II***
      - ***ECG 2 Lead: V1***
      - ***ECG 3 Lead: aVL***
4. Start a patient case or admit a patient in ***Data & Pages*** > ***Admit/Discharge*** menu.

Setting up the wireless monitor

NOTE The ECG measurement module, ECG cables and patient simulator for the wireless CARESCAPE monitor are needed only if a central station with full disclosure license is available in the MC Network. If a central station with full disclosure license is not available, skip the following substeps: 1.b. and 1.c., step 2. and substeps 3. a. and 3.b.

NOTE Ensure that the monitor battery, the service PC battery and the patient simulator battery are fully charged.

1. Set up the connections:
   a. Set up the wireless monitor and service PC on a roll cart.
   b. Connect a PDM with 5-lead ECG trunk cable and 5-leadwire set, or a CARESCAPE ONE with CARESCAPE ECG and 5-leadwire set to the monitor.
   c. Turn on the patient simulator.
   d. Connect the service PC to the monitor using the Ethernet crossover cable.
   e. Turn on the monitor and the service PC.
2. Configure the patient simulator:
   a. Refer to the simulator documentation for details on how to use and configure the simulator.
   b. Configure the patient simulator to output ECG waveform with:
      - ECG rhythm: a normal sinus rhythm
      - Heart rate: 80 bpm
      - Amplitude: 1 mV

3. Configure the monitor:
   a. Configure the ECG1, ECG2 and ECG3 waveform fields to the monitor screen with adequate priority.
   b. In the ***Parameter Setup*** > ***ECG*** > ***Setup***, select:
      - ***ECG1 lead: II***
      - ***ECG2 lead: V1***
      - ***ECG3 lead: aVL***
   c. Start a patient case or admit a patient in ***Data & Pages*** > ***Admit/Discharge*** menu.
   d. Select ***Data & Pages*** > ***Other Patients***.
   e. Select the unit and bed name of the stationary monitor and then select ***View***.
4. Configure the service PC:
   a. Login to service interface.
   b. Select ***Diagnostics*** > ***WLAN***.
   c. Select ***Auto-refresh On*** to enable automatic refresh of the screen.

Performing the test

Perform the test according to the test plan. Contact the nursing staff to ensure access to the needed areas before you start 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. Mark the network time, ***Signal Level (RSSI)*** and ***Transmit Rate*** to the test form.
   c. Identify the Access Point the patient monitor is connected to.
   d. Verify that the ***Signal Level (RSSI)*** in dBm is greater than or equal to -60 dBm.
   e. Verify that the ***Transmit Rate*** in Mbps is greater than or equal to 5.5 Mbps.
3. If there is a gap in the waveform, or the ***Signal Level (RSSI)*** or the ***Transmit Rate*** is lower than specified:
   - Observe the length of the waveform loss.
   - Try to find the cause of the gap, for example, roaming or out of range situations.
4. Move the roll cart to the next test point along the walking path and repeat steps 2 and 3 at each test point until you have completed the test plan. While you move the roll cart from one test point to another, verify that there are no losses in the ECG waveforms.

NOTE Momentary waveform losses up to 5 seconds are normal during roaming. If longer, or repeating waveform losses occur between test points, make it an extra test point and follow the instructions in step 2.

Summarizing and reporting

Include the following documents to the test results:

1. Print the full disclosure reports from the central station about the observed waveform loss situations.
2. Print the snap shots 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

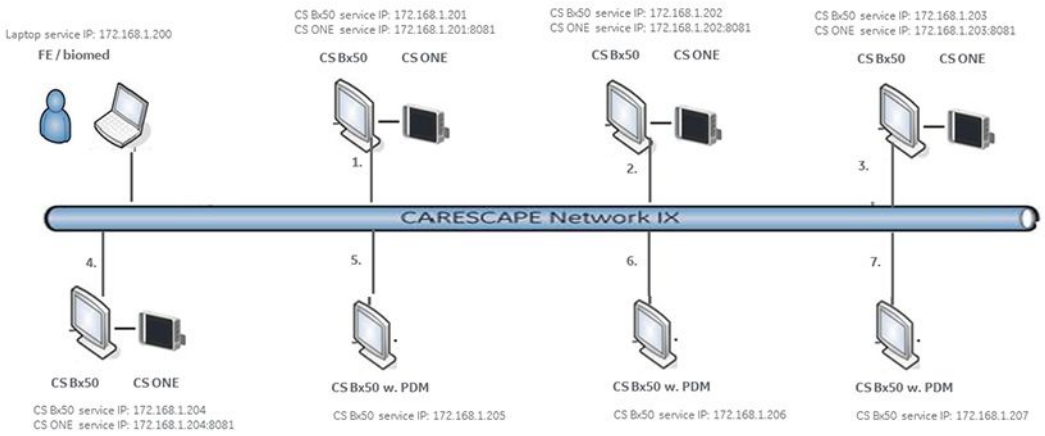
Date & time of testing	**Signature**

B

Multi Monitor Manager

Introduction to Multi Monitor Manager

CARESCAPE Multi Monitor Manager is a service application that allows you to install software and to transfer settings to multiple monitors at a time.



Prerequisites for using Multi Monitor Manager

You can use Multi Monitor Manager with the monitors that meet the following prerequisites:

1. Supported software versions:
   - At least one of the monitors, the one you use to access the Multi Monitor Manager application, must have CARESCAPE software version 3.2.
   - Software installation: All the other target monitors must have CARESCAPE software version 3.0 or later.
   - Settings transfer: The source monitor and all the target monitors must have CARESCAPE software version 3.2.
2. User authentication: User shall be able to authenticate to all the target monitors with the same username and password.
3. Device authentication: All the target monitors are able to authenticate themselves to the web browser on the service PC. Therefore, all the monitors must have a signed X.509 certificate issued by a publicly trusted certificate authority (CA). See Certificate management chapter for detailed instructions.

NOTE If you use Multi Monitor Manager with monitors that have the self-signed certificate issued by GE, you will have to specify a browser specific security exception separately for each target monitor. For more information refer to the web browser's instructions.

Accessing Multi Monitor Manager

The Multi Monitor Manager application is hosted by a CARESCAPE monitor (web server) that is running CARESCAPE Software v3.2 (or later). To load the Multi Monitor Manager application to your service PC (web client), you must first connect the PC to a monitor that is running CARESCAPE Software v3.2 or later.

For details refer to the following chapters in Bx50 Service manual section 4 Using the service applications:

- Checking the network settings of the target monitor
- Configuring the network settings of the service PC
- Supported web browsers in service PC
- Secure access with service PC

Tools needed:

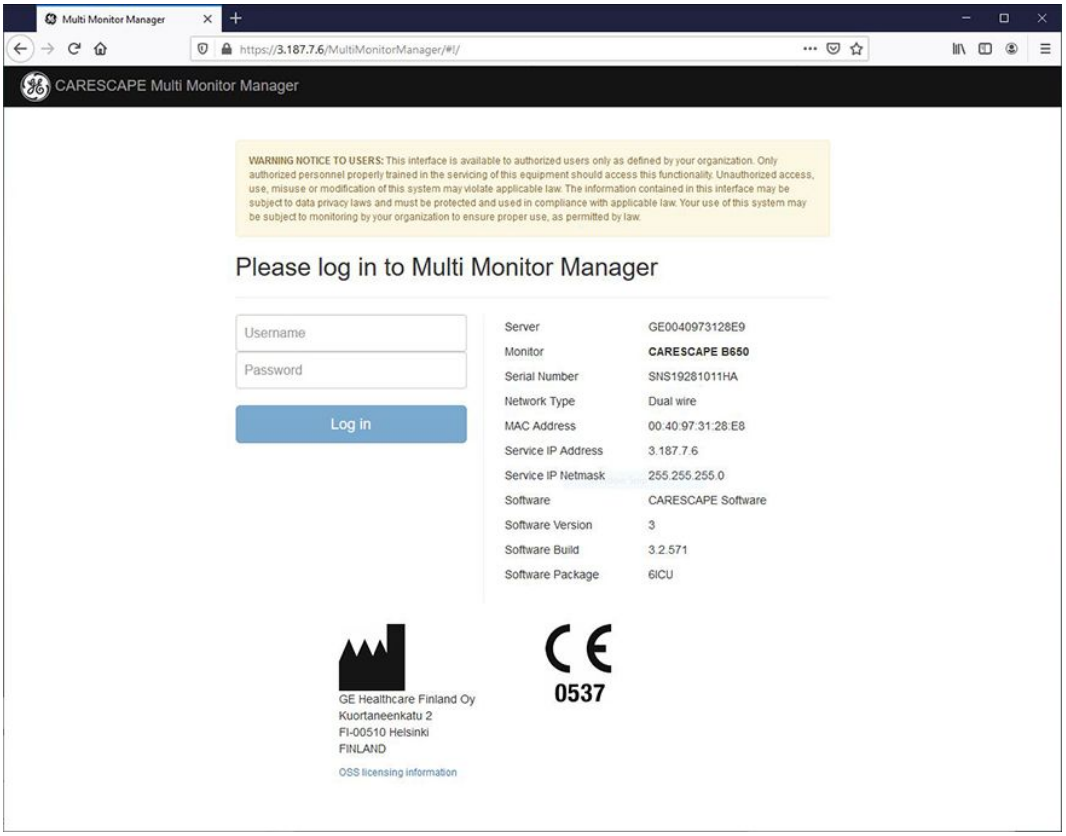
- a service PC
- Ethernet patch cable

1. Connect a service PC either to the IX wall connector (dual wire) or to the MC/IX wall connector (single wire) with an Ethernet patch cable.
2. Configure the service PC to operate in the same subnetwork with the target monitors: ***Service IP Address/ Netmask.***
3. Open a web browser on the service PC.
4. In the address field of the web browser, enter:

   the service IP address of the monitor followed by the suffix: **"/MultiMonitorManager"**.

   For example: **https://172.18.3.201/MultiMonitorManager**.
5. Press ***Enter***.

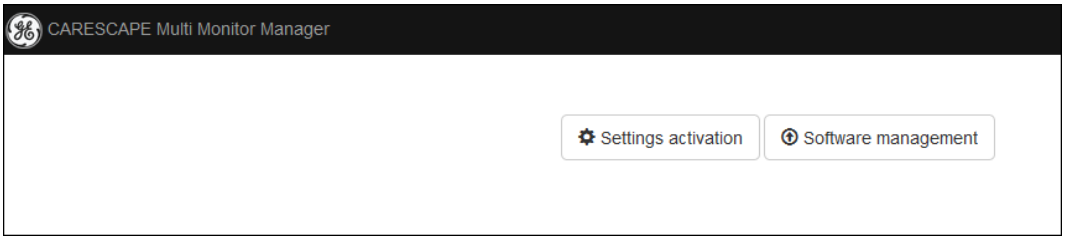
   The Multi Monitor Manager login screen opens:



6. Enter the ***username*** and the ***password*** and select ***Log in***.

   NOTE The user credentials (username and password) are the same as for accessing the service interface of the monitor.

7. Select the function:
   - Select ***Software management*** to upload and/or activate a new software version to multiple monitors at a time.
   - Select ***Settings activation*** to transfer a settings file and activate the new settings to multiple monitors at a time.



Software installation to multiple monitors at a time

You can install new software to multiple monitors at a time with the Software management utility.

Points to note:

- Software installation is possible only either to CARESCAPE Bx50 monitors or to CARESCAPE ONE acquisition devices at a time. In case you need to install software to both type of monitors, complete the activity first to the CARESCAPE Bx50 monitors, and after that to the CARESCAPE ONE acquisition devices.
- Software installation consists of two phases: the software upload and the software activation. You can either perform both phases during the same session, or you can perform the phases during separate sessions.
- Multi Monitor Manager can be used only for the CARESCAPE monitor software (host software) installation.
- Software updates: Multi Monitor Manager can be used both for the software upload and for the software activation.
- Software upgrades: Multi Monitor Manager can only be used for the software upload. Software activation must be completed one monitor at a time using CARESCAPE service interface. See the Activating the host software chapter for more information about the software upgrades and about entering the base license activation code.

Software signing

Software code for CARESCAPE Software v3.2 (host software) is signed with a digital signature by GE Healthcare. The purpose of code signing is to confirm the software author and to ensure that the software code has not been altered or corrupted since it was signed.

There are two software files for each software build:

1. If you are updating the monitor software from one v3.2 software build to another, upload the software file that is named as "CSP_3.2.X.cas.csmon".
2. If you are upgrading the monitor software from v3.1 to v3.2, or if you are reloading host software to the monitor after CPU replacement, upload the software file that is named as "CSP_3.2.X.cas-unsigned.csmon".

Specifying the target monitors

1. To specify all the target monitors to which you want to upload and/or activate a new software image, do one of the following:
   a. Select ***load from file*** to load the IP addresses from a file on your service PC.

      NOTE Prepare the file beforehand. The file must be a text file. IP addresses and/or host names must be separated with a line break.

   b. Enter the IP addresses or the host names of all the target monitors manually one per line to the ***Monitor Addresses*** field. Press **Enter** for a line break.

Connecting to the target monitors

1. Enter the ***Username*** and the ***Password***.
2. Select ***Contact Monitors*** to log in and to authenticate to the target monitors.

   The progress of the authentication process is updating on the screen.

3. Wait until the authentication process completes and the ***Operation summary*** appears on the screen:

4. Check the summary for possible issues and select ***Close***.
5. Review the connection statuses of all the target monitors:

4 Monitor(s) contacted successfully. 3 Monitor(s) failed to contact. 7 total.

Address	Monitor Type	Current Version	Serial Number	Uploaded Version	Note	Status
172.18.3.201	B650	3.2.551	SNS18170026HP			OK
172.18.3.202	B450	3.1.376	SNT19281011HA			OK
172.18.3.203	B450	3.1.376	SNT19360050HA			OK
172.18.3.204	B450	3.1.376	SNT17421019HP			OK
172.18.3.205	B450	3.1.376	SNT18231014HP			Authentication failed
172.18.3.206						Invalid address or monitor is not reachable
172.18.3.207						Invalid address or monitor is not reachable

Address	The service IP Address of a monitor. Selecting the IP address will open a new browser tab to access the service interface of the monitor. You can use this link for troubleshooting purposes.
Monitor Type*	B450, B650, B850, or CS ONE. Mixing CS ONE and Bx50 to the same operation is prevented. In case there are both Bx50 monitors and CS ONE devices, the operation will only be performed on the Bx50 monitors. The CS ONE devices will be excluded from the operation.
Current Version*	The current (active) software version in use.
Serial Number*	The serial number of the target monitor.
Uploaded Version*	The current uploaded (inactive) software version. If this field is empty, the monitor does not have an inactive software uploaded.
Status	Software upload and activation is possible only to the monitors with the ***OK*** status. For information about other statuses, see the Authentication statuses table in the Troubleshooting section.

* If the field is empty, the Multi Monitor Manager failed to connect to the monitor.

Uploading software to the target monitors

Software upload is possible to all the monitors for which authentication was completed successfully (connection status is ***OK***).

NOTE Software is delivered as an ISO image file, either using a physical media or electronically. To have access to the software file the ISO image must be mounted first as a logical drive. If software is delivered using a physical media, mounting typically takes place automatically when you attach the USB flash drive to your computer. If software is delivered electronically, you will have to enable the mounting manually by double-clicking the ISO image file.

1. Select ***Browse*** or ***Choose File***.

   An ***Open*** or a ***Choose File to Upload*** dialog box will open.

2. Browse the drive and folder to find the software image file. Select the software file by double-clicking it or by selecting ***Open***.

   a. Select the software file that is named as "CSP_3.2.X.cas.csmon", if you are updating the monitor software from one v3.2 software to another.

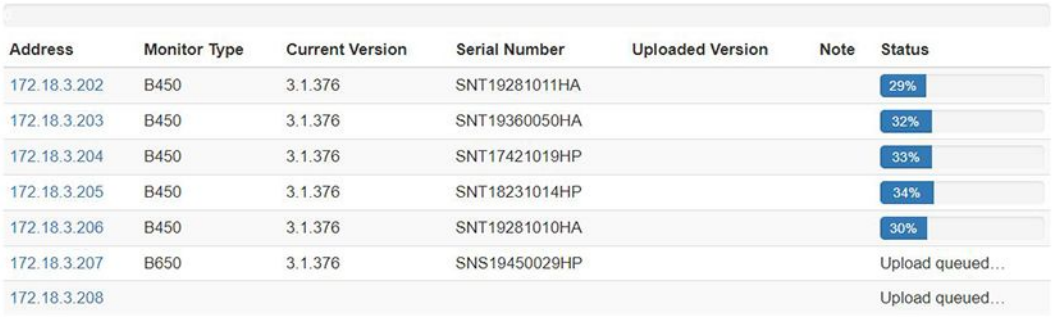
   b. Select the software file that is named as "CSP_3.2.X.cas-unsigned.csmon", if you are upgrading the monitor software from v3.1 to v3.2.

3. Select ***Upload image to all monitors*** to start uploading the software to the target monitors.

   Points to note:

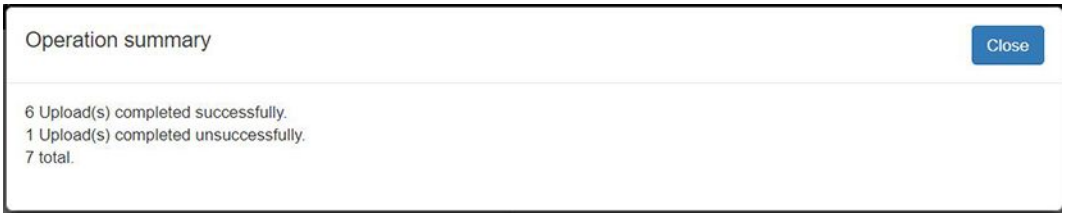
   - Multi Monitor Manager uploads the software to the target monitors in batches of five monitors at a time. The rest of the contacted monitors will be queued.
   - Closing the menu page during the process will abort all incomplete uploads.

   The progress of the software upload is shown on the screen:



Address	Monitor Type	Current Version	Serial Number	Uploaded Version	Note	Status
172.18.3.202	B450	3.1.376	SNT19281011HA			29%
172.18.3.203	B450	3.1.376	SNT19360050HA			32%
172.18.3.204	B450	3.1.376	SNT17421019HP			33%
172.18.3.205	B450	3.1.376	SNT18231014HP			34%
172.18.3.206	B450	3.1.376	SNT19281010HA			30%
172.18.3.207	B650	3.1.376	SNS19450029HP			Upload queued...
172.18.3.208						Upload queued...

4. Wait until software upload is completed and the ***Operation summary*** appears:



5. Check the summary and select ***Close***.

6. Review the software upload statuses of all the target monitors:
   a. If the software upload is completed successfully, the ***Status*** field shows ***Uploaded*** and the new software version is shown in the ***Uploaded Version*** -field.
   b. If the software upload failed, the reason is shown in ***Status*** field. For more information about the statuses, see Software upload statuses table in the Troubleshooting section.

6 Upload(s) completed successfully. 1 Upload(s) completed unsuccessfully. 7 total.

Address	Monitor Type	Current Version	Serial Number	Uploaded Version	Note	Status
172.18.3.202	B450	3.1.376	SNT19281011HA	3.2.551		Uploaded
172.18.3.203	B450	3.1.376	SNT19360050HA	3.2.551		Uploaded
172.18.3.204	B450	3.1.376	SNT17421019HP	3.2.551		Uploaded
172.18.3.205	B450	3.1.376	SNT18231014HP	3.2.551		Uploaded
172.18.3.206	B450	3.1.376	SNT19281010HA	3.2.551		Uploaded
172.18.3.207	B650	3.1.376	SNS19450029HP	3.2.551		Uploaded
172.18.3.208						Request Aborted

Activating the uploaded software on the target monitors

Software activation is possible for all the monitors that have an uploaded (inactive) software version installed.

NOTE

BEFORE INSTALLATION- Compatibility is critical to safe and effective use of this device. Verify the compatibility of all system components and device interfaces, including hardware and software versions, prior to installation and use.

Before you start activating a new host software:

- Verify the compatibility of the new software version with all the monitors, and the connected bedside and network devices. Refer to the latest version of the supplemental information manual for a list of compatible network and bedside devices.
- Contact GE to get the latest version of the user and service documentation.
- Ensure that the CARESCAPE B450 and B650 monitors are connected to AC mains power for the duration of the entire software activation.

Points to note:

- A successful software activation will automatically erase (uninstall) the previous version of the software.
- LOSS OF MONITORING. Software is activated only when the 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.
- The target monitors will retain all the current clinical and platform settings unchanged. However, any new or changed clinical and platform setting will be set to the factory defaults and may require manual configuration. For more information, refer to the latest version of the supplemental information manual

- Do not shut down the monitor until the software activation is successfully completed.

1. Select ***Activate uploaded version on all monitors*** to start the software activation.
2. Wait until the software activation is started or initiated in all the target monitors and the ***Operation summary*** appears:

3. Check the summary and select ***Close***.
4. Review the software activation status of all the target monitors:
   - If the software activation is started / initiated successfully, the ***Status*** is ***Activation started*** or ***Activation is pending discharge***.
   - If the software activation failed, the reason is shown in the ***Status*** field. For more information, see the Software activation statuses table in the Troubleshooting section.

5 Activation(s) requested successfully. 3 Activation(s) requested unsuccessfully. 8 total. 1 activations pending patient discharge.

Address	Monitor Type	Current Version	Serial Number	Uploaded Version	Note	Status
172.18.3.201	B650	3.2.551	SNS18170026HP	3.2.552		Activation started
172.18.3.202	B450	3.2.551	SNT19281011HA	3.2.552		Activation started
172.18.3.203	B450	3.2.551	SNT19360050HA	3.2.552		Activation started
172.18.3.204	B450	3.2.551	SNT17421019HP	3.2.552		Monitor is not in mains power
172.18.3.205	B450	3.2.551	SNT18231014HP	3.2.552	Patient admitted / SW activation pending	Activation is pending discharge
172.18.3.206	B450	3.2.551	SNT19281010HA	3.2.552		Activation started
172.18.3.207	B650	3.2.551	SNS19450029HA			No uploaded version to activate
172.18.3.208						Request Aborted

The software activation takes place either immediately or after next case end / discharge, depending on the monitor status.

Software activation immediately:

- Software activation starts immediately in all the target monitors that do not have an ongoing patient case.
- The monitor shows the following screen saver for the clinical user: ***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.***

Software activation after next case end / discharge :

- The software activation will start after the next case end / discharge in all the target monitors that have an ongoing patient case.

- The monitor informs the clinical user about the pending software activation with the following message: ***Software activation after next case end / Software activation after next discharge.*** Monitoring can continue normally.
- The software activation starts automatically after the patient is discharged, or patient case is ended. The patient monitor displays 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.

Settings activation to multiple monitors at a time

You can transfer clinical and/or platform settings to multiple monitors at a time.

Refer to the Settings transfer process chapter for an overview of the settings transfer process.

Before you can activate settings to the target monitors:

1. Complete the platform and/or the clinical configuration in the source monitor.
2. Download the platform and/or clinical settings of the source monitor to a settings file. See Downloading clinical and platform settings chapter for details.

Points to note:

- The source monitor and all the target monitors must have CARESCAPE software version 3.2.
- Settings transfer is possible only either to CARESCAPE Bx50 monitors or to CARESCAPE ONE devices at a time. In case you need to transfer settings both to CARESCAPE Bx50 monitors and CARESCAPE ONE devices, complete the activity first to the CARESCAPE Bx50 monitors and after that to the CARESCAPE ONE devices.
- The following platform settings are unique to each monitor. When you transfer the settings, the existing values for these settings will remain the same. In case you need to change these settings, you must use CARESCAPE Service Interface to change these configurations manually for each monitor.
  - software licenses
  - host asset settings
  - network hostname
  - settings for wired network
  - unit and bed name

Specifying the target monitors for the settings transfer

1. To specify all the target monitors to which you want to transfer a new settings file, do one of the following:
   a. Select ***load from file*** to load the IP addresses from a file on your service PC.

      NOTE Prepare the file beforehand. The file must be a text file. IP addresses and/or host names must be separated with a line break.

   b. Enter the IP addresses or the host names of all the target monitors manually one per line to the ***Monitor Addresses*** field. Press **Enter** for a line break.

Connecting to the target monitors

1. Enter the ***Username*** and the ***Password***.
2. Select ***Contact Monitors*** to log in and to authenticate to the target monitors.

   The progress of the authentication process is updating on the screen.
3. Wait until the authentication process completes and the ***Operation summary*** appears on the screen:

4. Check the summary for possible issues and select ***Close***.
5. Review the connection statuses of all the target monitors:

7 Monitor(s) contacted successfully. 0 Monitor(s) failed to contact. 7 total.

Address	Monitor Type	Current Version	Serial Number	Note	Status
172.18.3.201	B650	3.2.552	SNS18170026HP		OK
172.18.3.202	B450	3.2.552	SNT19281011HA		OK
172.18.3.203	B450	3.2.552	SNT19360050HA		OK
172.18.3.204	B450	3.2.552	SNT17421019HP		OK
172.18.3.205	B450	3.2.552	SNT18231014HP	Patient admitted	OK
172.18.3.206	B450	3.2.552	SNT19281010HA	Patient admitted	OK
172.18.3.207	B650	3.2.552	SNS19450029HA		OK

Address	The service IP Address of a monitor. Selecting the IP address will open a new browser tab to access the service interface of the monitor. You can use this link for troubleshooting purposes.
Monitor Type*	B450, B650, B850, or CS ONE. Mixing CS ONE and Bx50 to the same operation is prevented. In case there are both Bx50 monitors and CS ONE devices, the operation will only be performed on the Bx50 monitors. The CS ONE devices will be excluded from the operation.
Current Version*	The current (active) software version in use.
Serial Number*	The serial number of the target monitor.
Note	Shows ***Patient admitted***, if the target monitor has an ongoing patient case. In this case the settings activation will start after the next case end/discharge.
Status	Settings activation is possible only to the monitors with the ***OK*** status. For information about the other statuses, see Authentication statuses table in the Troubleshooting section.

* If the field is empty, the Multi Monitor Manager failed to connect to the monitor.

Selecting the settings file and the settings to be transmitted to the target monitors

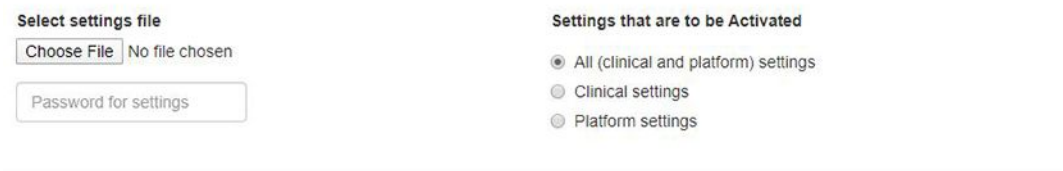
Select the settings file that you have previously downloaded from the source monitor to your service PC.

1. Select ***Browse*** or ***Choose File***.

   An ***Open*** or a ***Choose File to Upload*** dialog box will open.

2. Browse the drive and folder to find the software image file. Select the software file by double-clicking it or by selecting ***Open***.
3. Enter the password that was used for encrypting the settings file.
4. Select the radio button of the settings you want to activate:
   - ***All (clinical and platform) settings***: Activates both the clinical and platform settings.
   - ***Clinical settings***: Activates clinical settings only.
   - ***Platform settings***: Activates platform settings only.

NOTE Passwords are included in the platform settings. If you select either ***All (clinical and platform) settings*** or ***Platform settings***, all the target monitors will receive new passwords from the settings file.



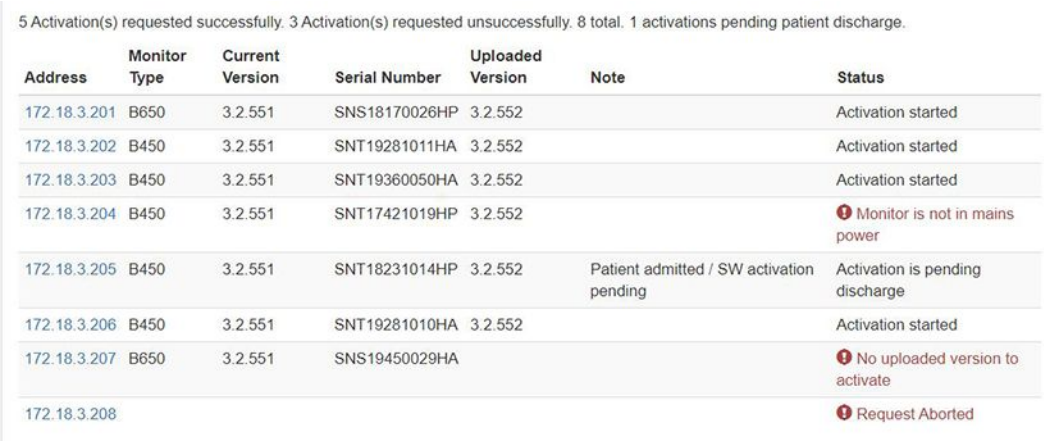
Activating the settings on the target monitors

Settings transfer is possible for all the monitors for which authentication was completed successfully (***Status: OK***).

1. Select ***Activate settings on the target monitors*** to start or initiate the settings activation.
2. Wait until the ***Operation summary*** appears:

3. Check the summary and select ***Close***.

4. Review the settings activation status of all the target monitors:



5 Activation(s) requested successfully. 3 Activation(s) requested unsuccessfully. 8 total. 1 activations pending patient discharge.

Address	Monitor Type	Current Version	Serial Number	Uploaded Version	Note	Status
172.18.3.201	B650	3.2.551	SNS18170026HP	3.2.552		Activation started
172.18.3.202	B450	3.2.551	SNT19281011HA	3.2.552		Activation started
172.18.3.203	B450	3.2.551	SNT19360050HA	3.2.552		Activation started
172.18.3.204	B450	3.2.551	SNT17421019HP	3.2.552		Monitor is not in mains power
172.18.3.205	B450	3.2.551	SNT18231014HP	3.2.552	Patient admitted / SW activation pending	Activation is pending discharge
172.18.3.206	B450	3.2.551	SNT19281010HA	3.2.552		Activation started
172.18.3.207	B650	3.2.551	SNS19450029HA			No uploaded version to activate
172.18.3.208						Request Aborted

   - If the software activation is started / initiated successfully, the ***Status*** is ***Activation started*** or ***Activation is pending discharge***.
   - If the settings activation failed, the reason is shown in the ***Status*** field. For more information, see the Settings activation statuses table in the Troubleshooting section.

The settings activation takes place either immediately or after next case end / discharge, depending on the monitor status.

Settings activation immediately:

- Settings activation starts immediately in all the target monitors that do not have an ongoing patient case.

Settings activation after next case end / discharge:

- The settings activation will start after the next case end/discharge in all the target monitors that have an ongoing patient case.
- The monitor informs the clinical user about the pending software activation with the following message: ***Settings activation after next case end / Settings activation after next discharge.*** The monitoring can continue normally.
- The settings activation will start automatically after next discharge, or when the patient case is ended. After the settings activation the monitor will restart automatically.

Troubleshooting

Authentication statuses

Status	Possible causes	Suggested actions
OK	Both user and device authentication is successfully completed .	Monitor is ready for the software installation or settings transfer.
Invalid address or monitor is not reachable	Incorrect IP address or host name entered or uploaded into the ***Monitor Addresses*** field.	Check that the IP address or host name of the target monitor is correct.

Status	Possible causes	Suggested actions
	Device authentication failed for one of the following reasons: 1. The certificate of the target monitor is not valid. 2. The monitor has a self-signed certificate but the web browser does not have a security exception for the target monitor.	Do one of the following: 1. It is recommended to install a valid signed certificate to the target monitor. 2. Alternatively you can specify a security exception for the web browser you use to access the target monitor.
	The target monitor is not accessible for one of the following reasons: 1. The monitor is turned off. 2. The monitor is not connected to the IX network. 3. Network error or configuration issue.	Check that: 1. The monitor is turned on. 2. The monitor is connected to the IX network. 3. The monitor's IX network configuration is correct and that there are no network errors.
Authentication failed	1. User authentication failed on all contacted monitors due to entering incorrect ***Username*** and/or ***Password***. 2. User authentication failed on one or more monitors due to incorrect password. These monitors might have different passwords than the monitors with successful authentication statuses.	1. Check that the ***Username*** and the ***Password*** you entered are correct. 2. Check the password of the target monitor. You have the following options to resolve the issue: • Use the service interface to change the password of the monitor to be the same than in those monitors on which the user authentication was successfully completed, and retry to contact the monitor. • Use the service interface instead of the Multi Monitor Manager to install software and/or transfer settings on this monitor. • If several monitors have different passwords, group the target monitors by password, so that all the monitors that share the same password

Status	Possible causes	Suggested actions
		are in the same group. Then use the Multi Monitor Manager to install software and/or transfer settings on the monitors one group at a time.
Operation not possible. Install software image to CS ONE in a separate upload session.	The ***Monitor Addresses*** list contains both CARESCAPE Bx50 monitors and CARESCAPE ONE acquisition devices	In case you need to perform an operation (software installation or settings transfer) to both CARESCAPE Bx50s and CARESCAPE ONEs, complete the activity first to the CARESCAPE Bx50s and only after that to the CARESCAPE ONEs. Mixing CARESCAPE Bx50s and CARESCAPE ONEs to the same operation is prevented. In case the ***Monitor Addresses*** list contains both monitor types, the operation will only be performed on the CARESCAPE Bx50 monitors. The CARESCAPE ONE monitors will be excluded from the operation.
Monitor is duplicate with X where X = the duplicate IP address or host name	Two or more different monitors have the same IP-address or host name.	Remove all duplicate IP-addresses or host names from the list.

Software upload statuses

Status	Possible causes	Suggested actions
Uploaded	Software upload to the target monitor was completed successfully.	The monitor is available for the software activation.
Invalid file	The uploaded file is not a valid CARESCAPE software image.	Replace the file with a valid CARESCAPE software image. Contact GE Healthcare for more information.
Request aborted	Software upload cannot be started, because the monitor and/or the user authentication failed.	See Authentication statuses table for more information.

Software activation statuses

Status	Possible causes	Suggested actions
Activation started	The software activation was started immediately, because the target monitor did not have a patient admitted /an ongoing patient case.	No action required. The monitor will automatically restart with the new software version after the software activation is completed. This can take up to 10 minutes NOTE: Reconnect to the monitor after the monitor has restarted to confirm that the software activation was completed successfully with the new software version.
Activation is pending discharge	Software activation is initiated with a pending status, because the monitor has currently a patient admitted / case is started.	No action required. The software activation will start automatically after the patient is discharged / case is closed. The monitor will restart automatically with the new software version after the software activation is completed. NOTE: Reconnect to the monitor after the monitor has restarted to confirm that the software activation was completed successfully with the new software version.
No uploaded version to activate	Software activation cannot be started, because the monitor does not have any uploaded (inactive) software to be activated.	Upload a new software image to the target monitor, and restart the software activation.
Monitor is not in mains power	The target monitor (B450 or B650) is being used on battery power. The software activation can be started only when the monitor is connected to the AC mains power.	Connect the target monitor to the mains power, and restart the software activation.

Status	Possible causes	Suggested actions
Unknown error (400)	Software activation with Multi Monitor Manager is not supported if the software version to be activated requires a base license. This is typically the case in software upgrades. See Activating the host software chapter for more information about the base license.	Use service interface ***Configuration*** >***Software Management*** >***Host Software*** to activate software on this monitor. Ensure that you have the device specific activation code for the base license available.
Request aborted	Software activation cannot be started, because the device and/or the user authentication failed.	See Authentication statuses table for more information.

Settings activation statuses

Status	Possible causes	Suggested actions
Activation started	The settings activation was started immediately, because the target monitor did not have a patient admitted /an ongoing patient case.	No action required. The monitor will automatically restart after the operation is completed. NOTE: Reconnect to the monitor after the monitor has restarted to confirm that the new settings are effective.
Activation is pending discharge	The settings activation is initiated with a pending status, because the monitor has currently a patient admitted / an ongoing patient case.	No action required. The settings activation will start automatically after the patient is discharged / case is closed. The monitor will restart automatically with the new settings after the operation is completed. NOTE: Reconnect to the monitor after the monitor has restarted to confirm that the new settings are effective.
Invalid settings file or bad password	1. Incorrect password used to decrypt the settings file. 2. The settings file is either invalid or corrupted.	1. Try one of the following: • Enter the correct password to decrypt the settings file. • Retry to download the settings file from the source monitor. 2. Retry to download the settings file from the source monitor.

Status	Possible causes	Suggested actions
Cannot activate settings on software older than <version>	The settings activation with Multiple Monitor Manager is not possible on a monitor with a software older than this version.	Use service interface ***Configuration*** >***Settings*** >***Activate*** to activate the settings file on this monitor.
Request aborted	Settings activation cannot be started, because the device and/or the user authentication failed.	See Authentication statuses table for more information.

Other issues

Problem	Possible causes	Suggested actions
Contact Monitors – button is inactive.	1. The ***Monitor Addresses*** field is empty. There are no specified target monitors. 2. The ***Username*** and/or ***Password*** fiel is empty.	1. Enter the IP address or hostname for at least for one target monitor. 2. Enter ***Username*** and ***Password***.
Upload image to all monitors – button is inactive.	1. No software image file is selected. 2. None of the specified target monitors has been connected successfully.	1. Select ***Browse*** to select a software image file. 2. Ensure that at least one target monitor is successfully connected.
Activate uploaded version on all monitors – button is inactive.	None of the connected target monitors has an uploaded (inactive) software version ready to be activated.	Complete the software upload at least to one of the connected target monitors.
Activate settings on all monitors – button is inactive.	1. No settings file is selected. 2. None of the specified target monitors has been connected successfully.	1. Select ***Browse*** to select a settings file. 2. Ensure that at least one target monitor is successfully connected.

CARESCAPE B450

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