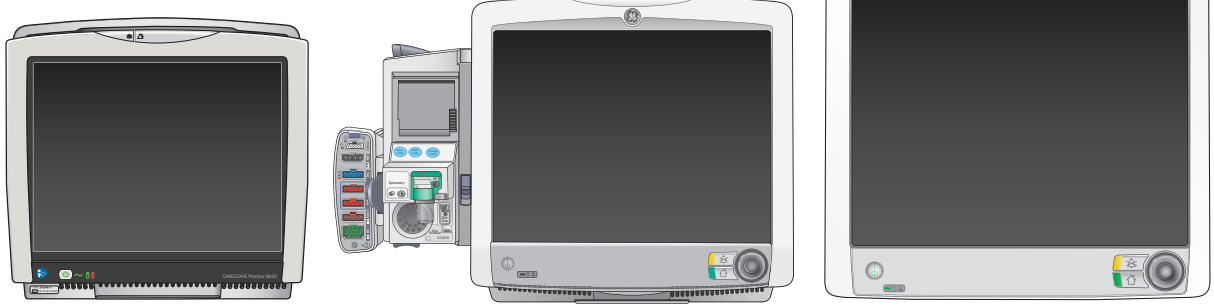
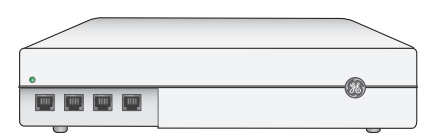
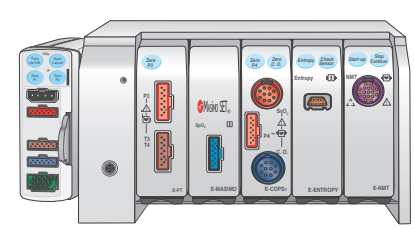
GE Healthcare



CARESCAPE Modular Monitors



Quick Reference Guide



Global Customer Education

Notice

The materials contained in this document are intended for educational purposes only. This document does not establish specifications, operating procedures or maintenance methods for any of the products referenced. Always refer to the official written materials (labeling) provided with the product for specifications, operating procedures and maintenance requirements.

Contents

Admitting and Discharging a Patient Overview

A patient is automatically admitted when the monitor detects any of the following vital signs: ECG, impedance respiration, Art, ABP, Fem, UAC, NIBP, SpO_2, CO_2, EEG, BIS, or Entropy.

A patient is also automatically admitted when any patient data is entered or loaded. Patient data can be entered locally using the monitor, loaded from an Admit-Discharge-Transfer (ADT) server over the CARESCAPE Network, or entered remotely using a central station.

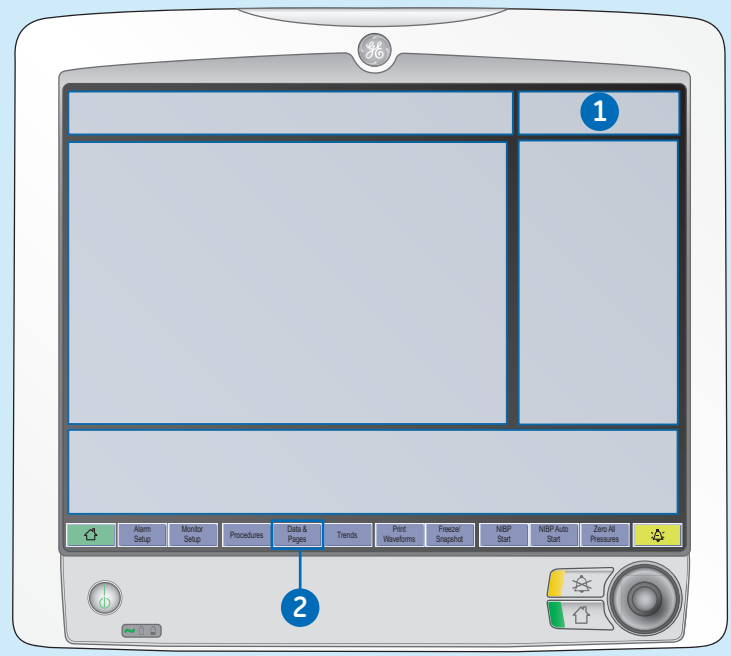


Figure 1
Accessing the Admit/Discharge Menu

Accessing the Admit/ Discharge Menu

The Admit/Discharge menu is used to add or edit patient information. There are two ways to access the Admit/Discharge menu:

1. Select the information area on the screen.
2. Select ***Data & Pages*** from the main menu area at the bottom of the display and then select ***Admit/ Discharge***.

Selecting a Profile

A profile is a group of unique settings suited to a particular care unit or patient demographic and can be customized. Settings for a profile could include alarm limits, screen layouts, trends and snapshot settings. When you start monitoring a patient, you can use the startup profile or select another profile. According to the configuration, your monitor software may have up to eight profiles to choose from.

You can select another profile while monitoring a patient without losing any patient data.

To Select a Profile:

1. Select the patient information area on the screen, or select ***Data & Pages*** from the main menu area at the bottom of the display, and then select ***Admit/Discharge.***
2. Select the ***Patient*** tab.

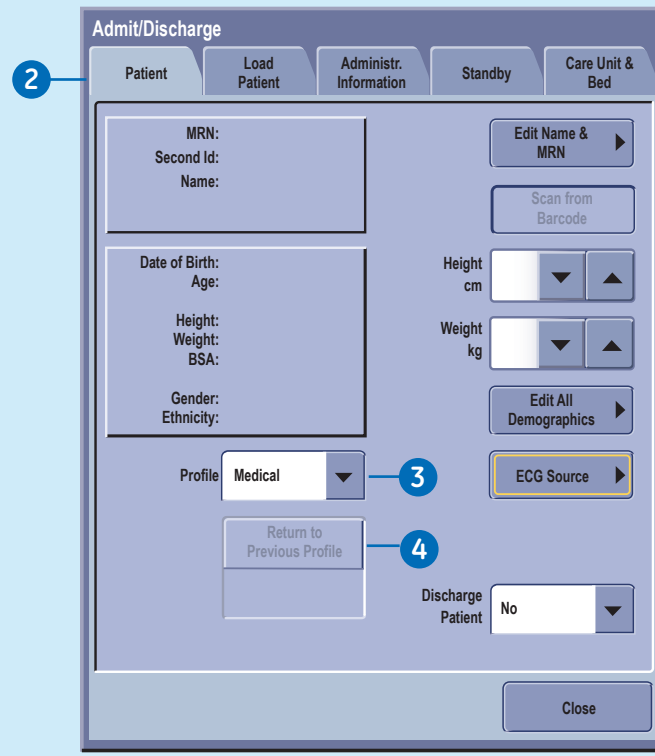


Figure 2
Admit/Discharge Menu - Profile

3. Select a profile from the Profile list.
4. You can return to the previous profile by selecting ***Return to Previous Profile***.

Loading Patient Information from the ADT Server

In the CARESCAPE Network, patient information can be loaded from the ADT server.

You cannot merge data between the monitor and the ADT server.

1. Select the patient information area on the screen.
2. Select the ***Load Patient*** tab.

3. Select ***Find Patients***.
4. Select the ***Medical Record Numbe***r and/or ***Last Name*** field and enter the information you have available. You can also add the First Name information but the search does not function with this information only.
5. Select ***Find***.

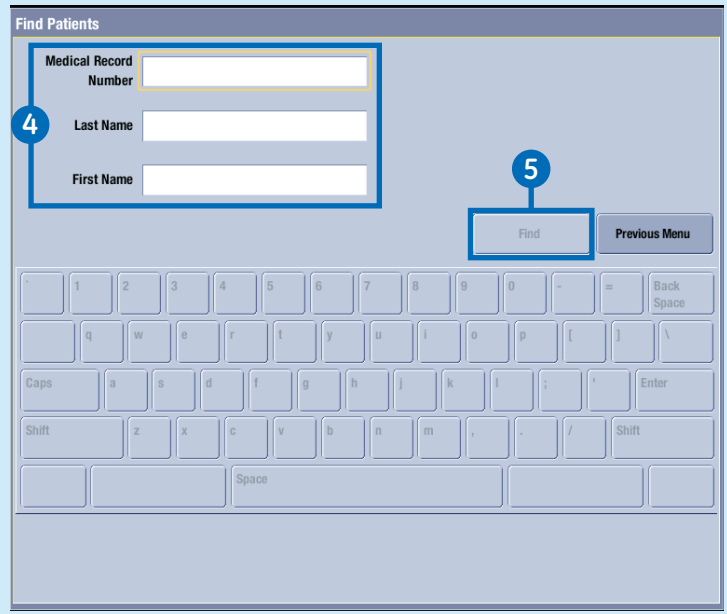


Figure 3
Find Patients Menu

6. When the patient list appears, select the patient.
7. Select ***Load Patient Information*** to load the data from the ADT server.

Combination Monitoring Mode

The combination monitoring is a licensed feature where ECG is acquired from a telemetry receiver system.

Note! *This option cannot be used in the NICU software package.*

The Combo mode uses a monitor mounted in a room, but the ECG data can be acquired from either the monitor or from a telemetry transmitter/transceiver.

To admit a patient to combination monitoring:

1. Select the ECG parameter window or select ***Data and Pages***.

2. Select ***Admit/Discharge*** (only if ***Data and Pages*** was selected).

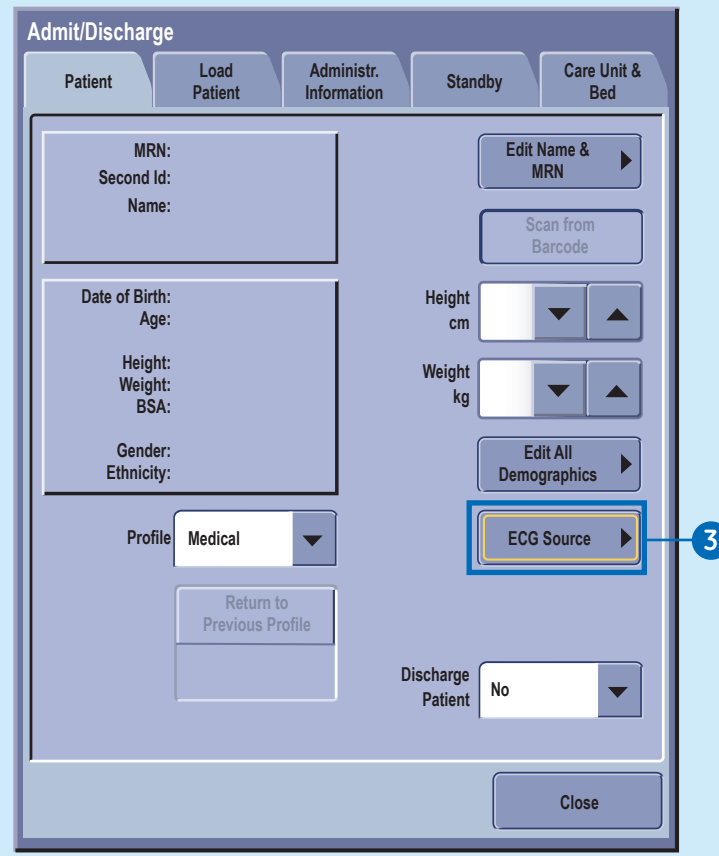


Figure 4
ECG Source Selection

3. Select ***ECG Source***.
4. Select the Telemetry TTX number from the ***ECG Source*** list.
5. Verify the desired TTX number is visible in the upper right corner of the display.

Roving Functionality

Roving functionality allows you to move, or rove, the monitor to fit the patient's acuity needs, rather than moving the patient to a monitored room. When you move the monitor to a new location in the CARESCAPE Network, you can update the unit and/or bed names from drop-down lists, or add new names manually. Available selections depend on what has been allowed in configuration.

Roving between units

If roving between units is allowed, you can update the unit name when moving the monitor to a new location.

1. Select the patient information area on screen.
2. Select the ***Care Unit & Bed*** tab.
3. Select the ***Care Unit Name*** from the dropdown list.

   Changing the Care Unit Name will also update the contents of the Bed Name list.

   You can also change the name manually through ***New Unit & Bed***. This selection is available in the ***Care Unit & Bed*** menu if it has been allowed in the Roving settings.

Roving between beds

If roving between beds is allowed, you can update the bed name when needed.

1. Select the patient information area.
2. Select the ***Care Unit & Bed*** tab.
3. Select the ***Bed Name*** from the dropdown list.

   The new name appears in the upper right corner of the display. The unit name is given first, then a dash and the bed name (for instance, UNIT1–BED1).

   You can also change the name manually through New Unit & Bed, or through New Bed. These selections are available in the Care Unit & Bed menu according to what has been allowed in the Roving settings

Adding new units and beds (manual roving)

If manual roving between beds and/or units is allowed, you can also enter their names manually.

1. Select the patient information area.
2. Select the ***Care Unit & Bed*** tab. If the Roving settings do not allow roving between units, the ***New Unit & Bed*** is not available. In this case, select ***New Bed*** to enter a new bed name.
3. Select ***New Unit & Bed.***
4. Select the ***Care Unit Name*** or the ***Bed Name*** field and type the new name with the on-screen keyboard. The maximum number of characters for the ***Care Unit Name*** is seven, and for the ***Bed Name*** it is five.

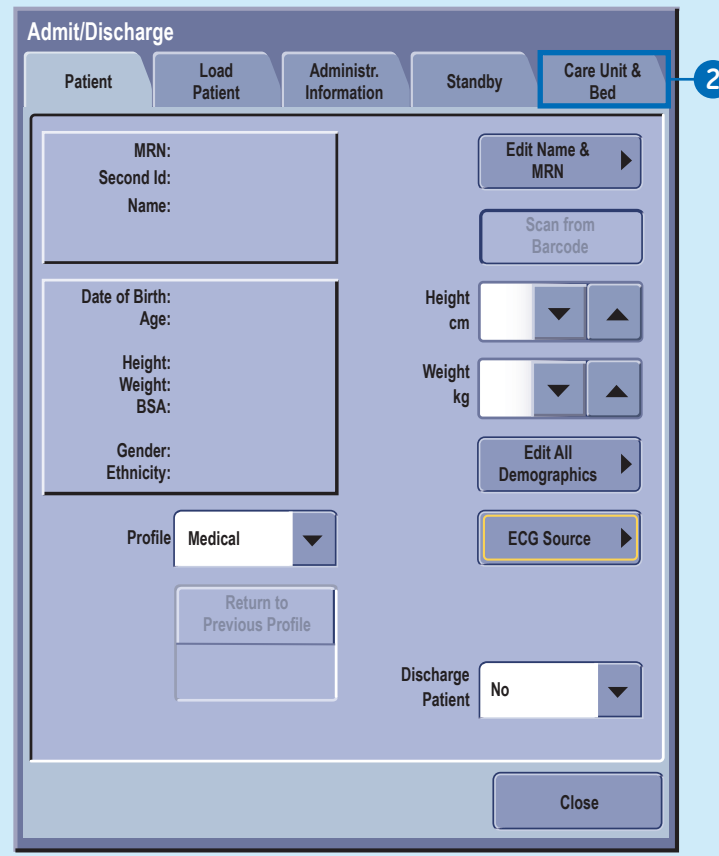


Figure 5
Care Unit & Bed Tab

Discharging a Patient

1. Disconnect patient cables.
2. Print necessary data and wait until the printing is completed.
3. Select the patient information area on the screen, or select ***Data & Pages*** from the main menu area at the bottom of the display.

   Data & Pages

   Then select ***Admit/ Discharge.***
4. Select the ***Patient*** tab.
5. Select ***Discharge Patient***.

Monitor settings, including alarm limits, return to their default settings. All patient data and trend data is removed from both the monitor and a connected PDM.

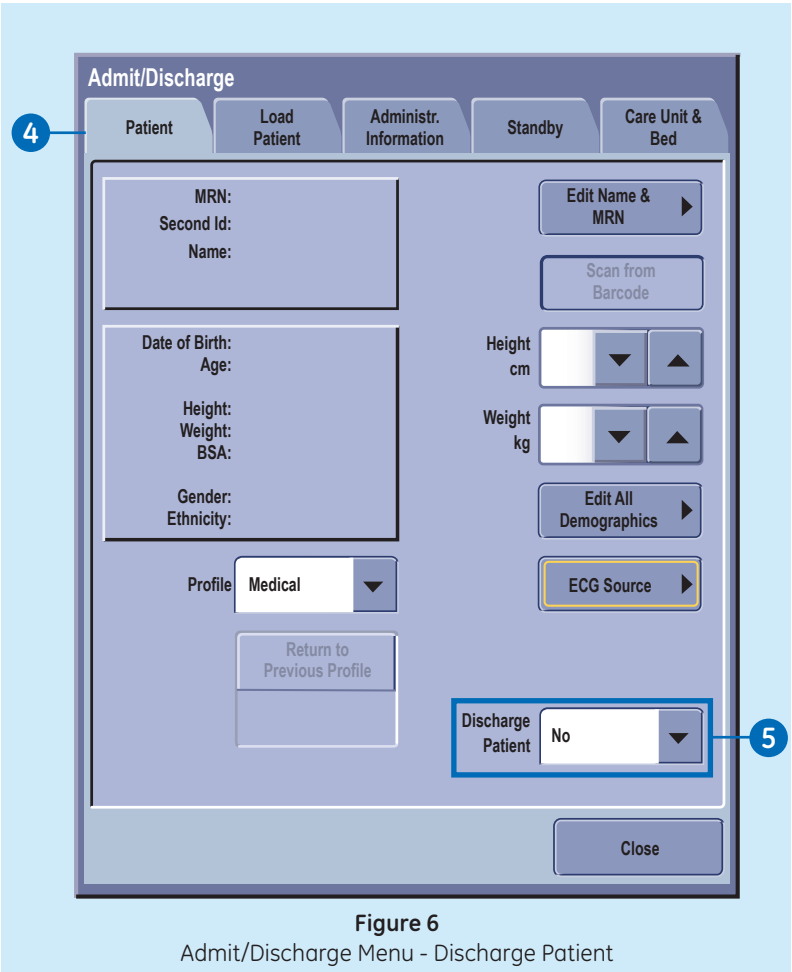


Figure 6
Admit/Discharge Menu - Discharge Patient

Starting Standby

When you remove the patient temporarily from the monitor, you can use the standby option.

1. Select the patient information area on the screen.
2. Select the ***Standby*** tab.
3. Select the radio button for an appropriate standby location.
4. Select ***Prepare for Standby***. If patient cables are still connected and the monitor receives vital signs, a text indicating that audio alarms have been paused appears.
5. Disconnect patient cables to start the standby. If you do not disconnect the cables and vital signs are still present after the audio pause time expires, the standby is canceled.
6. Check that the ***NIBP Auto*** is turned off.

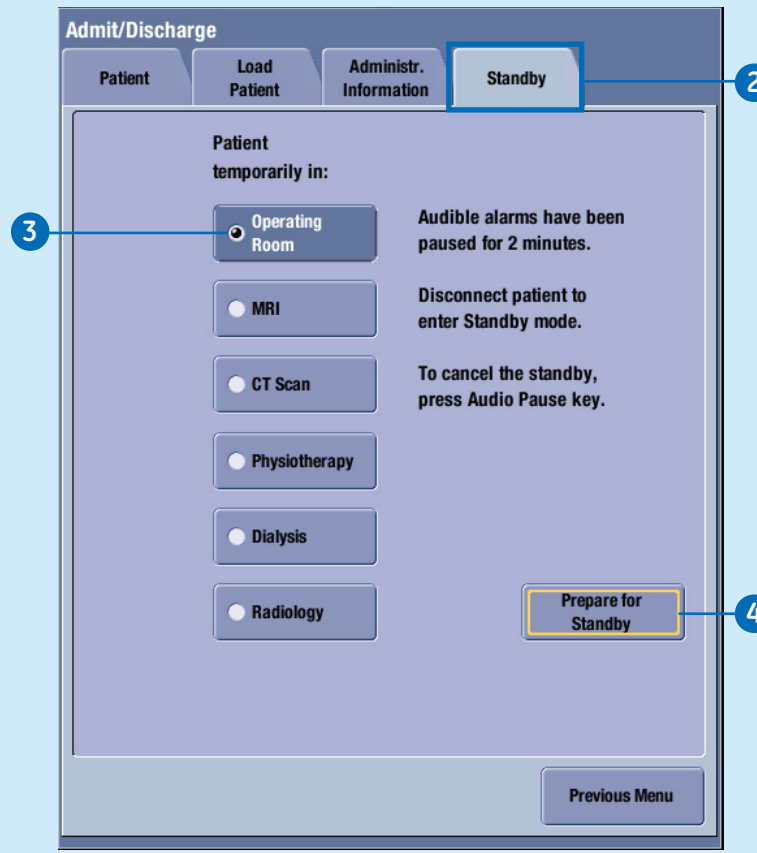


Figure 7
Admit/Discharge Menu

The screen goes blank and the GE logo along with a message such as ***Patient temporarily in MRI*** (according to the location selected) appears.

Skin Preparation

Excessive body hair or skin oil reduces electrode contact with the skin and decreases the quality of electrode signal. When preparing the electrode sites, avoid bones close to skin, obvious layers of fat and major muscles.

1. Shave any hair from the electrode site.
2. Gently rub the surface of the skin to increase capillary blood flow.
3. Clean the skin with alcohol or a mild soap and water solution to remove skin oil and dead or abraded skin cells.
4. Dry the skin completely before applying the electrodes.

Lead Placement

3-lead or 5-lead ECG Electrode Placement

Key: IEC Lead - AAMI/AHA Lead

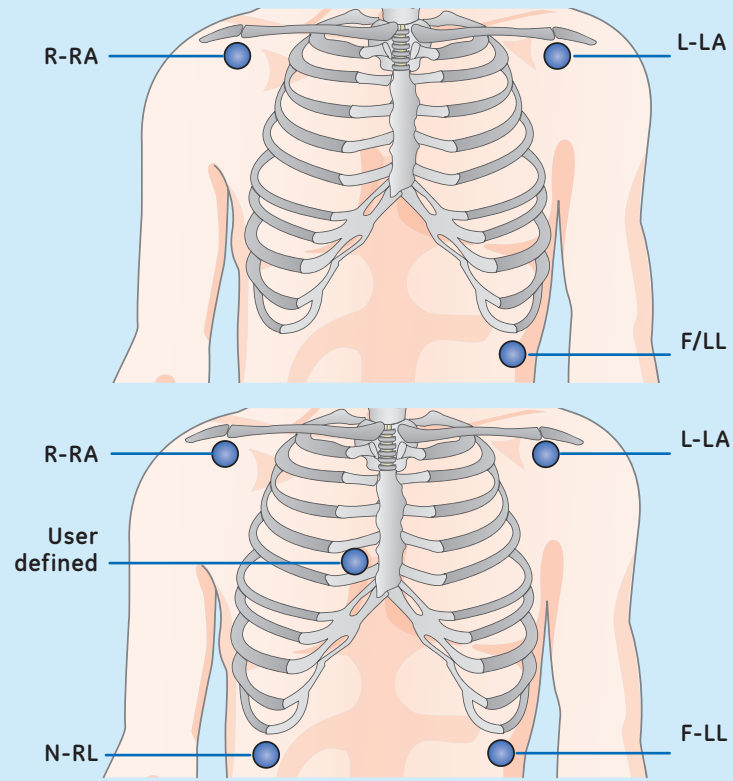


Figure 8

IEC Lead	AAMI/AHA Lead	Electrode Placement
R -Red	RA - White	Just below the right clavicle
L - Yellow	LA - Black	Just below the left clavicle
User defined	User defined	For the 5-lead placement, place the precordial electrode according to the physician's preference.
N - Black	RL - Green	Lower right edge of the rib cage
F -Green	LL - Red	Lower left edge of the rib cage

6-lead ECG Electrode Placement

If you are using the 6–leadwire cables for a 12 lead ECG connection, note that the 12RL can be used for adult patients only.

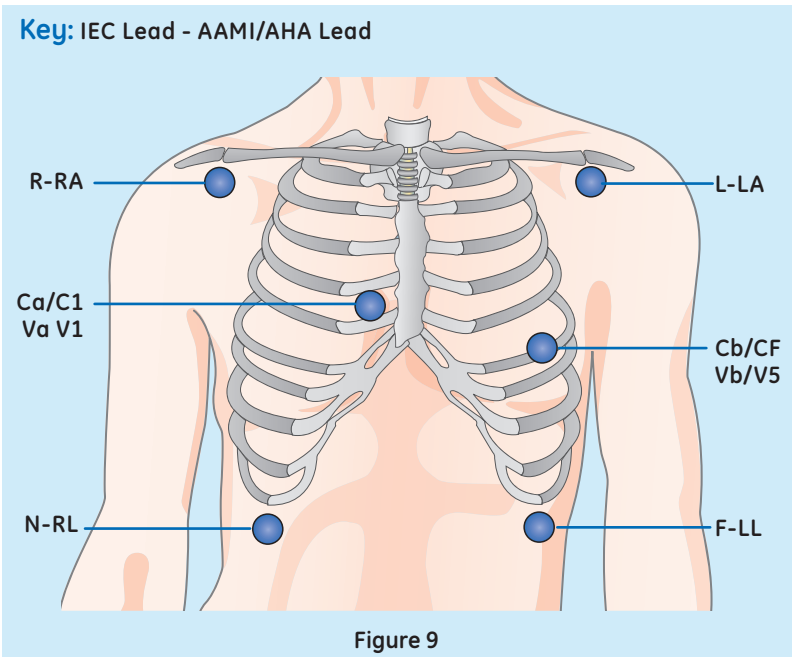


Figure 9

IEC Lead	AAMI/AHA Lead	Electrode Placement
R -Red	RA - White	Just below the right clavicle
L - Yellow	LA - Black	Just below the left clavicle
Ca/C1 - white	Va/V1 - brown	4th intercostal space, right sternal border
Cb/C5 - white	Vb/V5 - brown	Left anterior axillary line at C4/V4 level
N - Black	RL - Green	Lower right edge of the rib cage
F -Green	LL - Red	Lower left edge of the rib cage

10-lead ECG Electrode Placement for Cardiac Monitoring

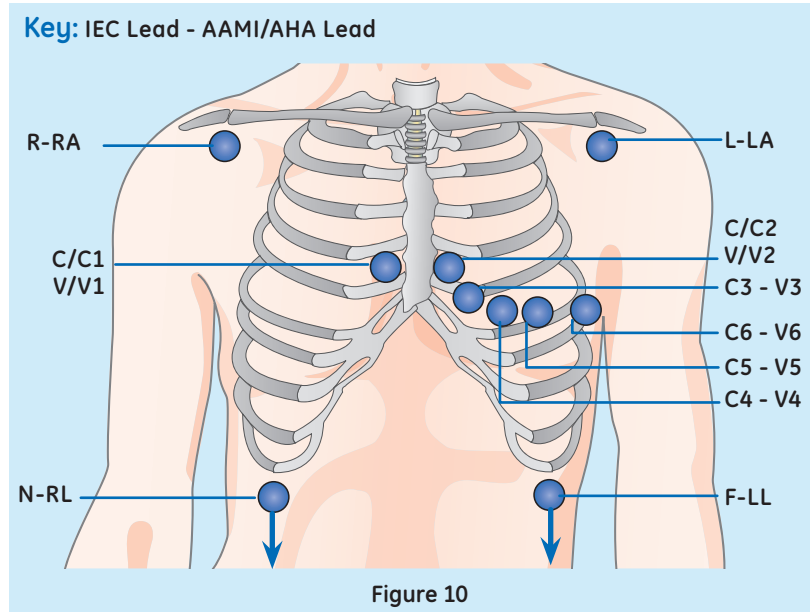


Figure 10

IEC Lead	AAMI/AHA Lead	Electrode Placement
R -Red	RA - White	Just below the right clavicle
L - Yellow	LA - Black	Just below the left clavicle
N - Black	RL - Green	Lower right dege of the rib cage
F -Green	LL - Red	Lower left of the rib cage
C/C1 - white/yellow	V/V1 - brown	4th intercostal space, right sternal border
C2 - white/yellow	V2 - brown/yellow	4th intercostal space, left sternal border
C3 - white/green	V3 - brown/green	Midway between C2/V2 and C4 /4
C4 - white/brown	V4 - Brown/blue	5th intercostal space, mid-clavicular line
C5 - white	V5 - brown/orange	Left anterior axillary line at C4/V4 level
C6 - white/purple	V6 - brown/purple	Mid axillary line at C4/V4 and C5/V5 levels

Standard Resting 10-lead ECG Electrode Placement

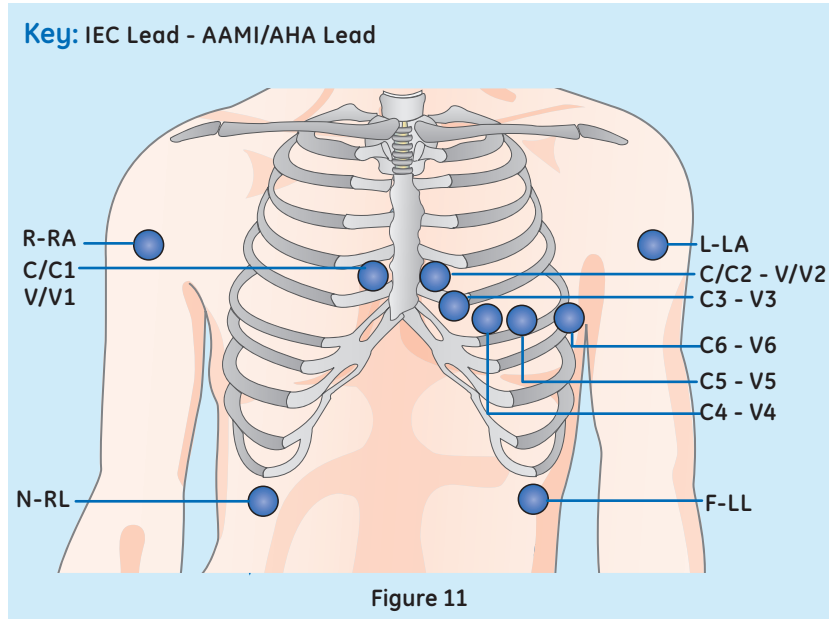


Figure 11

IEC Lead	AAMI/AHA Lead	Electrode Placement
R -Red	RA - White	Right deltoid or wrist
L - Yellow	LA - Black	Left deltoid or wrist
N - Black	RL - Green	Right thigh or ankle
F - Green	LL - Red	Left thigh or ankle
C/C1 - white	V/V1 - brown	4th intercostal space, right border of sternum
C2 - white/yellow	V2 - brown/yellow	4th intercostal space, left border of sternum
C3 - white/green	V3 - brown/green	Midway between C2/V2 and C4 /4
C4 - white/brown	V4 - Brown/blue	5th intercostal space, mid-clavicular line
C5 - white/black	V5 - brown/orange	Left anterior axillary line at C4/V4 level.
C6 - white/purple	V6 - brown/purple	Mid axillary line at C4/V4 and C5/V5 levels

12 Lead Analysis

To access the 12 Analysis menu:

1. Select the ***HR*** parameter window and then select ***12 Lead Analysis***.

To access the 12 Lead Analysis Settings Menu:

2. Select the ***HR*** parameter window.
3. Select ***12 Lead Analysis.***
4. Select ***Settings.***

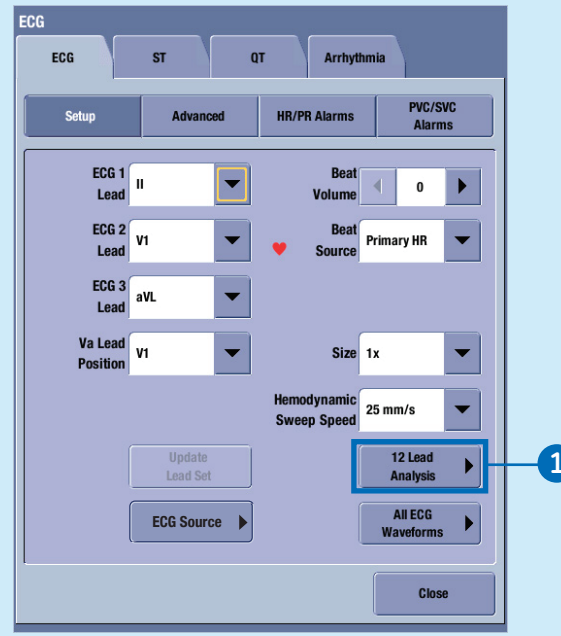


Figure 12 Accessing 12 Lead Analysis

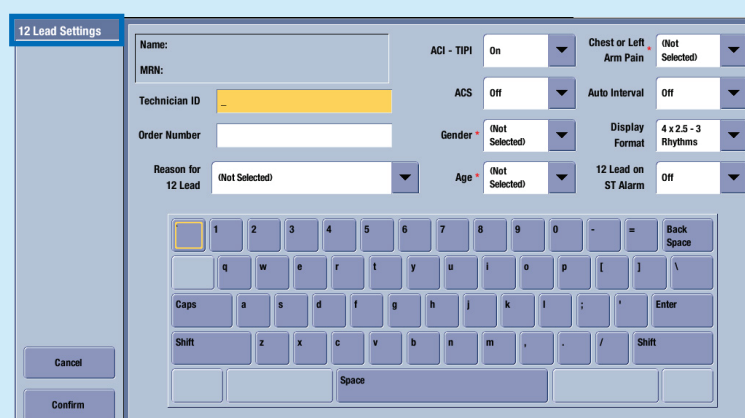


Figure 13 12 Lead Analysis Settings Menu

Figure 14 12 Lead Analysis Settings Menu

Performing a 12 Lead Analysis

1. Select the ***HR*** parameter window.
2. Select ***12 Lead Analysis***.
3. Select ***12 Lead Now***.

All the waveforms in the 12 Lead Analysis view freeze during the analysis except for the ECG I waveform. Analysis takes less than one second to complete. At that time, the monitor generates a 12 lead report, saves the report locally, and displays the report on the screen.

The monitor can store up to fifteen 12 lead reports locally.

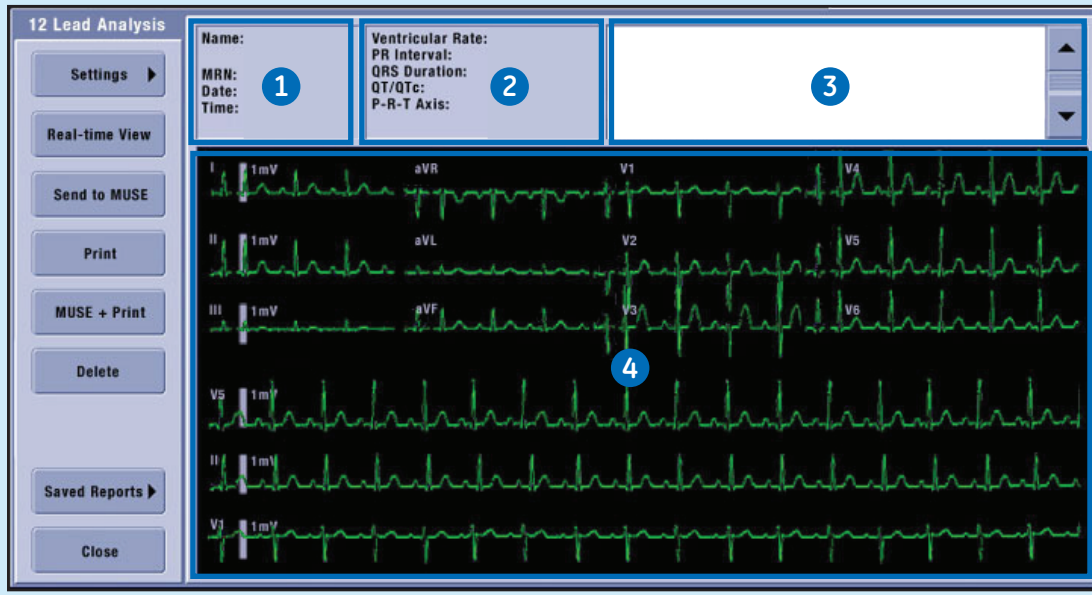


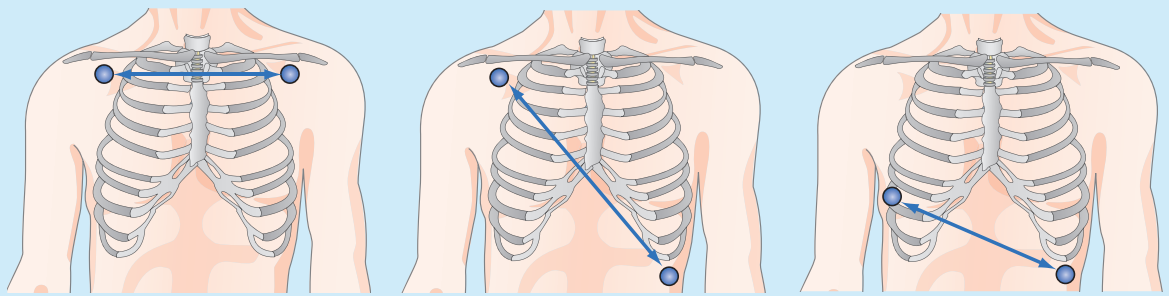
Figure 15 12 Lead Analysis Settings Menu

The 12 lead ECG Analysis Program

The 12 lead ECG analysis program assists the physician in interpreting and measuring the resting ten seconds of ECG data. This program generates a diagnostic textual report on patient's cardiovascular condition. This report can be routed to the MUSE Cardiology Information System via the CARESCAPE Network.

1. Patient information, including patient Name:, MRN:, Date: and Time: the report was generated.
2. Available values including Ventricular Rate, PR Interval, QRS Duration, QT/QTc, and P-R-T Axis.
3. Diagnostic statements and/or error messages.
4. Waveform area.

Impedance Respiration



1 ECG ***Lead I*** for upper chest breather

2 ECG ***Lead II*** for upper abdominal breather

3 RL-LL for upper abdominal breather

Figure 16 Respiration Lead Placement

Respiration Lead Placement

1. **Lead I:** Provides good thoracic (upper chest) breath detection. However, lead I is more susceptible to cardiogenic artifact than the RL-LL vector.
2. **Lead II:** Provides good thoracic breath detection and upper abdominal (lower chest) breath detection. However, lead II is more susceptible to both cardiogenic and motion (head, neck, or arm) artifact than the RL-LL vector.
3. **RL-LL:** Vector provides good abdominal breath detection and is not as susceptible to cardiogenic artifact or motion artifact. When monitoring respiration through the RL-LL vector, use a standard 5-leadwire electrode placement, except place the RL electrode on the fifth intercoastal space on the right side of the chest.

Note! *RL-LL vector only applies to PDM module.*

Using Impedance Respiration

The respiration measurement does not start automatically, so you must turn it on.

1. Select the ***Impedance Respiration*** parameter window.
2. Select the ***Setup*** tab.
3. Select ***Respiration Measurement > On.***

You can also perform the followings tasks from the ***Impedance Respiration Setup*** menu:

4. Adjust the respiration waveform ***Size***.
5. Adjust the respiration waveform ***Sensitivity*** (the lower the value, the greater the sensitivity).
6. Adjust the respiration waveform ***Sweep Speed***.
7. Select the respiration ***lead***.
8. ***Relearn*** the respiration pattern (if the patient's breathing pattern changes after the initial learning process has taken place).

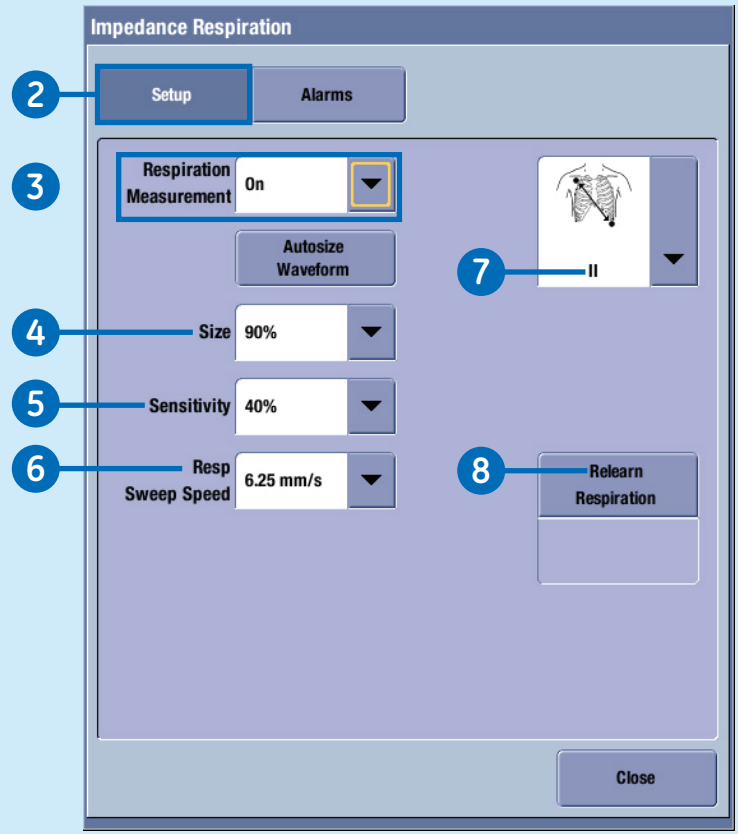


Figure 17 Impedance Respiration

Figure 18 Single and Automatic NIBP Measurement

Manual NIBP Measurement from the Main Menu

1. Start the measurement by selecting ***NIBP Start***.
2. Stop the measurement by selecting ***NIBP Cancel***.

Automatic NIBP Measurement from the Main Menu

3. Select ***NIBP Auto Start***.
4. Stop the measurement by selecting ***NIBP Auto Stop.***

The NIBP Setup Menu

To Access the NIBP Setup Menu:

1. Select the ***NIBP*** parameter window.
2. Select the ***Setup*** tab

You can perform the following tasks from the NIBP Setup Menu:

3. Start automatic, manual or Stat NIBP measurements.
4. Change the cycle time for automatic NIBP measurements.
5. Adjust the tone volume for a completed NIBP measurement.
6. Select the display format (large Systolic/Diastolic or large Mean values)
7. Select the cuff size.
8. Select the initial NIBP cuff inflation pressure automatically based on the cuff size.
9. Select the target NIBP inflation pressure for the first NIBP measurement

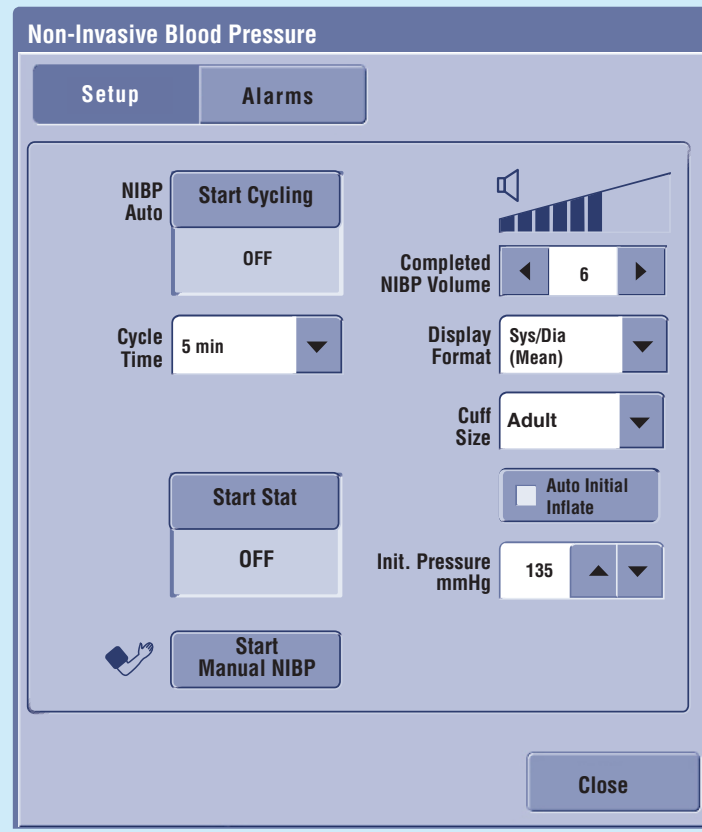


Figure 19 NIBP Setup Menu for PDM

Overview

There are three supported pulse oximetry technologies:

- GE Ohmeda
- Masimo SET
- Nellcor OxiMax

SpO_2 monitoring starts automatically when the monitor detects an SpO2 signal.

It is possible to measure SpO_2 from two different measurement sources simultaneously. The primary SpO_2 source is labeled SpO_2 and the secondary SpO_2 source is labeled SpO_2(2).

The SpO_2 Setup Menu

To Access the SpO_2 Setup Menu:

1. Select the ***SpO_2*** parameter window.
2. Select the ***SpO_2*** or ***SpO_2(2)*** tab.
3. Select ***Setup.***

You can perform the following tasks from the SpO_2 Setup Menu:

Note! *The selections available from the SpO_2 menu will vary depending on the pulse oximetry technology and acquisition module.*

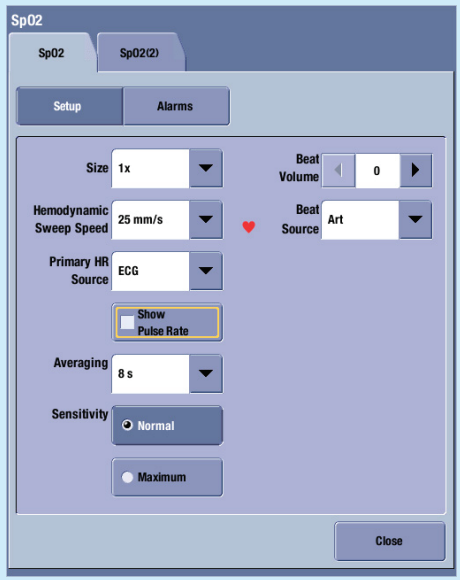


Figure 20 SpO_2 Setup Menu Masimo Set

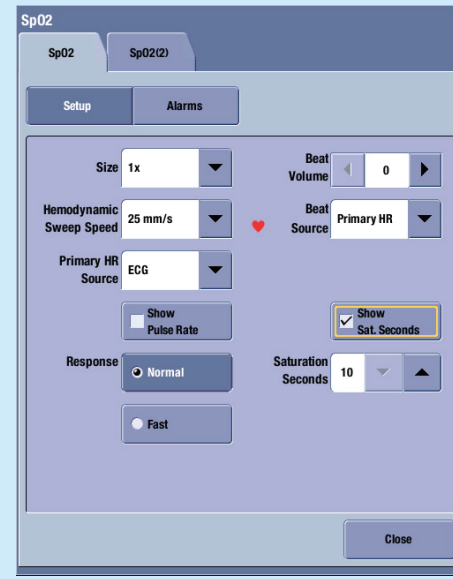


Figure 21 SpO_2 Setup Menu Nellcor OxiMax

1. Adjust the SpO_2 size.
2. Change the SpO_2 waveform sweep speed.
3. Change the primary Heart Rate source (ECG, SpO_2 or invasive pressure).
4. Show or hide the SpO_2 pulse rate.
5. Select the SpO_2 averaging time (Masimo technology and Masimo sensors only).
6. Select the SpO_2 sensor sensitivity level (Masimo technology and Masimo sensors only).
7. Show or hide the Saturation Seconds in the SpO_2 parameter window (Nellcor OxiMax technology and sensor only).
8. Select the response time to Normal or Fast (Nellcor OxiMax technology and sensor only).
9. Set the Saturations Seconds threshold (Nellcor OxiMax technology and sensor only).
10. Adjust the SpO_2 pulse beep tone volume.
11. Select the audio beat source.

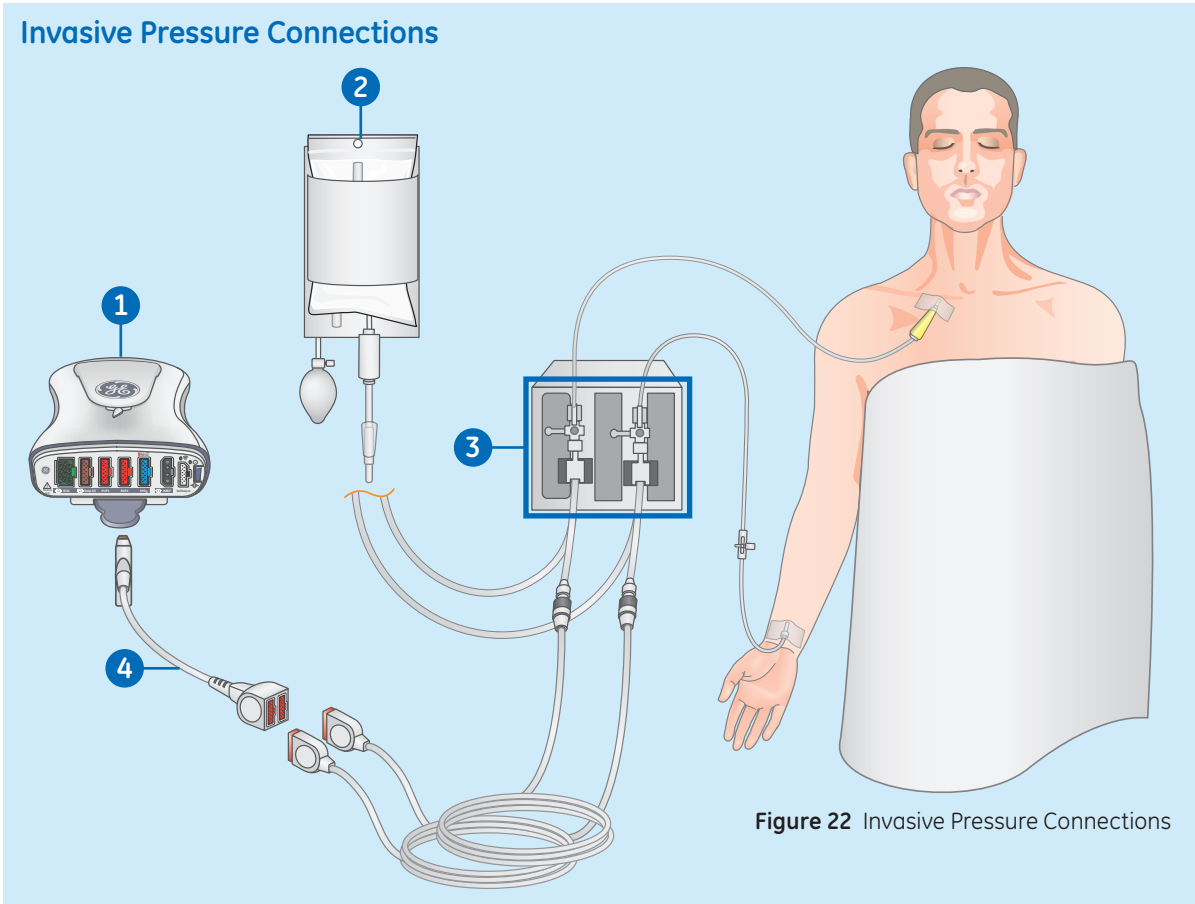


Figure 22 Invasive Pressure Connections

1. Module with invasive pressure measurement capability.
2. Fluid bag with pressure infusor.
3. Transducer setup.
4. Invasive blood pressure adapter cable; single or dual cable (optional).

Zeroing a Transducer

Figure 23 Main Menu

1. Level the transducer following your care unit's policy (usually level of the phlebostatic axis).
2. Close the transducer stopcock to the patient and open the venting stopcock to air.
3. If the pressure line you are trying to zero does not have the transducer open to air, the message "Pressure Senses" displays.
4. You can zero all connected pressure transducers simultaneously by selecting ***Zero All Pressures*** from the monitor's main menu or from the remote control, or you can zero a single active pressure transducer by selecting the invasive pressure parameter window and then selecting ***Setup*** > ***Zero***.
5. Check that a zero reference has been established. Watch the pressure parameter window for messages.
6. Close the venting stopcock to air and open the transducer stopcock to the patient.
7. Check that pressure numerics display on screen.

Selecting an Invasive Pressure Label

1. Select the Invasive Pressure parameter window.
2. Select the ***Setup*** tab.
3. Select a channel label from the ***Label*** list.

Selecting the Size of the Invasive Pressure Waveform

4. Select the ***Invasive Pressure*** parameter window.
5. Select the ***Setup*** tab.
6. Set the waveform scale with the ***Scale*** arrows. The larger the scale value, the smaller the waveform size.

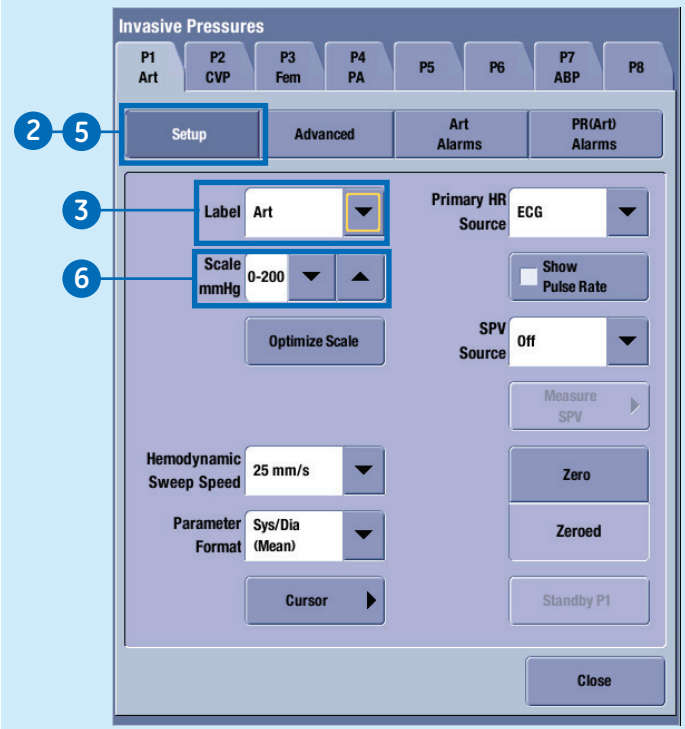


Figure 24 Invasive Pressure Setup Menu

Optimizing the Invasive Pressure Waveform Scale

The algorithm uses the last four seconds of the waveform data to optimize the waveform size. If you notice a considerable change in the waveform during that time, wait for the waveform to stabilize and perform the operation again.

Airway Gas Modules and Connectors

CARESCAPE Respiratory Module

1. Patient Spirometry keys.
2. Water trap release/locking latch.
3. Gas sample, sampling line connector on the water trap.
4. Water trap container.
5. Connectors for Patient Spirometry tubes.
6. Gas exhaust, connector for the gas exhaust line.

E-miniC

Note! *E-miniC is not suitable for use with patients weighing less than 5 kg (11 lbs).*

1. Water trap latch.
2. Sampling line connector.
3. Mini D-fend water trap with a washable container.
4. Sample gas outlet.

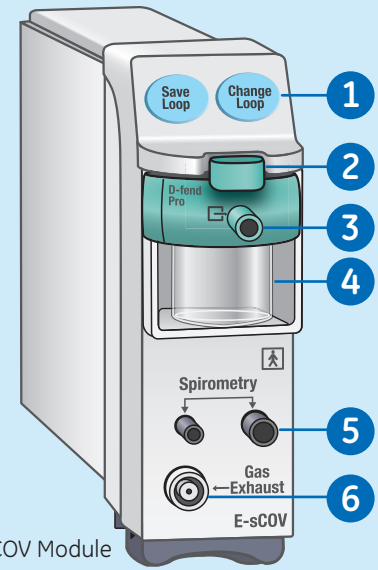


Figure 25 E-sCOV Module

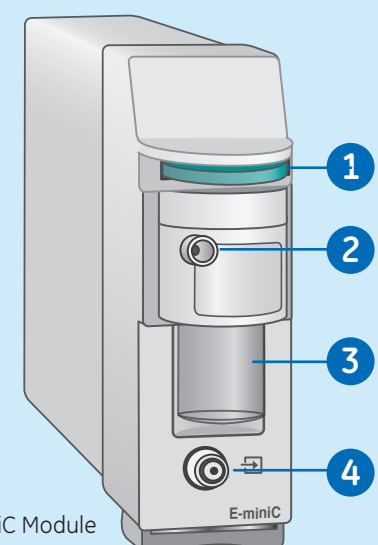


Figure 26 E-miniC Module

Airway Gases Parameters

The airway modules listed below measure the following airway gas parameters:

Parameter	E-sCO	E-sCOV	E-miniC
CO_2	X	X	X
O_2	X	X	
N_2O	X[1]	X[1]	X[2]
Respiration Rate	X	X	X
Patient Spirometry		X	

[1]automatic compensation, the measured N_20 value is not displayed.

[2]automatic compensation, the measured N_20 value is not displayed. E-miniC requires manual selection from the monitor menu to compensate for N_2O.

Setup

Note! *Check that the sample line is connected to the water trap before connecting the module to the monitor or turning on the monitor.*

1. Make sure that the water trap container is empty and properly attached.
2. Connect the gas sampling line to the sampling line connector on the water trap.
3. Connect the sample gas outlet to gas scavenging if N_2O or volatile agents are used.
4. Turn on the monitor or connect the module to the monitor. The monitor performs a self-check for the module when the module is connected. Automatic agent identification is activated in those modules that have this feature.
5. Wait until the message ***Calibrating*** disappears.

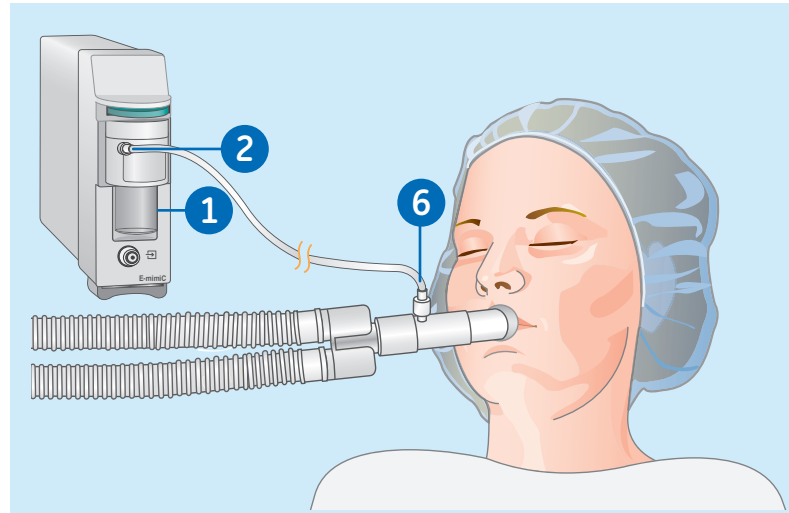


Figure 27 Patient connection with the E-miniC module

6. Connect the sampling line to the airway adapter or the airway adapter to the ventilator circuit. Position the adapter with the sampling port upwards to minimize the amount of condensed water possibly entering the sampling line.
7. Check that the airway adapter connections are tight and that the adapter is operating properly.

Note! *To minimize the amount of dust drawn into the gas sampling system, always keep the water trap connected to the module. When gas measurement is not in use, you can disconnect the module from the monitor to eliminate the operating sound of the gas pump.*

Viewing Numeric Trends

1. Select ***Trends*** from the main menu area at the bottom of the display.

2. Select ***Numeric*** from the View list.
   - To see other parameters, select their tabs in the ***Numeric*** trend view
   - To see more numeric trend data, use the cursor to scroll the data in horizontal direction
   - To change the time internal, select a new value from the ***Time Interval*** list

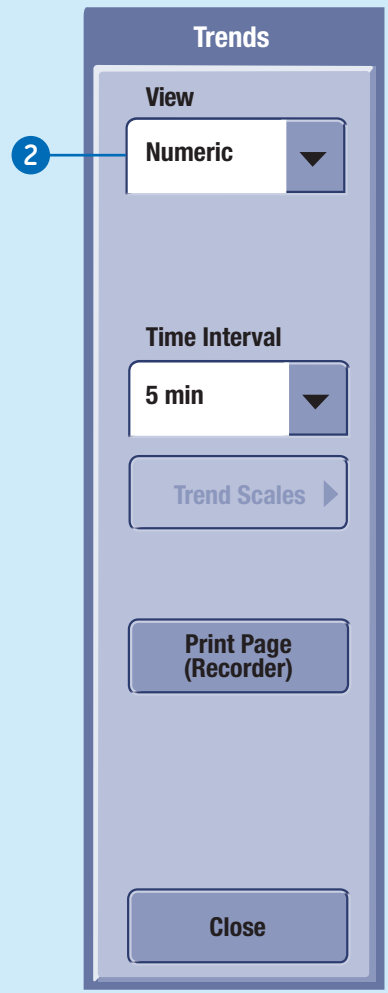


Figure 28
Trends Menu - Numeric

Viewing Graphic Trends

1. Select ***Trends*** from the main menu area at the bottom of the display.

2. Select ***Graphic*** from the ***View*** list.
   - To see more parameters, select tabs 1 to 4.
   - To see numeric values of a certain time, move the cursor to that point of time. The numeric values are displayed next to the cursor.
   - To change the time scale, select a new value from the ***Time Scales*** list.
   - To change the trend scale, select ***Trend Scales*** and make the appropriate adjustment

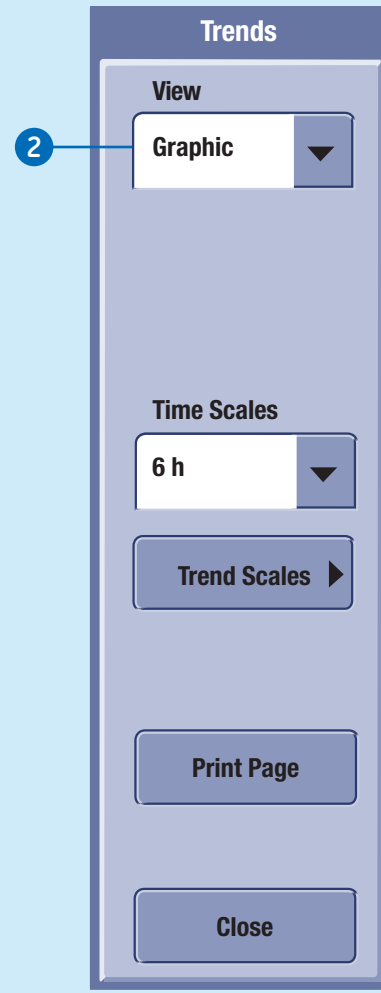


Figure 29
Trends Menu - Graphic

Managing Snapshots

A snapshot is a set of measured data saved from a certain moment of time. Snapshots can contain waveform clips and graphic trends.

Creating Manual Snapshots

You can create a snapshot manually by selecting ***Freeze/ Snapshot*** from the main menu

Freeze/ Snapshot

area at the bottom of the display. The monitor saves the image of pre-configured waveforms or trends at that moment in time. When a snapshot is taken manually, it is automatically numbered.

Creating Automatic Snapshots

You can select alarms that will automatically create a snapshot independent of their alarm priority.

1. Select ***Trends*** from the main menu area at the bottom of the display.

Trends

2. Select ***Snapshot*** from the ***View*** list.
3. Select ***Snapshot Setup***.
4. Select which alarms will automatically create a snapshot.

Viewing Snapshots

1. Select ***Trends*** from the main menu area at the bottom of the display.
2. Select ***Snapshot*** from the View list.
   - To change the Snapshot time scale, select a new value from the ***Time Scale*** list
   - To change the trend scale, select ***Trend Scales*** and make the appropriate adjustment

Figure 30
Trends Menu - Snapshot

Managing Events

Events are timestamps that are shown in their own list. An event is created automatically upon an alarm. An event records the time of and reason for its creation. Some events may also record a snapshot. Manually created events contain only the time and a manually added reason for the event. You cannot configure the Event trend pages.

An event is created automatically from:

- Medium and high priority physiological or technical alarms.
- Low priority alarms that have a snapshot.
- Manually created snapshots or ST snapshots.

Viewing Events

The ***Event*** trend view shows event data on horizontal axis and time on vertical axis. The top of the view shows the highest priority realtime waveform and the bottom of the view shows a sample waveform if an event has a snapshot.

1. Select ***Trends*** from the main menu area at the bottom of the display.
2. Select ***Event*** from the ***View*** list.
   - The ***Priority*** column shows an alarm priority symbol for events created automatically from an alarm.
   - The ***Event*** column shows the reason the event was created for. If the event was created automatically, the alarm message is shown. If the event was created manually, a possible manually added text is shown.
   - If there is a manual annotation added to the event, this text is shown in quotation marks and also includes the prefix ***NOTE***.
   - The Snapshot column shows a snapshot symbol if there is a snapshot attached to an event.

Figure 31
Trends Menu - Event

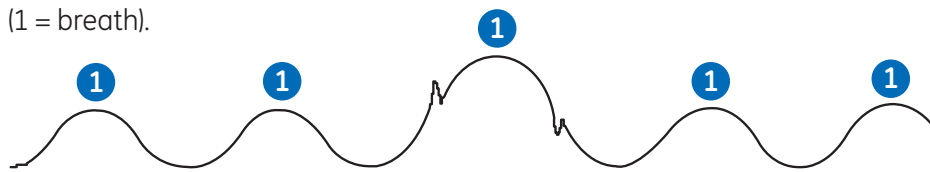
ECG Troubleshooting

Problem	Solution
The monitor is calling V Tach when the patient is not in V Tach.	The monitoring system may be detecting a wider QRS complex or artifact in some of the analyzed ECG waveforms. In addition, the V leads may be exhibiting polarity changes, which may occasionally cause an inaccurate call. **1.** Assess the patient. **2.** Check the ECG signal acquired from the patient. • View all ECG leads to assess the width of the QRS complexes in the analyzed leads. • If artifact exists in any of the analyzed leads, reprep the patient's skin, replace electrodes, and adjust the electrode placement. • It may be beneficial to move V lead electrodes (chest lead) to alternate precordial electrode placements to improve detection. **3.** Relearn arrhythmia. It is important to relearn the patient's ECG pattern any time the electrode configuration is adjusted: • Select the ***HR*** parameter window. • Select the ***Advanced*** tab. • Select ***Relearn QRS***. If the problem continues, determine the lead with the narrowest QRS complex, display that lead, then switch to single lead analysis so all arrhythmia interpretations are based on this single ECG lead.

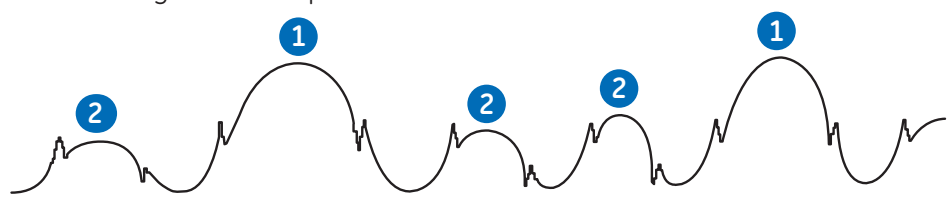
ECG Troubleshooting (continued)

Problem	Solution
ECG signal is noisy or no QRS is detected.	• Ensure that the patient is not shivering. • Select the correct filter by selecting the ***HR parameter window > Advanced > Waveform Filter.*** • Check the electrode quality and positioning. Do not place electrodes on body hair, bones close to skin, layers of fat and major muscles. Pre-gelled electrodes are recommended. • Change the lead in ECG1 to the best available signal and consider using the Single lead mode. • Consider using ***ECG Size > 2x***. • Remove the ECG cable from the module and reinsert it.
The monitor is alarming for asystole, bradycardia, pause, or inaccurate heart rate when a visible QRS waveform is present.	The monitor may not be detecting sufficient QRS amplitude in all analyzed leads. Multiple leads are used for arrhythmia processing. View all ECG leads to assess the amplitude of the QRS complexes. To ensure correct HR readings, a 0.5 mV QRS amplitude is recommended for a normal ECG signal. If the QRS amplitude drops below 0.5 mV or an abnormal QRS width occurs (more than 120 ms), QRS detection may be reduced, leading to false Asystole alarms. Relearn arrhythmia. It is important to relearn the patient's ECG pattern any time the electrode configuration is adjusted: **1.** Select the ***HR*** parameter window. **2.** Select the ***Advanced*** tab. **3.** Select ***Relearn QRS***. If the problem continues, switch to the ECG lead with the greatest amplitude, display that lead, then switch to single lead analysis so all arrhythmia interpretations are based on this single ECG lead.

Respiration Troubleshooting

Problem	Solution
The ECG respiration measurement fails.	• Check electrode quality and positioning. • Adjust the breath detection sensitivity. During ventilator-supported breathing, the respiration calculation may count only ventilator-produced inspirations and expirations. • Other electrical devices may interfere with the measurement.
The waveform has a combination of shallow and deep breaths, but the monitor is not detecting the shallow breaths.	If the detection sensitivity threshold is set too high, shallow breaths will not be detected, as shown in the following example of incorrect detection (1 = breath).  Decrease the detection sensitivity percentage until the markers correctly identify each inspiration and expiration or set to AUTO (PSM). If the detection mode is AUTO, the grid lines represent the minimum limits. The limits in use may be a larger range. The following is an example of correct detection. 

Respiration Troubleshooting (continued)

Problem	Solution
	Respiration detection is not dependent on the size of the waveform. Size is for visual purposes only. The breath detection threshold is too low (1 = breath, 2 = artifact). The following is an example of incorrect detection.  Increase the detection sensitivity percentage until the markers correctly identify each inspiration and expiration. The following is an example of correct detection. 

SpO_2 Troubleshooting

Problem	Solution
SpO_2 signal is poor	• Check the sensor and sensor position. • Make sure the patient is not shivering, moving, or does not have tremors. The patient's pulse may be too low to measure.
Unable to adjust alarm limits	The alarm limits are not adjustable when the measurement source is from an external device connected to the Unity Network ID connectivity device.
Deactivated SpO_2 probe off alarm keeps alarming when the sensor is disconnected from the patient.	Ensure that the sensor is protected from ambient light. Light sources such as surgical lamps, bilirubin lamps, fluorescent lights, infrared heating lamps, and sunlight can cause poor waveform quality and inaccurate readings. Error messages are possible.

NIBP Troubleshooting

Problem	Solution
NIBP measurement does not work or the values seem unstable.	• Check that the cuff tubing is not bent, stretched, compressed, or loose. • Check the cuff position and cuff tube connection. • Prevent motion artifact. • Use NIBP cuffs of correct size.
The mean value displays while the associated systolic and diastolic values display as - - -?	Assess the patient and perform a visual inspection of the equipment to ensure system integrity. The following conditions may cause the mean value to display in the NIBP parameter window while the associated systolic and diastolic values display as - - -: • Very low systolic and diastolic amplitude fluctuations (e.g., patient in shock). • Very small difference between the mean and systolic pressure or the mean and diastolic pressure. • Loss of system integrity (e.g., loose connections or worn parts).

NIBP Troubleshooting *(continued)*

Problem	Solution
The monitor is re-inflating the cuff automatically	The cuff target pressure must be higher than the patient's systolic pressure to obtain an accurate systolic and diastolic measurement. If a systolic blood pressure cannot be found, the monitor searches for a systolic reading by re-inflating the cuff at a higher pressure. This systolic search may occur once per NIBP determination cycle.

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